*DRAFT ENVIRONMENTAL IMPACT REPORT*

# *Vesting Tentative Tract No. 52419*

**County of Los Angeles**
**Los Angeles County Project No. 97-178**

March, 2005

# Draft Environmental Impact Report

**Vesting Tentative Tract No. 52419**
**Triangle Ranch**

County of Los Angeles Project No. 97-178
SCH 1998111091

Tentative Tract No. 52419
Conditional Use Permit
Oak Tree Permit

County of Los Angeles
Department of Regional Planning
320 West Temple Street
Los Angeles, California 90012

March 2005

# TABLE OF CONTENTS


| Section | | | Page |
|---|---|---|---|
| **SUMMARY** | | | S-1 |
| **I.** | **PROJECT DESCRIPTION** | | |
| | A. | OBJECTIVES | I-1 |
| | B. | DISCRETIONARY ACTIONS | I-3 |
| | C. | LOCATION AND BOUNDARIES | I-4 |
| | D. | PROJECT CHARACTERISTICS | I-8 |
| | E. | INTENDED USES OF EIR | I-18 |
| **II.** | **ENVIRONMENTAL SETTING** | | |
| | A. | OVERVIEW OF THE ENVIRONMENTAL SETTING | II-1 |
| | B. | APPLICABLE LOCAL AND REGIONAL PLANS | II-15 |
| | C. | RELATED PROJECTS | II-16 |
| **III.** | **ENVIRONMENTAL IMPACT ANALYSIS** | | |
| | A. | Geotechnical Hazards - Grading | III.A-1 |
| | B. | Geotechnical Hazards - Seismicity | III.B-1 |
| | C. | Air Quality | III.C-1 |
| | D. | Surface Water Runoff/Hydrology | III.D-1 |
| | E. | Water Quality | III.E-1 |
| | F. | Biological Resources | III.F-1 |
| | G. | Cultural Resources - Archaeological | III.G-1 |
| | H. | Noise | III.H-1 |
| | I. | Visual Qualities | III.I-1 |
| | J. | Light and Glare | III.J-1 |
| | K. | Land Use - Community Compatibility | III.K-1 |
| | L. | Traffic and Access | III.L-1 |
| | M. | Public Services | III.M-1 |

**Section** **Page**

1. Fire Protection ..... III.M.1-1
2. Sheriff ..... III.M.2-1
3. Schools ..... III.M.3-1
4. Libraries ..... III.M.4-1
5. Parks and Recreation ..... III.M.5-1

N. Utilities

1. Water ..... III.N.1-1
2. Sewerage ..... III.N.2-1
3. Solid Waste and Disposal ..... III.N.3-1

P. Energy Conservation

1. Electricity ..... III.P.1-1
2. Natural Gas ..... III.P.2-1

**IV. GENERAL IMPACT CATEGORIES**

A. Summary of Significant Unavoidable Impacts ..... IV-1
B. Growth Inducing Impacts of the Proposed Project ..... IV-1
C. Impacts Found to Be Less Than Significant ..... IV-3

**V. ALTERNATIVES TO THE PROPOSED PROJECT**

Alternative No. 1: No Project ..... V-8
Alternative No. 2: Large Lot Design ..... V-11
Alternative No. 3: Alternate Site Plan ..... V-23
Alternative No. 4: SEA Sensitive Site Plan ..... V-36
Alternative No. 5: Sensitive Species Avoidance Site Plan ..... V-50
Environmentally Superior Alternative ..... V-65

**VI. ORGANIZATIONS AND PERSONS CONSULTED** ..... VI-1

**VII. REFERENCES** ..... VII-1

**Section**

**VIII.**

A. Initial Study

B. Notice of Preparation and Responses

C. Inter-Departmental Review Comments

D. SEATAC Minutes

**TECHNICAL APPENDICES**

A. Geotechnical Reports

B. Air Quality Model Output

C. Biological Resources Background Materials

D. Traffic Report

E. Drainage Concept Plan

F. Noise Analysis

G. Water Quality

H. Preliminary Water System Design Report

# LIST OF FIGURES


| Figure | | Page |
|---|---|---|
| I-1 | Regional Map | I-5 |
| I-2 | Vicinity Map | I-6 |
| I-3 | Surrounding Vicinity Aerial Photograph | I-7 |
| I-4 | Proposed Site Plan | I-9 |
| I-5 | Tentative Tract Map | I-10 |
| I-6 | Tentative Tract Map Detail | I-11 |
| I-7 | Landscape Concept Plan | I-15 |
| II-1 | Photograph Location Map | II-2 |
| II-2 | Photographs A and B | II-3 |
| II-3 | Photographs C and D | II-4 |
| II-4 | Photographs E and F | II-5 |
| II-5 | Photographs G | II-6 |
| II-6 | Open Space Reserves and Proposed Acquisition Areas | II-8 |
| II-7 | Site Topography | II-12 |
| II-8 | Site Drainage | II-13 |
| II-9 | Subject Property and SEA #6 | II-14 |
| II-10 | Related Projects Map | II-20 |
| III.A-1A | Geotechnical Map - Westerly Portion | III-A-3 |
| III.A-1B | Geotechnical Map - Easterly Portion | III.A-4 |
| III.A-2A | Grading Plan - Westerly Portion | III-A-10 |
| III.A-2B | Grading Plan - Easterly Portion | III.A-11 |
| III.A-3 | Cut and Fill Map | III.A-12 |
| III.D-1 | Greater Medea Creek Watershed | III.D-2 |
| III.D-2 | Hydrology Map of Existing Conditions | III.D-3 |
| III.D-3 | Drainage Concept Plan | III.D-12 |
| III.D-4 | Hydrology Map of Proposed Development | III.D-13 |

## LIST OF FIGURES (CONT.)


| Figure | | Page |
|---|---|---|
| III.E-1 | Ventura Central Groundwater Basins | III.E-12 |
| III.F-1. | Jurisdictional Drainages | III.F-7 |
| III.F-2 | Vegetation Communities | III.F-21 |
| III.F-3. | Sensitive Species Location Map | III.F-30 |
| III.F-4 | Project Impact Map: Vegetation Communities | III.F-37 |
| III.F-5 | Project Impact Map: Sensitive Species | III.F-38 |
| III.F-6 | Project Impact Map: Jurisdictional Drainages | III.F-42 |
| III.H-1 | Noise Monitoring Locations | III.H-3 |
| III.H-2 | Typical Construction Equipment Noise Generation Levels | III.H-9 |
| III.I-1 | Photograph Location Map | III.I-2 |
| III.I-2 | Photographs H and I | III.I-3 |
| III.I-3 | Photographs J and K | III.I-4 |
| III.I-4 | Photographs L and M | III.I-5 |
| III.I-5 | Landscape Sections A-A and B-B | III.I-12 |
| III.I-6 | Landscape Section C-C | III.I-13 |
| III.I-7 | View Simulation 1 | III.I-17 |
| III.I-8 | View Simulation 2 | III.I-18 |
| III.I-9 | View Simulation 3 | III.I-19 |
| III.I-10 | View Simulation 4 | III.I-20 |
| III.I-11 | View Simulation 5 | III.I-21 |
| III.I-12 | View Analysis Map | III.I-23 |
| III.I-13 | View Analysis Profiles 1 and 2 | III.I-24 |
| III.I-14 | View Analysis Profiles 3 and 4 | III.I-25 |
| III.I-15 | Crib Wall Plan | III.I-28 |
| III.I-16 | Crib Wall Design Concept | III.I-29 |
| III.J-1 | Existing Street Lighting | III.J-2 |
| III.J-2 | Standard Street Light Layout Plan | III.J-5 |
| III.J-3 | Lighting Mitigation Plan | III.J-12 |
| III.K-1 | Los Angeles County General Plan | III.K-2 |

## LIST OF FIGURES (CONT.)


| Figure | | Page |
|---|---|---|
| III.K-2 | Santa Monica Mountains North Area Plan | III.K-5 |
| III.K-3 | Existing Zoning | III.K-6 |
| III.L-1 | Existing Lane Configurations | III.L-5 |
| III.L-2 | Existing Daily and Peak Hour Traffic Volumes | III.L-8 |
| III.L-3 | Proposed Project Trip Distribution | III.L-16 |
| III.L-4 | Proposed Project Traffic Volumes | III.L-17 |
| III.L-5 | Existing Plus Growth Traffic Volumes | III.L-18 |
| III.L-6 | Existing Plus Growth Plus Proposed Project Traffic Volumes | III.L-20 |
| III.L-7 | Kanan Road Interchange Project | III.L-22 |
| III.L-8 | Related Projects Location Map | III.L-25 |
| III.L-9 | Related Projects Traffic Volumes | III.L-26 |
| III.L-10 | Cumulative Conditions | III.L-28 |
| III.M.1-1 | Fuel Modification Plan | III.M.1-8 |
| III.M.1-2 | Fuel Modification Zones Cross-Section | III.M.1-9 |
| III.N.1-1 | Water Plan | III.N.1-4 |
| III.N.2-1 | Sewer Plan | III.N.2-2 |
| V-1 | Alternative 2 | V-12 |
| V-2 | Alternative 3 | V-24 |
| V-3 | Alternative 4 | V-37 |
| V-4 | Alternative 5 | V-51 |

# LIST OF TABLES


| Table | | Page |
|---|---|---|
| II-1 | Related Projects List | II-18 |
| III.B-1 | Maximum Credible/Probable Earthquakes | III.B-3 |
| III.C-1 | Ambient Air Quality Standards | III.C-3 |
| III.C-2 | West San Fernando Valley Ambient Air Quality Monitoring Summary | III.C-4 |
| III.C-3 | Current Attainment Designations for the Los Angeles County | III.C-5 |
| III.C-4 | Construction-Related Dust Impacts | III.C-11 |
| III.C-5 | Construction Activity Emissions | III.C-13 |
| III.C-6 | Project Operations Air Pollution Emissions | III.C-15 |
| III.C-7 | Microscale Impact Assessment | III.C-16 |
| III.D-1 | Summary of Existing and Proposed Hydrologic Conditions | III.D-5 |
| III.E-1 | Beneficial Uses of Inland Surface Waters in Malibu Creek Watershed | III.E-4 |
| III.E-2 | Major Sources of Nutrients in the Malibu Creek Watershed | III.E-7 |
| III.E-3 | Sources of Bacteria in the Lower Medea Creek Watershed | III.E-9 |
| III.E-4 | Median Event Mean Concentrations Residential Land Uses | III.E-18 |
| III.F-1 | Summary of Jurisdictional Areas | III-F-7 |
| III.F-2 | Sensitive Floral Species | III.F-21 |
| III.F-3 | Sensitive Faunal Species | III.F-31 |
| III.H-1. | Short-Term Baseline Noise Monitoring Results | III.H-4 |
| III.H-2 | Noise Measurements Versus Model Calibration | III.H-5 |
| III.H-3 | Peak Construction Equipment Noise Levels | III.H-10 |
| III.H-4. | Traffic Noise Impact Analysis (CNEL in dBA at 100 Feet) | III.H-12 |
| III.H-5 | Traffic Noise Impact Analysis (Distance in Feet to 65 dB CNEL) Acoustically "Soft" Conditions | III.H-13 |
| III.H-6 | Traffic Noise Impact Analysis (Distance in Feet to 65 dB CNEL) Acoustically "Hard" Conditions | III.H-13 |
| III.H-7 | Usable Exterior Space Noise Impact Analysis | III.H-14 |
| III.H-8 | Structural Noise Mitigation | III.H-15 |

## LIST OF TABLES (CONT.)


| Table | | Page |
|---|---|---|
| III.H-9 | Interior Noise Compliance Mitigation Analysis | III.H-16 |
| III.K-1 | Santa Monica Mountains North Area Plan Consistency Analysis | III.K-13 |
| III.L-1 | Intersection/Roadway Segment Summary | III.L-2 |
| III.L-2 | Summary of Two-Lane Roadway Operation | III.L-9 |
| III.L-3 | Summary of Intersection Operation | III.L-10 |
| III.L-4 | Summary of Highway Accident History | III.L-12 |
| III.L-5 | Summary of Speed Data | III.L-13 |
| III.L-6 | Summary of Project Trip Generation | II.L-14 |
| III.L-7 | Related Projects List | III.L-23 |
| III.L-8 | Summary of Cumulative Conditions at the Kanan-US 101 Interchange | III-L-27 |
| III.L-9 | Summary of Intersection Operations Cumulative Conditions With and Without Mitigation | III.L-31 |
| III.M.1-1 | Fire Stations Serving Project Area | III.M.1-2 |
| III.M.2-1 | Sheriff's Response Times | III.M.2-2 |
| III.M.3-1 | Current School Enrollments/Capacities | III.M.3-1 |
| III.M.3-2 | Project Student Generation | III.M.3-3 |
| III.M.3-3 | School Capacities With Project | III.M.3-3 |
| III.M.4-1 | Library Facilities Serving the Proposed Project Site | III.M.4-1 |
| III.M.5-1 | Parks and Recreation Facilities in the City of Agoura Hills | III.M.5-2 |
| III.N.1-1 | Project Water Consumption | III.N.1-8 |
| III.N.1-2 | Development Monitoring System Cumulative LVMWD Water Supply Analysis | III.N.1-10 |
| III.N.2-1 | Project Sewage Generation | III.N.2-5 |
| III.N.2-2 | Development Monitoring System LVMWD Sewage Treatment Capacity Analysis | III.N.2-6 |
| III.N.3-1 | Project/Cumulative Solid Waste Generation | III.N.3-5 |
| III.P.1-1 | Cumulative Daily Electricity Consumption | III.P.1-3 |
| III.P.2-1 | Cumulative Natural Gas Consumption | III.P.2-4 |
| V-1 | Alternative 4 – Comparative Landform Grading | V-38 |

## LIST OF TABLES (CONT.)

| Table | | Page |
|---|---|---|
| V-3 | Alternative 5 – Comparative Landform Grading | V-52 |
| V-4 | Alternatives Comparison | V-63 |

# I. PROJECT DESCRIPTION

## A. OBJECTIVES

The primary objective of the County of Los Angeles is to implement the North Area Plan (Plan). The Plan provides a focused policy for the regulation of development within the North Area Plan area portion of the Santa Monica Mountains. Overall, the emphasis of this policy is:

> *"...to maximize preservation of the area's natural environment, recognize the opportunities and constraints that the land imposes, accommodate new uses that minimize impacts on the natural environment, and ensure that new development is compatible with and enhances the quality of existing communities, and provide for a wide range of public and private recreational opportunities."*

Specific objectives of the North Area Plan are:

- To maintain the continuation of existing settlement patterns, especially the more remote rural enclaves, embracing the area's rural and semi-rural character.
- To protect natural environments especially sensitive flora and fauna biological habitats. A major contributing factor to this is surface and underground water quality which may be affected by alterations to watersheds (in particular Malibu Creek and other key watersheds).
- To protect areas of scenic beauty and natural open space.
- To preserve undisturbed terrain in its natural state, not only to preserve natural environmental features, but also to protect resident's health and safety within developed lands. This is to be achieved through consciously choosing to protect the natural terrain in its natural state over allowing development projects to proceed simply because impacts can be mitigated.

The County of Los Angeles has identified the following "design concepts" as its specific objectives for the proposed project:

- To create a semi-rural residential community by minimizing or avoiding street lighting and construction of sidewalks, curbs, and gutters.
- To concentrate development along the existing Kanan and Cornell Roads and to be in proximity to existing infrastructure and services.
- To design lots and roadways to avoid ridgelines.

- To locate the majority of the development on the gentler slopes.

The project applicant's primary objective is to achieve a profitable economic return on its property investment. To achieve this objective, the applicant proposes to subdivide the predominantly vacant 320.3-acre site and to create a "high-end" single-family residential development that is marketable, aesthetically attractive, environmentally sensitive, and financially feasible. More specifically, it is the applicant's objective to develop 81 single-family residences within a development envelope of approximately 48.6 acres. The remaining portion of the project site will be permanently preserved as open space.

To achieve this broad development objective, the applicant has identified the following specific objectives:

- To create a semi-rural "clustered" residential community (that avoids the appearance of a "tract" development);

- To minimize grading disturbance and human and domestic animal intrusions into the majority of the project site;

- To preserve to the greatest extent possible the natural character of the site and the surrounding environment. To this end the project seeks:

  - To preserve approximately 271.7 acres of permanent open space, or 84 percent of the project site.

  - To concentrate development on the least environmentally sensitive portions of the property, while preserving in perpetuity the more sensitive resources.

  - To preserve the area's semi-rural ambiance by maintaining development setbacks from public roadways, minimizing or avoiding street lighting, and avoiding construction of sidewalks, curbs, and gutters;

  - To preserve as many coast live oaks and other sensitive plant species, such as the Lyon's pentachaeta, as possible;

  - To landscape the development area primarily with native vegetation and local building materials.

- To site and design the proposed development to protect significant scenic vistas and features. In particular the plan seeks to preserve views of Ladyface Mountain and major ridgelines by:

  - Siting lots and roadways to avoid breaking ridgeline views; and

- ➢ Concentrating development in previously disturbed areas;

- To minimize grading by concentrating development on the gentler slopes;

- To provide high-quality housing for local and area residents to meet existing and future needs of those desiring to live in the Santa Monica Mountains and to help alleviate the severe housing shortage in the greater Los Angeles region.

- To locate the residential development in proximity to existing infrastructure and services; and,

- To develop the site in conformance with the goals and policies of the Los Angeles County General Plan, the Santa Monica Mountains North Area Plan, and to the extent possible, the General Plan of the City of Agoura Hills.

## B. DISCRETIONARY ACTIONS

In order to meet these objectives, the applicant seeks approval of the following discretionary actions from the County of Los Angeles:

1) Subdivision Map (Vesting Tentative Tract No. 52419) - to establish residential and open space lot lines, and required improvements;

2) Conditional Use Permit– to implement a development within an SEA; to grade in excess of 100,000 cubic yards of earth materials; and to allow for a Density Controlled Development which allows the concentration of dwelling units on a portion of the project site while retaining the remaining portions of the project site (with the exception of infrastructure) in permanent open space.

3) Oak Tree Permit – to remove 18 oak trees, encroach into the protected zone of 17 oak trees.

4) Any other necessary discretionary or ministerial permits or approvals as may be required for the construction of the proposed project. Such approvals may include, but are not limited to: landscaping, permit approvals for grading, approvals for foundations, retaining walls, and structural improvements; installation and hookup approvals for public utilities and related permits.

In addition, subsequent to County approval of these entitlements, the following additional agency approvals may need to be obtained:

5) Section 404 Permit – to alter stream courses and/or wetlands (i.e., Waters of the U.S.) pursuant to provisions of the Clean Water Act, to be obtained from the U.S. Army Corps of

Engineers;

6) Department of Fish and Game Section 1603 Agreement – to implement streambed alterations;

7) Department of Fish and Game Memorandum of Understanding (MOU) – to implement the Management Plan for the Lyon's pentachaeta;

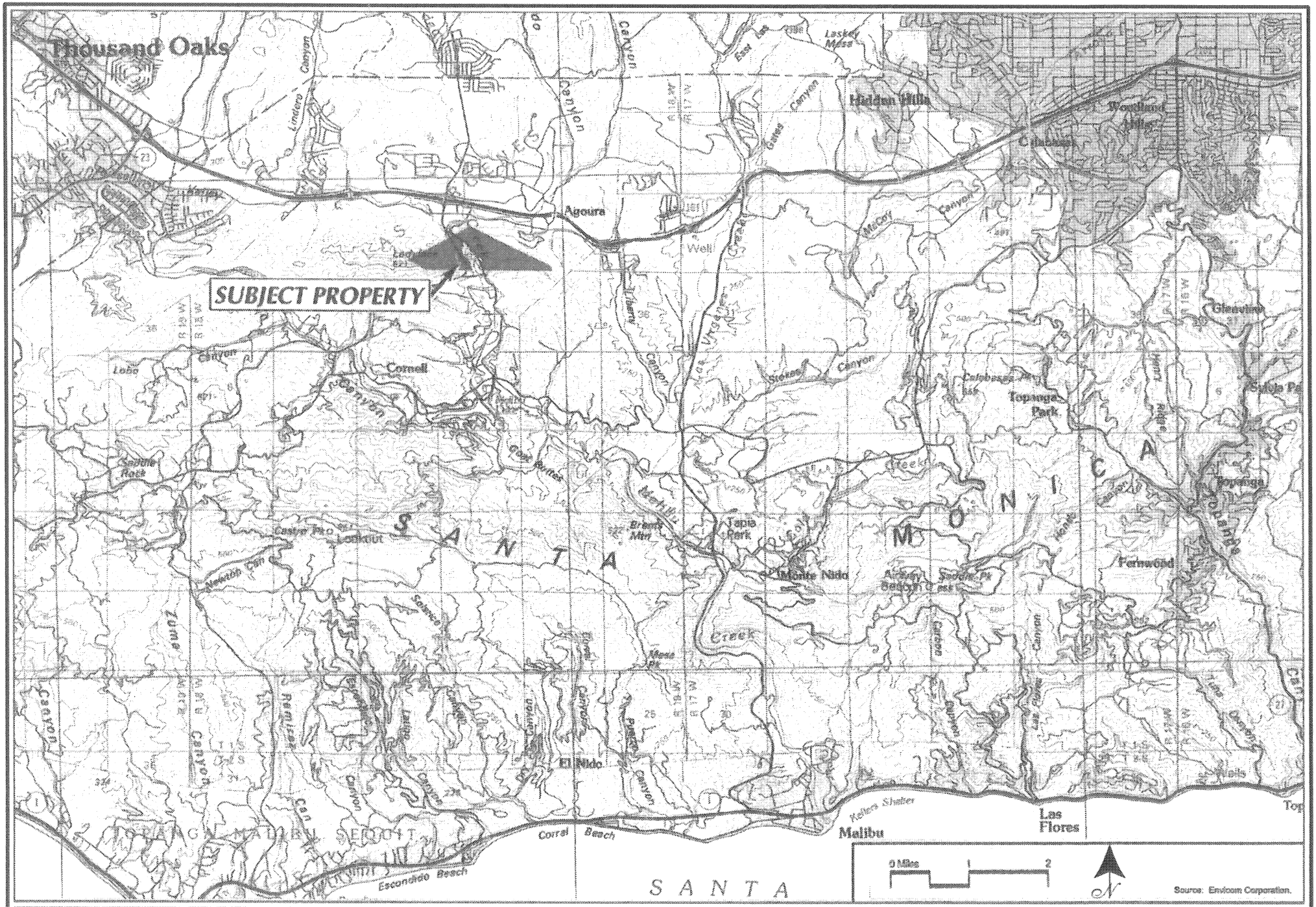
8) National Pollutants Discharge Elimination System (NPDES) Permit - to regulate stormwater discharges issued by the Regional Water Quality Control Board;

9) Section 401 Water Quality Certification - required from the Regional Water Quality Control Board in conjunction with the issuance of an Army Corps of Engineers' Section 404 Permit

10) US Fish and Wildlife Service ESA Section 9 Consultation and Agreement – for incidental take of Federally-listed Lyon's pentachaeta and Santa Monica Mountains dudleya

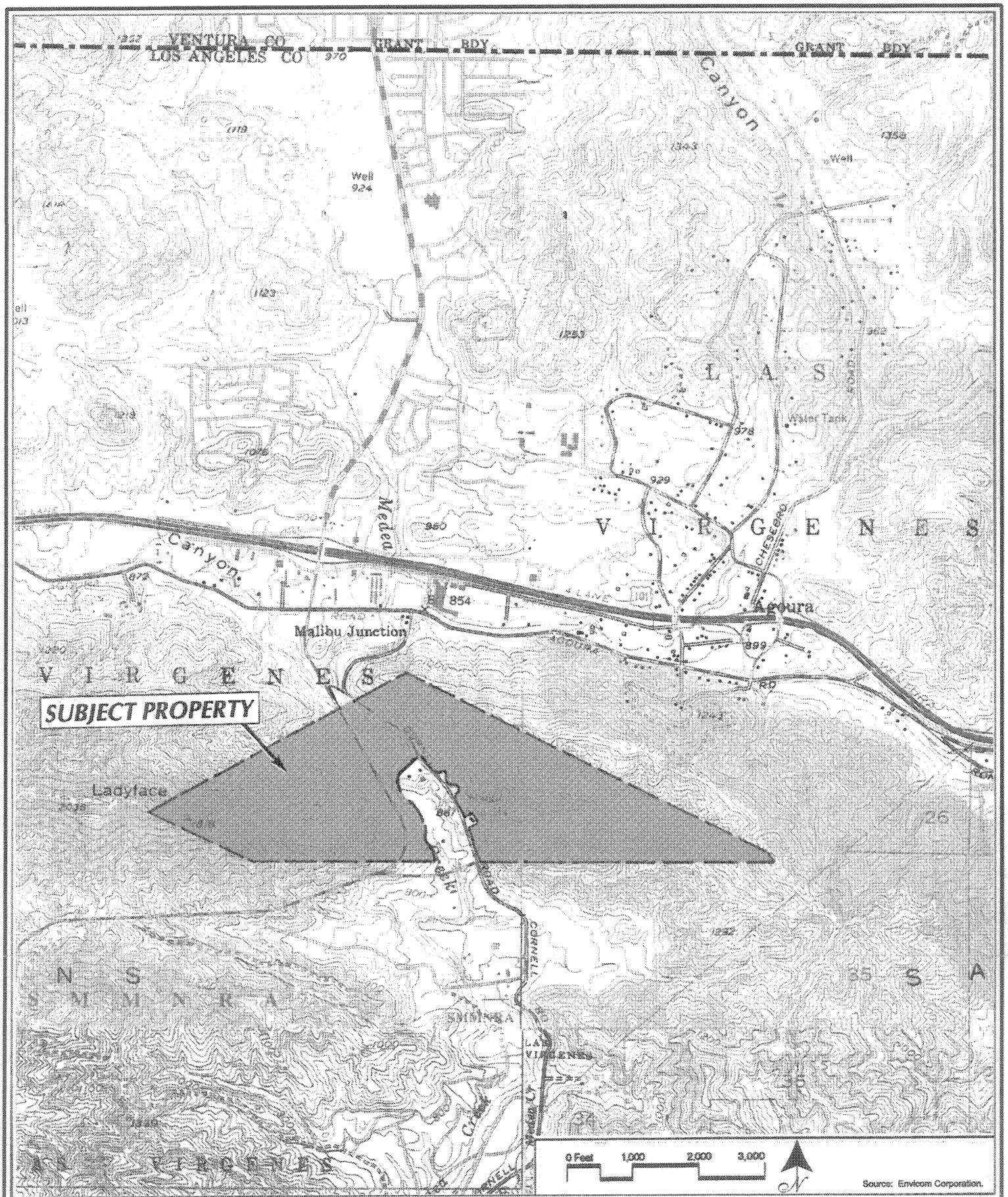
## C. LOCATION AND BOUNDARIES

The 320.3-acre project site is located in the western Santa Monica Mountains in an unincorporated portion of Los Angeles County, adjacent to and south of the City of Agoura Hills. The project site is approximately one-quarter mile south of U.S. 101 (Ventura Freeway). It is bordered on the north by the City of Agoura Hills, and by vacant land to the east and the west. Land to the south is developed with single-family residential and estates concentrated along the Kanan Road and Cornell Road corridors. Kanan and Cornell Roads run generally north/south through the center of the site, dividing the ownership into three parcels. For a generalized site location, see Figure I-1, Regional Map, and also Figure I-2, Vicinity Map. Figure I-3, Surrounding Vicinity, is an aerial photograph showing the project site in relationship to existing development in the area.



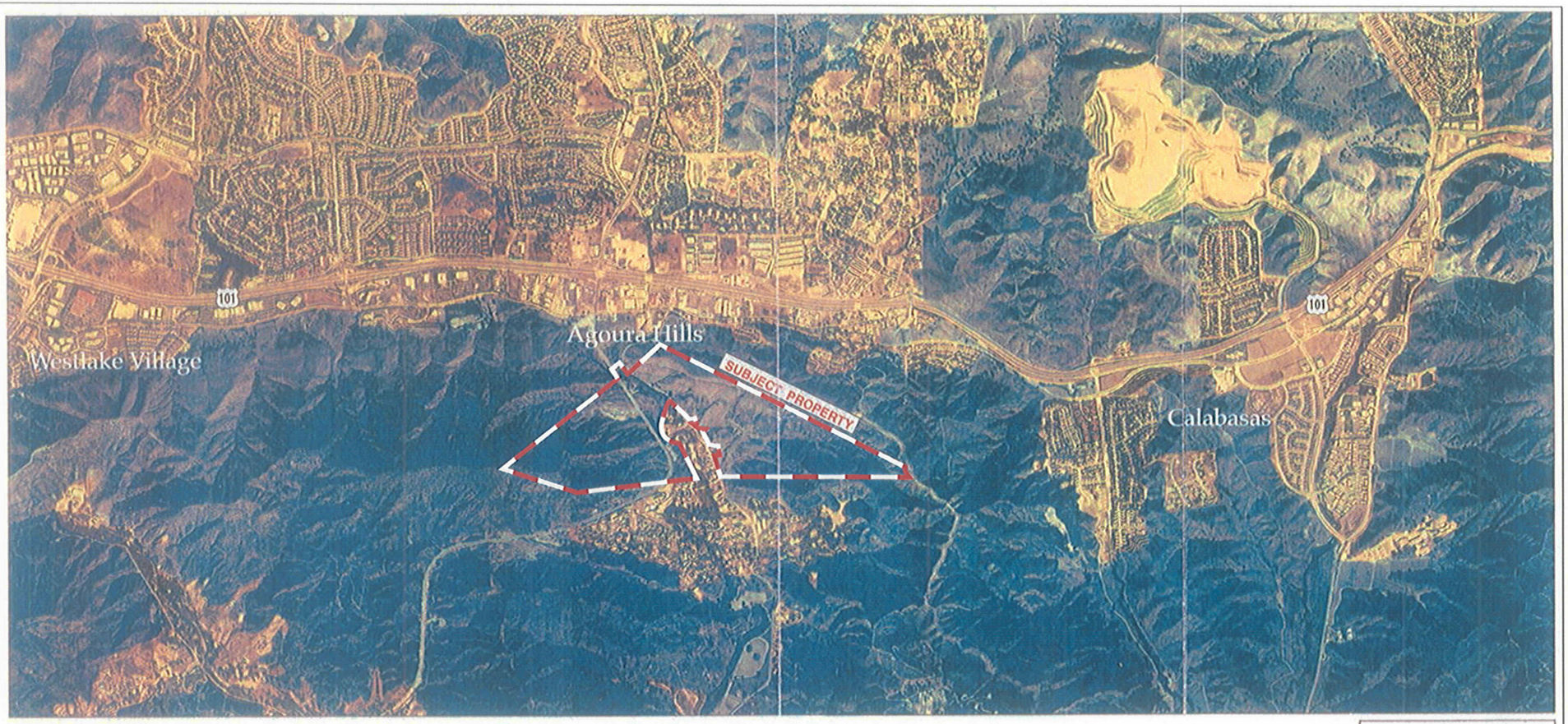

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure I-1
Regional Map




CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure I-2
Vicinity Map




CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure I-3
Surrounding Vicnity Aerial Photograph

## D. PROJECT CHARACTERISTICS

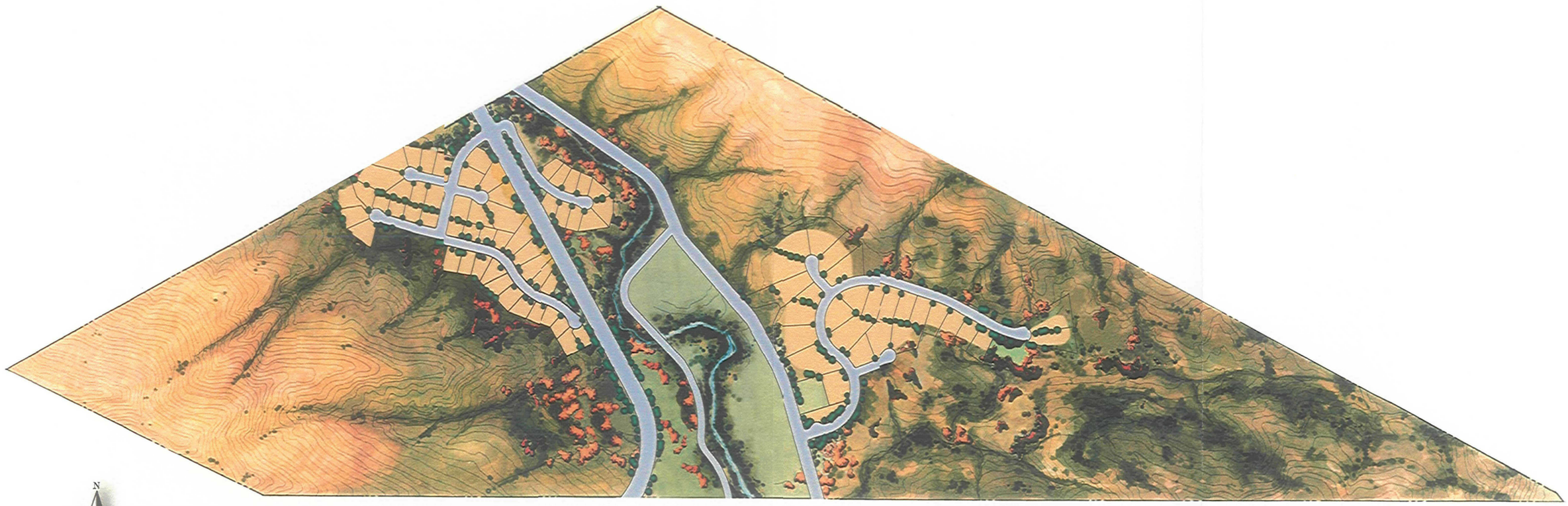
The project consists of the subdivision of the 320.3-acre project site into 81 single-family residential lots, 4 landscape lots, and 5 open space lots. Proposed development would occupy approximately 48.6 acres of the project site; and the remaining 271.7 acre portion of the site (or approximately 84 percent of the site) would be retained as open space to be maintained by the homeowners' association and/or dedicated to a public agency acceptable to the County of Los Angeles. Site development, as proposed by the project applicant, consists of grading for building pad sites, access, and other necessary improvements; construction of residences, storm drainage facilities, and access improvements; installation of utilities (e.g. water lines, fire hydrants, and sewers); and the landscaping of common slope areas.[1] See Figure I-4, Proposed Site Plan. Figure I-5, Tentative Tract Map, indicates the relationship of the project's proposed development areas to the entire ownership. Figure I-6, Tract Map Detail, provides greater project detail than is discernible in Figure I-5.

Basically, the project would consist of two "product" lines, with Cornell Road as the boundary between them. The development to the east of Cornell Road is proposed to be a private community with a security gate at the Street "E" entrance. Proposed residences in this area would be on large, custom lots. Lot sizes would range from approximately 21,858 to 70,654 square feet, while building pads would range from approximately 9,725 to 20,770 square feet. By County ordinance[2] there would be no sidewalks, curbs, or gutters east of Cornell Road, and street lighting would be kept to the minimum required for safety purposes. Custom home construction, if any, would occur east of Cornell Road. The project applicant does not propose street lights on Cornell Road in order to preserve rural standards.

---

2 *As currently envisioned, all residences and required improvements will be constructed by the project applicant/developer. However, because of the uncertainties surrounding future market conditions, the applicant retains the option to sell portions of the approved project site to another developer(s). Nevertheless, it is the applicant's intention to retain management oversight of any development on the project site, regardless of the ultimate home builder, in order to ensure quality control and adherence to the guiding project objectives and conditions of approval. Additionally, while it is the applicant's intention to develop all of the proposed residences, some lots may ultimately be sold to individuals wishing to build custom homes.*

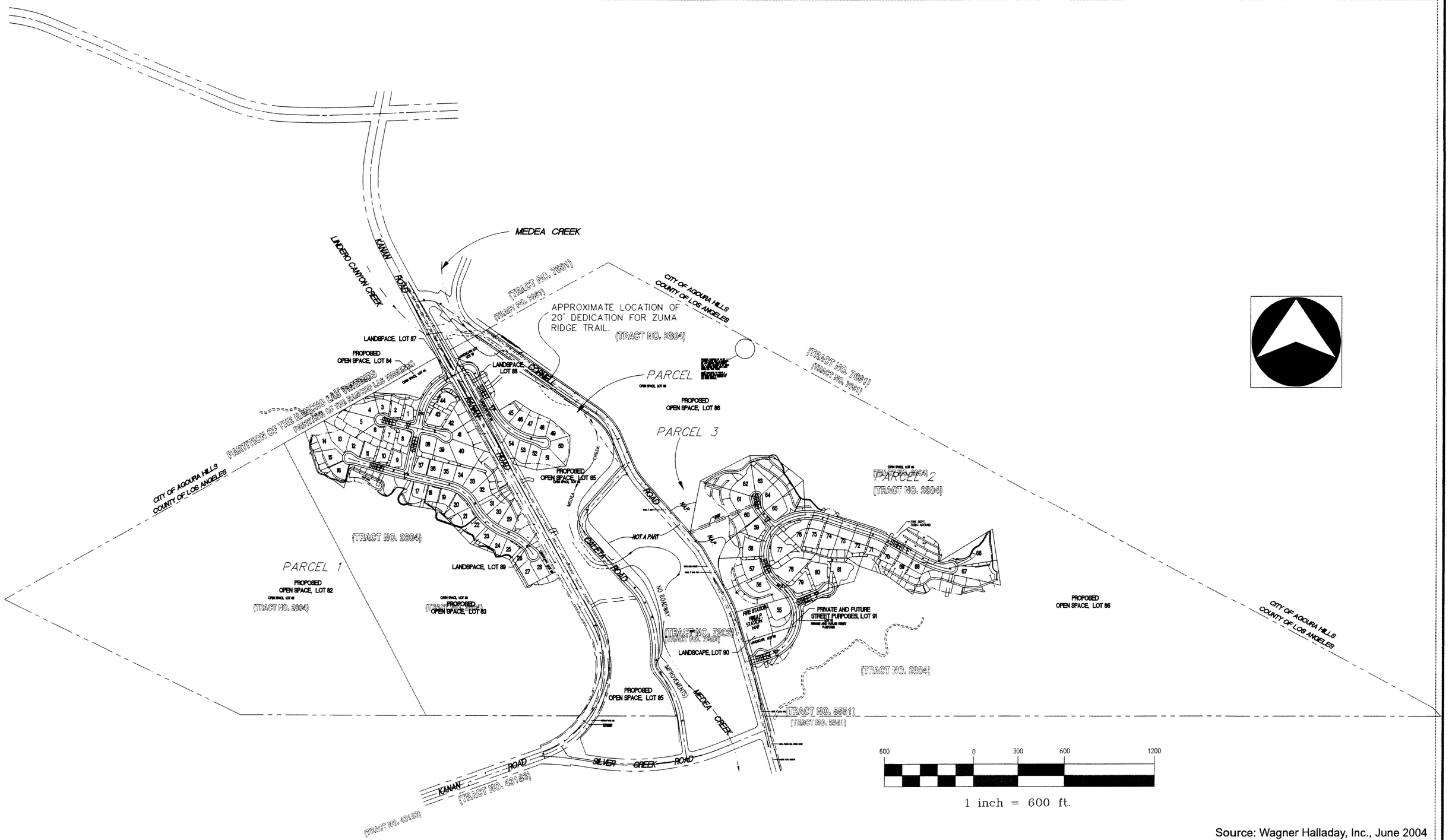
3 *Los Angeles County Subdivision Ordinance Section 21.32.070 for roads, Section 21.32.190 for sidewalks, and Section 21.32.140 for street lighting.*




Source: dizin Landscape Architects, May 2004.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

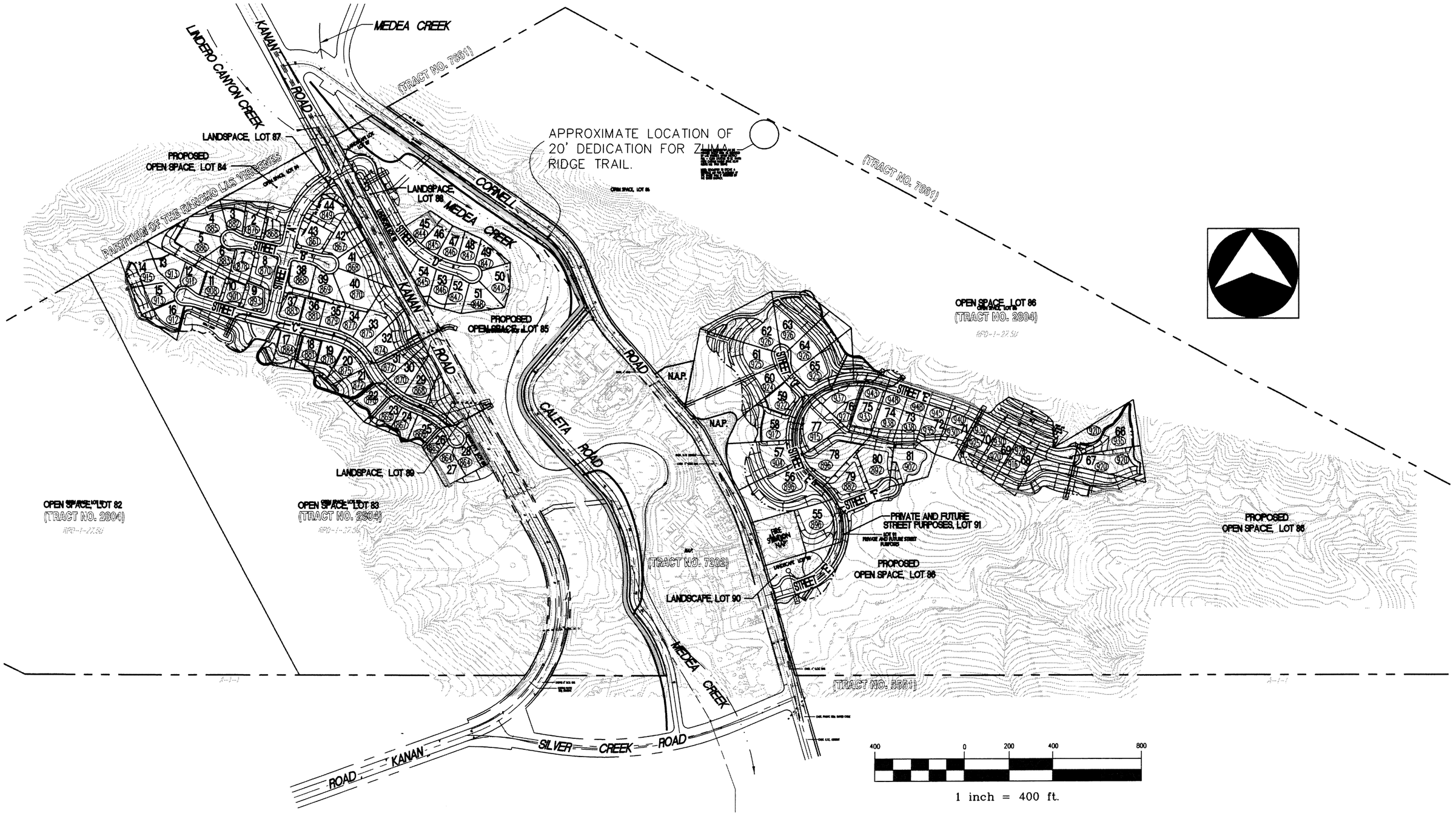
Figure I-4
Site Plan




Source: Wagner Halladay, Inc., June 2004

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure I-5
Tentative Tract Map




Source: Wagner Halladay, Inc., June 2004

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure I-6
Tentative Tract Map Detail

Proposed residential enclaves to the west of Cornell Road are proposed to be developed in accord with Los Angeles County Subdivision Code requirements for developments where any lot area is less than 20,000 square feet. Lot sizes in this area would range from approximately 10,020 to 33,977 square feet, while building pads would range from approximately 6,200 to 21,545 square feet. In this area, due to the smaller average lot size, standard subdivision requirements would normally include the provision of streetlights, sidewalks, curbs and gutters.

**Design Concept**

To create a semi-rural residential community that avoids the appearance of a "tract" development, the project proposes to construct curvilinear roads that follow site topography. Proposed residential lots within view of public roadways and nearby residences have been sited to minimize straight rows of houses. Also, the large building pads and lots are proposed to avoid the common tract appearance of large houses squeezed onto small lots. To preserve the existing semi-rural and rural character of Kanan Road and Cornell Road, the project maintains a minimum setback of 50 feet from the future right-of-way for all but three residential lots along those roadways. In addition, street lighting and construction of sidewalks, curbs, and gutters will be minimized or totally avoided. To reduce grading the majority of development will be located on the gentler slopes and lots and roadways will be designed to avoid ridgelines.

The project utilizes retaining walls where grading occurs in areas of steep natural terrain. Where retaining walls are necessary, crib walls are used and will be vegetated to minimize impacts.

Proposed development has been designed in order to minimize landform alternations and maximize open space. The concentration of residences in enclaves also permits the project design to partially avoid the most sensitive resources on the project site, such as Lyon's pentachaeta and coast live oaks. Of the 136 oak trees on and or/adjacent to the project site, the project would retain 116 trees, or 85 percent. Also, where County of Los Angeles Fire Department required fuel modification zones may conflict with sensitive resources, individual lots have been sited to minimize impacts to nearby sensitive native plant species.

The proposed project would be landscaped almost exclusively with native plant species and local building materials (e.g. local stone for entrance monuments, etc.) in order to blend the development area with the natural character of the site and the surrounding environment. Entrances to each project enclave, in particular, would receive enhanced landscape treatment emphasizing the use of native plants. For example, entrance landscaping to the enclave east of Cornell Road would use riparian species, reflective of the existing vegetation along the nearby drainage course (Drainage B). While west of Kanan Road, the entrance would feature the use of native grasses and oak trees. Proposed landscaping is subject to review and approval by the Los Angeles County Departments of Regional Planning and Public Works.

A homeowners' association would be established for the proposed project. Its primary responsibilities would be the maintenance of private roads, security gates, drainage improvements, and common open space and recreational amenities. The project developer would be responsible for these functions until the homeowners' association can be established.

**Grading**

Site grading is required to prepare the proposed home building sites for future construction. Grading is also an initial step before construction of private roads and driveways, drainage improvements, and installation of utilities. Site preparation plans propose the use of conventional cut and fill contoured grading techniques, as well as the construction of crib-type retaining walls. For the most part, proposed residences would be developed on the flatter portions of the site bordering Kanan and Cornell Roads. In total, 48.6 acres (15.2 percent of the project site) would be altered by the proposed grading plan. Of this total area, approximately 10.2 acres have previously been disturbed by earlier activities. Therefore, the project's grading plan would disturb only 38.4 acres of previously undisturbed natural areas.

In terms of earth movement volume, the grading plan requires the excavation of 498,421 cubic yards of earth, to be balanced onsite. In addition, artificial fill exists on the project site, particularly in the northwestern portion of the property, which must be removed and recompacted (i.e. remedial grading). No off-site export or import of fill material is expected.

The grading plan has been designed around the following criteria:

- To minimize grading by concentrating development on the gentler slopes and, to the extent possible, on previously disturbed portions of the property;
- In steeper terrain, to utilize split-level pads to minimize grading;
- To cluster proposed development in order to maximize open space and to avoid, to the extend feasible, sensitive environmental resources, on-site wildlife corridors and habitat linkages with adjacent open spaces;
- To employ contour grading techniques (i.e. variable slope grades and undulating "daylight" elevations) to minimize the alteration of natural landforms and smoothly transition manufactured slopes back into the natural contours of adjacent undisturbed areas.
- To site and design the proposed development to protect significance scenic vistas and, where feasible, to avoid breaking ridgeline views.

**Open Space**

The project proposes the retention of approximately 271.7 acres of open space (approximately 84 percent of the site) in five open space lots and in four commonly owned landscaped lots (i.e., 2.0 acres). See Figure I-6, Tentative Tract Map Detail.

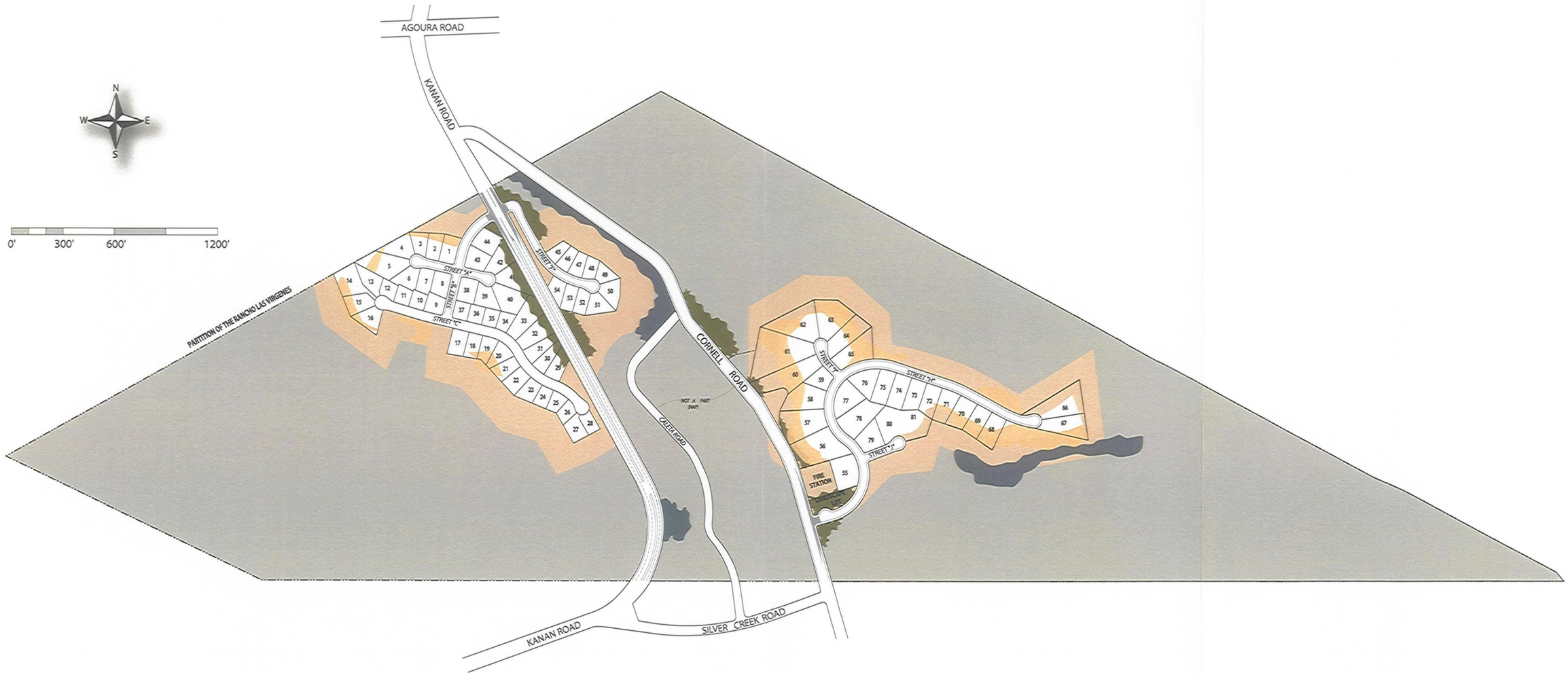
The proposed open space lots would retain, in an undisturbed condition (with the exception of adjacent areas subject to fuel modification), the entire on-site portion of Ladyface Mountain above the 960-foot contour line and the ridgeline in the eastern portion of the property above the 1,000-foot contour line. Additionally, development in the eastern portion of the property has been sited to avoid as much as feasible the major onsite population of Lyon's pentachaeta (a federally designated endangered plant species). Preservation of major onsite watercourses is another of the project's open space design criteria. The project does not intrude into Medea Creek. However, as required by the Los Angeles County Department of Parks and Recreation, a 20-foot dedication for the Zuma Ridge Trail is provided in the area. Major portions of Drainage "B" (the un-named drainage in the southeastern portion of the site) have been retained.

**Landscape Plan**

A key component of the proposed project is the provision of a master landscape plan that would guide landscaping for the entire project area, including common landscaped areas, undeveloped building pads, and the private grounds of occupied residential lots (see Figure I-7).

The master landscape plan would serve several functions:

- To provide a coherent plant palette of native species to minimize the introduction of non-native invasive species and to partially off-set the loss of wildlife habitat and forage as a result of project development (see Appendix C-7 for the preliminary plant palette);
- To provide for an integrated fire protection strategy combining the use of fire retardant species, water conserving irrigation systems, and appropriate fuel modification maintenance;
- To minimize water irrigation needs through the use of drought tolerant species;




**Development Interior Zone**
Graded pad sites shall be landscaped with plants selected from the Development Interior plant palette.

**Riparian Zone**
Area to be enhanced with plant species selected from the Riparian plant palette.

**Fuel Modification Zone (Graded / Disturbed)**
Area to remain in natural state with exception of plant thinning required by Los Angeles Fire Department. Sensitive plant species, which may occur in this zone, shall not be removed.

**Undisturbed Landscape Zone**
Graded Area to remain in current natural state.

**Streetscape Zone**
Area to be enhanced with Oak Trees and revegetated with plant species selected from the Fuel Modification / Development Perimeter plant palette.

**Fuel Modification Zone (Graded / Undisturbed)**
Area is comprised of graded slopes, which shall be revegetated with plants selected from the Fuel Modification / Development Perimeter plant palette.

Source: dizin Landscape Architects, May 2004.

- To minimize the introduction of fertilizers, pesticides, and herbicides into natural watercourses by providing guidelines and training for the appropriate handling, storage, and disposal of these materials; To provide slope stabilization (e.g., slope planting) both during construction and for the life-time of the development;

- To provide for the management of endangered and other sensitive species;

- To provide for the replanting of oak resources; and,

- To enhance on-site riparian resources.

The project applicant/developer would establish the landscape plan to be reviewed by SEATAC and the Planning Department's staff biologist and would be responsible for its implementation and maintenance until such time as a homeowners' association is prepared to take over landscape maintenance responsibilities. To ensure its implementation, the landscape plan would be incorporated into the project's Conditions, Covenants, and Restrictions (CC&Rs).

**Storm Drainage Improvements**

The project's "drainage concept" has been designed to achieve the basic objectives of:

- avoiding construction within potential flood hazard/inundation areas;

- avoiding or eliminating potential on-site drainage-related hazards, such as mud and debris flows;

- returning "post-construction" runoff discharge into natural watercourses to as close to "pre-construction" conditions as possible;

- avoiding or eliminating potential downstream impacts, resulting from increased debris, siltation, and turbidity; and,

- providing storm water pollution control facilities in accordance with the National Pollutants Discharge Elimination System program (NPDES) requirements.

Storm drainage improvements proposed to achieve the above objectives include the construction of on-site storm drains, terrace drains and swales, a debris basin, and a separate storm drain system to convey 50-year storm runoff from the developed areas of the project (i.e., streets and residential use areas) to proposed Urban Storm Water Runoff clarifiers, where the "first flush" cleansing of urban runoff can be achieved (see Drainage Concept Plan, Figure III.D-3). All storm water flows would be returned to

natural drainage courses before discharging from the project site. Where appropriate, energy dissipaters would be installed to prevent downstream erosion.

**Views/Scenic Qualities**

The proposed project has been designed to minimize its visual intrusion into the area's scenic resources. The project design concentrates development in enclaves (to maximize open space), concentrates development to the gentler slopes (to minimize grading and visibility), utilizes split-level building pads on steeper slopes (to minimize grading), employs contour grading techniques (to smoothly transition manufactured slopes back into the natural contours of adjacent undisturbed areas), and uses landscaping and highway setbacks (to buffer views of development areas). Where feasible, residential lots have been sited to prevent structures from breaking ridgeline views as seen from Kanan and Cornell Roads, and all on-site utility lines would be placed underground. Additionally, to protect vistas of Ladyface Mountain, all building pads in the western portion of the property have been sited below an elevation of 960 feet above sea level. To maintain architectural control of future residences built by the individual lot owners, the project proposes a set of CC&Rs which would establish the "ground rules" for aesthetic compatibility with the surrounding open space and existing development in the area.

**Access Improvements**

In the northwestern portion of the project site, the proposed project includes the construction of one four-way intersection on Kanan Road. The four-way "A" Street/"D" Street/Kanan Road intersection in the northern portion of the project site would provide north and southbound left-turn lanes, plus right-turn acceleration/deceleration lanes.

In the eastern portion of the property, a three-way intersection (with acceleration/deceleration lane) on the east side of Cornell Road would be constructed south of Los Angeles County Fire Station No. 65. Grading for the new intersections would be designed to maximize line-of-sight for posted and prevailing speeds.

Within the boundaries of the project site, the project would be required to dedicate sufficient rights-of-way for both Kanan and Cornell Roads to their ultimate design widths. However, roadway improvements to Kanan and Cornell Roads (other than for access) are neither proposed by the project nor required by the County of Los Angeles.

**Project Amenities**

In addition to the 271.7 acres of the site to be dedicated as open space, the project proposes to dedicate to the County of Los Angeles a 20-foot easement for riding and hiking purposes for the Zuma Ridge

Trail. The general alignment for the trail is shown on Figures I-5 and I-6. The trail's precise location would be shown on the Final Map.

**Water Tank Site**

Tentative Tract Map 52419 shows a potential water tank site in the northeastern portion of the project site. For clarification purposes, the potential water tank is not required for and is not a part of the proposed project. Rather, the Las Virgenes Municipal Water District (LVMWD) needs a 3-million gallon tank in the general vicinity of the District's Cornell Pump Station (located near the intersection of Cornell Road and Agoura Road). According to the District, the tank must be located on lands with an elevation of 1200 to 1225 feet. The tank is needed to meet future storage and operational requirements in the district's backbone water transmission system. While not needed immediately, the tank is identified as a long-term requirement for the District's overall water system.

A Preliminary Water system Design Report (WSDR) was prepared for the proposed project and the report identified a tank site on the project site that could be used. The need for a tank in this vicinity was identified in the District's Potable Water System Master Plan. It is not needed specifically for the proposed project. Rather, the tank is needed in the future as a water system improvement for the District.

All that the District has asked of the project applicant at this time is the dedication of a fee parcel of land for the tank site (1.5 to 2 acres) and an access easement to the tank site. It is not necessary for the developer to build the tank since it isn't required to support the proposed project. The tank would be built by the District when needed. Appropriate CEQA documentation and compliance for the tank construction would be the responsibility of the District.

The recommended tank capacity is 3.0 MG (million gallons); the tank has not been designed but a typical size would be about 15 feet in height and 185 feet in diameter. The proposed location shown on the tentative tract map would be accessed by an extension of the existing Knight Drive near the Indian Hills Tank. The extension past the existing Knight Drive would need to be constructed by LVMWD. The view-shed mitigation would also be addressed by the LVMWD once the Tank Siting Study has been completed.

## E. INTENDED USES OF EIR

This EIR will be used by the County of Los Angeles to assess the granting of approvals for the Vesting Tentative Tract Map, Conditional Use Permit and Oak -Tree Permit. Subsequently, the U.S. Army Corps of Engineers may use the EIR when assessing the approval of a Section 404 Permit; US Fish and Wildlife Service may use the EIR in conjunction with the required ESA Section 9 Consultation; the

California Department of Fish and Game may use the EIR when assessing the approval of a Section 1603 Agreement and the Memorandum of Understanding regarding the Management Plan for the Lyon's pentachaeta; and the Regional Water Quality Control Board, Los Angeles Region, may use the EIR in regard to the issuance of waste discharge permits, including NPDES permits and a Section 401 Water Quality Certification.

# II. GENERAL DESCRIPTION OF ENVIRONMENTAL SETTING

This section discusses both the regional and project site environmental setting associated with the proposed project. Specific resources occurring on and/or near the project site are discussed in detail in the relevant discussions in Section III of this EIR.

## A. OVERVIEW OF ENVIRONMENTAL SETTING

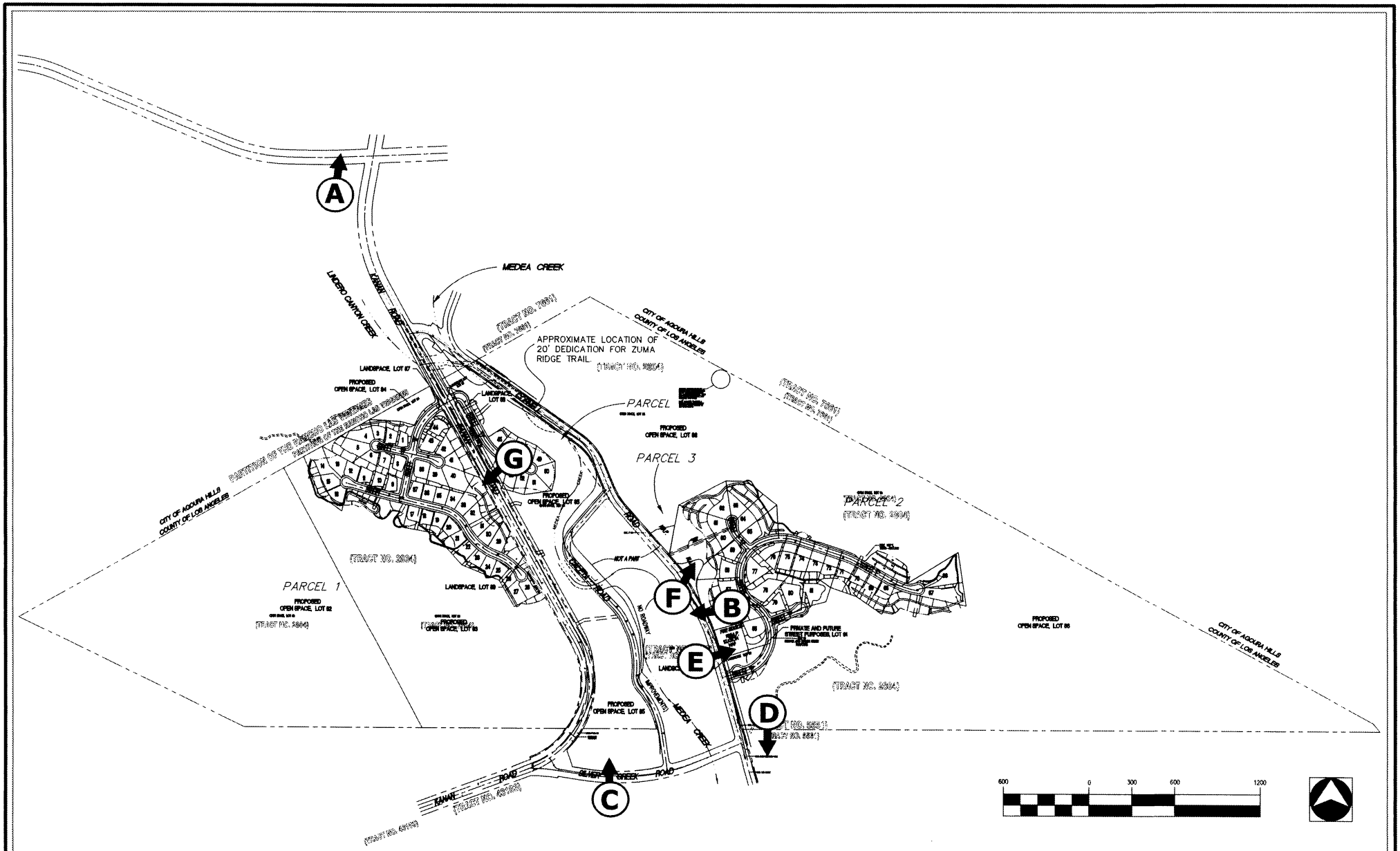
### Regional Setting

The 320.3-acre project site is located in unincorporated Los Angeles County, in the northwestern portion of the Santa Monica Mountains. The site is approximately 32 miles west of downtown Los Angeles, 12 miles southwest of Warner Center (a major retail and commercial center in the western San Fernando Valley), 12 miles north of the City of Malibu Civic Center, and approximately 6 miles east of the Cities of Thousand Oaks and Westlake Village.

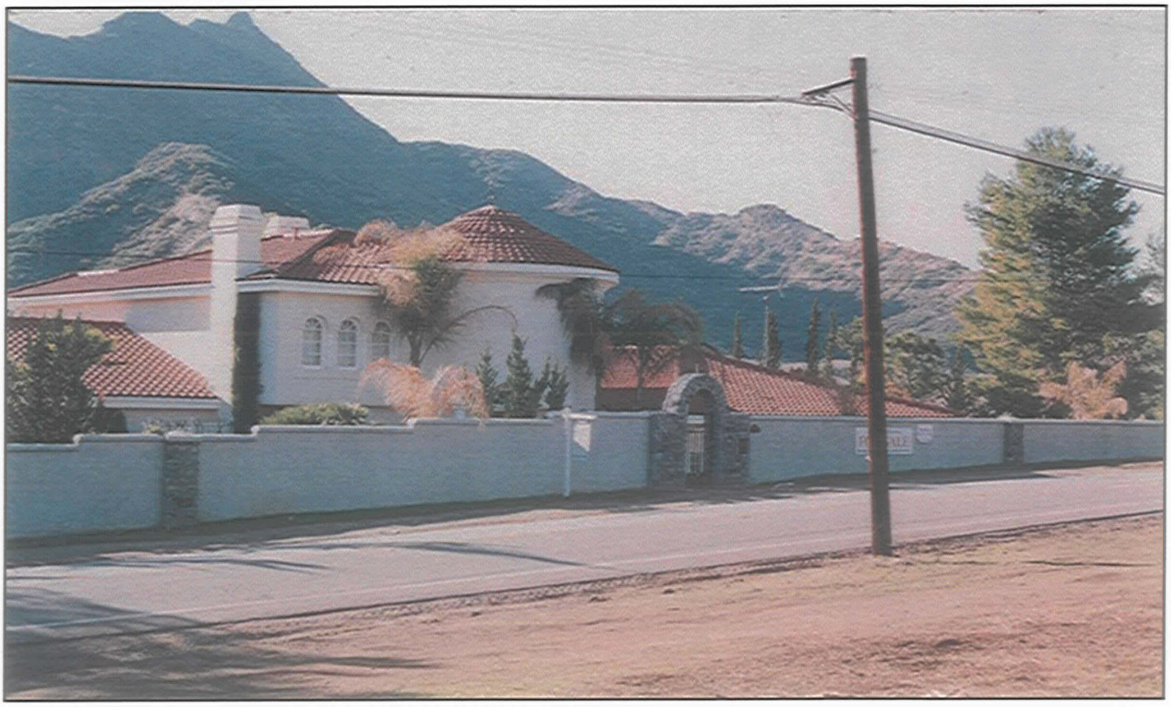
Most of the development in the northwestern portion of the Santa Monica Mountains is located along the major transportation corridors: U.S. 101 (Ventura Freeway) and its frontage roads (i.e., Agoura Road, Roadside Drive, and Canwood Street), Kanan Road (primarily north of the project site), Las Virgenes Road (east of the site), and Mulholland Highway (e.g., Malibou Lake, Lake Enchanto, Cornell, and Seminole Hot Springs south of the site).

Immediately to the north of the site lies the City of Agoura Hills. There are also some areas of unincorporated Los Angeles County to the northeast. This area is characterized by a mix of residential and commercial, business park, and light industrial development, which generally parallels the freeway. Directly north of the freeway at Kanan Road, a large multi-family housing project is under construction. South of the freeway, residential development generally consists of semi-rural to rural single-family custom homes. To the east, however, near Chesebro Road and just south of the freeway, some clustering of tract housing is added to the mix. Commercial development is dominant in the area approximately one-third mile north of the site, with businesses in that area including gas stations, government facilities, recycling centers, small businesses, restaurants, and office buildings (see Figure II-1, Photo Location Map, and Figure II-2, Photograph A)..

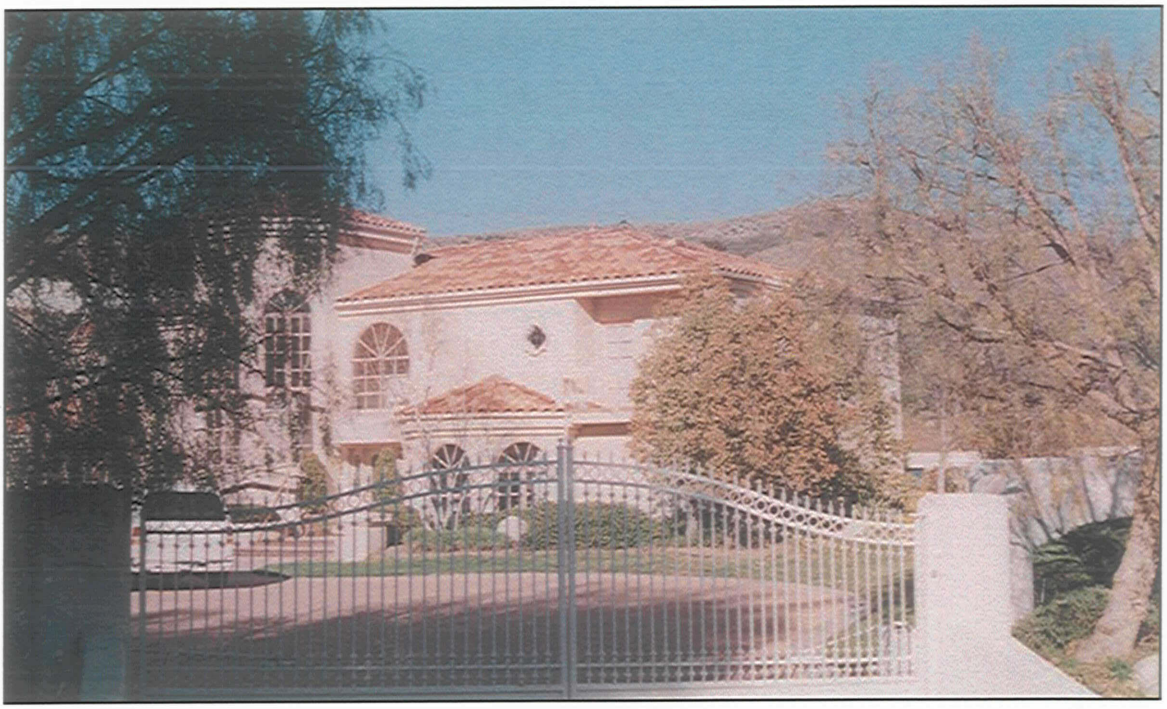
The area immediately south of the project site (i.e., sharing access via Kanan Road and Cornell Road) is developed with single-family homes on a variety of parcel sizes. Residentially developed parcels are typically a third of an acre or greater in size in this area, and typically do not include commonly held private open space. Parcels of five (5) acres or more in size, located south of the project site and east of Cornell Road, are separated from the project site by a major ridgeline. Horse-keeping occurs on some of these parcels.


A
B
C
D
E
F
G
MEDEA CREEK
LINDERO CANYON CREEK
KANAN ROAD
APPROXIMATE LOCATION OF 20' DEDICATION FOR ZUMA RIDGE TRAIL.
PARCEL
PARCEL 1
PARCEL 2
PARCEL 3
CITY OF AGOURA HILLS
COUNTY OF LOS ANGELES
PROPOSED OPEN SPACE, LOT 84
PROPOSED OPEN SPACE, LOT 85
PROPOSED OPEN SPACE, LOT 86
LANDSCAPE, LOT 87
LANDSCAPE, LOT 88
PRIVATE AND PUBLIC STREET PURPOSES, LOT 89
PRIVATE AND FUTURE STREET PURPOSES, LOT 94
NO DRAINAGE IMPROVEMENTS
NOT A PART
[TRACT NO. 28904]
[TRACT NO. 28904-1]
[TRACT NO. 28904-2]
[TRACT NO. 28904-3]
[TRACT NO. 28904-4]
[TRACT NO. 28904-5]
[TRACT NO. 28904-6]
[TRACT NO. 28904-7]
[TRACT NO. 28904-8]
[TRACT NO. 28904-9]
[TRACT NO. 28904-10]
[TRACT NO. 28904-11]
[TRACT NO. 28904-12]
[TRACT NO. 28904-13]
[TRACT NO.

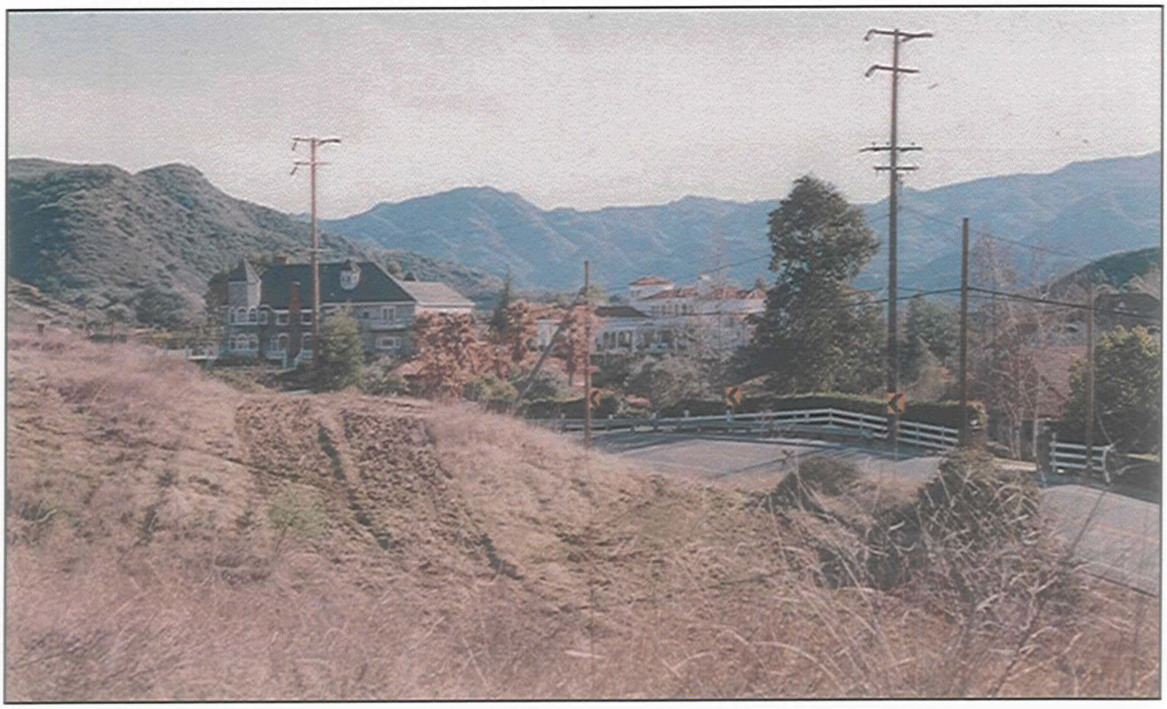
Photograph A: Looking north at existing commercial development along Kanan Road, approximately 1/3 mile north of the project site.



Photograph B: Existing residence on west side of Cornell Road north of Silver Creek Road. Los Angeles County Fire Station No. 65 and the project's proposed private community on the east side of Cornell Road are opposite the photograph.

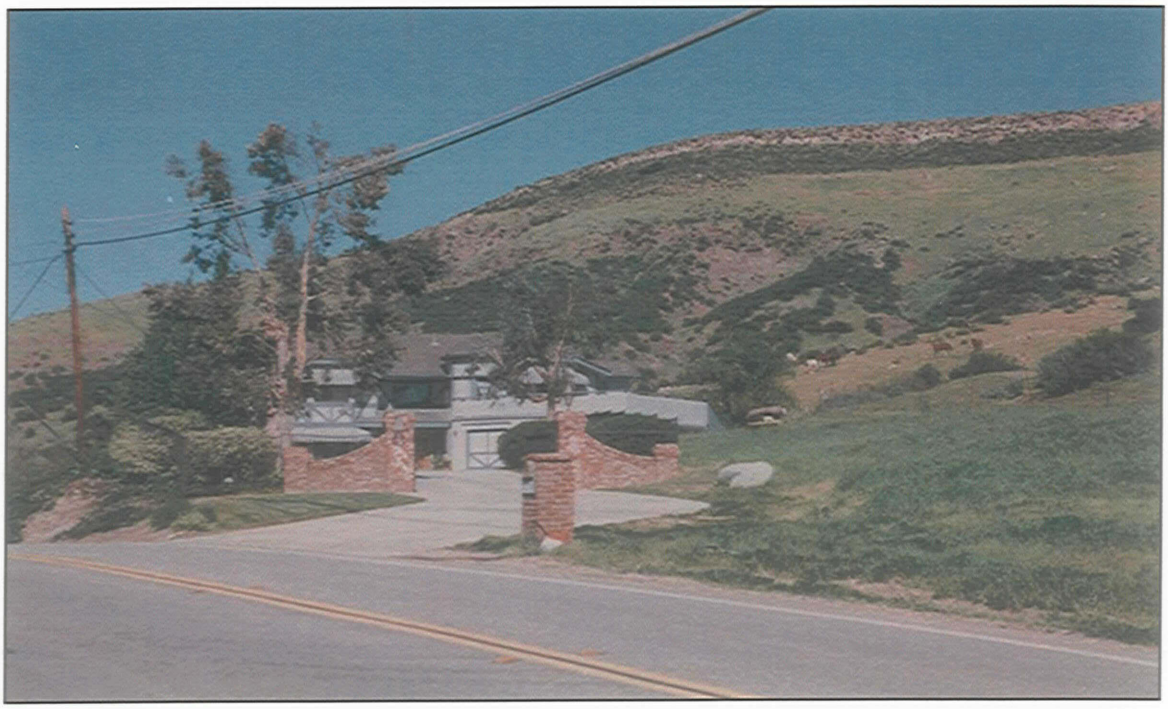


Photograph C: Typical residence on Silver Creek Road to the south of the project site.



Photograph D: View of two prominently visible residences located west of Cornell Road between the project site and Paramount Ranch.

Photograph E: Los Angeles County Fire Station No. 65, located on the east side of Cornell Road, which is surrounded on three sides by the project site.



Photograph F: Existing residence on the east side of Cornell Road (north of the Fire Station). The project site includes all of the vacant land adjacent and behind this residence.

Photograph G: Westerly view of the previously graded lower slopes of Ladyface mountain (i.e., the prominent ridge in the center of the photograph). View looks up the approximately alignment of proposed "C" Street.

An existing enclave of residences is located along Cornell and Caleta Roads, surrounded on three sides by the project site (see Figure II-2, Photograph B). Silver Creek Road, on the south side of the project site is also developed with existing residences (see Figure II-3, Photograph C), and the area immediately south of the project site is developed with single-family homes, estates and ranches (see Figure II-3, Photograph D).

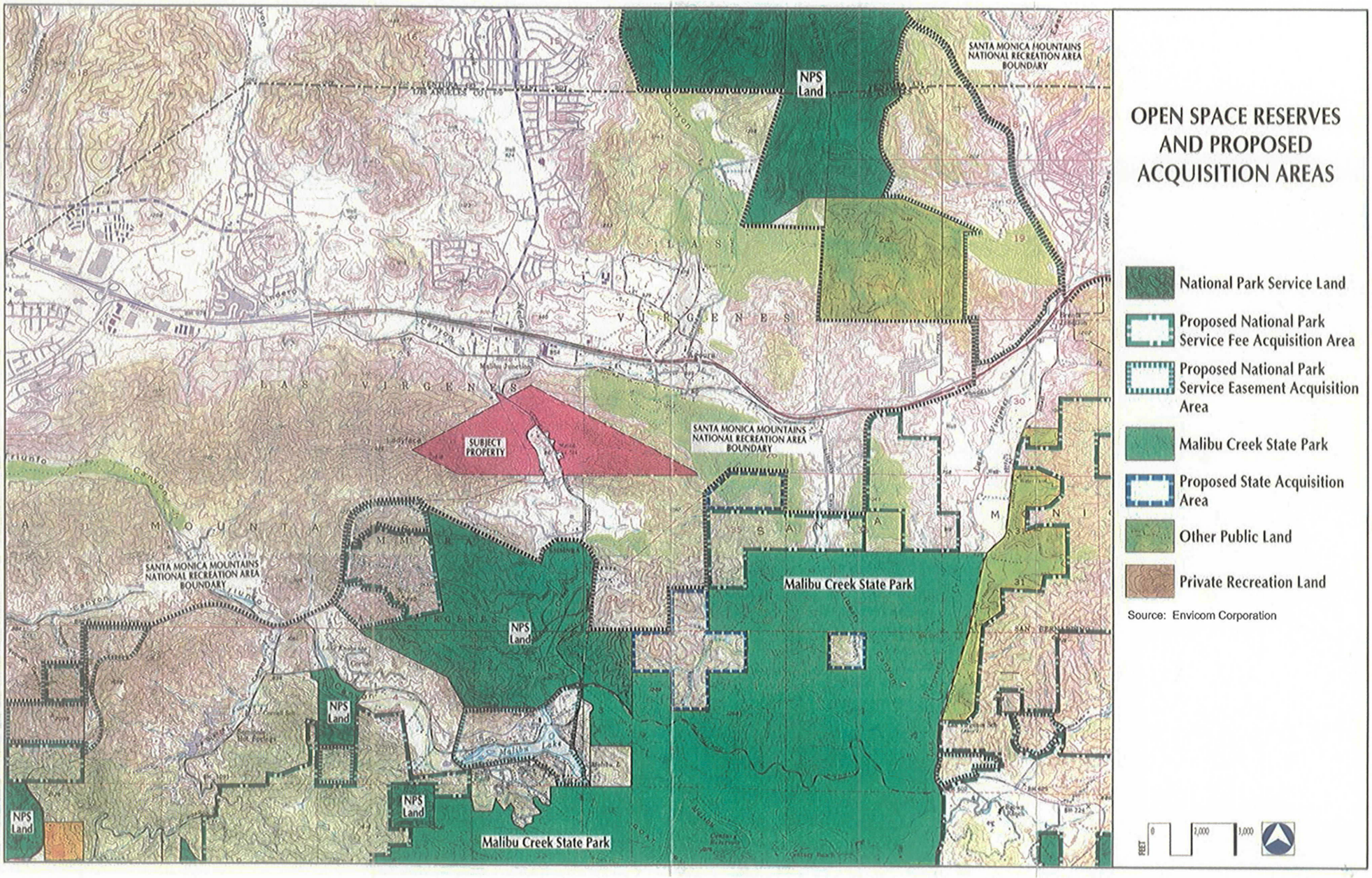
Most of the area surrounding the project site to the east and west is vacant and in private ownership. Land preserved as public parklands is located to the south of the site, beyond the existing residential development and/or privately owned vacant lands. The project site is an area between existing residential uses and privately held vacant land. See Figure I-3, Surrounding Vicinity Aerial Photograph.

The more interior areas of the Santa Monica Mountains remain largely undeveloped with occasional semi-rural residential enclaves and scattered rural residences. Among these are several older residential communities in the general vicinity of the project site and include: Malibou Lake, located along Mulholland Highway, approximately 1.5 miles to the south of the project site; Seminole Hot Springs, also located along Mulholland Highway, approximately 2.7 miles to the southwest; and Monte Nido, located east of Malibu Canyon Road, approximately 6.0 miles to the southeast of the project site. Lost Hills Village, a 500+ acre development, consisting of a mix of residential, commercial, and manufacturing uses, is located approximately 3.0 miles to the east of the project site.

National and state parkland/holdings also exist within the general area of the subject property (see Figure II-6, Open Space Reserves and Proposed Acquisition Areas). Portions of the approximately 150,000-acre Santa Monica Mountains National Recreation Area (SMMNRA), a unit of the National Park System, are located within the vicinity of the subject property.[1] The SMMNRA boundary extends approximately forty-six miles from the community of Hollywood, in the City of Los Angeles to the east, to Point Mugu, along the Pacific Ocean Coast, southwesterly in Ventura County. The California Department of Parks and Recreation is the largest single landowner within the Recreation Area with approximately 42,000 acres; the National Park Service controls approximately 21,500 acres; approximately 6,000 acres used for private recreation (e.g., camps, equestrian facilities, etc,); and approximately 50,000 acres remain in private, non-recreational use ownership.[2]

---

1 *National Park Service, "Fascinating Facts About the Santa Monica National Recreation Area"*
2 *Ibid.*




CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure II-6
Open Space Reserves

Paramount Ranch, a unit of the SMMNRA, represents the northerly boundary of the Recreation Area in the vicinity of the project site. Single-family residences, ranchettes, and improved streets have been developed in the 3/4-mile area separating the subject property from Paramount Ranch. Portions of Paramount Ranch have been developed and are currently used for movie and television show production, as well as special events. The northern portion of Paramount Ranch is the former site of the Renaissance Faire.

Much of the privately held land located southerly of Paramount Ranch is sparsely developed, primarily with residential uses, with a concentration of residences in the vicinity of Malibou Lake, which is located southerly of Mulholland Highway at its intersection with Cornell Road. Malibu Creek State Park, which offers a number of recreational opportunities including hiking, horseback riding, picnicking and nature study, contains 7,472 acres of grassland, oak woodland, chaparral, coastal sage scrub and riparian habitat. The western portion of Malibu Creek State Park is located approximately one-half mile from the project site. Malibu Creek State Park also includes the 800-acre Liberty Canyon Wilderness Preserve, located approximately 1.5 miles east of the project site.

The project site lies within the greater Medea Creek watershed, comprised of four subdrainages (namely Medea Creek, Lindero, Palo Comado, and Cheeseboro Canyons) which originate on the south slope of the Simi Hills and converge in the vicinity of Malibu Junction, just to the north of the project site. Portions of these tributaries are concrete-channelized upstream (north) of Malibu Junction. The main stem of Medea Creek, downstream of Malibu Junction, has cut a narrow passage through the Santa Monica Mountains, carrying the combined flows of the subdrainages through the project site. Across the project site and southward, the stream gradually widens, passing through Paramount Ranch (to the south). Medea Creek then converges with Triunfo Canyon Creek to create Malibou Lake. Water flowing through Malibou Lake forms Malibu Creek, which flows to the Pacific Ocean and has created Malibu Lagoon, the last existing lagoon in Los Angeles County.

Via Kanan Road, the project site has access to many of the major public roadways and freeways in the region, including the Ventura Freeway (U.S. 101) approximately one-quarter mile to the north; and Pacific Coast Highway approximately 8.0 miles to the south. Mulholland Highway, approximately 1.5 miles to the south, meanders through the Santa Monica Mountains in primarily an east-west direction, intersecting the major north-south canyon roads.

**Project Site**

Kanan and Cornell Roads run roughly north/south through the center of the project site, dividing the ownership into three geographically distinct areas. The western portion of the site (i.e., west of Kanan Road) is located on the lower, generally east facing slopes of what is commonly known as "Ladyface

Mountain".[3] Topographically, the central portion of the project site (bounded by Kanan Road on the west and Cornell Road on the east) is relatively flat, consisting of valley floor and Medea Creek. Some existing single-family residential development currently occupies the area between Medea Creek and Cornell Roads (north of Silver Creek Road) and is not part of the project site.

Most of the eastern portion of the site (i.e., east of Cornell Road) consists of the southwest facing slopes of a prominent northwest-southeast trending ridge. In the southern end of this area is a small canyon and an un-named tributary drainage to Medea Creek (hereinafter referred to as Drainage B). Los Angeles County Fire Station No. 65 and two single-family residences are located on the east side of Cornell Road between Kanan Road and Drainage B and are not part of the project site (see Figure II-4, Photographs E and F).

The project site is primarily vacant, undisturbed land, without permanent structures. Portions of the site, however, have been previously disturbed and used on a temporary basis. A small area (less than one acre) on the east side of Cornell Road adjacent to and northerly of Los Angeles County Fire Station No. 65 is currently being used to cut and store fire wood. Also, a portion of the property on the south side of the fire station was previously used for horse stables, but is currently vacant. Another area of approximately 1 to 2 acres, located between Cornell Road and Kanan Road approximately 800 feet south of Cornell Way, was previously used as a dumpster storage yard but is currently vacant. West of Kanan Road on the lower slopes of Ladyface Mountain, an area of approximately 10.2 acres was previously used for the temporary storage of grading equipment and the stockpiling of fill material to be used in a nearby commercial development project (see Figure II-5, Photograph G). Each of these remaining temporary uses would cease its activities and would be removed from the site before the onset of construction.

As indicated above, the project site is characterized by hilly to mountainous terrain bordering a basically level alluvial valley floor. From the lowest elevation on the property (the bed of Medea Creek) at approximately 800 feet, the parcel extends west and up the eastern slope of Ladyface Mountain to an elevation of approximately 1,900 feet. Off-site, Ladyface Mountain reaches a peak

---

[3] *The status of Ladyface Mountain as a "cultural icon" appears to have resulted from attempts at self-promotion of the region by Art Whizins, owner of the original Whizins' Restaurant at Cornell Corners. Mr. Whizins acknowledged that the mountain was so-named by his father and, in the early 1970's attempted to promote its importance to the local archaeological community by taking archaeological field classes to its peak. No consequential interest was generated in the archaeological community by Whizins' efforts. Ladyface Mountain has no unusual or outstanding archaeological sensitivity or Native American significance. For further discussion of archaeological status of Ladyface Mountain, see Section IV,G. (Cultural Resources – Archaeological).*

elevation of 2,038. The prominent ridge in the eastern portion of the property attains heights of 1,100 to 1,200 feet, increasing to a peak elevation of 1,400 feet in the extreme eastern corner of the property, near the headwaters of Drainage B. Slopes on the site range from near level (along Medea Creek and Drainage B), to gradients exceeding 50 percent (on the higher elevations of the ridgelines along the property's borders). See Figure II-7, Site Topography.

The site also contains portions of several other tributaries to Medea Creek, two of which are shown as blue-line streams on the USGS maps (herein referred to as Drainages A and B). Slopes on the west side of the project site drain easterly toward Medea Creek, while slopes on the east drain westerly toward the creek. Figure II-8, Site Drainage, indicates the locations of the blueline streams and other tributaries on the project site.

The eastern portion of the project site (east of Cornell Road) is located within the boundaries of the Las Virgenes Significant Ecological Area (SEA No. 6), designated by the Los Angeles County General Plan.[4] Within this area, vegetation consists of grasslands, sparse scrub, and chaparral. Vegetation along Drainage B is riparian scrub. Figure II-9 indicates the subject property's relationship to SEA No. 6.

In the central portion of the site, a relatively well developed willow riparian forest occupies the Medea Creek channel.

There are 136 oak trees (*Quercus lobata* and *Quercus agrifolia*) on the site covered by the County of Los Angeles Oak Tree Ordinance. These are trees having a trunk diameter of 8" or greater which are located within 200' of proposed development activities. These and other specific resources occurring on the project site are discussed in detail in the relevant discussions in Section III of this EIR.

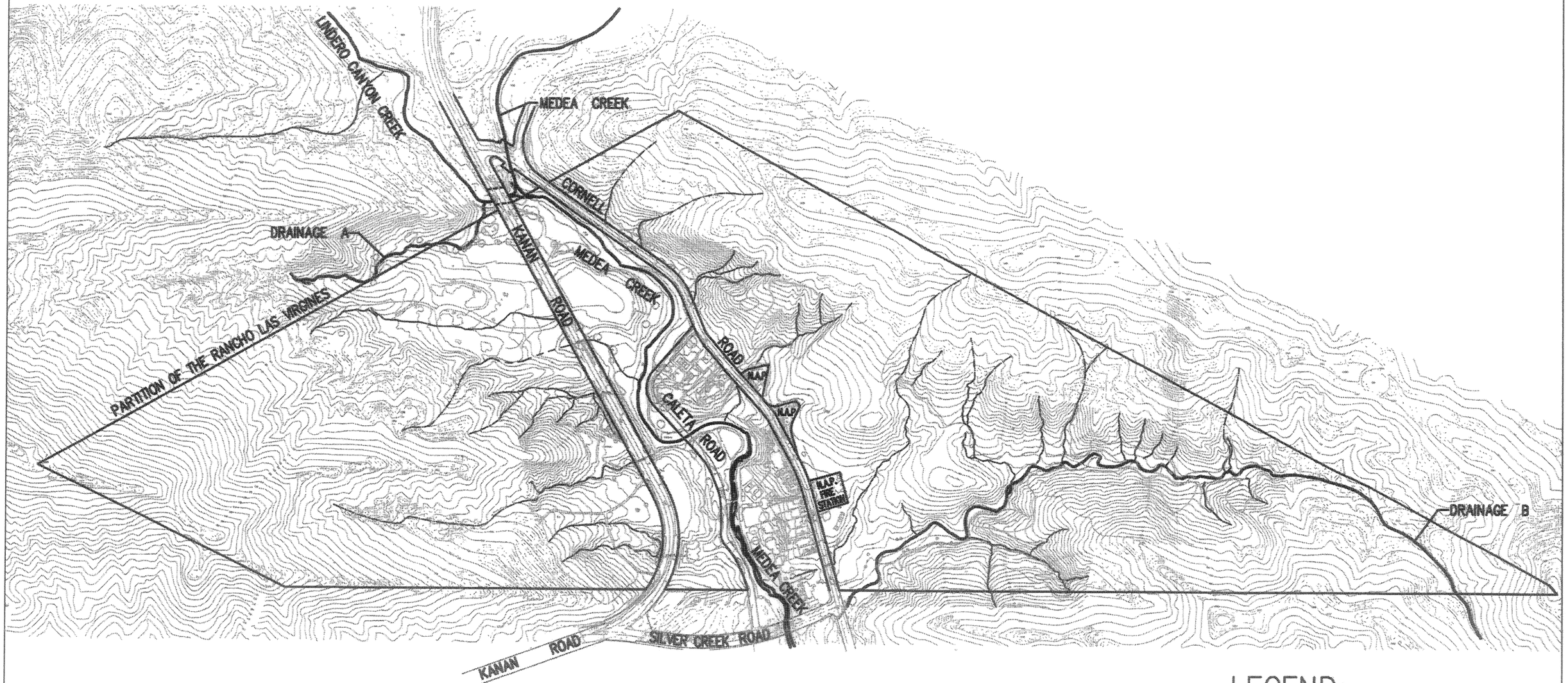
---

4 *SEAs are designated as Special Management Areas on the Los Angeles County Land Use Policy Map. According to the General Plan, "This designation identifies lands having important biological resources. This classification, as set forth in the Conservation and Open Space Element, includes habitats of rare and endangered species, sites with critical fish and wildlife values, relatively undisturbed areas of typical natural habitat and regionally scarce biotic resources. The intent of the Countywide General Plan is to preserve and enhance, to the extent possible, SEAs for the benefit of present and future County residents." In addition to regulated scientific study and limited recreational activities, a range of more intensive uses may be permitted within SEAs where it can be demonstrated by a detailed biotic survey and project analysis that the proposed development is highly compatible with the resource values present..."*
*Project consistency with SEA No. 6 is discussed in detail in Section III.F.*

Source: Wagner Halladay Inc.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

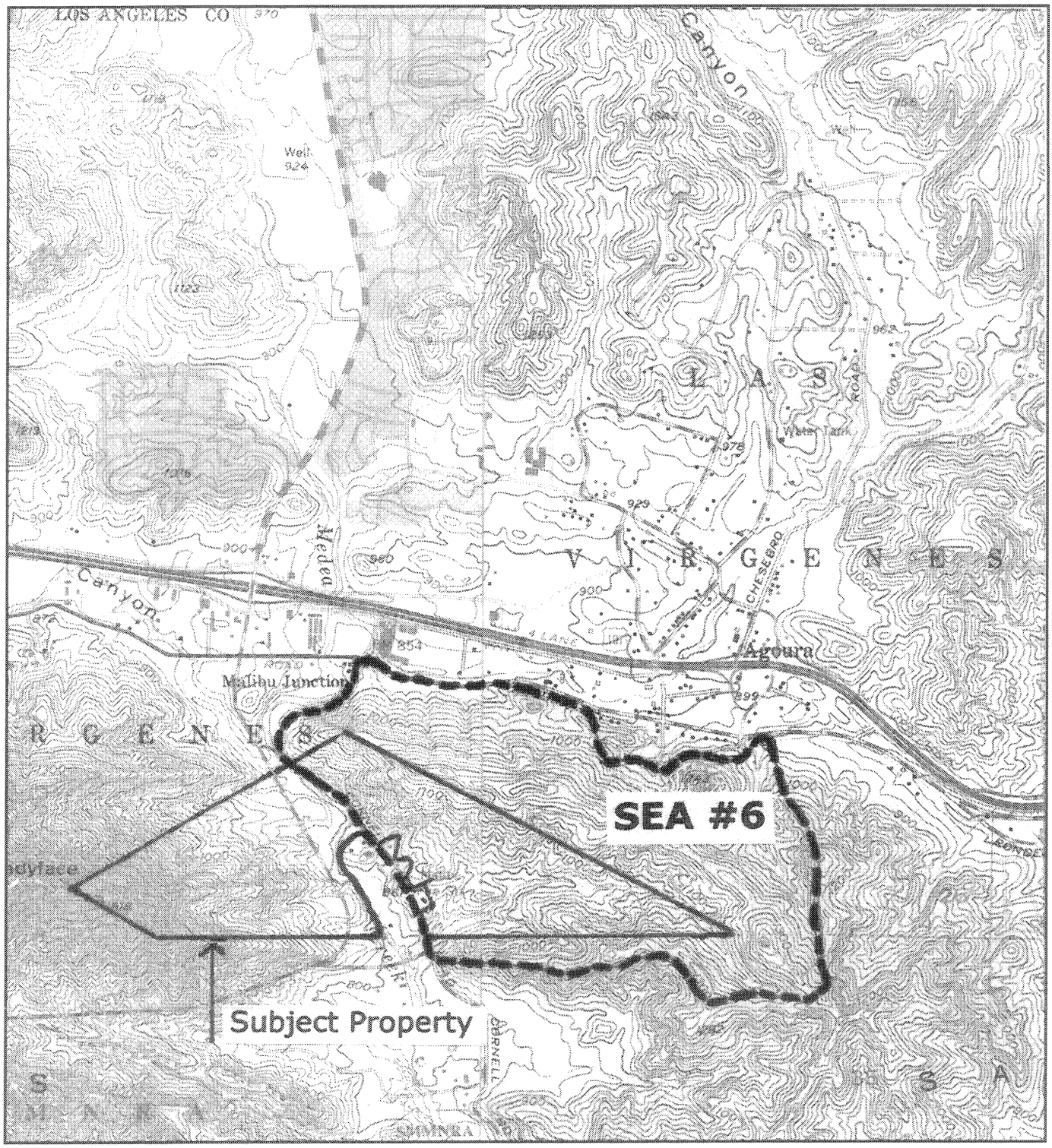
Figure II-7
Site Topography




Source: Wagner Halladay Inc.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure II-8
Site Drainages




CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure II-9
SEA No. 6

## B. APPLICABLE LOCAL AND REGIONAL PLANS

### Los Angeles County General Plan

The Los Angeles County General Plan Land Use Policy Map designates 148 acres of the project site as Non-Urban, while 172.3 acres of the project site are located within the Las Virgenes Significant Ecological Area (SEA No. 6). The intent of the Non-Urban classification is to maintain the character of dispersed non-urban settlements and communities; provide for agricultural and mineral production; preserve areas of significant natural and scenic resources; and avoid intensive development of areas subject to natural hazards or lacking essential services and facilities. The SEA designation identifies lands having important biological resources. The intent of the Countywide General Plan is to preserve and enhance, to the extent possible, SEAs for the benefit of present and future County residents.

The consistency of the proposed project with the Los Angeles County General Plan land use designations is discussed in detail in Section III.K (Land Use Compatibility). Project consistency with SEA No. 6 is discussed in detail in Section III.F.

### Santa Monica Mountains North Area Plan

Land use designations for the project site are established by the Santa Monica Mountains North Area Plan (SMMNAP), which the Los Angeles County Board of Supervisors adopted on October 24, 2000. The SMMNAP designates 172.3 acres of the project site (located east of Cornell Road) as Mountain Lands 5 (N5), and 148 acres of the project site (located west of Cornell Road) as Rural Residential 2 (N2). Development within the N5 designation shall not exceed a maximum density of one dwelling unit per 5 acres (1 du/5ac). Development within the N2 designation shall not exceed a maximum density of one dwelling unit per 2 acres (1 du/2ac). The SMMNAP encourages the clustering of development in hillside areas.

The SMMNAP also designates the 172.3 acres of the project site located east of Cornell Road as Significant Ecological Area - Las Virgenes SEA No. 6. An application for a discretionary review of the proposed project, in the context of the SEA, has been submitted for this project under Conditional Use Permit No. 97-178.

The proposed project is consistent with the applicable policies of the SMMNAP. The consistency of the proposed project with the SMMNAP is discussed in detail in Section III.K (Land Use Compatibility).

**Los Angeles County Zoning Code**

Approximately 172.3 acres of the project site are zoned RPD-5 - 0.2/DU, which permits one dwelling unit per five acres. Approximately 148 acres of the project site are zoned RPD-2 - 0.5/DU, which permits one dwelling unit per two acres. The boundaries of the portion of the project site designated in the RPD-5 - 0.2/DU zone are co-terminus with the portions of the site designated N5 (one dwelling unit per five acres) in the SMMNAP. The boundaries of the portions of the project site designated in the RPD-2 - 0.5/DU zone are co-terminus with the portions of the site designated N2 (one dwelling unit per two acres) in the SMMNAP. The consistency of the proposed project with the Los Angeles County Zoning Code is discussed in detail in Section III.K (Land Use Compatibility).

## C. RELATED PROJECTS

Sections 15126 and 15130 of the CEQA Guidelines provide that EIRs consider the significant environmental effects of a proposed project, as well as "cumulative impacts." Cumulative impacts are two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts (CEQA Guidelines Section 15355).

In accordance with CEQA Guidelines Section 15130, cumulative impacts are anticipated impacts of the proposed project along with reasonably foreseeable growth. Reasonably foreseeable growth may be based on:

- A list of past, present, and probably future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency; or

- A summary of projections contained in the adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or area wide conditions contributing to the cumulative impact.

All proposed, recently approved, under construction, and reasonably foreseeable projects that could produce a related or cumulative impact on the local environment when considered in conjunction with the proposed project are evaluated in this Draft EIR. An analysis of the cumulative impacts associated with these related projects and the proposed project is provided in the cumulative impact discussion under each individual impact category in Section III, Environmental Impact Analysis, of this Draft EIR.

In coordination with the County of Los Angeles Department of Regional Planning and the Planning Department at the City of Agoura Hills, a list of 31 related projects was developed. The list of related projects consists of approved or proposed projects within the project area. As shown in Table II-1, the

31 projects include various land uses such as single-family and multi-family residential, commercial, retail, restaurant, church and a school. The locations of the related projects are shown in Figure II-10.

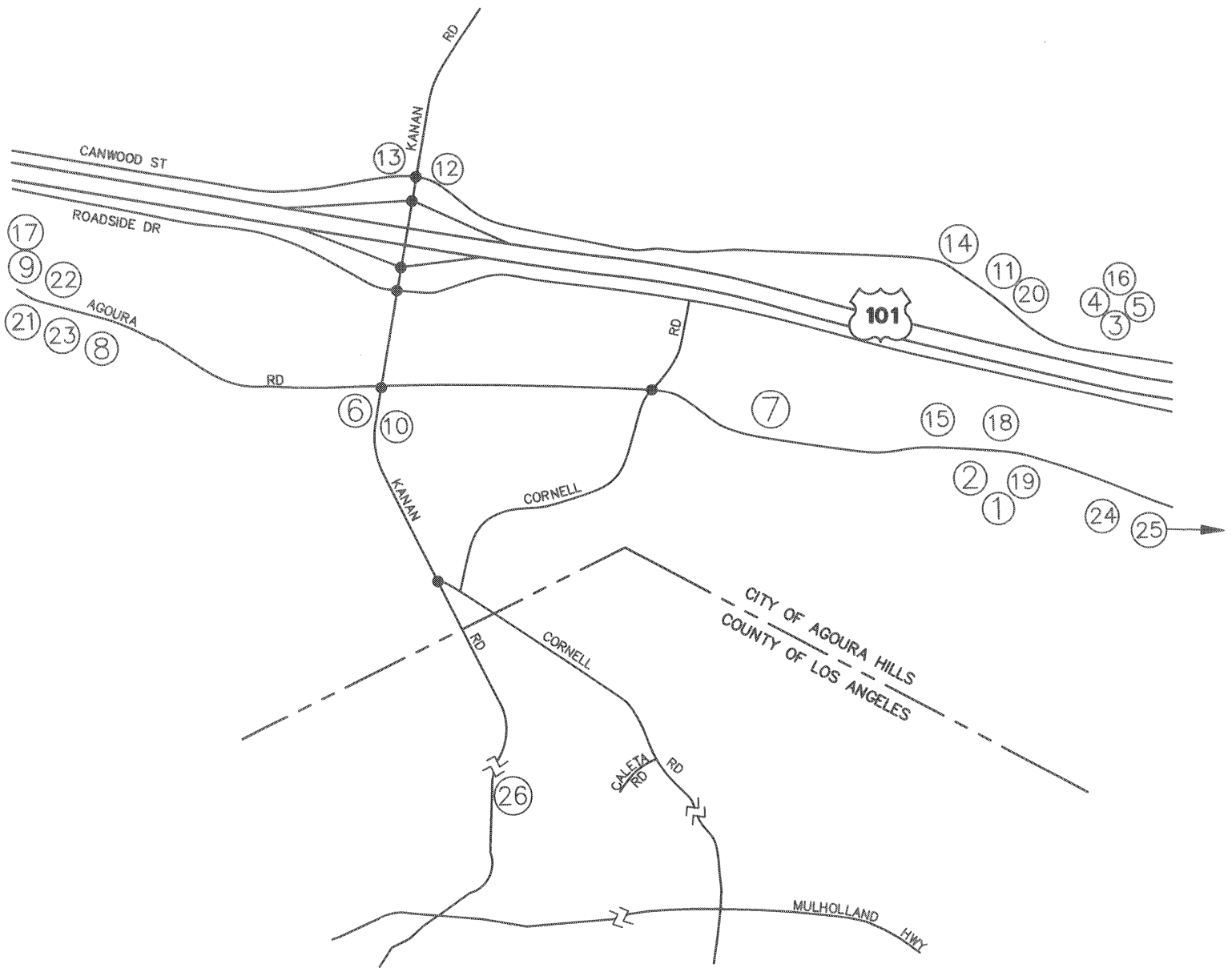
Cumulative impacts analyzed in this Draft EIR were conservatively assessed. Some of the related projects may not be approved, and some approved projects may not be developed. In addition, many of the related projects have been or will be subject to a variety of mitigation measures that will reduce the potential environmental impacts associated with those projects. However, with limited exceptions, those mitigation measures have not been taken into account in projecting the environmental impact of the related projects. Therefore, the cumulative analyses set forth below are conservative and result in greater impacts than actually anticipated.

**TABLE II-1**
**Related Projects List**

| No. | Project Description and Location | Project Size | Location | Employee Generation Rate[a] (per 1,000 SF) | Estimated Employees |
|---|---|---|---|---|---|
| ***CITY OF AGOURA HILLS – RESIDENTIAL*** | | | | | |
| 1 | Riopharm 1 – single family residences | 14 DU | 27754 Agoura Road SE of Agoura and Montecillo | --- | --- |
| 2 | Riopharm 2 – single family residences | 14 DU | 26750 Agoura Road SE of Agoura and Riopharm | --- | --- |
| 3 | Stockton – 4-unit apartment building | 4 DU | 5310 Colodny Drive | --- | --- |
| 4 | Schneider – 4-unit condominium project | 4 DU | 5276 Colodny Drive | --- | --- |
| 5 | Minder – 19-unit condominium project | 19 DU | 5241 Colodny Drive | --- | --- |
| ***CITY OF AGOURA HILLS – COMMERCIAL*** | | | | | |
| 6 | Creekside – Retail Center | 93,000 SF | SWC Kanan Road and Agoura Road | 2.2 | 205 |
| 7 | Burgandy Creek Bistro – New restaurant and reception hall | 11,000 SF | Vacant lot west of 28818 Agoura Road | 2.2 | 24 |
| 8 | St. Paul's Lutheran Church | 9,104 SF | 30125 Agoura Road | 2.2 | 20 |
| 9 | Alesco Development – Office buildings | 67,000 SF | NEC Chesebro and Agoura Roads | 3.5 | 235 |
| 10 | Ted Moore – Agoura Village mixed use land development | Office: 20,000 SF<br>Retail: 21,000 SF<br>Restaurant: 14,000 SF<br>Daycare: 10,000 SF<br>Apartments: 95 DU | SEC of Agoura Road and Kanan Road | Office: 3.5<br>Retail: 2.2<br>Restaurant: 2.2<br>Daycare: 2.2 | 169 |
| 11 | Ball Properties (Centrepoint) – 2 office buildings | 8,000 SF | Ladyface Circle | 3.5 | 28 |
| 12 | Riverwalk – residential, office buildings & restaurants | Apartments: 336 DU<br>Office: 93,000 SF<br>Restaurant: 19,000 SF | NEC Canwood and Kanan Road | Office: 3.5<br>Restaurant: 2.2 | 368 |
| 13 | Silagi "Canwood Plaza" – Office building | 22,896 SF | NW corner of Canwood and Kanan Road | 3.5 | 80 |
| 14 | Semler (Alan Hartley) – 2 office buildings | 125,000 SF | NEC Canwood and Derry | 3.5 | 438 |
| 15 | Levy, Moshe – office building w/underground parking | 20,830 SF | Roadside Drive, west of Lewis Road | 3.5 | 73 |

| No. | Project Description and Location | Project Size | Location | Employee Generation Rate[a] (per 1,000 SF) | Estimated Employees |
|---|---|---|---|---|---|
| 16 | Wickman "Agoura Furniture Center" | 38,760 SF | N/S Canwood Street and Chesebro Road | 2.2 | 85 |
| 17 | Reyes Adobe Partners – Mattress and Bedroom showroom | 14,500 SF | Reyes Adobe Road, directly south of US 101 | 2.2 | 32 |
| 18 | Leaders Carpets | 14,080 SF | 28350 Roadside Drive | 2.2 | 31 |
| 19 | So. Cal Food Services for Wendy's | 3,200 SF | Lots 29 & 30 on Dorothy Drive | 2.2 | 7 |
| 20 | Silagi "Center Court" – Office building | 49,000 SF | 29475 Canwood Street | 3.5 | 172 |
| 21 | Scheu (Corp. Point) – 2 new buildings | 81,000 SF | S/S Agoura Road at Reyes Adobe Road | 3.5 | 284 |
| 22 | Development Partners – 2 story office building | 31,160 SF | 30101 Agoura Court | 3.5 | 109 |
| 23 | Realty Bancorp Equities – 2 story commercial building | 76,750 SF | 29901 Agoura Road | 3.5 | 269 |
| *COUNTY OF LOS ANGELES* | | | | | |
| 24 | Private school, K-8 | 161,175 SF<br>750 students | E of Palo Comado Cyn Rd and Chesebro | 0.5[b] | 38 |
| 25 | Six story office building w/parking structure | 140,000 SF<br>140 employees | 26585 Agoura Road, Calabasas | -- | 140[c] |
| 26 | 5 Single-Family Lots | 5 DU | 3155 Kanan Road | -- | -- |

[a] *Source: Los Angeles Unified School District, Commercial/Industrial Development School Fee Justification Study, September 2002.*
[b] *Assumed 1.5 employees per student.*
[c] *Source: Kimley-Horn and Associates, Inc., July 2003.*




Kimley-Horn & Associates, Inc., August 2003

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure II-10
Related Projects Location Map

# III. ENVIRONMENTAL IMPACT ANALYSIS
# A. GEOTECHNICAL HAZARDS - GRADING

The following reports are summarized below and incorporated by reference. Copies of these reports are included in Appendix A of this DEIR.

- Pacific Soils Engineering, Inc., EIR-Level Geotechnical Study, Live Oak Ranch, Vesting Tentative Tract 52419 (Revised), County of Los Angeles and City of Agoura Hills, California, January 22, 1999[1] (Appendix A-1)

- Pacific Soils Engineering, Inc., Supplemental Geotechnical Investigation and Revision Received Vesting Tentative Tract Geotechnical Review, Vesting Tentative Tract 52419, County of Los Angeles, California, May 15, 2000[2] (Appendix A-2)

- Pacific Soils Engineering, Inc., Update Geotechnical Report, Revised Tentative Tract Map, Alternate Site Plan "B" - 81 Lots, Tentative Tract No. 52419, Triangle Ranch, Agoura Area, County of Los Angeles, California, June 30, 2003[3] (Appendix A-3)

- Pacific Soils Engineering, Inc., Updated Geotechnical Report, Revision Received Map, Vesting Tentative Tract Map No. 52419, Triangle Ranch, Agoura Area, County of Los Angeles, California, June 1, 2004 (Appendix A-4)

## ENVIRONMENTAL SETTING

### Previous Geotechnical Investigations

The project site was originally investigated in 1988. That field investigation included geologic reconnaissance mapping and the logging of 58 backhoe trenches and 4 bucket-auger borings. Also,

---

1 *This report provides the background geotechnical information for the proposed project, based upon on-site geotechnical investigations conducted in 1988 and updated in September 1997 and early 1998. The report describes the site's geologic setting, on-site bedrock, surficial soils, and local seismicity. The report maps all major on-site geological features and provides preliminary recommendations for site preparation. The conclusions of this report form the authority for the conclusions drawn by this EIR.*

2 *This report provides geotechnical conclusions and recommendations about the feasibility, design, and construction of the project as presented on the Revision Received Vesting Tenative Tract Maps dated April 28, 2000.*

3 *This letter report updates the previous Geotechnical Report prepared by Pacific Soils Engineering, Inc. It addresses the geotechnical considerations of the revised 81-unit project design and contrasts that project to the previous 108-unit design.*

nine shallow refraction seismic lines, useful for estimating rock rippability, were completed. The locations of trenches, borings, and seismic lines are plotted on Figures III.A-1A and III.A-1B, Geotechnical Map. The Logs of Trenches and Borings, along with seismic profiles are contained in the appendices of the above referenced Pacific Soils Engineering, Inc. geotechnical report, which is included as Technical Appendix A-1 of this EIR.[4]

Subsequent subsurface exploration of the project site was completed as part of the investigation reported in the May 15, 2000 Supplemental Geotechnical Investigation (Appendix A-2). During this investigation, 12 additional exploratory borings were excavated, as well as 15 test pits. Additionally, 8 shallow refraction seismic lies were surveyed in areas of deeper cuts that had not been previously explored. The approximate locations of these excavations are also shown Figures III.A-1A and III.A-1B.

**Current Site Conditions**

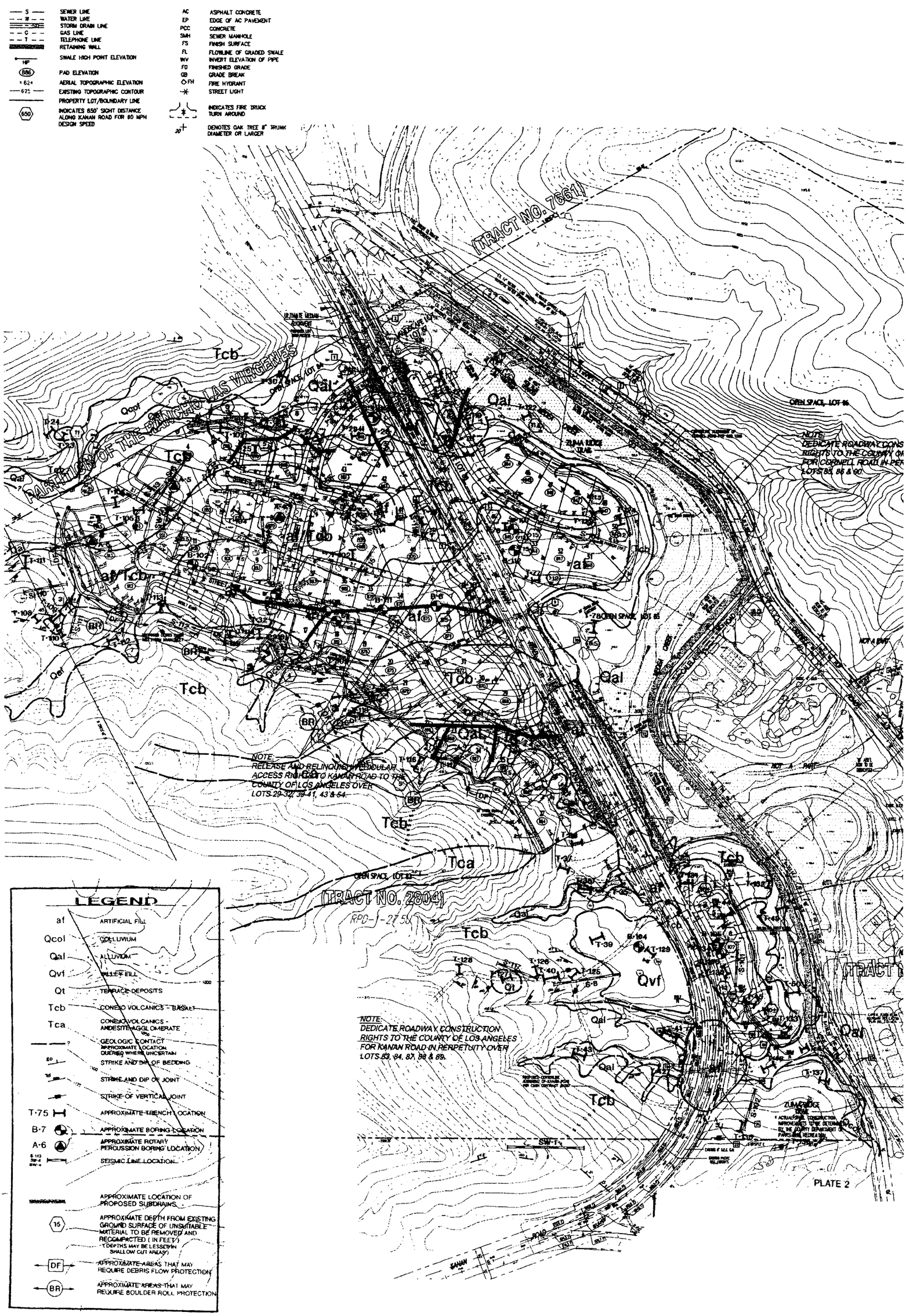
The site is essentially undeveloped, except for peripheral cut slopes and fills associated with Kanan and Cornell Roads, and a canyon fill in the northwestern portion of the site (see borings B-5 through B-7 on Figure III.A-1A , Geotechnical Map). The canyon fill, however, is a former disposal and borrow area, the depth of which increased and decreased over the past several decades. Research regarding the site's natural topography including review of prior USGS maps has been inconclusive due to the historical nature of the prior disposal and borrow area. Vestiges of graded pads and an old concrete pad, probably used for agriculture, also exist in the northwestern portion of the property, near trenches T-22 through T-28.

Topographically, the area proposed to be developed west of Kanan Road lies near the base of a series of easterly trending spur ridges that protrude from a large east-trending major ridge (Ladyface Mountain). Slope ratios vary from nearly flat in Medea Creek to $\pm 1\frac{1}{2}:1$ (horizontal to vertical) on spur ridges.

The eastern portion of the property consists of a series of northwesterly trending ridges with numerous small northerly and southerly trending spurs. Natural slopes vary from 3:1 to $1\frac{1}{2}:1$ with locally gentler and steeper elements. The ridges are separated by numerous westerly-draining canyons and valleys.

---

[4] *Because the subject parcel was investigated concurrently with an adjoining project, the Log of Trenches begins with trench number T-22, Log of Borings with B-4, and seismic lines at S-5.*




CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.A-1A
Geotechnical Map - Western Portion

## LEGEND

| | | | |
|---|---|---|---|
| S | SEWER LINE | AC | ASPHALT CONCRETE |
| W | WATER LINE | EP | EDGE OF AC PAVEMENT |
| SD | STORM DRAIN LINE | PCC | CONCRETE |
| G | GAS LINE | SMH | SEWER MANHOLE |
| T | TELEPHONE LINE | FS | FINISH SURFACE |
| | RETAINING WALL | FL | FLOWLINE OF GRADED SWALE |
| HP | SWALE HIGH POINT ELEVATION | INV | INVERT ELEVATION OF PIPE |
| 886 | PAD ELEVATION | FG | FINISHED GRADE |
| x 624 | AERIAL TOPOGRAPHIC ELEVATION | GB | GRADE BREAK |
| 625 | EXISTING TOPOGRAPHIC CONTOUR | FH | FIRE HYDRANT |
| | PROPERTY LOT/BOUNDARY LINE | | STREET LIGHT |
| 310 | INDICATES 310' SIGHT DISTANCE FOR 30 MPH DESIGN SPEED | | INDICATES FIRE TRUCK TURN AROUND |

## EASEMENT LEGEND

23 LAS VIRGENES MUNICIPAL WATER DISTRICT 20 FT. WIDE SEWER EASEMENT RECORDING INFORMATION UNKNOWN

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.A-1B
Geotechnical Map - Eastern Portion

**Geologic Conditions**

The project site is located on the north flank of the Santa Monica Mountains. These mountains are composed mainly of Tertiary sedimentary and volcanic rocks on a core of Mesozoic crystalline basement rock. The site is underlain by a sequence of northerly dipping Miocene volcanic rocks (Conejo Volcanics) and minor sedimentary rock of the Modelo Formation. The bedrock is mantled with Quaternary/Holocene terrace deposits, valley fill, alluvium, colluvium, artificial fill, and locally, talus.

In approximate order of deposition, from oldest to youngest, the following bedrock and surficial units have been mapped on or near the site:

***Conejo Volcanics and Andesite Agglomerate (Map Units: Tcb, Tcm)***

Several different types of volcanic rock assigned to this middle Miocene-aged formation have been identified on the site. The sequence is virtually all extrusive and composed mainly of basalt/andesite flows (Tcb), flow breccia, and agglomerate (Tca).

Where observed in outcrops, artificial cuts, and exploratory excavations, the rock is generally well-indurated and hard below a weathered "corona" of several to tens of feet thick. Locally, very hard outcrops are present at the surface as isolated knobs and as discrete beds a few tens of feet thick. Andesite flows mainly account for the most resistant beds. In summary, the visually striking terrain owes its existence to the resistant volcanic bedrock.

Bedding features within the Conjeo Volcanics are principally flow boundaries. These vary from well-developed and planar for short distances to poorly developed and undulatory. In most exploratory excavations, bedding was not readily apparent because of either the massiveness of the rock or because the excavating equipment could not penetrate to sufficient depths to identify planar bedding structures.

***Valley Fill (Qvf)***

This unit is composed of unconsolidated to consolidated clayey sands with some gravel, cobbles, and occasional boulders. These deposits occur above the modern valley floor in the central and south areas of the project site and are interpreted to be remnants of a rather extensive alluvial fill deposited during the Pleistocene. They are characterized by broad, relatively flat, dissected "caps" on several of the lower ridges. Where observed, these deposits contain far fewer boulders than other surficial deposits; suggesting a low energy depositional environment unable to transport large boulders, such as a low-gradient valley.

***Terrace Deposits (Qt)***

In the southeastern portion of the property near trench T-74 (see Figure III.A-1B), thin, very hard, veneers of cobbly material mantle the bedrock. They are surmised as being either remnant upstream deposits coeval with the valley fill, relict paleosols, or combinations thereof.

***Alluvium (Qal)***

Later Quaternary and Holocene stream-deposited sediments commonly occur in valleys and swales. Based upon observation of numerous exploratory trenches excavated into these materials, they are composed mainly of poorly consolidated mixtures of sand, silt, clay, and numerous large boulders. Where encountered, alluvium averages about 7 to 10 feet deep, but may be locally deeper, particularly at Medea Creek.

***Colluvium (Qcol)***

Bouldery, loose, soil-like materials that have crept or been washed short distances downslope occupy most draws and slope flanks. Such deposits vary from 4 to 15 feet deep, where observed. Because of the small scale map inherent to the present level of study, only the surmised larger deposits are shown on Figures III.A-1A and III.A-1B.

***Artificial Fill (af)***

Several substantial deposits of artificial fill exist on or near the site. The largest accumulation is within the west central portion of the site near borings B-5 through B-7 and B-101 through B-103 and B-111 (see Figure III.A-1A). Boring B-6 encountered about 25 feet of canyon fill. The canyon fill, however, has been an active disposal and borrow area, thus the depth of fill has increased and decreased over the past several decades. Research regarding the site's natural topography including review of prior USGS maps has been inconclusive due to the historical nature of the prior disposal and borrow area. Borings B-101 through B-103 and B-112 indicate recent depths of fill on the order of 30+ feet. Field observations, measured densities, and consolidation tests of undisturbed samples all indicate this fill is not compacted, nor placed on suitable bearing material. It is of poor quality and may contain large rocks.

Similar fill deposits occupy the surfaces of two partly graded knobs on the east side of Kanan Road, about opposite the aforementioned fill; although apparently neither is as extensive nor as deep, they also are of poor quality. Based on the backhoe trenches and recent borings (B-112 for example), this fill is of the order of 15 feet deep.

Fill to several (8±) feet thick exists near in the northwest part of the site (see trenches T-22 through T-28, Figure III.A-1A). This fill is the result of the grading of several pads. It is uncompacted and rests on porous colluvium/soil.

Road fill embankments placed across canyons and draws during grading for Kanan and Cornell Roads are present at several places adjacent to the subject property. These fills vary up to about 40 feet thick.

**Mass Wasting**

No landslides have been mapped on the project site. Previous field work suggested possible, but unlikely, landslides north of the project site (trenches T-23 and T-24 within the City of Agoura Hills) and near the Drainage B canyon (in the southeast portion of the project site). However, backhoe trenches as well as the presence of undisplaced marker beds across the areas of concern, revealed such features to be the result of differential weathering. Occasional, small slumps exist locally.

In general, the strength of the Conejo Volcanic bedrock, combined with the relative steep dips of bedding within the rock and generally shallow soil cover, provide for relatively stable slopes that are not particularly susceptible to landsliding. Landslides are thus uncommon locally.

Talus and occasional loose boulders occur on some onsite or superjacent natural slopes, particularly easterly superjacent to Cornell Road.

***Debris Flow Potential***

The principal natural slopes with debris flow potential occur on the west side of Kanan Road. These slopes rise to as much as about 300 feet above proposed Lots 14 to 28. Slope ratios vary from about 1 1/2 : 1 to 3 : 1 with local steeper and gentler elements. In general, the higher slopes are "broken" by a series of east to northeast-draining ravines/canyons that have been carved out along bedding. These, in turn, allow for the capture and concentration of the major part of any debris generated from the major slopes, except below relatively narrow interfluves. The fluves that are anticipated to capture and debouch the most debris are superjacent to Lot 15, Lot 17, and Lot 22 west of Kanan Road. These are drainages capable of intercepting and collecting debris evacuated from the high natural slopes. Unusual geological conditions such as thick colluvium and plentiful landslides are not a consideration.

The estimated limits of colluvium composed of native soil and rock debris are plotted on Figures III.A-1A and III.A-1B. These deposits occupy gentle swales at the foot and toe of the subject natural slopes. Subsurface investigations at the foot-slopes identified generally thin colluvial deposits of one-half to less than five feet thick, with most less than two feet thick. Most of the upper reaches of the subject slopes are devoid of large deposits subject to soil slip and/or debris flow.

The bedrock in general and the agglomerate in particular produce plentiful boulders on anti-dip slopes. General areas of boulders are shown on Figures III.A-1A and III.A-1B.

### Engineering Characteristics

#### *Compressible and/or Collapsible Soils*

The sinking or settlement of a structure, compacted fill or other imposed load is usually the result of compaction or consolidation of the underlying soil. This may result where materials possess a low relative density and/or voids that collapse upon loading and/or saturation. Valley fill, terrace deposits, alluvium, colluvium and artificial fill areas on-site generally consist of potentially compressible and/or collapsible soils. As indicated in the above discussion, such soils can be found in the alluvial valley bottoms and along the sloping hillsides adjacent to drainage courses.

#### *Soil Expansion Potential*

The onsite materials are considered to possess potential expansion in the "very low" to "high" ranges.

#### *Chemical Analyses*

Preliminary chemical testing of the onsite soil samples indicate that these materials contain "negligible" amounts of soluble sulfates. Testing also indicated these materials are: "moderately" to "severely" corrosive toward onsite ferrous improvements.

## ENVIRONMENTAL IMPACTS

### Thresholds of Significance

In accordance with Appendix G to the State CEQA Guidelines, the proposed project could have a significant environmental impact if it would:

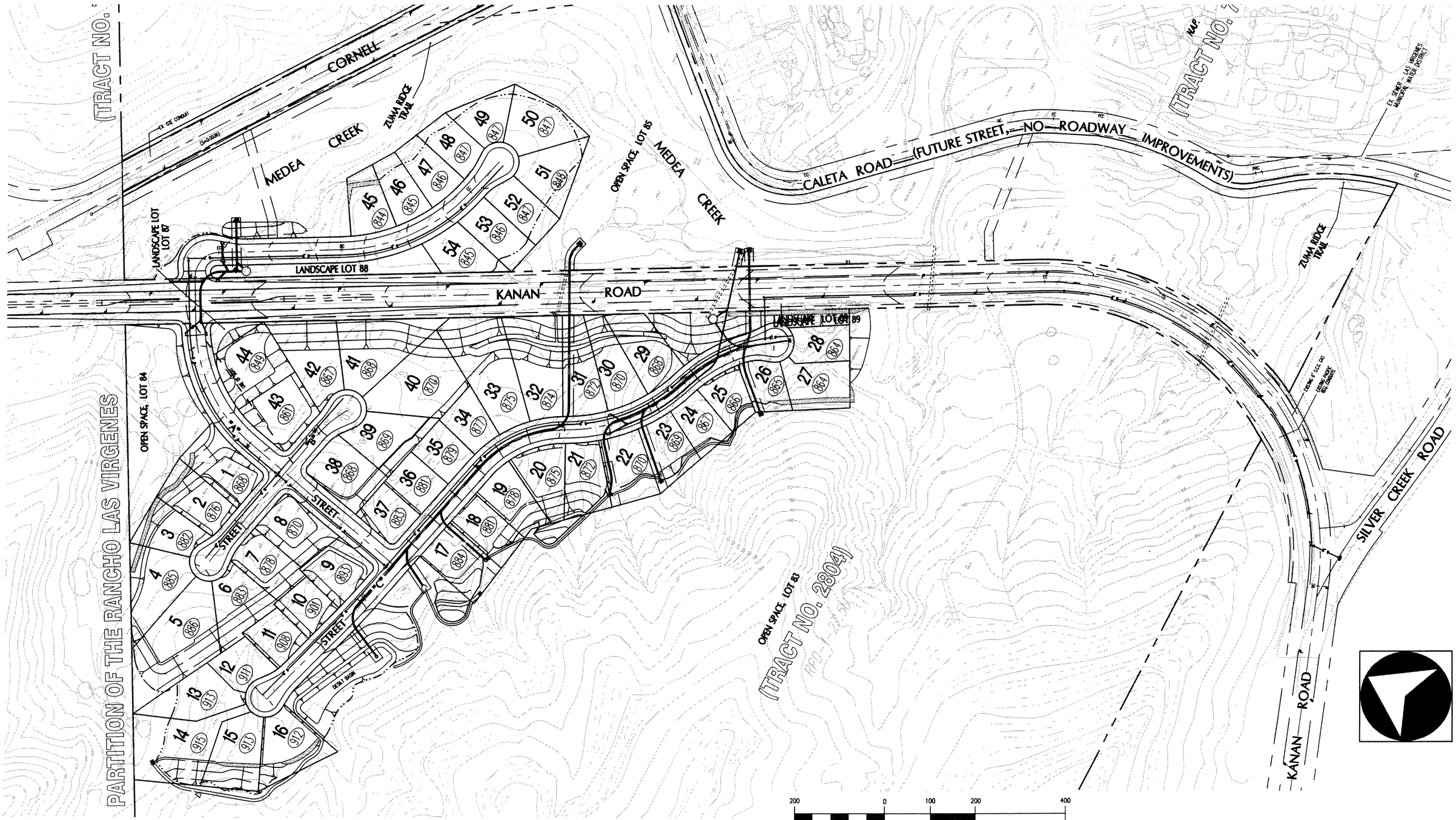
- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides.
- Result in substantial soil erosion or the loss of topsoil.
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.

- Be located on expansive soil, as defined in Table 18-1-B of the California Building Code (2001), creating substantial risks to life or property.

**Proposed Project Grading**

Site grading is required to prepare the proposed home building sites for future construction. Grading is also an initial step before construction of private roads and driveways, drainage improvements, and installation of utilities. Site preparation plans propose the use of conventional cut and fill grading techniques, as well as the construction of crib-type retaining walls. For the most part, proposed residences are to be clustered on the flatter portions of the site bordering Kanan and Cornell Roads. In total, 48.6 acres (approximately 15 percent of the project site) would be altered by the proposed grading plan. Of this total area, approximately 10.2 acres have previously been disturbed by earlier activities. Therefore, the project's grading plan would disturb only 38.4 acres of previously undisturbed natural areas. Figures III.A-2A and III.A-2B present the proposed grading plan, while Figure III.A-3 indicates proposed areas for cut and fill.

In terms of earth movement volume, the grading plan requires the excavation of 498,421 cubic yards of earth. In addition, artificial fill exists on the project site, particularly in the northwestern portion of the property, which must be removed and recompacted (i.e. remedial grading). No off-site export or import of fill material is expected.




Source: Wagner Halladay, Inc., June 2004

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.A-2A
Grading Plan - Westerly Portion

OPEN SPACE, LOT 86
(TRACT NO. 2804)

NOT A PART

NOT A PART

NOT A PART

EXIST. 4" GAS

EXIST. G.T.E. CONDUIT

EXIST. 4" S.C.G. GAS

ROAD

ROADWAY IMPROVEMENTS

62 (926)
63 (926)
64 (926)
61 (925)
65 (925)
60 (924)
59 (922)
58 (912)
57 (904)
56 (896)
55 (896)
77 (915)
78 (896)
79 (882)
80 (892)
81 (902)
76 (927)
75 (933)
74 (938)
73 (938)
72 (935)
71 (935)
70 (925)
69 (920)
68 (916)
67 (920)
66 (930)

STREET "C" PRIVATE AND FUTURE

STREET "E" PRIVATE AND FUTURE

STREET "F" PRIVATE AND FUTURE

STREET "D" PRIVATE AND FUTURE

STREET "A"

FIRE STATION NAP

LOT 91 PRIVATE AND FUTURE STREET PURPOSES

LANDSCAPE LOT 90

GATED ENTRY AND EXIT

64' DIAMETER TURN AROUND AREA

PROPOSED ROADWAY WIDENING FOR ACCELERATION AND DECELERATION LANES

PROPOSED V12 SEWER

N.A.P.
(TRACT NO. 7202)

ZUMA RIDGE TRAIL

EX. SEWER - LAS VIRGENES MUNICIPAL WATER DISTRICT

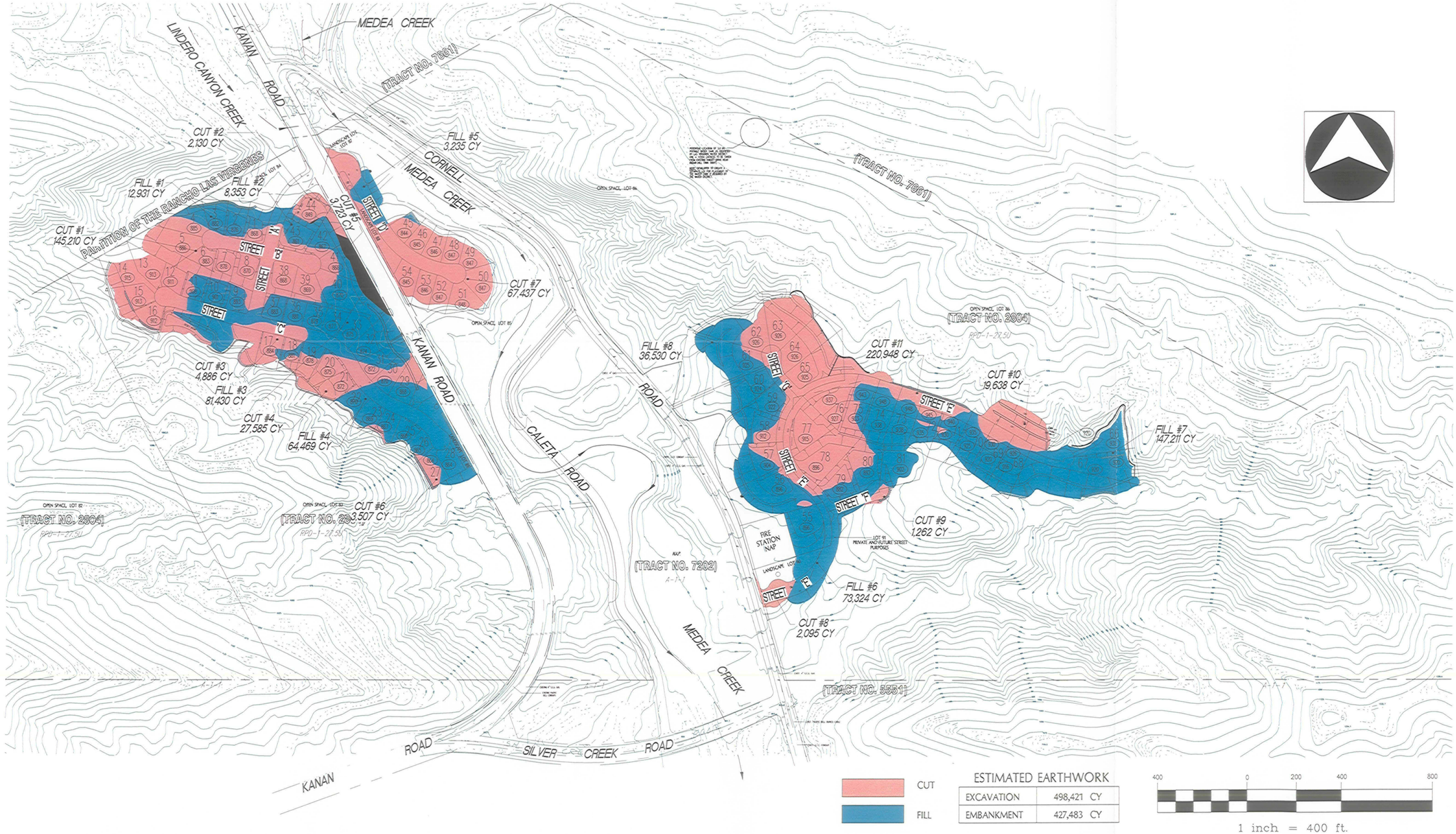
200 0 100 200 400

1 inch = 200 ft.

Source: Wagner Halladay, Inc., June 2004

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.A-2B
Grading Plan - Easterly Portion




Source: Wagner Halladay, Inc., June 2004

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.A-3
Cut and Fill Plan

**Slope Stability**

Proposed cut slopes are planned for slope ratios no steeper than 1.5 to 1 (horizontal to vertical) and planned fill slopes are no steeper than 2:1, with appropriate drainage devices. The highest designed on-site cut slope is a 70-foot southerly facing slope (located east of Cornell Road northerly of Lots 68 through 70). The area of this cut slope is underlain by bedrock classified as the basalt member of the Conejo Volcanics, and the cut slope is situated in a favorable direction in relation to geologic structure. Gross stability calculations for the cut slope exceed the minimum, code required factors of safety. Therefore, this cut slope is considered acceptable from a geotechnical/geologic viewpoint.

Fill slopes, when properly constructed at a slope ratio of 2:1 (horizontal to vertical) are considered to be grossly stable. The highest designed 2:1 fill slope (located on the east side of Cornell Road, below Lots 61 and 62) is roughly 65 feet high. Gross stability calculations (see Appendix A-1) indicate factors of safety in excess of the County of Los Angeles minimums.

Much of the southwest margin of the development from about Lot 27 on the south to Lot 14 on the north, as well as the north side of Street "E" east of Cornell Road, would be adjacent to ascending natural slopes. These natural slopes are considered grossly stable, as indicated in Appendix A-2.

**Project Impacts**

Based upon the field investigations, laboratory tests, and geotechnical analyses, and review of the background reports referenced in the Appendices, the consulting geotechnical engineer has concluded that development of the subject property is feasible from a geotechnical viewpoint. According to the consulting geotechnical engineer, much of the proposed plan is compatible with the indicated geologic and soils engineering conditions and may be developed as planned with conventional cut and fill procedures. Areas where unusual or adverse geologic/geotechnical conditions exist have been identified and the consulting geotechnical engineer has made recommendations intended to result in a safe and stable residential development.

Briefly, the consulting geotechnical engineer concludes that the proposed building site would be free from the detrimental effects associated with landsliding, settlement and slippage, provided the grading construction is performed in an acceptable manner conforming to the building Code requirements and recommendation contained in the geotechnical reports. Similarly, at the completion of grading, the proposed building and grading would not have an adverse effect on the geologic stability of neighboring off-site properties.

The following discussions evaluate the project's consistency with the aforementioned thresholds of significance:

***Impacts from Landslides***

As discussed above, no landslides have been mapped on the project site and the Conejo Volcanic bedrock is not particularly susceptible to landsliding. Therefore, the proposed project would not be expected to expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides. Impacts associated with landsliding would be less than significant.

***Impacts from Debris Flows***

Portions of the project site are subject to debris flows that tend to occur in draws (hollows, swales), because of the concentrated accumulations of surficial materials and concentration (or channeling) of runoff during major storms. This is a potentially significant impact and mitigation is required. The Supplemental Geotechnical Investigation (May 15, 2000) indicates that among the methods of debris flow mitigation most suitable for the project site is the possible use of J-walls, catchment fills and/or impact walls. The Supplemental Geotechnical Investigation concludes that although some debris production, particularly after burns, may be anticipated, remedial methods are available to adequately and feasibly reduce hazards below the subject natural slopes.

***Impacts from Boulder Roll***

Portions of the project site are subject to boulder roll, particularly during earthquakes or heavy storms. Figures III.A-1A and III.A-1B indicate the natural slopes of concern. This is a potentially significant impact and mitigation is required. As mitigation, the Supplemental Geotechnical Investigation (May 15, 2000) recommends that catchment fences founded in bedrock should be placed strategically on the natural slopes. It should be noted that the catchment fences are not intended to mitigate debris flow in channels or swales, but solely for boulder roll protection.

***Impacts from Unstable Geologic Units***

Onsite earth materials, such as alluvial/colluvial soils, artificial fill, and weathered rock, are unsuitable for development and must be removed prior to construction. Anticipated depths of alluvial removals are indicated on Figures III.A-1A and III.A-1B and range from a few feet to about 10 to 15 feet. Depths of fill would vary from a few feet along unimproved roads to depths on the order of 25 to greater than 35 feet in the area of the existing canyon fill west of Kanan Road, near Lots 9, 10, 17, 18, 19, 32-37 and 40. It should be noted that part of this fill would be removed as planned cut. Also

planned cut would remove uncompacted fill on the two mesas between Kanan and Cornell Roads, and in the vicinity of a proposed retention structure at Boring B-105. The Conejo Volcanics are mantled by soil and exhibit a weathered profile that is approximately 0 to 3 feet thick. All such compressible earth materials are to be removed from areas planned to receive fill or where exposed at final grade and replaced as compacted fill.

While the exact extent of removal would be determined in the field during grading when observation and evaluation can be performed by the soils engineer and/or engineering geologist, all such grading must be conducted in accordance with the requirements of the Los Angeles County Grading Ordinance. Removal and recompaction of compressible materials in accordance with the Los Angeles County Grading Ordinance would not be expected to result in on- or offsite landslide, lateral spreading, subsidence, liquefaction or collapse. Therefore, project impacts associated with unstable geologic units or soil would be less than significant.

***Impacts from Soil Erosion or Loss of Topsoil***

The graded and natural areas of the proposed project would be subject to erosion and sedimentation during and following proposed grading. The Los Angeles County Grading Ordinance, as well as the provisions of the Federal Clean Water Act regulations (see Section III.E, Water Quality) requires that erosion be controlled and minimized through the use of Best Management Practices, and appropriate flood and storm drainage control systems. Implementation of the proposed project in compliance with those codes and regulations would assure that the project would not result in substantial soil erosion or loss of topsoil. Therefore, impacts associated with soil erosion and loss of topsoil would be less than significant.

***Impacts from Expansive Soils***

According to the consulting geotechnical engineer, it is anticipated that the majority of onsite soils would possess "low" to "medium" expansion potential when tested in accordance with UBC Standard 18-2 and classified in accordance with UBC Table 18-1-B. As discussed above, a significant impact would occur if the proposed project were located on expansive soils, as defined in Table 18-1-B of the California Building Code (2001), such that there would be substantial risks to life or property. The geotechnical report (May 15, 2000) recommends the use of post-tensioned slab-on-grade foundations on lots where soils with "medium" or higher expansion potential occur and/or where the potential for differential movement relating to consolidation exists. The report concludes that the project would be free from the hazards associated with landsliding, settlement and slippage if grading construction is performed in accordance with applicable Code requirements and the recommendations of the geotechnical reports. Therefore, impacts associated with expansive soils would be less than significant.

## SIGNIFICANCE OF IMPACTS BEFORE MITIGATION

The proposed project has the potential to expose people or structures to substantial adverse effects, including the risk of loss, injury, or death involving debris flows and boulder roll. These are significant impacts and mitigation is required.

The proposed project would not:

- result in substantial soil erosion or the loss of topsoil.
- be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.
- be located on expansive soil, as defined in Table 18-1-B of the California Building Code (2001), creating substantial risks to life or property.

## MITIGATION MEASURES

The following measures are recommended to reduce proposed project impacts to less than significant levels.

A-1 All grading activities shall be in compliance with specific recommendations and requirements provided in a comprehensive geotechnical report prepared specifically for the proposed project, including provisions for excavation, cut and fill slopes, and the correction of potential geologic hazards, subject to approval by the Los Angeles County Department of Public Works and other responsible agencies.

A-2 Prior to the issuance of grading permits by the Los Angeles County Department of Public Works, the consulting geologist and/or soils engineer shall review and approve the detailed grading plans approved by the Department of Public Works. This approval shall be conferred by signature on the plans which clearly indicate that the geologist and/or soils engineer have reviewed the plans prepared by the design engineer and that the plans include the recommendations contained in the geotechnical report.

A-3 The project shall be constructed in compliance with all applicable provisions of the County of Los Angeles County Grading Ordinance, and the requirements of the Los Angeles County Department of Public Works and other responsible agencies.

A-4 Stability analyses of proposed graded slopes shall be performed as part of the preliminary geotechnical reports and grading plan reviews.

A-5 Grading shall be scheduled in accordance with the Los Angeles County Grading Ordinance and the requirements of the Los Angeles County Department of Public Works. However, the grading schedule shall be coordinated by the project grading contractor to minimize the unsupported exposure time of temporary backcuts created during landslide or buttress and stabilization fill construction as well as other unsuitable soil removals. Once started, temporary excavations and subsequent fill operations should be maintained to completion without intervening delays imposed by avoidable circumstances. Grading should be planned to avoid exposing at or near grade temporary backcut excavations through non-work periods. Where improvements (either on or off-site) may be affected by temporary instability, further restrictions such as slot cutting, extending work day and/or weekend schedules or other requirements considered critical to serving the specific circumstances shall be imposed.

A-6 Design and construction of conventional retaining walls, crib-type and/or gabion-type, shall be in conformance with the recommendations of the wall manufacturers, consulting geotechnical engineer, and the requirements of the Los Angeles County Department of Public Works.

A-7 Compressible soils and weathered bedrock in areas to be developed shall be removed and recompacted, except where further detailed engineering studies indicate such materials may be left in place, or where structural setbacks are provided to the satisfaction of the Los Angeles County Department of Public Works.

A-8 Specifications for: protection from debris flows and boulder roll, backfill, retaining walls, foundations, reinforcement and any other engineering aspect related to project development shall be subject to requirements and approval by the Los Angeles County Department of Public Works, and any other responsible agency.

A-9 Prior to commencement of grading, a qualified geotechnical engineer and engineering geologist shall be employed for the purpose of observing earthwork procedures and testing the fills for conformance to the recommendations of the Los Angeles County Department of Public Works, approved grading plans, applicable grading codes, and the geotechnical report(s) approved to the satisfaction of the Department of Public Works. If, in the opinion of the geotechnical consultant, unsatisfactory conditions (e.g., questionable weather, excessive oversize rock, or deleterious material) result in a quality of work substandard to that required under specifications of the geotechnical reports and the requirements of the Los Angeles County Department of Public Works, the geotechnical consultant shall be empowered to stop construction until conditions are rectified.

A-10 During construction, all grading shall be carefully observed, mapped and tested by the licensed engineering geologist and/or soils engineer. All grading shall be performed under the supervision of a licensed engineering geologist and/or soils engineer in accordance with the applicable provisions of the Los Angeles County Grading Ordinance, and to the satisfaction of the Los Angeles County Department of Public Works.

A-11 On-site truck staging areas shall be subject to approval by the Los Angeles County Department of Public Works. No staging of haul trucks shall be permitted on either Kanan or Cornell Roads without prior approval of the Department of Public Works. Possible on-site truck staging areas include the 10.2 acres of previously disturbed land on the west side of Kanan Road.

A-12 Barriers and warning signs shall be employed where appropriate to maintain traffic and pedestrian safety during grading operations.

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

Implementation of the recommended mitigation measures, which address potentially hazardous geologic and soils conditions at the project site, would reduce grading-related project impacts to less-than-significant levels.

## CUMULATIVE IMPACTS

Development of the proposed project in conjunction with the related projects listed in Section II.C would result in further grading/landform alteration in this portion of the Santa Monica Mountains. Most of the related projects are located far enough away from the proposed project such that there would be no potential to combine with the proposed project to cumulatively expose people or structures to hazardous geotechnical conditions. However, two related projects (No.6, Creekside - Retail Center; and No. 10, Ted Moore Agoura Village) are located in close proximity to the proposed project. Nevertheless, no significant cumulative impacts related to geotechnical hazards would be expected for the following reasons. The proposed project would not be contiguous with these two related projects and there would be no combining of graded areas. Also, since there would be open space separating the proposed projects from the related projects, it is unlikely that grading activities on the related project sites could adversely affect the proposed project. Additionally, it can be expected that potential geotechnical hazards posed by the related projects would be identified and mitigated through the development review process, including the development of grading and construction plans in accordance with the applicable grading and building ordinances. For these reasons, cumulative impacts associated with geotechnical hazards would be less than significant.

# III. ENVIRONMENTAL IMPACT ANALYSIS
# B. SEISMICITY

## ENVIRONMENTAL SETTING

In California, the California Division of Mines (CDMG) categorizes geologic faults in regards to the capability of generating earth movement as active, potentially active and inactive. Active faults show evidence of surface displacement within the last approximately 11,000 years (Holocene-age). Potentially active faults show evidence of displacement within the last approximately 1.6 million years (Quaternary age). Faults showing no evidence of displacement within the last 1.6 million years are generally considered inactive.

Under the Alquist-Priolo Special Studies Zone Act of 1972, the State Geologist is required to delineate "special studies zones" along known active faults. Cities or counties affected by the zones must regulate development within the designated zones. Building permits for sites within State-designated zones must be withheld until geologic investigations demonstrate that a proposed development is not threatened by surface displacement from future faulting.

The Alquist-Priolo Special Studies Zone Act defines active and potentially active faults utilizing the same age criteria as used by the CDMG, above. However, only those potentially active faults that have a relatively high potential for ground rupture are included as State designated fault zones. Therefore, not all faults termed "potentially active" by the CDMG are zoned under the Alquist-Priolo Act. The project site is not within any Alquist-Priolo Special Studies Zone. No active or potentially active faults have been mapped on or near the site. Some evidence of small faults were noted during the site investigation in some road cuts north of the study area, but were of limited width and could not be traced beyond the road cuts.

The eastern half of the project site lies within an area that has been mapped as part of the state's Urban Seismic Hazard Mapping Act (Official Seismic Hazards Zone of the Calabasas Quadrangle).[1] While the site is not in a designated zone subject to tectonic ground rupture along known active faults, parts of the site are within potential liquefaction and potential seismically-induced landslide study areas. As such, the State mandates studies/investigations of the potential for the occurrence of the aforementioned

---

[1] *This map, prepared by the California Department of Conservation's Division of Mines and Geology, became official on February 1, 1998. The official map only covers the Calabasas Quadrangle; the western half of the project site is covered by the Thousand Oaks quadrangle, which has not yet been legally zoned. However, according to the Department of Conservation, the geologic conditions for landslides in both the western and eastern parts of the project site are similar.*

secondary seismic hazards, together with the appropriate analysis of their impact and mitigation methodology.

Because the site is located in a seismically active region, numerous active faults that hypothetically could generate moderate to large earthquakes have been mapped within about 50 miles of the project area. Several known active faults are sufficiently close to the site to dominate any deterministic seismic hazards assessment.[2] Those faults, listed in Table III.B-1, possess both proximity and the potential to give rise to large, long-duration earthquakes that could induce strong ground acceleration at the project site. Although large earthquakes could occur along faults other than those listed, the spatial distribution of the listed faults seemingly permits a representative assessment of regional seismicity.

Two kinds of faults are represented in Table III.B-1: (1) northwest-trending, right-lateral, strike-slip faults that occur in a belt that extends from the Mojave Desert on the east to beyond the Channel Islands on the west; and (2) reverse or thrust faults produced by ongoing regional compression resultant from convergence of the North American and Pacific plates in Southern California. The San Andreas, Whittier-Elsinore, San Jacinto, San Gabriel, and Newport-Inglewood faults typify the former, whereas the other faults listed in the Table III.B-1 are regional examples of the latter. The nearest known active faults are the system of reverse faults that have elevated the Santa Monica, Santa Susana, and San Gabriel Mountains (all major components of the Transverse Ranges). These particular faults proximal to the project site include the Malibu Coast, Anacapa-Santa Monica, Verdugo, San Fernando faults, and the blind thrust fault that gave rise to the 1994 Northridge earthquake.

The frontal fault systems (i.e. the above identified reverse or thrust faults) are composed of numerous individual fault strands generally about 10 to 20 miles long; some of which reach the surface and some of which do not ("blind thrusts"). Some investigators infer that these faults are merely ramps tied to a deep decollement, possibly associated with the "Elysian Park Thrust".

**Discussion of Deterministic Methodology**

Predictions of times of occurrence, locations and magnitudes of, as well as ground response to, future earthquakes are tenuous and subjective. Only probabilities and/or possibilities can be assessed on the basis of the existing geologic data, limited historical and seismic records; and empirical relationships

---

[2] *The deterministic method assigns a maximum earthquake to a fault derived from formulas that correlate the length of the fault trace to the theoretical maximum magnitude earthquake. Two levels of earthquakes (maximum probable and maximum credible) are postulated for regional faults. The maximum credible earthquake is the theoretical maximum event that could occur along a fault. The maximum probable earthquake is the maximum earthquake that may reasonably be expected within a 100-year period.*

**Table III.B-1**
**Maximum Credible/Probable Earthquakes**

| Fault Name | Approx. Distance Miles (Km) | Length of Nearest Segment (Miles) | Length of Multiple Segments (Miles) | Maximum Credible Event | | Maximum Probable Event | |
|---|---|---|---|---|---|---|---|
| | | | | Maximum Credible Magnitude | Maximum Median Peak Site Acceleration (g) | Maximum Probable Magnitude | Maximum Median Peak Site Acceleration (g) |
| Malibu Coast | 6.0 | 16.0 | 41.0 | 7.4 | 0.52 | 6.9 | 0.40 |
| Simi | 10.0 | 12.0 | 25.0 | 7.2 | 0.32 | 6.7 | 0.26 |
| Anacapa-Santa Monica | 10.0 | 16.0 | 41.0 | 7.4 | 0.37 | 6.9 | 0.29 |
| Northridge B.T.Z. | 14.0 | 12.0 | 25.0 | 7.2 | 0.26 | 6.7 | 0.21 |
| Santa Susana | 15.0 | 15.0 | 15.0 | 6.9 | 0.21 | 6.9 | 0.21 |
| Oak Ridge | 17.0 | 16.0 | 39.0 | 7.4 | 0.25 | 6.9 | 0.19 |
| San Fernando | 18.0 | 9.3 | 24.0 | 7.1 | 0.21 | 6.6. | 0.16 |
| Holser | 21.0 | 6.0 | 12.0 | 6.7 | 0.15 | 6.3 | 0.12 |
| Verdugo | 22.0 | 12.5 | 20.0 | 7.0 | 0.17 | 6.8 | 0.15 |
| San Cayetano | 23.0 | 20.0 | 31.0 | 7.3 | 0.19 | 7.0 | 0.17 |
| San Gabriel | 23.0 | 9.3 | 17.0 | 6.5 | 0.13 | 6.2 | 0.11 |
| Newport-Inglewood | 24.0 | 18.0 | 45.0 | 7.1 | 0.17 | 6.6 | 0.13 |
| North L.A. Thrust Belt | 30.0 | 8.0 | 16.0 | 6.9 | 0.13 | 6.5 | 0.10 |
| Pine Mountain | 34.0 | 23.0 | 23.0 | 7.1 | 0.13 | 7.1 | 0.13 |
| Santa Ynez | 34.0 | 29.0 | 81.0 | 7.4 | 0.15 | 6.8 | 0.11 |
| San Andreas | 42.0 | 211.0 | 400.0 | 8.4 | 0.20 | 8.0 | 0.17 |
| Garlock | 48.0 | 60.0 | 160.0 | 7.8 | 0.14 | 7.3 | 0.11 |

*Source: Pacific Soils Engineering, Inc.*

among fault lengths, distances between the faults and the project site, and ground acceleration. However, enough seismic events of magnitude 6.0 or greater have occurred regionally to indicate that such events could recur within the life of the subject development. Table III.B-1 presents hypothetical maximum credible and maximum probable earthquakes and associated free-field ground acceleration for local fault systems.

By definition, the maximum credible earthquake (MCE) is the maximum earthquake that appears to be reasonably capable of occurring under the conditions of the presently known geological framework. A maximum probable earthquake (MPE) is the maximum earthquake that appears to be reasonably expectable within a 100-year period.

Table III.B-1 considers slip along single fault segments as representative of the maximum probable earthquakes (MPE), and slip along two or more contiguous faults as representative of cascade or maximum credible earthquakes (MCE). A cascade event is when seismogenic slip migrates from one fault segment to others, thus increasing the length of fault rupture and the magnitude of the accompanying earthquake. Further discussion of the deterministic methodology is contained in the appendices of the above referenced Pacific Soils Engineering, Inc. geotechnical report, which is included as Technical Appendix A of this EIR.

The results of the deterministic approach are presented in Table III.B-1, Maximum Credible/Probable Earthquakes. According to Table III.B-1, the maximum credible earthquake resulting in the highest peak horizontal acceleration at the site would be a magnitude 7.4 event on the Malibu Coast fault. Such an event would be expected to generate a maximum median peak horizontal acceleration on the order of 0.52g. The maximum probable earthquake resulting in the highest probable peak horizontal acceleration at the project site would be a magnitude 6.9 event on the Malibu Coast fault. Such an event would be expected to generate a maximum median peak horizontal acceleration on the order of 0.40g.

**Liquefaction**

Seismic agitation of loose, saturated sands and silty sands can result in a buildup of pore water pressure. If these pore water pressures are sufficient to overcome overburden stresses, a temporary quick condition know as liquefaction can result.

**Surface Rupture**

Surface rupture is a break in the ground surface during, or as a consequence of, seismic activity. The potential for surface rupture on the project site is considered low due to the lack of active faults at the site.

## ENVIRONMENTAL IMPACTS

### Thresholds of Significance

In accordance with Appendix G to the CEQA Guidelines, the proposed project could have a significant environmental impact if it would:

(a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

(i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault.

(ii) Strong seismic ground shaking.

(b) Seismic-related ground failure, including liquefaction.

### Strong Ground Shaking Impacts

Movement upon known active and potentially active faults in proximity to the site could periodically cause moderate to high intensity ground shaking on the subject property. It is reasonable to assume that the proposed development could, at least once during its lifetime, experience a strong earthquake. However, ground motion on the site should be no more severe than that at other existing developments in the vicinity. Implementation of the recommendations contained in the project's geotechnical reports and compliance with the Los Angeles County Building Code would reduce impacts from strong seismic ground shaking to a less than significant level. Therefore, no further mitigation is required.

### Ground Rupture Impacts

The project site is not in an Alquist Priolo Special Studies Zone, as designated by the State of California; and active faults have not been mapped on-site. The potential for tectonic ground rupture during the life of the proposed development is therefore considered low. Implementation of the recommendations contained in the project's geotechnical reports and compliance with the Los Angeles County Building Code would reduce impacts from strong seismic ground shaking to a less than significant level. Therefore, impacts from ground rupture are expected to be less than significant. No further mitigation is required.

**Slope Stability Impacts**

Potential slope stability concerns, including seismically induced debris flows and boulder roll, and recommended mitigation measures are addressed in Section III.A., Geotechnical Hazards - Grading.

As discussed above, some evidence of small faults were noted during the site investigation in some road cuts, but were of limited width and could not be traced beyond the road cuts north of the site. It is anticipated that such small faults that may exist on-site would not significantly impact future development; although such faults may affect cut slope stability or potential ground water transmission. Potential cut slope instability due to such faults can be mitigated by the use of stability fills, as recommended by the consulting geotechnical engineer. Implementation of the recommendations contained in the project's geotechnical reports and compliance with the Los Angeles County Building Code would reduce slope stability impacts to a less than significant level. Therefore, no further mitigation is required.

**Liquefaction**

Liquefaction potential of the project site after grading is considered remote owing to: (1) the density of the underlying bedrock (i.e., Conejo Volcanics), and (2) because loose soils and alluvium, which may be prone to liquefaction, would be removed and replace with drained compacted fill materials in structural fill areas. Therefore, for most of the project site, impacts associated with liquefaction potential would be less than significant.

A possible exception is near Lots 32, 33, 40, 41, 42 and 44 where a proposed fill slope would abut existing Kanan Road fill. In order to mitigate possible liquefaction of the road fill and the alluvium that may underlie it, the project's geotechnical report recommends that the proposed fill be keyed into bedrock, and building setbacks be imposed. Similarly, a wall and a fill is planned adjacent to Kanan Road fill near Lots 26 through 28. To mitigate the potential effects of liquefaction in that location, the project's geotechnical report recommends that both the wall and the proposed fill be founded in bedrock. Project implementation of these recommendations would reduce liquefaction-related hazards to a less than significant level. Therefore, no further mitigation is required.

## SIGNIFICANCE OF IMPACTS BEFORE MITIGATION

Implementation of recommendations contained in the project's geotechnical reports and compliance with the Los Angeles County Building Code would reduce impacts associated with strong ground shaking, ground rupture, slope stability, and liquefaction to less than significant levels.

## MITIGATION MEASURES

Project impacts associated with seismically induced hazards would be less than significant. Under CEQA, further mitigation is not required. However, the following measures are recommended to reduce further the less than significant seismic hazards:

B-1 Upon application for a building permit, the applicant/developer shall present satisfactory evidence to the Los Angeles County Department of Public Works that each proposed residence has been designed by a qualified structural engineer for strong ground shaking. Residential design shall incorporate the latest seismic engineering data, including revisions to the Los Angeles County Building Code as they are implemented.

B-2 To reduce differential settling of fill material during ground shaking, the grading contractor shall conduct grading in accordance with the Los Angeles County Building Code, the recommendations of the consulting geotechnical engineer, and the requirements of the Los Angeles County Department of Public Works and other responsible agencies.

B-3 To mitigate potential cut slope instability due to on-site faults, stability fills shall be constructed as recommended by the consulting geotechnical engineers and in accordance with the Los Angeles County Grading Ordinance and the requirements of the Los Angeles County Department of Public Works.

B-4 To mitigate the on-site liquefaction potential, the developer/grading contractor shall remove and recompact any potentially liquefiable sediments that could effect engineered structures during site grading.

B-5 In order to mitigate possible liquefaction in the vicinity of proposed Lots 32, 33, 40, 41, 42 and 44, where a proposed fill slope would abut existing Kanan Road fill, the proposed fill shall be keyed into bedrock, and building setbacks shall be imposed. The extent of the required setbacks shall be determined in the field during the preparation of the detailed grading plans.

B-6 In order to mitigate possible liquefaction in the vicinity of proposed Lots 26-28, the fill below proposed retaining wall shall be founded in bedrock.

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

Project impacts associated with seismically induced hazards would be less than significant level. Implementation of the above mitigation measures would further reduce those less than significant impacts.

## CUMULATIVE IMPACTS

Development of the proposed project would result in further exposure of persons and structures to potential seismic hazards in this portion of the Santa Monica Mountains. However, no significant cumulative impacts related to seismicity would be expected for the following reasons. The related projects listed in Section II.C are located far enough away from the proposed project such that there would be no potential to combine with the proposed project to cumulatively expose people or structures to hazardous geotechnical conditions. The proposed grading is grossly stable and meets or exceeds minimum standards for factor of safety in both static and pseudostatic (earthquake) conditions. Furthermore, the geotechnical reports for the proposed project indicate that the project site and the surrounding area are not more susceptible to seismic hazards than other locations in the region. For these reasons, cumulative impacts associated with seismic hazards would be less than significant.

# III. ENVIRONMENTAL IMPACT ANALYSIS
# C. AIR QUALITY

## ENVIRONMENTAL SETTING

### Air Quality Planning and Regulatory Environment

*Federal Agencies*

Regulatory control over air quality relative to meeting federal clean air standards rests with the U.S. Environmental Protection Agency (EPA). EPA derives its authority from the federal Clean Air Act. The federal Clean Air Act (CAA) was enacted in 1970 and extensively revised in 1977. The 1977 CAA Amendments revised the National Ambient Air Quality Standards (NAAQS) designed to protect public health and welfare. Standards were established for criteria air pollutants, $O_3$, CO, $NO_2$, $SO_2$ and total suspended particulates (TSP). In later years, the TSP standard was revised to address PM-10, and a lead standard was established. A PM-2.5 standard was added in 1997.

The 1977 CAA Amendments (CAAA) required each state to prepare a State Implementation Plan (SIP) describing its plans for attaining compliance with federal air quality goals. The 1977 CAAA also classified air basins as either "attainment" or "non-attainment" areas for each criterion air pollutant, based on whether the established standards have been achieved. The 1990 CAAAs reflect revised requirements and deadlines for attainment of NAAQS.

*State Agencies*

The California Air Resources Board (CARB) is responsible for state air quality programs. The CARB may delegate a portion of its responsibilities to local or subregional jurisdictions; however, they generally retain authority over statewide programs such as motor vehicle emission standards. Air quality monitoring, stationary source permitting and enforcement, or basinwide air quality planning are subordinated to local air pollution control districts (APCD) or air quality management districts (AQMD).

California ambient air quality standards (CAAQS) predate the establishment of federal AAQS by several years. These standards are designed to protect those people most sensitive to adverse air pollution exposure (called "sensitive receptors") such as young children, the elderly, asthmatics, or persons weakened from other disease or illness. Existing state (CAAQS) and federal AAQS are shown in Table III.C-1. CAAQS may be equal to, but are normally more stringent than the NAAQS. The CAAA of 1990 required that the EPA consider revising standards if health information warrants. Revisions to the national ozone standard and the establishment of a standard for PM-2.5 resulted from

this review process. Implementation of these standards was stayed by a decision in the U.S. Court of Appeals.

The U.S. Supreme Court overturned the lower court decision in deciding that the EPA did not require a specific mandate to revise or adopt a health-based standard. Data collection for PM-2.5 is now ongoing and attainment or non-attainment designations and plans will be adopted in coming years. California health agencies also reviewed the technical literature on PM-2.5 and found that a more stringent standard would be appropriate for health protection. A new annual state PM-2.5 standard has been adopted, and will become part of the state clean air planning process.

***South Coast Air Quality Management District Monitoring***

The South Coast Air Quality Management District (SCAQMD) is the regional agency charged with meeting state and federal air quality goals in the South Coast Air Basin (SCAB). SCAQMD operates a regional air quality monitoring network that provides information on average concentrations of those air pollutants for which state or federal agencies have established ambient air quality standards. Table III.C-2 is a six-year summary of monitoring data for the major air pollutants collected at the SCAQMD's Reseda monitoring station. This station is the nearest SCAQMD monitoring station to the project site and, among SCAQMD's current stations, is the one most representative of air quality conditions in the project area. Because there are no measurements of respirable particulate matter (PM-10) made in the western San Fernando Valley, Table III.C-2 also includes PM-10 data from the Ventura County APCD monitoring station in Thousand Oaks.

Over the last 15 years, air quality in the SCAB has improved substantially (see Table III.C-2 for Ambient Air Quality Monitoring Summary for the years 1996-2001). Violations of the State and National standards for lead have been completely eliminated. The State and National sulfur dioxide ($SO_x$) standards were met throughout the period. Second-stage smog alerts have disappeared and the number of first-stage alerts has dropped dramatically. The federal annual standard for Nitrogen Dioxide ($NO_2$) is now met almost every year as is the one-hour carbon monoxide (CO) standard. The likelihood of meeting the federal 8-hour CO standard is a realistic expectation in the not-too-distant future. No significant trend, however, can be seen over the last decade for which respirable particulates (PM-10) have been monitored.

## Table III.C-1
## Ambient Air Quality Standards

| Air Pollutant | State Standard Concentration/ Averaging Time | Federal Primary Standard Concentration/ Averaging Time | Most Relevant Effects |
|---|---|---|---|
| Ozone | 0.09 ppm, 1-hr. avg. | 0.12 ppm, 1-hr avg.<br>0.08 ppm – 8-hour avg. | (a) Short-term exposures: (1) Pulmonary function decrements and localized lung edema in humans and animals. (2) Risk to public health implied by alterations in pulmonary morphology and host defense in animals; (b) Long-term exposures: Risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronologically exposed humans; (c) Vegetation damage: (d) Property damage |
| Carbon Monoxide | 9.0 ppm, 8-hr avg.><br>20 ppm, 1-hr avg.> | 9 ppm, 8-hr avg.<br>35 ppm, 1-hr avg. | (a) Aggravation of angina pectoris and other aspects of coronary heart disease; (b) Deceased exercise tolerance in persons with peripheral vascular disease and lung disease; (c) Impairment of central nervous system functions; (d) Possible increased risk to fetuses. |
| Nitrogen Dioxide | 0.25 ppm, 1-hr avg. | 0.053 ppm, annual arithmetic mean. | (a) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; (b) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; (c) Contribution to atmospheric discoloration |
| Sulfur Dioxide | 0.04 ppm, 24-hr avg.<br>0.25 ppm, 1-hr. avg. | 0.03 ppm, annual arithmetic mean<br>0.14 ppm, 24-hr avg. | (a) Bronchoconstriction accompanied by symptoms which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in persons with asthma |
| Suspended Particulate Matter ($PM_{10}$) | 30 $\mu g/m^3$, ann. Geometric mean<br>50 $\mu g/m^3$, 24-hr avg. | 50 $\mu g/m^3$, annual arithmetic mean<br>150 $\mu g/m^3$, 24-hr avg. | (a) Excess deaths from short-term exposures and exacerbation of symptoms in sensitive patients with respiratory disease; (b) Excess seasonal declines in pulmonary function, especially in children |
| Sulfates | 25 $\mu g/m^3$, 24-hr avg. | No Federal Standard | (a) Decrease in ventilatory function; (b) Aggravation of asthmatic symptoms; (c) Aggravation of cardio-pulmonary disease; (d) Vegetation damage; (e) Degradation of visibility; (f) Property damage |
| Lead | 1.5 $\mu g/m^3$, 30-day avg. | 1.5 $\mu g/m^3$, calendar quarter> | (a) Increased body burden; (b) impairment of blood formation and nerve conduction |
| Visibility-Reducing Particles | In sufficient amount to reduce the visual range to less than 10 miles at relative humidity less than 70 percent, 8-hour average (10am-6pm) | | Visibility impairment on days when relative humidity is less than 70 percent |

**Table III.C-2**
**West San Fernando Valley Ambient Air Quality Monitoring Summary 1996-2001**
**(Days exceeding standards and maximum concentrations for criteria pollutants)**
**(Entries shown as ratios = samples exceeding standard/samples taken)**

| Pollutant/Standard | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|
| **Ozone:** | | | | | | |
| 1-hour > 0.09 ppm | 50 | 12 | 13 | 5 | 6 | 25 |
| 1-hour > 0.12 ppm | 11 | 0 | 7 | 0 | 0 | 2 |
| 8-hour ≥ 0.09 ppm | 28 | 2 | 12 | 3 | 0 | 7 |
| Max. 1-hour Conc. (ppm) | 0.21 | 0.12 | 0.16 | 0.12 | 0.11 | 0.14 |
| **Carbon Monoxide:** | | | | | | |
| 1-hour > 20.0 ppm | 0 | 0 | 0 | 0 | 0 | 0 |
| 8-hour ≥ 9.0 ppm | 0 | 2 | 1 | 0 | 2 | 0 |
| Max. 1-hr. Conc. (ppm) | 10 | 12 | 11 | 9 | 11 | 7 |
| Max. 8-hr. Conc. (ppm) | 8.9 | 9.8 | 9.3 | 7.6 | 9.8 | 6.0 |
| **Nitrogen Dioxide** | | | | | | |
| 1-hour > 0.25 ppm | 0 | 0 | 0 | 0 | 0 | 0 |
| Max. 1-hr. Conc. (ppm) | 0.16 | 0.20 | 0.14 | 0.12 | 0.11 | 0.09 |
| **Inhalable Particulates (PM-10)** | | | | | | |
| 24-hour > 50 $\mu g/m^3$ | 1/60 | 3/60 | 0/59 | 6/56 | 6/59 | 1/60 |
| 24-hour > 150 $\mu g/m^3$ (Federal Standard) | 0/60 | 0/60 | 0/59 | 0/56 | 0/59 | 0/60 |
| Max. 24-hour Conc. ($\mu g/m^3$) | 55 | 62 | 50 | 84 | 100 | 54 |
| **Ultra-Fine Particulates (PM-2.5)** | | | | | | |
| 24-Hour > 65 $\mu g/m^3$ | -- | -- | -- | 1/71 | 2/108 | 1/109 |
| Max. 24-hour Conc. ($\mu g/m^3$) | -- | -- | -- | 79 | 68 | 71 |

-- PM-2.5 monitoring initiated in 1999
*Source: SCAQMD Reseda Air Quality Monitoring Station; VCAPCD Thousand Oaks Station for PM-10*

Monitoring for ultra-fine particulate matter (PM-2.5) was initiated in the West San Fernando Valley in 1999. A total of 4 days out of 288 measurement days have exceeded the federal PM-2.5 standard. Data has not been gathered for enough time for EPA to make a "non-attainment" designation for PM-2.5, but the project vicinity does exceed the federal PM-2.5 standard on a limited number of days. The more stringent annual state PM-2.5 standard, to be phased in this year, has been exceeded in each monitoring year.

Airsheds where ambient air quality standards are exceeded are called "non-attainment" areas. If standards are met, they are designated "attainment" areas. If there is inadequate or inconclusive data to make a definitive attainment designation, they are considered "unclassified." Federal "non-attainment"

areas are considered extreme, serious, or moderate as a function of deviation from standards. The current attainment designations for the Los Angeles County portion of the SCAB are shown in Table III.C-3:

**Table III.C-3**
**Current Attainment Designations for the Los Angeles County**

| Pollutant | Avg. Time | State | Federal |
|---|---|---|---|
| Ozone | 1-hour | Nonattainment | Extreme nonattainment |
| CO | 8-hour | Attainment | Serious nonattainment |
| $NO_x$ | 1-hour + annual | Attainment | Attainment |
| PM-10 | Annual | Nonattainment | Serious Nonattainment |
| All other | -- | Attainment or unclassified | Attainment or unclassified |

**Criteria Air Pollutants**

Ozone. Ozone (O3) is not emitted directly by any major stationary or mobile air pollutant sources in SCAB. It is a derived air pollutant formed in the atmosphere through a complex series of photochemical reactions involving hydrocarbons and NOx, primarily nitrogen dioxide. Substantial O3 formation generally requires a stable atmosphere with strong sunlight.

$O_3$ is considered a pollutant of regional rather than local concern. Significant progress has been made over the past decade in reducing $O_3$ concentrations in the SCAB, but $O_3$ concentrations in the SCAB still exceed the national standards far more frequently than in any other area of the U.S. $O_3$ levels near West Hills exceeded the State standard on less than sixty days per year with less than 15 annual violations of the less stringent federal standard. The one-hour federal ozone standard was not exceeded at all in 1997 in the western San Fernando Valley for the first time ever in the Reseda SCAQMD station's monitoring history.

Carbon Monoxide. Carbon monoxide (CO) is a product of incomplete combustion emitted, along with carbon dioxide, by motor vehicles, power plants, refineries, industrial boilers, ships, aircraft, and trains. In urban areas, CO is emitted primarily by motor vehicles. CO concentrations are influenced by local meteorological conditions, primarily wind speed, topography, and atmospheric stability. Excesses of the state CO standard in the SCAB tend to occur near major motor vehicle traffic corridors when meteorological conditions allow CO to accumulate. CO standards are infrequently exceeded near the project site. The eight-hour state and federal CO standard has averaged slightly over one violation per year since 1992. The one-hour state CO standard has been met with a wide margin of safety.

Nitrogen Dioxide. Nitrogen Dioxide (NO2) is a product of high temperature combustion, emitted generally by the same sources as CO. High concentrations of NO2 cause the brown haze readily observed in urban areas during periods of heavy air pollution. Los Angeles is the last county in the

U.S. to meet the national annual NO2 standard; the standard has been met since 1992 with a very slim margin. State one-hour NO2 standards are met near the project site by a substantial margin.

Respirable Particulate Matter. Respirable particulate matter (PM-10) consists of suspended particles 10 microns in diameter or less. Particulates in the atmosphere result from natural sources, such as wind erosion and ocean spray, and from human activities. Man-made sources include many types of dust- and fume-producing industrial and agricultural operations; fuel combustion and vehicle travel; grading, excavating, demolition, and blasting for construction; and atmospheric chemical and photochemical reactions. Motor vehicle traffic is the major source of PM-10 from dust lofted by vehicular turbulence.

State PM-10 standards are exceeded at the nearest air monitoring station on an average of five percent of all measured days. The three times less stringent federal PM-10 standard has never been violated at the nearest PM-10 monitoring location.

Monitoring data are not yet available on compliance with the recently adopted (1997) federal standard for ultra-small diameter (2.5 microns or less) particulate matter called "PM-2.5." The typical PM-2.5 fraction of PM-10 is around 50 percent. If PM-2.5 is assumed to comprise one-half of maximum measured PM-10 levels, Table III.C-2 suggests that the new PM-2.5 standard is not normally exceeded in the project vicinity.

**Local Agencies**

***South Coast Air Quality Management District (SCAMQD)***

SCAQMD is required to prepare an Air Quality Management Plan (AQMP) that addresses attaining and maintaining compliance with NAAQS and SAAQS in SCAB. SCAQMD adopted a 1994 AQMP (SCAQMD and SCAG 1994) in September 1994. The 1994 AQMP contains air pollution control measures for stationary sources, and on- and off-road mobile sources. The 1994 AQMP was finally approved by EPA in 1996 as part of the State Implementation Plan (SIP).

The CAAA requires that clean air plans be updated periodically for all non-attainment areas. The California Clean Air Act (CCAA) similarly requires development and periodic revision of a plan to meet CAAQS. A revised AQMP for federal standards was prepared in February 1997. The CCAA plan update was due at the end of 1997. A revised AQMP was prepared early in 1997 designed to meet both federal and state planning requirements. It contains an attainment plan for PM-10 for the first time ever.

The timetable in the draft 1997 AQMP/SIP Revision was challenged by environmental organizations as not consistent with the 1990 CAAA. The 9th Circuit Court found for these organizations. SCAQMD thus revised the 1997 AQMP/SIP and has submitted the 1999 revisions for approval. The 1999 plan was certified as meeting the legal mandate in 2000 and is the currently adopted SCAB portion of the

SIP. An AQMP/SIP update is currently in final planning. The 2003 AQMP/SIP has been locally approved by the SCAQMD and SCAG governing boards. The plan was submitted to the CARB in July 2003 to be forwarded to EPA for its consideration. The plan contains a number of assumed emissions reductions for which complete control technology does not yet exist.

As part of the AQMP, SCAQMD structures most of its pollution control programs through its Rules and Regulations. SCAQMD's Rules and Regulations include rules that apply to project construction and operation. For a residential development such as the proposed project, few of the SCAQMD rules apply to mobile source emissions. Therefore, District rules apply mainly to construction. Applicable rules to the construction of the proposed project include Rule 401 -Visible Emissions; Rule 402 - Nuisance Emissions; and Rule 403 - Fugitive Dust.

***Southern California Association of Governments (SCAG)***

SCAG is responsible for adopting regional growth forecasts and the Regional Transportation Improvement Program (RTIP). Local governments are responsible for implementing suggested transportation and land use measures. These plans and forecasts are incorporated into SCAG's Regional Comprehensive Plan (SCAG 1994) which is thus directly linked to the AQMP. Project conformity with the regional growth forecast, as well as implementation of air quality planning measures applicable on a project-specific basis, are considered necessary conditions to support a finding of a less than significant regional air quality impact from any general development project.

General development such as the proposed project does not relate directly to the AQMP/SIP because there are no specific measures in these documents that relate directly to overall growth. The air quality plan does have transportation and land use measures designed to reduce vehicle miles traveled (VMT) and vehicle trips (VT) generated. Land use patterns that concentrate housing, employment, goods and services, recreation, etc. into a single geographic area promote VMT/VT reduction. Such patterns are considered air quality positive and thus consistent with the AQMP. Similarly, development near transportation corridors such as freeways is air quality positive, while long commutes to reach such corridors would be inconsistent with the air quality plan.

**Project Consistency with AQMP**

The proposed project relates to the AQMP through the land use and growth assumptions used to forecast automotive air pollution emissions. The SCAB AQMP is based on the designated land use for the project site contained in the Los Angeles County General Plan. The proposed project is in conformance with SCAG's regional growth forecast because it is in conformance with the Santa Monica Mountains North Area Plan, the applicable land use plan for the project site and the plan used to develop the growth forecast. To the extent that the proposed development is consistent with the growth assumptions in the general plan, it is, by inference, also consistent with the AQMP. Such consistency implies that the project would not create any significant regional air quality impacts because such

impacts have already been anticipated within the framework of the regional air quality planning process. The SCAQMD acknowledges that the AQMP is a growth-accommodating document. However, the AQMD recommends that, while AQMP-incompatibility is a source of potentially significant impact, that compatibility is not sufficient basis for a finding of a less-than-significant impact. Impact significance is therefore evaluated on a project-specific basis.

**Project Site**

The project site is located within the South Coast Air Basin (SCAB), a 6,600 square mile coastal plain bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto mountains to the north and east, and Orange County to the south. The SCAB includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties. Warm summers, mild winters, infrequent rainfall, moderate onshore daytime breezes, and moderate humidities characterize Basinwide conditions.

All seasons generally exhibit onshore flows during the day and offshore flows at night, after the land cools below the temperature of the ocean. The likelihood of strong offshore flows, including Santa Ana winds, is greater during winter than during summer.

The topography and climate of Southern California combine to promote generally human produced poor air quality in the Air Basin. The combination of low temperature inversion; meteorological conditions such as light winds, shallow vertical mixing, and extensive sunlight; and topographical features such as adjacent mountain ranges hinder dispersion of human produced air pollutants, thus facilitating poor air quality, especially in inland valleys of the basin.

**San Joaquin Valley Fever**

San Joaquin Valley Fever ("Valley Fever") is caused by the fungus Coccidioides immitis. The fungus spores are most common 8 - 10 inches below the soil surface in climates characterized by modest rainfall, mild winters and prolonged hot seasons. Although Valley Fever occurs throughout the southwestern United States, the geographical "hot spot" for the disease is in Kern County.

Within the endemic southwestern United States, there are about 100,000 infections of coccidioidimycosis annually (about the same frequency as chicken pox). [1] Of these cases, about 10 percent of people have upper respiratory infections of sufficient severity to warrant a doctor's care. In most cases of Valley Fever infection, it behaves like an extended cold that never seems to quite disappear for an extended period of time. The disease lasts 1-3 weeks, but may persist up to six weeks.

---

[1] *Neither the Los Angeles County Department of Health Services nor CalOSHA keep records on the number of reported cases of Coccidioidomycosis for Los Angeles County.*

The disease is often misdiagnosed as the symptoms wane and then reappear. Symptoms in children are usually less severe than in adults. Recovery from infection leads to resistance to reinfection. Adults entering areas of infection without prior exposure are therefore at much greater risk than people who grew up in the area.

Coccidioidomycosis occurs in two forms. In the self-limiting form the symptoms are confined to the respiratory tract with associated mucus production, cough and short-term fever. In less than 1 percent of the cases, the primary infection progresses to a disseminated form attacking other parts of the body. Attack sites include bones, joints, skin and lining of the brain and spinal cord (meningitis).

If left untreated, the progressive form of the disease can be fatal. An elevated risk exists for all adults who are recent arrivals, especially if they work in areas of soil disturbance such as farm workers, construction workers or students on archaeological digs. The risk for the disseminated, progressive disease is greater for people of certain ethnic or racial groups. Filipinos and Malaysian males appear most susceptible of all, but Latinos, African-Americans and Native Americans are also at higher risk.

A typical year has six reported deaths in California from Valley Fever. After six years of drought in the early 1990s, which creates dustier conditions, there was a major epidemic in Kern County and throughout California. There were 34 reported deaths in the last half of 1991 and all of 1992 in California with two-thirds of the cases in Kern County. The heavier rains in the mid to late 1990s returned the disease outbreak to more "normal" levels.

## ENVIRONMENTAL IMPACT

The SCAQMD CEQA Air Quality Handbook (1993) states that any projects in the SCAB with daily emissions that exceed any of the following thresholds should be considered as having an individually and cumulatively significant air quality impact:

55 lbs. per day of ROC (75 lbs./day during construction)

55 lbs. per day of $NO_x$ (100 lbs./day during construction)

550 lbs. per day of CO

150 lbs. per day of PM-10

150 lbs. per day of $SO_x$

Additionally, carbon monoxide (CO) emissions from the project would be significant if they cause CO concentrations at impacted locations to exceed the most stringent California one-hour standard of 20 ppm or, in an area that already exceeds the standard, to increase CO concentrations by more than one part per million (ppm) averaged over one hour or 0.45 ppm averaged over eight hours.

**Construction Activity Impacts**

Project development would entail construction activity to prepare the site and to build new structures and facilities. Construction is considered mainly a source of potential nuisance from dust or odors. Dust is normally the primary concern during construction. Because dust emissions from soil disturbance are not amenable to collection and discharge through a controlled source, they are called "fugitive emissions".

Dust (PM-10) emission rates vary as a function of many parameters (soil silt, soil moisture, wind speed, area disturbed, number of vehicles, depth of disturbance or excavation, etc.). Regulatory agencies generally use one universal factor based on the area of disturbance. The South Coast AQMD, in its 1993 "CEQA Air Quality Handbook," estimates daily PM-10 emissions during construction to be 26.4 pounds per day per acre disturbed when "standard" dust control procedures required by SCAQMD Rule 403 are used. Recent studies have shown that enhanced dust control procedures can reduce the average daily PM-10 emission rate to as low as 10 pounds per day when a highly aggressive control program is implemented. The most recent measurements of construction PM-10 emissions using enhanced dust control required by SCAQMD Rule 403 is 10.0 pounds per acre per day (CARB, Documentation of Area Sources, 2000).

The steep slopes of the project site preclude conducting mass grading operations over the entire project site. Rather, earthwork will entail conducting a deep cut on one small area with an accompanying deep fill on another small area. At any given time the typical disturbance "footprint" would cover approximately one acre of cut, one acre of fill, and 1-2 acres of dirt haul roads or staging areas connecting the two activities.

The California Air Resources Board has developed the URBEMIS2002 urban emissions computer model which contains an algorithm that calculates the probable daily construction activity "footprint" for residential development. For 81 dwelling units, the model predicts a 4.0-acre maximum daily grading activity area.

A simultaneous daily disturbance area of 4 acres was used to estimate daily PM-10 emissions. Calculated daily PM-10 emissions using the SCAQMD (pre-enhanced Rule 403) Handbook and the most current emissions estimates (post-enhanced Rule 403) are as presented in Table III.C-4:

**Table III.C-4**
**Construction-Related Dust Impacts**

| | Acres | Emission Factor (Pounds/Acre/Day) | Emissions (pounds/day) |
|---|---|---|---|
| 1993 SCAQMD Handbook | 4.0 | 26.4 | 105.6 |
| 2000 CARB Study | 4.0 | 10.0 | 40.0 |

Under either set of emissions assumptions, the SCAQMD significance threshold of 150 pounds per day would not be exceeded. Therefore, construction-related PM-10 impacts would be less than significant. In addition to PM-10 impact potential, the recent adoption of a new air quality standard for ultra-small diameter particulates (PM-2.5) also relates directly to project construction air quality impacts. This standard has implications of construction fugitive dust for two reasons, namely,

1. Human health effects from particulate inhalation are mainly related to very small diameter, chemically active material; and

2. Construction fugitive dust contains almost no PM-2.5, and the material is comprised mainly of chemically inert silicates.

Regardless of the magnitude of PM-10 emissions from site grading, there is adequate rationale to support a finding of a less than significant impact because of the almost complete absence of any chemically active PM-2.5 within the construction dust PM-10 burden. Certainly from a human health perspective, project-related construction activity PM-10 generation has a less than significant impact. However, because of the non-attainment status of the air basin for PM-10, any temporary PM-10 increase would have an adverse impact. Therefore, additional reasonable and feasible dust mitigation beyond minimum Rule 403 requirements is recommended, even though the significance threshold is not exceeded.

Noticeable construction activity dust impacts derive almost exclusively from the largest diameter material that remain suspended in air for only a few seconds. These large particulates quickly settle out on parked cars, landscaping, outdoor furniture and other horizontal surfaces. The USEPA states that the primary zone of impact is less than 100 feet from the source unless there are unusually strong winds that can keep large particles suspended for more than a few seconds. Given this primary zone of impact, there are a few homes along Cornell Road north of Silver Creek Road and Los Angeles County Fire Station No. 65 that might be affected by soiling nuisance from large particle deposition during typical daytime wind conditions. All other homes in the project vicinity are at greater distances. The prevailing daytime onshore wind pattern (i.e., from the south and southwest) would also mediate

potential dust problems, since most of the existing residences in the project vicinity are located to the south (i.e., up wind) from the proposed grading activities. Consequently, there are relatively few homes in the project vicinity that might be affected by soiling nuisance from large particle deposition during typical daytime wind conditions. During Santa Ana winds from the northeast, there are a few homes along Cornell Road in the downwind trajectory, although most homes are a considerable distance to the south and beyond the reach of large airborne particles. Although enhanced dust control procedures are recommended for grading during strong wind events, soiling nuisance impacts during all wind conditions are anticipated to be less than significant.

In addition to PM-10 emissions, construction would entail the use of internal combustion engines to power on-road trucks and off-road mobile, semi-mobile and semi-stationary equipment. Such sources are mainly diesel-powered and are poorly regulated in terms of allowable emission levels. Off-road sources are sometimes not well maintained because there is no regulatory mechanism to enforce efficient combustion as there is for on-road sources. Construction activities also include minor amounts of emissions from construction worker commuting.

The type of equipment, number of employees and daily activity scenario varies dramatically among contractors. Emissions estimates for construction activities have a high degree of uncertainty because equipment utilization varies from day to day and from one contractor to another. An equipment scenario consisting of four scrapers, one dozer, one grader, two backhoes, and one water truck was used to calculate daily equipment exhaust emissions during a typical grading (cut and fill) scenario. Different types of construction activities would occur during actual pad preparation and building assembly (cement trucks, delivery trucks, etc.), but the grading activity was assumed to represent a worst-case condition.

Construction activity emissions from the above equipment fleet were calculated using the URBEMIS2002 model. Table III.C-5 provides the average daily emissions that would be generated during construction of the proposed project. The URBEMIS2002 run output is provided in Appendix B.

**Table III.C-5**
**Construction Activity Emissions (pounds/day)**

| | Emissions (pounds/day) | | | | |
|---|---|---|---|---|---|
| | ROG | $NO_x$ | CO | $SO_2$ | PM-10 |
| Grading Equipment | 23.6 | 197.5 | 166.2 | 0.0 | 9.6 |
| Fugitive Dust | -- | -- | -- | -- | -- |
| TOTAL | 23.6 | 197.5[a] | 166.2 | 0.0 | 49.6 |
| Finish Construction | 331.8[b] | 0.4 | 9.6 | 0.0 | 0.1 |
| SCAQMD Threshold | 75 | 100 | 550 | 150 | 150 |

*a. Exceeds threshold from diesel exhaust*
*b. Exceeds threshold during application of paint*

As indicated in Table III.C-5, all the construction-related pollutant emissions would be well below the SCAQMD's thresholds of significance, with the exception of $NO_x$ (from grading equipment) and ROG (during application of paint). Minor amounts of emissions reductions can be achieved by low-$NO_x$ tune-ups and by replacement of some internal combustion equipment with electrical (line-powered) systems. Feasible levels of mitigation are 10-20 percent. Possible "excess" $NO_x$ emissions can not therefore be reduced to achieve a less than significant daily $NO_x$ emissions level with the application of reasonable and feasible mitigation. Use of a longer construction schedule using less daily equipment is the only possible mitigation measure. Application of paints and coatings similarly would be exceeded if all 81 homes are presumed painted in 20 days as the computer model "default" assumption. Using lower volatility paint, more efficient applicators, and a longer painting schedule can reduce the ROG emissions to less than significant levels.

Construction activities would be concentrated at the construction site, but they may also spill over into the adjacent community. Vehicles may track dirt off-site, lane closures may create congestion on public roadways and construction worker vehicles and supply trucks may compete with the general public for sometimes inadequate roadway capacity. Trucks are often left idling near off-site sensitive receptors while waiting to load or unload. Each of these small impacts may become substantial when summed over all basinwide construction activities. As with the on-site impacts, a heightened level of impact mitigation would need to be implemented to minimize off-site spill-over effects during construction.

***San Joaquin Valley Fever Impacts***

A grading operation would increase the exposure risk by stirring up dust. With the more stringent fugitive dust control requirements in the revised SCAQMD Rule 403, the magnitude of dust generation

and associated health risk to contractor employees has been reduced. Agoura Hills is furthermore a low risk area because it is not sufficiently arid (less than 6 inches of precipitation annually) and the soil is not saline (which promotes "coxy" dominance because other fungi are less salt-tolerant). Construction workers (heavy equipment operators) who have worked on other Southern California projects are often immune to Valley Fever from previous exposure.[2]

Spores often cling to small soil particles. These particles settle back out within short travel distances from their origin. Public exposure outside the immediate construction area is low. Public health risk from Valley Fever spores released during grading is very low because the area is minimally endemic for Valley Fever and the risk of off-site migration is very low. Because of this low level of risk, no special mitigation other than an aggressive dust suppression program during construction is necessary to maintain a less than significant public health impact.

**Operational Impacts**

The primary source of project-related air quality impact would derive from site-related traffic. Minor amounts of air emissions would also result from energy needs met by burning fossil fuels (electrical generation and in-home natural gas consumption), and from various miscellaneous homeowner emissions sources (mowers, paint, cleaning products, etc.).

Single family residences generate slightly over ten (10) trips per dwelling unit. The average trip length is around ten (10) miles per trip, or 100 vehicle miles traveled (VMT) per dwelling unit per day. Air emissions associated with 854 daily project-related trips (81 D.U. x 10.54 trips/D.U. = 854 average daily trips) plus area source emissions from the average daily energy consumption and other household sources were calculated using the California Air Resources Board's (CARB) URBEMIS2002 air quality computer model. Data from these calculations are summarized in Table III.C-6. Project operational activity emissions from each pollutant category would be less than the SCAQMD threshold of significance. Therefore, the project's operational impact on air quality would be less than significant.

---

2 *Personal communication from Ann Harrington, CalOSHA, Sacramento*

**Table III.C-6**
**Project Operations Air Pollution Emissions (pounds/day)**

| Source: | CO | ROC | $NO_x$ | $SO_x$ | PM-10 |
|---|---|---|---|---|---|
| Mobile | 113.4 | 9.2 | 10.2 | 0.1 | 8.7 |
| Stationary | 1.4 | 4.2 | 1.0 | < 0.1 | < 0.1 |
| TOTAL | 114.8 | 13.4 | 11.2 | 0.1 | 8.7 |
| SCAQMD Significance Threshold | 550 | 55 | 55 | 150 | 150 |
| Exceed Threshold (?) | No | No | No | No | No |
| *Source: CARB URBEMIS2002 Air Quality Model; See Output in Appendix B* | | | | | |

**Microscale Analysis**

While project-related regional emissions (mainly from mobile source) would not have an individually significant impact on western Los Angeles County air quality, the incremental traffic growth over a wide area may change microscale air quality distributions. To determine whether future traffic changes would create an adverse air quality impact, a microscale air quality impact analysis was performed for the traffic analysis grid around the project area. A Caltrans screening procedure based on the California line source roadway dispersion model CALINE4 was run for four traffic scenarios (Existing, 2006 Ambient Growth, 2006 With Project, and 2006 Cumulative) to evaluate any possible microscale air quality impacts due to changes in patterns of growth anticipated as part of the proposed project.

The model procedure that was followed combined the results of the project's traffic analysis (see Section III.I, Traffic and Access) with very restrictive dispersion conditions in order to generate a worst-case impact assessment. Light winds almost parallel to each roadway analyzed were used to estimate pollutant exposure adjacent to eight arterial intersections analyzed in the project traffic study. Carbon monoxide (CO) was used as an indicator of any "hot spot" potential because CO, unlike regional pollutants such as ozone, is directly related to source activity immediately adjacent to the receptor (a primary, unreacted pollutant impact).

The results of the microscale impact analysis are summarized in Table III.C-7. The hourly CO exposures do not include the background (non-local) CO levels for existing (2001) conditions. An hourly background level of 7.0 ppm should be added to the entries in Table III.C-7 if the worst-case one-hour local CO were to coincide with the worst-case one-hour non-local CO background. The worst-case combination of maximum local plus regional CO levels would not exceed the most stringent California one-hour standard of 20 ppm. Therefore, CO impacts are not considered significant either individually or cumulatively.

**Table III.C-7**
**Microscale Impact Assessment**
**(Peak Hour CO Concentrations Above Local Background Levels)**

| Intersection | Existing | 2006 Ambient | 2006 + Project | 2006 Cumulative |
|---|---|---|---|---|
| **AM Peak Hour** | | | | |
| Kanan Road/ Canwood Street | 3.7 | 3.0 | 3.1 | 4.5 |
| Kanan Road / US 101 Interchange | 5.1 | 4.2 | 4.2 | DNE |
| Kanan Road / US 101 WB | DNE | DNE | DNE | 4.0 |
| Kanan Road / US 101 EB | DNE | DNE | DNE | 2.6 |
| Kanan Road / Agoura Road | 1.2 | 1.0 | 1.2 | 2.0 |
| Kanan Road / Roadside Drive | 5.1 | 4.2 | 4.2 | DNE |
| Kanan Road / Cornell Road | 1.5 | 1.2 | 1.3 | 1.3 |
| Agoura Road / Cornell Road | 0.3 | 0.3 | 0.3 | 0.5 |
| **PM Peak Hour** | | | | |
| Kanan Road/ Canwood Street | 6.6 | 2.6 | 5.4 | 6.5 |
| Kanan Road / US 101 Interchange | 3.9 | 2.6 | 3.3 | DNE |
| Kanan Road / US 101 WB | DNE | DNE | DNE | 5.3 |
| Kanan Road / US 101 EB | DNE | DNE | DNE | 4.7 |
| Kanan Road / Agoura Road | 1.7 | 1.4 | 1.5 | 5.1 |
| Kanan Road / Roadside Drive | 5.1 | 6.7 | 4.2 | DNE |
| Kanan Road / Cornell Road | 1.2 | 1.0 | 1.2 | 1.4 |
| Agoura Road / Cornell Road | 0.7 | 0.6 | 0.6 | 2.4 |

*DNE = Does not exist.*
*Note: Cumulative assumes Kanan/US 101 interchange realignment. Other scenarios presume existing configuration with the interchange treated as one single "intersection"*

## LEVEL OF SIGNIFICANCE BEFORE MITIGATION

All construction-related pollutant emissions would be well below the SCAQMD's thresholds of significance, with the exception of $NO_x$ (from grading equipment) and ROG (during application of paint). $NO_x$ and ROG emissions would exceed the SCAQMD's threshold criteria, resulting in short-term construction-related significant impacts.

Long-term operational activity emissions from each pollutant category would be less than the SCAQMD threshold of significance. Therefore, the project's operational impact on air quality would be less than significant.

With respect to the CO microscale "hot-spot" analysis, the worst-case combination of maximum local plus regional CO levels would not exceed the most stringent California one-hour standard of 20 ppm. Therefore, CO impacts would be less than significant.

## MITIGATION MEASURES

The following enhanced dust control measures -- beyond those required by SCAQMD Rule 403 -- are proposed to be implemented by the project applicant to reduce short-term construction-related dust impacts:

C-1 All active construction areas shall be watered at least twice daily.

C-2 All haul trucks shall be covered or shall maintain at least two feet of freeboard.

C-3 Water shall be applied to all unpaved parking or staging areas four times daily.

C-4 Site access points shall be swept or washed of visible dirt deposition on adjacent public roadways.

C-5 On-site stockpiles of debris, dirt or other dusty material shall be covered or watered twice daily.

C- All grading operations on unpaved surfaces shall be suspended when winds exceed 25 mph.

C-7 Cleared areas, which are to remain inactive for more than 96 hours after clearing is completed, shall be hydroseeded or otherwise stabilized.

The following measures are proposed by the project applicant to reduce short-term construction-related $NO_x$ emissions:

C-8 As a condition of the grading contract, the grading contractor shall be required to provide 90-day low-NOx tune-ups for all off-road equipment.

C-9 As a condition of the grading contract, the grading contractor shall be required to limit idling times for trucks and heavy equipment to no more 5 minutes.

The following measures are proposed by the project applicant to reduce off-site short-term construction-related impacts:

C-10 As conditions of the grading and construction contracts, contractors shall be required to provide for car pooling for construction workers, where feasible.

C-11 Lane closures shall be limited to off-peak travel periods.

C-12 On-site construction vehicle staging areas shall be provided; no construction vehicles shall be permitted to park on public roadways.

C-13 To the extent practical, receipt of construction materials shall be scheduled during non-peak traffic hours.

C-14 In order to control erosion, construction sites shall be sandbagged.

The following measures are proposed by the project applicant to reduce architectural coating-related impacts:

C-15 Pre-coated building materials shall be used.

C-16 High pressure-low volume (HPLV) paint applicators with a 50% efficiency shall be used.

C-17 Lower volatility paint with 100 grams of ROG per liter or less shall be used.

C-18 Paint application shall be spread out over a longer period of time (3-4 months).

C-19 No more than 100 gallons of paint per day shall be used.

The following measure is required by Los Angeles County:

C-20 Grading operations shall not exceed 4 acres of land disturbance per day.

See also Section III.E, Water Quality, for additional "good housekeeping" mitigation measures that would also help to reduce off-site short-term construction-related impacts.

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

Implementation of the mitigation measures would reduce temporary PM-10 emissions from soil disturbance and ROG emissions from paints and coatings to less-than-significant levels with an adequate margin of safety. $NO_x$ emissions from heavy equipment cannot be reduced to below the SCAQMD threshold. Extension of the construction schedule to use less daily equipment would be required to achieve a less-than-significant impact.

## CUMULATIVE IMPACTS

Regional impacts are cumulative in nature, deriving from overall growth plus the incremental contribution from the proposed project in combination with the emissions from the related projects. The proposed project represents a very small fraction of anticipated regional growth and, therefore, its incremental contribution to regional air quality is not cumulatively considerable. As long as new overall regional development does not exceed the level of growth forecast in the Regional Comprehensive Plan (RCP), the basin is expected to meet federal clean air standards by 2010, and

cumulative regional impacts will not be significant. The proposed site development is consistent with the forecast demand for residential opportunities in the western Los Angeles County. It will therefore not delay timely attainment of the federal ozone standard. Substantial mitigation of mainly mobile source air quality impacts from project implementation is not feasible, nor required because of the lack of impact significance.

The local air quality impact (using CO as an indicator of any "hot spot" potential) due to the combined effects of continuing development, intensification of development, and related projects in conjunction with the proposed project is incorporated into the microscale impact analysis above. The analysis indicates that the worst-case combination of maximum local plus regional CO levels would not exceed the most stringent California one-hour standard of 20 ppm. Therefore, CO impacts are not considered cumulatively significant.

# III. ENVIRONMENTAL IMPACT ANALYSIS
# D. SURFACE WATER RUNOFF / HYDROLOGY

The following report is summarized below and incorporated by reference. A copy of this report is included in Appendix A of this DEIR.

- Wager Halladay, Inc., Drainage Concept, Hydrology Calculations and Standard Urban Stormwater Mitigation Plan (SUSMP), Tract 52419 (Revised), October 15, 2004[1]

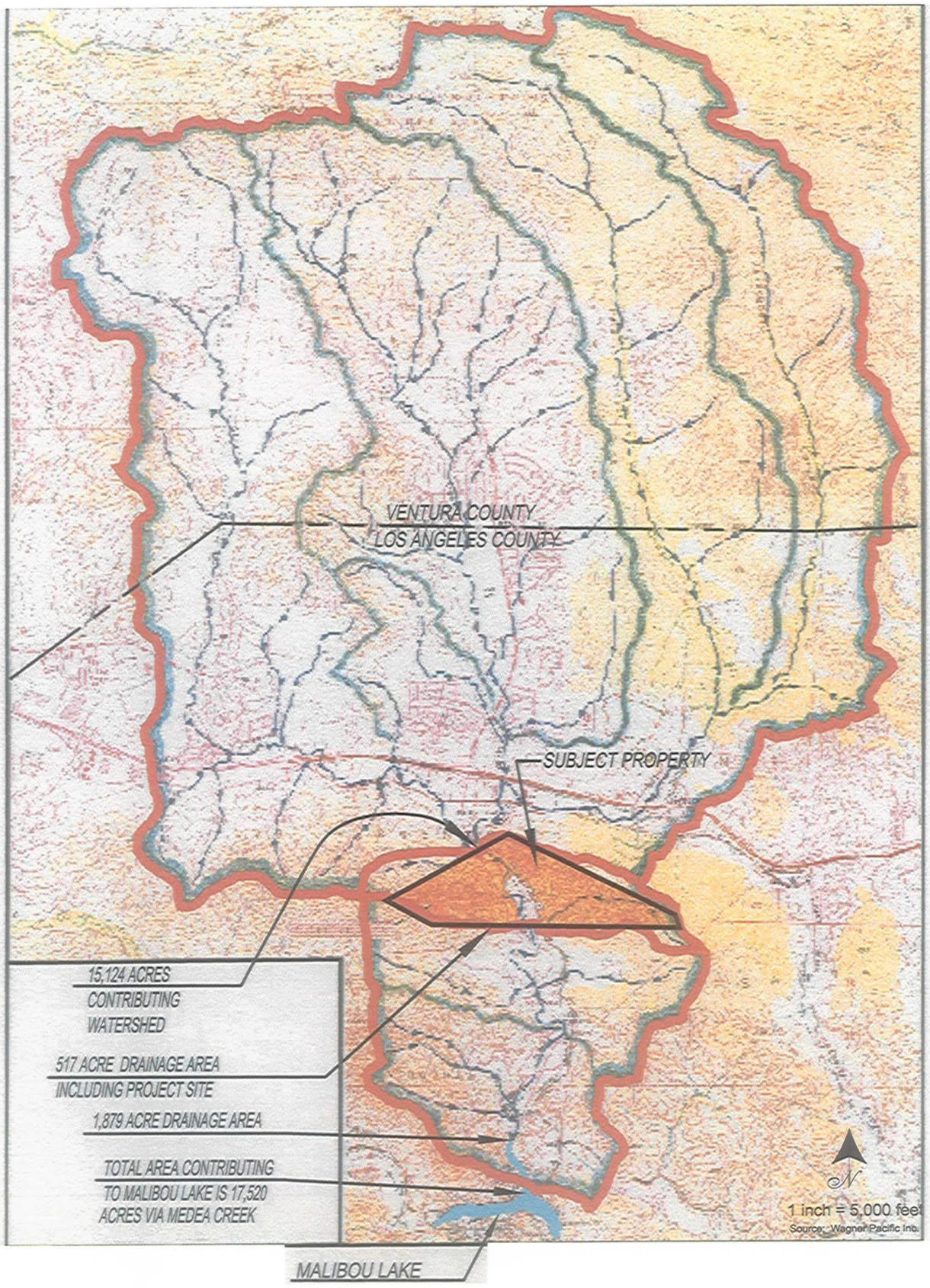
## ENVIRONMENTAL SETTING

The project site lies within the greater Medea Creek watershed, which is comprised of four sub-drainages (namely, Medea Creek, Lindero, Palo Comado and Cheeseboro Canyons) that originate from the south slopes of the Simi Hills, and converge in the vicinity of Malibu Junction, just to the north of the project site. Substantial portions of these tributaries are concrete-channelized upstream of Malibu Junction. The main stem of Medea Creek, downstream of Malibu Junction, has cut a narrow passage through the Santa Monica Mountains, carrying the combined flows of all four subdrainages through the project site. Across the project site and southward, the stream gradually widens, passing through Paramount Ranch and into Malibou Lake. Figure III.D-1 indicates the Greater Medea Creek watershed. Medea Creek then converges with Triunfo Canyon Creek to become Malibu Creek, which subsequently flows to Malibu Lagoon and the Pacific Ocean.

Storm water sources affecting the proposed development site fall into three categories: (1) precipitation falling directly on the site and discharging via natural drainage courses into Medea Creek; (2) tributary sheet flow and secondary drainage courses flowing primarily southerly onto the site from the surrounding hills at the edges of the proposed development; and (3) Medea Creek, a major perennial stream traversing the site. The existing site drainage pattern is indicated in Figure II-8, Site Drainages.

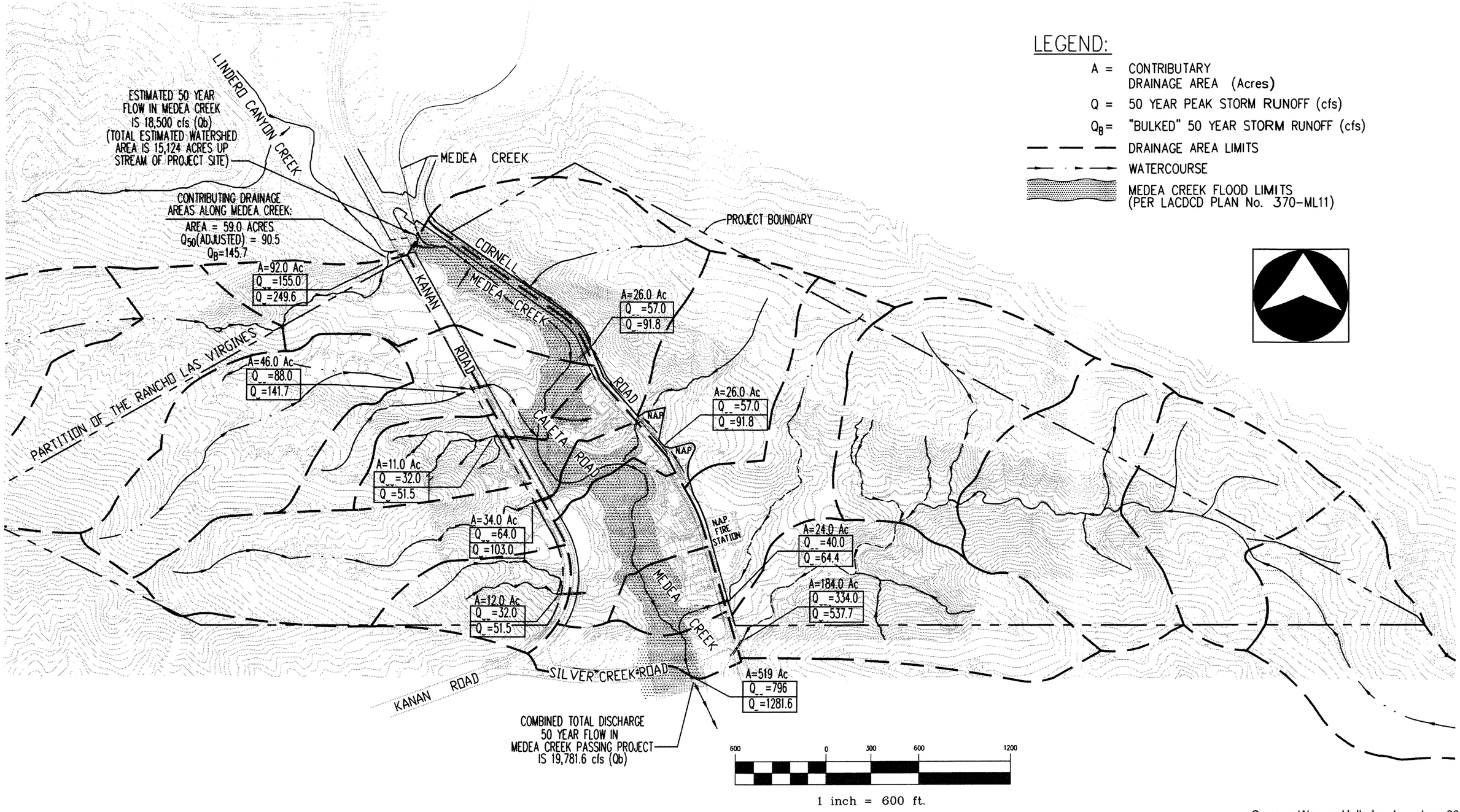
---

[1] *The Plan addresses the proposed implementation of storm drainage control and conveyance improvements for the proposed project. The Plan, while demonstrating the site's hydrologic conditions, is also intended to demonstrate that the propose storm drainage system consisting of two separate storm drain lines – one set designed to convey only urban storm water runoff and a second set to convey debris carrying or bulked flows – is suitable to provide protection to the proposed project.*




CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.D-1
Greater Medea Creek Watershed




Source: Wagner Halladay, Inc., June 2004.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.D-2
Hydrology Map of Existing Conditions

Medea Creek crosses the central portion of the property between Kanan and Cornell Roads, in a northerly to southerly direction. The on-site portion of the Medea Creek floodplain (i.e., the area subject to inundation during a 50-year storm) is demonstrated in Figure III.D-2, Hydrology Map of Existing Conditions.

The most notable of the intermittent drainages on the project site is "Drainage B", a blue-line stream that emanates from the most easterly portion of the property (see Figure II-8). Tributary runoff for Drainage "B" flows from the hills and canyons on the east side of Cornell Road. The concentrated runoff passes under Cornell Road, south of Fire Station No. 65 near Silver Creek Road, and joins with the Medea Creek drainage off site to the south.

**Storm Water Hydrology**

Flood hydrology, as applied to determine design quantities for major channel systems and flood regulating or retention structures, is based on a theoretical storm, created from the statistical analysis of data from past measurement records. Different governmental agencies require that engineering design be based on a probable storm frequency of 5, 10, 25, 50 or 100 years, (with storm intensity and flood potential inversely related to frequency probability). This design criteria, then, is referred to as a 25-year, 50-year or 100-year storm. The Los Angeles County Master Plan of Storm Drains requires any capital project to consider the 50-year storm frequency in its design.

For the undeveloped site conditions (i.e., existing conditions) 50-year "clear", "burned and "burned and bulked" storm flows (i.e., including sediment, vegetation and other debris carried along in the runoff) have been calculated. "Clear" flows consist only of stormwater runoff. "Burned" flows are clear flows that occur shortly after a fire. Burned flows produce more runoff due to the lower percolation rates of the burned soils. "Burned and bulked" refers to the worst-case scenario in which the volume of anticipated burned condition stormwater runoff is further increased by the addition of debris loading, or bulking, of the stormwater.[2]

---

[2] *Hydrology quantities were calculated, using the County of Los Angeles' Time of Concentration (TC) and Modified Rational Method (MORA) computer programs, to compare the 50-year storm frequency runoff of existing and developed site conditions. Time of concentration is defined as the period from the start of rainfall to the time at which the peak runoff rate first occurs. The TC program calculates the time of concentration for each drainage area based on unique physical characteristics such as soil type and land use, runoff coefficient, rainfall intensity, travel length and slope. The time of concentration for each drainage area is subsequently input to the MORA program for determining peak runoff rates at the drainage outlet of each area. Where drainage areas meet that do not have the same time of concentration for the peak runoff flows being conveyed, the contributing flows are combined, or confluenced, by*

As shown in Figure III.D-2, Hydrology Map of Existing Conditions, and summarized in Table III.D-1, the peak 50-year runoff from the project site in its current condition is approximately 490 cubic feet per second (cfs) of clear flows, 685 cfs of burned flows, and 1,103 cfs of burned and bulked flows.[3] The clear flow of 490 cfs has an estimated time of concentration of 19 to 20 minutes.

**Table III.D-1**
**Summary of Existing and Proposed Hydrologic Conditions**
**50-Year Storm**

| | Clear Flows | Burned Flows | Burned an Bulked Flows |
|---|---|---|---|
| **Existing Conditions** | 490 cfs | 685 cfs | 1,103 cfs |
| **Proposed Conditions** | 460 cfs | 638 cfs | 1,027 cfs |
| **Net Change** | -30 cfs | -47 cfs | -76 cfs |

Source: Drainage Concept, Hydrology Calculations and Standard Urban Stormwater Mitigation Plan (SUSMP), Tract 52419 (Revised), October 15, 2004

*adjusting the individual contributing flows based on their relative times of concentration and storm intensities.*

*The Modified Rational Method (MORA) modifies the classic Rational Method to eliminate the model's shortcomings. The classic Rational Method calculates peak runoff only, while MORA computes peak runoff rates as a function of time, thus producing a hydrograph. The hydrograph curve is shaped similar to a bell curve with the apex, or peak, corresponding to the peak runoff rate, and the volume of runoff is defined as the area under the curve.*

*For purposes of simplicity, the peak storm runoff flow rates for the western and eastern areas of the project site are discussed and identified as proportioned peak flows without adding their flow rates into the peak flow rate of Medea Creek. The peak flow rate of Medea Creek is estimated at approximately 18,500 cfs and the peak combined runoff from the site in an undeveloped condition is 1,103 cfs (burned and bulked), or approximately 6.0 % of the flow in Medea Creek.*

[2] *This flow rate is the estimated proportional peak flow from the westerly drainage area west of Medea Creek. The Drainage Concept Plan is included as Appendix E.*

Southerly of the project site, Medea Creek flows into Malibou Lake. At its confluence with Malibou Lake, Medea Creek has an estimated existing condition 50-year frequency storm-flow of approximately 20,300 cfs. According to the Los Angeles County Master Plan of Storm Drains, the total capital flood inflow to Malibou Lake from Medea Creek, Triunfo Canyon and surrounding areas is 38,400 cfs.

Malibou Lake has a man-made spillway at an elevation of 722 feet. The capital flood elevation of the lake is 735 feet, 13 feet higher than the spillway. The total peak runoff from the project site in the existing condition (i.e., 490 cfs clear, 1,103 cfs burned and bulked) amounts to approximately 2.9 percent of the total peak capital flood flow reaching Malibou Lake. Equating this to the potential flood depth of 13 feet calculates to 0.37 feet, or 4.5 inches of depth.

The total drainage area contributing to Medea Creek (and ultimately Malibou Lake) from the project site is approximately 518 acres. According to the Los Angeles County Hydrology Manual, the project area, as a whole, has a debris production potential of 25,000[4] cubic yards of debris per square mile of drainage area. Thus, the 518 acres representing the project site and tributary area has the potential to produce approximately 20,195 cubic yards of debris (including silt).

The project site is not down stream from any sizable body of water. As such, the project site is not subject to flooding resulting from seiches, or dam and/or levee failure. The project site is located inland, on the north-facing slopes of the Santa Monica Mountains, and is not subject to inundation hazards from tsunamis.

## ENVIRONMENTAL IMPACTS

### Thresholds of Significance

In accordance with Appendix G to the CEQA Guidelines, the proposed project would have a significant hydrology impact if it would cause any of the following conditions to occur:

---

[4] *The Debris Production Rate (DPR) for Los Angeles Basin is published in the County of Los Angeles Hydrology/Sedimentation Manual (1993), Appendix P. DPR is a function of area and the Debris Potential Area (DPA). The project site is DPA-6 except for the Medea Creek floodplain traversing the site which is DPA-7. Based on the entire 518 acres, the DPR is 25,000 cubic yards per square mile. However, when quantifying debris production in individual drainage courses, the DPR increases (or decreases) according to the tributary area, i.e., the smaller drainage areas have higher DPR than large drainage areas.*

- The project would substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner, which would result in substantial erosion or siltation on- or off-site.

- The project would substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site.

- The project would create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems.

- The project would place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.

- The project would place within a 100-year flood hazard area structures which would impede or redirect flood flows.

- The project would expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.

- The project would expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow.

**Proposed Project**

Storm drainage improvements proposed by the project include two separate storm drain systems. One system would convey debris (burned and bulked) flows generated in the open spaces surrounding the project site, and one system would convey urban runoff generated by the residential lots and connecting streets. No urban runoff will enter the bulked flow systems. The burned and bulked flow system is designed to intercept the 50-year storm runoff below natural open space areas by a desilting/debris basin, bulked flow inlets, and intercept ditches (brow and terrace drains). Actually, the burned and bulked flow system is a set of separate subsystems all designed to convey bulked flows from the natural open spaces and discharge into Medea Creek, in the process, conserving sediment balance in the Creek and reducing erosion potential. The bulked flow storm drains consist of two systems on the west side of Kanan Road and three systems on the east side of Cornell Road.

A separate "urban" storm drain system is proposed to convey 50-year storm runoff from the developed areas of the project (i.e., streets and residential use areas). The "urban" system is a set of separate

subsystems, each constructed with low-flow ("first flush")[5] cleansing devices designed to reduce sediment and pollutants of concern generated by residential land use from discharge into Medea Creek. Both bulked flow and urban storm drain systems would be constructed with reinforced concrete pipe (RCP).

The onsite 50-year inundation area along Medea Creek has been delineated and a 50-foot flood hazard setback area, beyond the inundation area, has been established. No buildings would be constructed within the 50-foot flood hazard setback area.

The amount of debris generated from natural open spaces is quantified two ways. The volume of debris is referred to as the debris production and is noted in units of cubic yards (see footnote 4). The flow of debris, or bulked flow, is determined by the Peak Bulking Factor, a function of Debris Potential Area (DPA) and the drainage area (acreage). Bulked flow is the product of the Peak Bulking Factor and burned flow runoff as determined by the MORA program, and is noted in units of cubic feet per second (cfs). The project has a DPA-6 except the Medea Creek floodplain between Kanan and Cornell Roads, which is DPA-7. Excluding the DPA-7 area, the project has a Peak Bulking Factor of 1.61.

***Debris Production – Bulked Flow Storm Drains***

The debris storm drain system would consist of 36-inch to 42-inch pipes, which would convey burned and bulked debris flows from the project site's natural open space and offsite tributary areas into Medea Creek. The Drainage Concept separates the storm drains according to drainage areas so that the debris potential through any given pipe does not exceed 1,000 cubic yards.

*West Side of Medea Creek*

Two systems on the west side of Medea Creek intercept burned and bulked flows from the northeast-facing slopes of Ladyface Mountain at six separate locations, three inlets for each system, and discharge it into Medea Creek at two outlets. Both systems convey bulked flow runoff under proposed improvements and Kanan Road before discharging into Medea Creek. No urban runoff enters these systems. A desilting/debris basin, proposed at the upstream end of the northerly of the two systems, is intended to intercept and retain approximately 1,670 cubic yards of debris that will not be conveyed in the debris storm drain. At the preliminary design stage, the estimated capacity of the desilting basin is approximately 2,320 cubic yards. The outlet structure for this basin joins the system at the northerly

---

[5] *The "first flush" is defined as the urban runoff generated during the first 0.75" of rainfall during any particular storm event.*

lateral. The longest natural drainage course on the west side is located northerly and adjacent to the proposed improvements. This drainage course joins Lindero Canyon Creek before crossing under Kanan Road and joining the main stem of Medea Creek. Similarly, two other drainages on the west side, located adjacent southerly to the project improvements, cross under Kanan Road in separate, existing culverts and discharge into Medea Creek. No drainage improvements are proposed on these tributaries.

The total debris potential from the northeast-facing slopes of Ladyface Mountain is approximately 11,900 cubic yards. After project development, the proposed debris basin would intercept and retain approximately 2,000 cubic yards of debris, while approximately 1,030 cubic yards of debris would be passed to Medea Creek in the debris storm drains. The remaining debris production from Ladyface Mountain would continue to be conveyed to Medea Creek in natural drainage courses that would not be impacted by the proposed development. Thus, after project development, a total of approximately 10,000 cubic yards (or 83% of the debris generated from Ladyface Mountain) would continue to be conveyed to Medea Creek.

*East Side of Medea Creek*

The total debris potential on the east side of Cornell Road is approximately 13,050 cubic yards. The three debris storm drains would be provided on the east side of Cornell Road consist of two single line conduits that convey bulked flows from the easterly adjacent open spaces that are tributary to Drainage "B", the longest tributary stream on the project site. Each conduit has a bulked flow inlet and discharges directly into Drainage "B". The other system conveys bulked flows from northerly adjacent open spaces that are tributary to Medea Creek but discharge at an outlet north of the Drainage "B" outlet. Both bulked flow paths have separate, existing culverts under Cornell Road.

Of the total debris potential of 13,050 cubic yards, about 9,950 cubic yards would be generated in the unimproved reaches of drainage "B"; this debris would be conveyed in bulked flow system through the development area and released into Drainage "B". Approximately 850 cubic yards, generated in the open spaces northerly and easterly of the proposed development area, would be conveyed in bulked flow system through the development area and released into Medea Creek via an existing culvert under Cornell Road. Approximately 2,250 cubic yards would be generated in the open spaces northerly of the proposed development area and would continue to be conveyed to Medea Creek in natural drainage courses that would not be impacted by the proposed development.

***Urban Storm Drains***

The urban storm drain system would intercept runoff generated from streets, residential lots, and landscaped areas. The urban runoff would be separated from debris flows generated from natural open spaces. All urban storm drains would direct urban runoff to clarifiers and/or approved treatment control BMPs to mitigate "nuisance-flows" and "first-flush" runoff before discharge to Medea Creek. The BMPs are proposed with diversion structures to bypass higher storm flows after the first flush has passed. The catch basins would be designed with a filter or other approved treatment control BMP. Catch basins would be constructed on the interior streets to intercept urban runoff before the 50-year flow quantities exceed street capacities. The catch basins would be located to provide the optimal pick-up of storm flows and to guard against flooding outside the street right-of-way.

*West Side of Medea Creek*

The 50-year storm runoff generated onsite from the west side of Medea Creek is about 215 cfs. The proposed urban storm drains on the west side of Medea Creek consists of two systems which convey urban runoff from residential lots and connecting streets by curb and gutter to catch basins connected to RCP. One system drains the westerly and southerly sections of the proposed development area by three catch basins intercepting about 23 cfs, or 11% of the total flow on the west side. The other system drains the northerly section and the development area located between Kanan and Cornell Roads by six catch basins. This system intercepts about 37 cfs, or 17% of the total flow.

*East Side of Medea Creek*

The 50-year storm runoff generated on the project site from the east side of Medea Creek is about 245 cfs. The urban storm drain on the east side consists of one system with six catch basins that intercept flow from the residential lots and connecting streets. This storm drain intercepts about 51 cfs, or 21% of the total flow on the east side.

The project's proposed storm drainage improvements are presented in Figure III.D-3, Drainage Concept Plan.

**Project Impacts**

The project has the potential to create short-term construction-related impacts due to temporary changes in onsite drainage patterns resulting from site grading. If left unmitigated, the elimination of protective vegetation and the exposure of raw graded surfaces could lead to unimpeded runoff, increased on-site

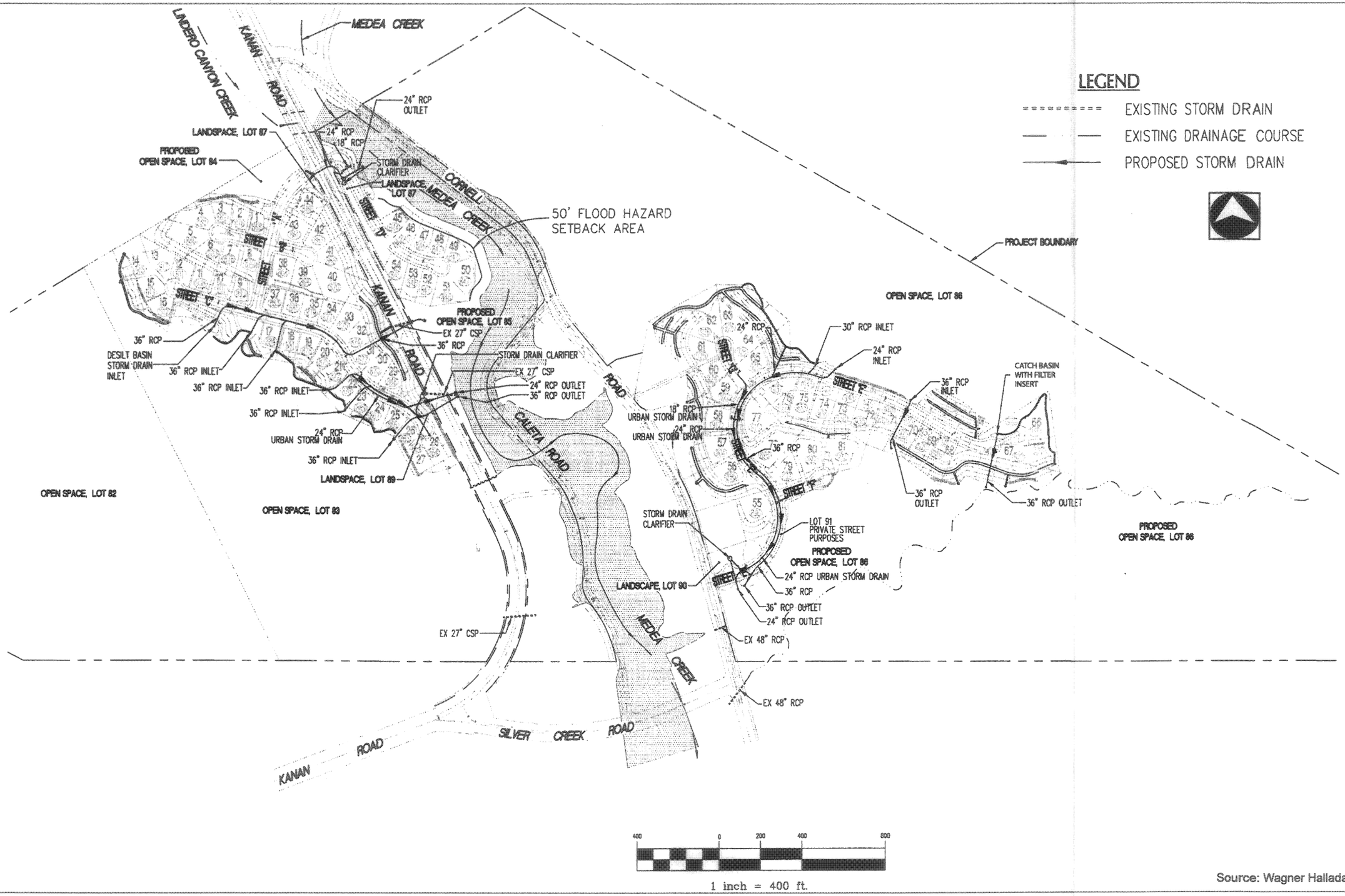
erosion, and downstream erosion and sedimentation. These short-term construction-related impacts are addressed in Section III.E, Water Quality.

Figure III.D-3, Drainage Concept Plan, and Figure III.D-4, Hydrology Map of Proposed Development, present the site hydrology following project completion. Based on Figure III.D-4, the 50-year peak, burned and bulked, storm flow for the "developed condition" of the project site would be 1,027 cfs. This is a reduction of 76 cfs, from the existing condition's 50-year peak, burned and bulked, storm flow of 1,103 cfs (see Table III.D-1)..

The 76 cfs (or 6.9 %) decrease in storm runoff for the "developed conditions" can be attributed to the retention of the project site's steep natural terrain with good vegetative cover in its existing state, while the lower elevations of the would be developed with high percentages of pervious surfaces and grading that recreates slower slope runoff rates. The developed portion also increases the runoff flow path length with high times of concentration and more opportunities for infiltration in landscaped areas with gradual slopes. Since there is no net increase in the amount of site generated peak runoff, the impact to Medea Creek is considered less than significant. Figure III.D-3, Drainage Concept Plan, and Figure III.D-4, Hydrology Map of Proposed Development, present the site hydrology following project completion.

The development of the proposed project would reduce natural and barren land by approximately 48.6 acres, which would reduce the amount of sediment and debris reaching Medea Creek and potentially Malibou Lake, by approximately 3,645 cubic yards. In addition, the proposed debris basin would intercept approximately 2,000 cubic yards, bringing the debris reduction to an approximate total of 5,645 cubic yards.

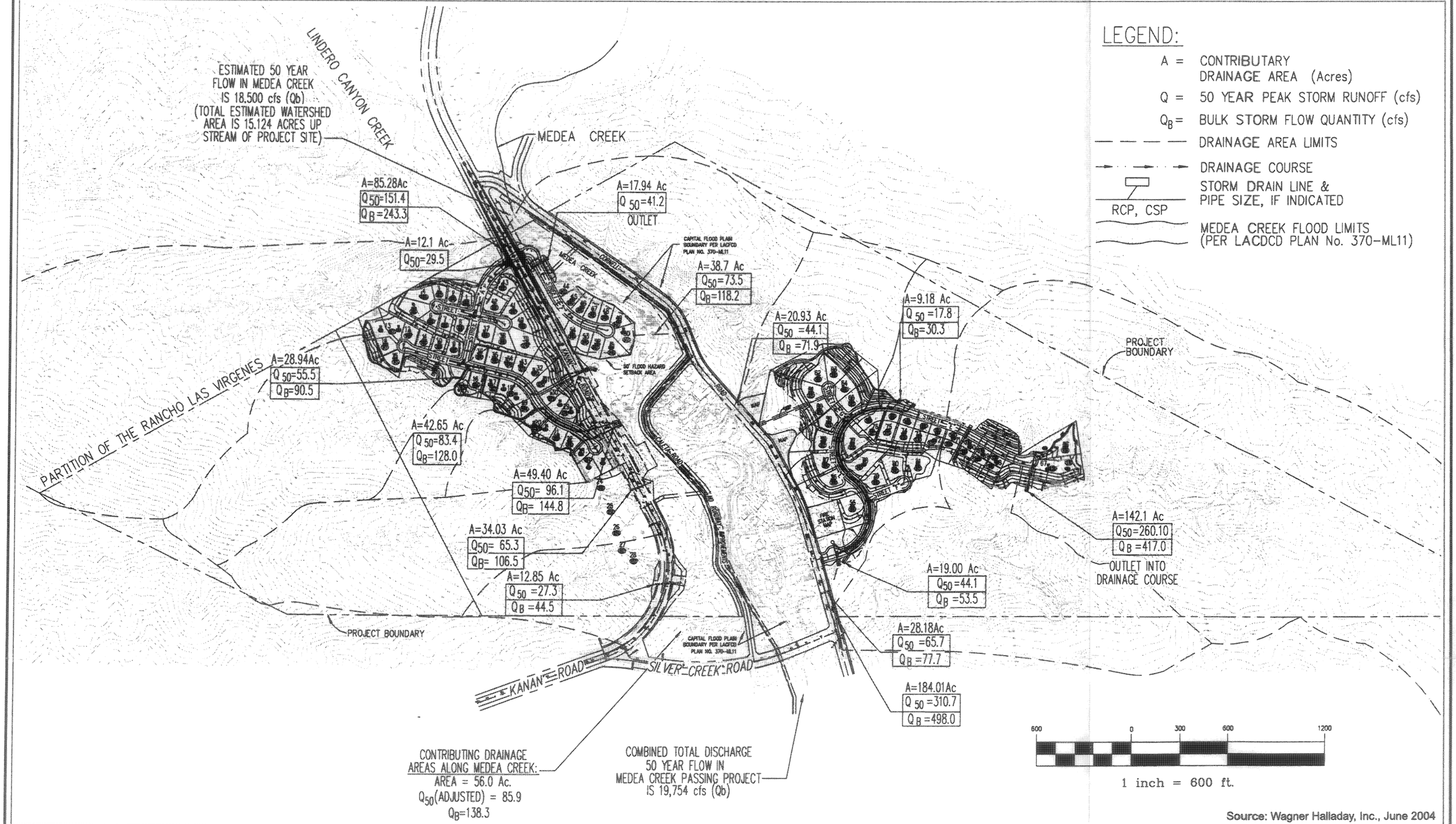
Nevertheless, there currently exists, and will continue to exist, a flooding potential in Medea Creek along Caleta Road (not an improved roadway). The proposed project will neither substantially degrade nor improve this existing condition. However, as previously mentioned, the 50-year floodplain has been delineated for this area and the project will established a 50-foot flood hazard setback area, beyond the inundation area. No buildings will be constructed within the 50-foot flood hazard setback area.




Source: Wagner Halladay Inc., June 2004

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.D-3
Drainage Concept Plan




Source: Wagner Halladay, Inc., June 2004

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.D-4
Hydrology of Proposed Development

**Off-Site Flood Conditions**

The total watershed area upstream of the project site is approximately 15,124 acres. The tributary drainage area of the project site and the surrounding ridges add another 518 acres to the Medea Creek watershed. Finally, the drainage basin downstream of the project, but upstream and directly contributing to Malibou Lake includes an additional 1,879 acres, for a total watershed area contributing to Malibou Lake of approximately 17,520 acres, or 27.4 square miles.

The County of Los Angeles reports that the 50-year capital flood rate into Malibou Lake is approximately 38,400 cfs. The peak burned and bulked flow rate contributing to Medea Creek from the developed site is 1,027 cfs (less than the existing conditions flow rate). Site generated flow is 2.7 percent of the flow reaching Malibou Lake. A comparison of this percentage to the Lake's capital flood elevation (i.e., 13 feet) reveals the developed project site's contribution to the capital flood elevation to be approximately 4.2 inches.

**Structural Drainage**

Grading hillside residential lots necessitate cutting slopes and earthen fill. Fill is graded and compacted to geotechnical specifications. Fill may consolidate when saturated even if it is thoroughly compacted. It is important to prevent water from ponding adjacent to foundations causing saturation of soil in a localized area and may promote settlement of foundations. The more frequent the ponding and the more numerous the ponded areas, the greater the depth and lateral extent of saturation. Heavy watering increases soil moisture content substantially; winter rains can further saturate the ground resulting in a completely saturated soil condition. These issues shall be addressed through compliance with the Uniform Building Code and the requirements of the Department of Public Works. Notwithstanding the foregoing, mitigation measures are also recommended to assure that positive drainage is provided for all structures by proper grading practices that shape ground slopes away from building foundations .

## SIGNIFICANCE OF IMPACTS BEFORE MITIGATION

***Alteration of the existing drainage pattern resulting in substantial erosion or siltation on- or off-site***

Project site development would result in minor alterations of drainage patterns, due to the construction storm drain systems. However, no substantial alteration of the existing drainage pattern would occur. All site runoff will continue to flow to Medea Creek in approximately the same location as it does currently.

According to the geotechnical report (see Section III.A, Earth Resources), the graded and natural areas of the proposed project would be subject to erosion and sedimentation. Mitigation measures are recommended to reduce these potential problems to a less than significant level (see Section III.E, Water Quality). However, peak runoff from the developed project site would be less than the undeveloped conditions peak flow. No substantial increase in erosion or siltation would be expected with proposed mitigation measures. Therefore, impacts with respect to the alteration of existing drainage patterns, erosion, and siltation would be less than significant.

***Alternation of the existing drainage pattern resulting in flooding on- or offsite***

Peak flow runoff from the developed portions of the project site would be less than the peak flow from the undeveloped site. As such, there would be no increased on-site or downstream flooding. Therefore, the project would have a less than significant impact with respect to flooding onsite or off.

***Create runoff water that would exceed the capacity of existing or planned stormwater drainage systems***

The project site drains directly into Medea Creek, which drains directly into Malibou Lake. There are no existing or planned drainage improvements between the project site and Malibou Lake. The proposed project would decrease peak flows in Medea Creek and would reduce debris accumulation by 5,645 cubic yards of debris. Therefore, the project would not create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems. Project impacts would be less than significant with respect to existing or planned stormwater drainage systems.

***Place housing within a 100-year flood hazard area***

Onsite flood hazards areas have been designated and the project has been designed not to encroach into those areas. The project would not place any housing within a designated 100-year flood hazard area. Further, the project would not place any structures within a 100-year flood hazard area that would impede or redirect flood flows. Therefore, the project impacts would be less than significant with respect to 100-year flood hazard areas.

***Expose people or structures to flooding as a result of the failure of a levee or dam.***

There are no levees or dams upstream from the project site. Therefore, the project will not expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam. Project impacts with respect to this issue would be less than significant.

***Expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow***

There are no upstream bodies of water that might subject the project site to seiche hazards. The project site is not near the ocean and is not subject to inundation from tsunamis. Therefore, impacts associated with seiche and tsunamis are less than significant.

## MITIGATION MEASURES

With implementation of the approved Drainage Concept, the proposed project's impact from increased runoff would be less than significant. Under the provisions of CEQA, mitigation measures are not required. Nevertheless, in addition to implementing the Drainage Concept as approved by the Department of Public Works, the project applicant proposes to implement the following measures to reduce further the project's less than significant long-term impacts from storm water runoff:

D-1 All necessary drainage structures on Kanan and Cornell Roads shall be constructed by the project applicant/developer to the satisfaction of the Los Angeles County Department of Public Works.

D-2 A 50-foot flood hazard setback area from the Medea Creek capital floodplain boundary shall be delineated on the project's Final Map in accord with the requirements of the Los Angeles County Department of Public Works. No buildings shall be constructed within the 50-foot flood hazard setback area.

D-3 The project shall construct slope protection along the newly graded portion of Kanan Road adjacent to Medea Creek to convey stormwater drainage through the project site and to protect the creek to the satisfaction of the Los Angeles County Department of Public Works.

D-4 Energy dissipaters shall be installed at any outlet structure where the velocity may be erosive.

D-5 The project applicant/developer shall provide rights of entry and physical access to all required temporary or permanent debris basin sites to the satisfaction of the Los Angeles County Department of Public Works.

D-6 To assure that common drainage facilities, landscape materials, irrigation systems and the privately-maintained open space lots are properly and adequately maintained, the applicant/developer shall record with the County Recorder, prior to the recordation of the Final Map, a declaration of covenants, conditions and restrictions to run with the land providing the

following:

1) The project's homeowners' association shall cause a yearly inspection to be made by a registered civil engineer of all onsite slope areas and drainage devices. Any necessary maintenance and corrective measures shall be undertaken by the association. Each future property owner shall automatically become a member of the association and shall automatically be subject to a proportionate share of the cost; and

2) Prior to issuance of building permits, the applicant/developer shall submit to the Department of Public Works a landscape plan for the project site which outlines how to properly maintain the planted areas in order to reduce fire hazard potential, maintain visual quality and prevent the establishment of rodent populations.

D-7 Slopes shall be planted and efficient irrigation systems (acceptable to the County) that minimize runoff and evaporation and maximize the water that would reach the plant roots, such as drip lines, shall be installed as soon as practical after completion of grading.

D-8 The project applicant/developer shall inform all future owners of affected lots with drainage devices of their responsibility for the maintenance of the devices on their lots. The future owner and all successors shall be presented with a copy of the drainage maintenance program for their lot. Any amendment or modification that would defeat the obligation of said association as required hereinabove shall be approved in writing by Los Angeles County Department of Public Works.

The project applicant proposes the following mitigation measures to assure all structures will have adequate drainage:

D-9 All discharge from erosion control structures shall be dissipated to non-erosive velocities.

D-10 Roof runoff shall be collected in appropriate systems (such as rain gutters and downspouts) and discharged from the building sites directed toward interior driveways in non-erosive drainage devices.

D-11 Building pads shall be provided for all proposed structures with sufficient height above the curb to drain toward interior driveways on a slope of 2 percent from all points on the pad. No building pad will drain directly toward a natural drainage course.

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

With implementation of the approved Drainage Concept, project related impacts associated with hydrology would be less than significant. Implementation of the applicant proposed mitigation measures would further reduce the project's less-than significant long-term runoff-related impacts. Implementation of the proposed mitigation measures discussed in Section III.E. Water Quality, would reduce the short-term construction-related impacts of increased on-site runoff and erosion, and downstream stream bank erosion and sedimentation to a less than significant level.

## CUMULATIVE IMPACTS

Implementation of the proposed project in combination with the related projects would cumulatively increase the amount of impervious surface area, and landform and drainage pattern alterations in the Medea Creek watershed. However, due to the combined effect of a debris basin and the increased opportunities for on-site storm water infiltration, the peak runoff from developed project site would be no greater than the peak runoff from the undeveloped project site. As such, the project's contribution to the peak cumulative flow would be less than significant. Furthermore, project site generated flow amounts to 1.2 percent of the total cumulative flow reaching Malibou Lake. This is a relatively small percentage of the total flow into Malibou Lake and since the flow would not increase as a result of the proposed project, its contribution to downstream conditions would not be considered cumulatively considerable.

# III. ENVIRONMENTAL IMPACT ANALYSIS
# E. WATER QUALITY

The following reports have been used in preparing this analysis of Water Quality. Data from these reports are summarized below and incorporated by reference. Copies of these reports are included in Appendix G of this DEIR.

- US Environmental Protection Agency, Region 9, Total Maximum Daily Loads for Nutrients, Malibu Creek Watershed, Published March 21, 2003

- California Regional Water Quality Control Board, Los Angeles, Total Maximum Daily Loads for Bacteria, Malibu Creek Watershed, January 29, 2004

Other references and resources used in developing the water quality impact analysis in this section are listed in Section VII, References.

## ENVIRONMENTAL SETTING

The project site is mostly vacant, undeveloped land. Natural sediments, vegetative debris, and wildlife/equestrian wastes are all factors that may affect the existing surface water quality on the project site. There are also a few temporary uses on portions of the property that may generate substances that have the potential to adversely affect surface water quality on the site and in the surrounding area. These temporary uses include: a fire wood cutting and storage operation (less than one acre) on the east side of Cornell Road adjacent to and northerly of Fire Station No. 65; and, an area located west of Kanan Road on the lower slopes of Ladyface Mountain which was formerly used for top-soil stockpiling and grading equipment storage. These uses would cease to operate and would be removed from the site prior to project construction.

Currently, stormwater drains from the project site via sheetflows and natural drainage courses into Medea Creek. Culverts direct stormwater flows in the larger tributary canyons under Kanan and Cornell Roads, but no other drainage improvements exist on the site.

The total Medea Creek watershed area contributing storm runoff to Malibou Lake (including the project site) is approximately 17,520 acres. The watershed area upstream of Malibu Lagoon is named the Malibu Creek Watershed; this area encompasses approximately 65,310 acres. The Malibu Creek Watershed discharges to the Pacific Ocean and includes Malibu Lagoon, Malibu Creek and its tributaries, of which the Medea Creek watershed is a part. The 320.3-acre project site, within its 518-acre contributory drainage area, amounts to 1.8% of the Malibu Creek Watershed.

**Regulatory Framework**

***National Pollutant Discharge Elimination Program (NPDES)***

The 1987 amendments to the Federal Water Pollution Control Act, or Clean Water Act, added Section 402(p), which establishes a framework for regulating municipal and industrial storm water discharges under the NPDES program. Subsequently, the EPA published final regulations that establish requirements for applications for storm water permits for specified categories of industries and construction activities of 5 acres or more.

In 1992, the California State Water Resources Control Board (SWRCB) adopted the General Construction Activity Storm Water Permit (GCASWP) which is "...required for all storm water discharges associated with construction activity where clearing, grading, and excavation results in a land disturbance of 5 or more acres." However, by Modification of Water Quality Order 99-08-DWQ (approved by Motion on December 2, 2002), the SWRCB lowered the threshold acreage of soil disturbance requiring permit coverage from 5 acres to 1 acre. Since the proposed project site falls within these criteria, a permit must be obtained from the SWRCB prior to start of construction. In order to be covered under the General Permit, the project developer must submit a Notice of Intent (NOI) to the SWRCB.

The General Permit requires all owners of land where construction activities occur (i.e., dischargers) to:

- Eliminate or reduce non-storm water discharges to storm sewer systems and other waters of the nation;
- Develop and implement a Storm Water Pollution Prevention Plan (SWPPP); and
- Perform inspections of storm water pollution prevention measures (control practices)

The General Permit authorizes the discharge of storm water associated with construction activity from construction sites. However, it prohibits the discharge of materials other than storm water and all discharges which contain hazardous substances in excess of reportable quantities established at 40 Code of Federal Regulations 117.3 or CFR 302.4 unless a separate NPDES permit has been issued to regulate those discharges.

The General Permit requires development and implementation of a SWPPP, emphasizing Best Management Practices (BMP), which is defined as " - schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States". The SWPPP has two major objectives:

- To help identify the sources of sediment and other pollutants that affect the quality of storm water discharges; and

- To describe and ensure the implementation of practices to reduce sediment and other pollutants in storm water discharges, both during and after construction.

In addition, dischargers are required to conduct inspections before and after storm events and to annually certify that they are in compliance with the General Permit.

***Water Quality Control Plan Los Angeles Region (Basin Plan)***

The State of California Water Resources Central Board delegates to the various Regional Water Quality Control Boards (RWQCB) the responsibility for protection of water quality in watershed basins throughout the state. The Los Angeles RWQCB Basin Water Quality Plan (Basin Plan) serves as a resource for the RWQCB and others who use water and/or discharge wastewater in the Los Angeles Region. The Basin Plan establishes water quality objectives for the County of Los Angeles. The California Water Code defines water quality objectives as "the allowable limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area." Therefore, the Basin Plan water quality objectives are intended to: (1) protect the public health and welfare; and (2) maintain or enhance water quality in relation to the designated existing and potential uses of the water.

The Basin Plan designates beneficial uses for surface and ground waters, sets narrative and numerical water quality objectives that must be attained (or maintained) to protect the designated beneficial uses, and describes implementation programs to protect all waters in the region. Table IV.E-1 lists the beneficial uses for inland surface waters in the Malibu Creek Watershed that are listed in the Basin Plan.

**Table III.E-1**
**Beneficial Uses of Inland Surface Waters in Malibu Creek Watershed**

| WATER BODY | MUN | GWR | NAV | REC1 | REC2 | WARM | COLD | EST | MAR | WILD | RARE | MIGR | SPWN | WET |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Malibu Lagoon | | | E | E | E | | | E | E | E | Ee | Ef | Ef | E |
| Malibu Creek | P | | | E | E | E | E | | | E | E | E | E | E |
| Malibou Lake | P | | E | E | E | E | | | | E | E | | | E |
| Medea Creek | P/I | I | | Im/Em | I/E | I/E | P | | | E | E | | | E |

*MUN- Municipal/Domestic Supply*
*GWR- Groundwater Recharge*
*NAV- Navigation (shipping/travel)*
*REC1- Water Contact Recreation*
*REC2- Non-Contact Water Recreation*
*WARM- Warm Freshwater Habitat*
*COLD- Cold Freshwater Habitat*
*EST- Estuarian Habitat*

*MAR- Marine Habitat*
*WILD- Wildlife Habitat*
*RARE- Rare, Threatened, Endangered Species*
*MIGR- Migration of Aquatic Organisms*
*SPWN- Spawning, Reproduction, Early Development*
*WET- Wetland Habitat*

*P- Potential Beneficial Use*
*E -Existing Beneficial Use*
*I- Intermittent Beneficial Use*
*e- One or more rare species utilize for foraging and/or nesting.*
*f- Aquatic organisms use for spawning and early development.*
*m- Access prohibited in channelized areas*

*Source: Water Quality Control Plan (Basin Plan) Los Angeles Region, Table 2-1*

### *County of Los Angeles Standard Urban Storm Water Mitigation Plan*

Los Angeles County and the Los Angeles Regional Water Quality Control Board (RWQCB) approved on January 26, 2000, new standards for construction projects aimed at limiting urban runoff and reducing the pollution of the County's public lands and beaches. Under these new requirements, new developments are required to collect and/or filter rainfall runoff from developed areas, particularly impervious areas, where pollutants can be expected to be carried from the first cleansing washes of a storm.

The County's Standard Urban Storm Water Mitigation Plan (SUSMP) is designed to eliminate 85 percent of the pollutants in storm runoff from new developments via requirements for implementation of a "first flush" cleansing program. The requirements of the program are such that the first 0.75 inch of rainfall runoff from a 24-hour storm is to be intercepted from drainage areas where new development is occurring and be cleansed, filtered or retained until pollutants are removed.

The County's SUSMP includes numerous examples of Treatment Control "Best Management Practices" (BMPs) including filtration of runoff waters into natural ground at locations where landscaping allows

or into cleansing devices such as clarifiers where runoff can be treated before it is released to natural drainage courses. The treated storm runoff must be the volume equivalent of 0.75 of an inch of rainfall over the contributory drainage area. Larger volumes of runoff are allowed to bypass the cleansing devices.

At this time, the County of Los Angeles does not have sufficient funding to maintain the "first flush" improvements when constructed. Therefore, the County's policy is that the cleansing devices, whether they be filters, mechanical clarifiers, or other BMPs, be a part of a private storm drain system to be operated and maintained by private homeowners or home owners' associations.

Storm drain improvements which are a part of a public system, or located within the public right-of-way, must still comply with public standards for construction, installation and sizing, but must not incorporate improvements that will necessitate maintenance by the County. Instead, the public drainage facilities, if draining developed improvements, must discharge to a "first flush" cleansing device or improvement on private property and be privately maintained.

**Surface Water Quality**

According to the Basin Plan, the Malibu Creek Watershed has changed rapidly in the last 20 years due to increasing population as well as the increased water runoff from the development that has supported the growing population base. Several tributaries of Malibu Creek have been channelized to provide flood protection to new development, resulting in an "imbalance in the natural flow regime"; non-point sources of stormwater runoff from new development have also resulted in high levels of pollutants in the waterways, including excess nutrients, sediment, and bacteria.

***Malibu Creek Watershed Total Maximum Daily Loads (TMDLs)***

Section 303(d)(1)(C) of the Clean Water Act (CWA) requires that each State shall establish TMDLs and that "...such loads shall be established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality." TMDLs are a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's contributing point and non-point sources.[1] Point source pollutants originate from a clearly defined source such as a pipe or other outflow (e.g. the Tapia Water Reclamation Facility). Non-point source pollutants come from a wide-range of sources which are not regulated through NPDES Permits (e.g., runoff from residential and commercial areas). Source

[1] *EPA website, July 23, 2004. Website: http://www.epa.gov/owow/tmdl/intro.html*

allocations are usually greatly reduced from existing source contributions and therefore TMDLs also include implementation strategies for reducing pollutant contributions from various sources. TMDLs consist of seven elements: 1) Problem Statement; 2) Numeric Targets; 3) Source Assessment; 4) Linkage Analysis; 5) TMDLS and Pollutant Allocations; 6) Implementation Recommendations; and 7) Monitoring Recommendations.

The Environmental Protection Agency has oversight authority for the 303(d) program and is required to review and either approve or disapprove the TMDLs submitted by states. Malibu Creek and three of its tributaries (Las Virgenes Creek, Medea Creek and Lindero Creek) exceed the water quality objectives for various nuisance effects. Specifically, Reach 1 of Medea Creek (defined as that portion of Medea Creek upstream of the Lake to its confluence with Lindero Creek), which flows through the project site, is listed as a 303(d) impaired water body for algae, high coliform count (bacteria), sedimentation/siltation, selenium, and trash. Consequently, the Malibu Creek Watershed Bacteria TMDLs and the Malibu Creek Watershed Nutrient (Nitrogen and Phosphorus) TMDLs were approved and established by the EPA on March 21, 2003 (see Appendix G).

*Nutrients*

Discharges of nutrients, including nitrogen and phosphorous, to waterbodies encourages the growth of algae that can deplete dissolved oxygen and can lead to eutrophication, which can result in the loss of invertebrate taxa through habitat alteration.[2] Additionally, excessive algal biomass can lead to impairment of swimming and wading activities, and other recreational uses. The summer TMDLs for the entire Malibu Creek Watershed are 27 lbs per day for nitrogen and 2.7 lbs per day for phosphorus.[3]

The major point-source for nutrient loads in the Malibu Creek Watershed is the Tapia Water Reclamation Facility operated by the Las Virgenes Municipal Water District. The major non-point sources of nutrients are septic systems, runoff from residential and commercial areas, runoff and erosion from undeveloped areas, runoff associated with agriculture and livestock, golf course irrigation and fertilization, effluent irrigation, rising groundwater and atmospheric deposition.

Within the Malibu Creek Watershed, the major non-point source contributor of nutrients is septic systems which, even when appropriately sited and functioning properly, can be a significant source of pollutants since they can introduce nutrients to shallow groundwater which may eventually enter surface waters. According to the Basin Plan, septic systems account for 40.4% of the average annual total nitrogen loads

---

[2] *Biggs, 2000 in "Total Maximum Daily Loads for Nutrients Malibu Creek Watershed", US Environmental Protection Agency, Region 9, March 21, 2003.*

[3] *Refer to Table 28, page 38 in "Total Maximum Daily Loads for Nutrients Malibu Creek Watershed", US Environmental Protection Agency Region 9, March 21, 2003.*

and 53.9% of the average annual total phosphorus loads to the entire Malibu Creek Watershed. Other major development-related sources are effluent irrigation, golf courses, agriculture and livestock, high/medium density residential uses and commercial/industrial uses (see Table IV.E-2).

However, the second major contributor is runoff from Chaparral/Sage (the predominant vegetation type in natural open space areas) which accounts for 17.5% of average annual total nitrogen and 14.8% of phosphorus loadings to the Malibu Creek Watershed. More than 75% of the Malibu Creek Watershed is undeveloped land consisting primarily of chaparral, scrub, and woodlands, with smaller areas of grasslands and forests. Runoff from these areas carries nutrients from decomposing organic litter, and wildlife wastes, particularly from mammals and birds.

**Table III.E-2**
**Major Sources of Nutrients in the Malibu Creek Watershed**

| Source | % of Average Annual Total Nitrogen Loads 1993-1995 | % of Average Annual Total Phosphorus Loads 1993-1995 |
|---|---|---|
| Commercial/Industrial | 3.2% | 2.3% |
| High/Medium Density Residential | 4.7% | 4.0% |
| Agriculture/Livestock | 5.3% | 2.5% |
| Chaparral/Sage | 17.5% | 14.8% |
| Golf Courses | 5.4% | 7.0% |
| Septic | 40.4% | 53.9% |
| Effluent Irrigation | 7.8% | 4.9% |
| Tidal Inflow | 3.8% | 1.8% |

*Source: Tables A-3 and A-4 in "Total Maximum Daily Loads for Nutrients, Malibu Creek Watershed", US Environmental Protection Agency, Region 9, March 21, 2003. Appendix G-1.*

Lower Medea Creek, which traverses the project site, carries approximately 5.4% of the total Malibu Creek Watershed nitrogen load and 3.5% of the total watershed phosphorus load. However, only 0.2% of the average annual total nitrogen and phosphorus loadings come from Low Density Residential uses. The majority of nitrogen and phosphorus loadings in Lower Medea Creek come from effluent irrigation (which contributes 3.7% of nitrogen and 2.4% of phosphorus loadings). Other sources are runoff from chaparral/sage and septic systems. Because the Medea Creek subwatershed (including both Upper Medea Creek; Medea Creek above the confluence with Lindero Creek, and Lower Medea Creek)

contains a majority of open space area (61%) and 31% residential uses[4], the major source of nutrient loadings is the open space areas.

*Bacteria*

The target bacteria indicators addressed in the TMDL are fecal coliform, total coliform, E. coli and enterococcus. Malibu Creek and five of its tributaries (including Medea Creek) exceed the water quality objectives for bacterial indicators. Fecal coliform bacteria, common in the intestines of warm-blooded animals, is used as an indicator for disease-causing bacteria and viruses.

Surface runoff from residential and commercial areas is the largest sources of bacteria in the Malibu Creek Watershed as a whole and specifically in the Lower Medea Creek subwatershed. Most of these loadings occur during storms: however, dry-weather (low flow) urban runoff and inadequate on-site wastewater treatment also contribute to pollutant loadings from human development sources. Potential sources include fertilizers used for landscaping; organic debris from gardens, landscaping and parks; trash and food wastes; domestic animal waste; and human waste from areas inhabited by homeless persons. Pollutants accumulate, particularly on impervious surfaces, and are washed into the waterways through storm drains when it rains. Pollutant loads are typically highest during the first major storms (i.e., first flush storms) after extended dry periods. Dry-weather sources include such activities as lawn watering and the washing down of parking lots and driveways. Failed septic systems are also a major source, discharging effluent either directly to local groundwater or to surface water via rising groundwater or overland flows.

Low Density Residential uses are the largest sources of bacterial loads in the Lower Medea Creek watershed, contributing approximately 74 percent[5] of existing fecal coliform loads to the watershed (see Table IV.E-3). The TMDL sets a percent reduction for each subwatershed area to meet the TMDL bacteria allocation. For the Lower Medea Creek watershed, the TMDL establishes a 92 percent overall reduction in bacteria loading; for Low Density Residential uses within this area, the TMDL would result in a 99 percent reduction[6] in fecal coliform loadings.

---

[4] *Refer to page 6 in "Total Maximum Daily Loads for Nutrients," Malibu Creek Watershed, March 21, 2003.*

[5] *$4.79x10^{13}$ no./yr. of a total of $6.47x10^{13}$ no./yr. Refer to Appendix 5 in "Total Maximum Daily Loads for Bacteria", Malibu Creek Watershed, January 29, 2004. Appendix G-2.*

[6] *Fecal coliform allocation is $5.96x10^{11}$ no./yr. Refer to Appendix 5 in "Total Maximum Daily Loads for Bacteria", Malibu Creek Watershed, January 29, 2004. Appendix G-2.*

**Table III.E-3**
**Sources of Bacteria in the Lower Medea Creek Watershed**

| Source | Existing Fecal Coliform Loads (no./yr) | Percent of Total Load |
|---|---|---|
| Commercial/Industrial | $7.26x10^{12}$ | 11.2 |
| Low Density Residential | $4.79x10^{13}$ | 74 |
| Rural Residential | $3.05x10^{12}$ | 4.7 |
| Agricultural/Livestock | $3.34x10^{11}$ | 0.5 |
| Vacant | $1.31x10^{10}$ | 0.02 |
| Chaparral/Sage Scrub | $1.39x10^{12}$ | 2.1 |
| Grasslands | $1.23x10^{11}$ | 0.2 |
| Woodlands | $7.94x10^{9}$ | 0.01 |
| Septic Systems | $4.48x10^{12}$ | 6.9 |
| Effluent Irrigation | $5.48x10^{9}$ | 0.008 |
| Imported Water | $1.56x10^{11}$ | 0.2 |
| **Total** | **$6.47x10^{13}$** | **100** |

*Source: Appendix 5 in "Total Maximum Daily Loads for Bacteria", Malibu Creek Watershed, January 29, 2004 (see Appendix G-2)*

*List of Pollutants of Concern*

The pollutants of concern listed below have been chosen for analysis from the Basin Plan list of "Regional Objectives for Inland Surface Water" based upon the types of anticipated pollutants that could be generated by the proposed project. In addition, the receiving water body (Medea Creek) that would receive project site runoff is listed as impaired on the RWQCB's 303(d) list and the relevant pollutants that led to this listing are described below. Many other pollutants have water quality objectives listed in the Basin Plan; however, these are not included in the following discussion because they are not likely to be generated by low-density residential land uses.

Total Dissolved Solids (TDS)

Total Dissolved Solids (TDS) are a measure of the amount of material dissolved in water. If TDS concentrations are too high or too low, growth of aquatic life can be impaired. TDS may reduce water clarity, thereby decreasing photosynthesis. Additionally, TDS may combine with toxic compounds and/or heavy metals to generate additional water quality concerns. Factors that affect the amount of TDS in stormwater runoff include soil erosion, pollutants from streets, fertilizers and pesticide use, wastewater and septic system effluent, and other materials that can be carried by storm flows into

receiving waters. Total Suspended Solids (TSS) refers to particles that are suspended in the water, which can result in a lack of water clarity and turbidity.

Petroleum Hydrocarbons (Oil and Grease)

Petroleum hydrocarbons are toxic to aquatic wildlife and plants. Petroleum hydrocarbons can enter stormwater runoff from various sources, including vehicle fuel and lubricant leaks, atmospheric deposition, vehicle exhaust, and leachate from pavement.

Pesticides

Pesticides and herbicides are used in urban environments on landscaped areas, including residential lawns, as well as on agricultural land. Pesticides often enter stormwater runoff through their attachment to soil particles and plant residue (TSS and TDS). An excess of pesticides and herbicides in stormwater runoff can be toxic to plants and animals in receiving waters.

Floating Materials

Floating materials (trash) are generally bulky and floatable materials that are aesthetically unsightly as well as dangerous to aquatic wildlife and plants. Heavy metals and petroleum hydrocarbons can be attached to trash and debris, thereby providing a vehicle for additional stormwater pollutants, undesirable bacterial and algal growth, and insect vectors. Trash and debris can inhibit the free-flow of surface waters, clog the gills of fish, and can carry other pollutants into stormwater runoff.

Total Phosphorus

Excess phosphorus can result in nuisance algae blooms and the growth of aquatic plants in surface water, which can deteriorate water quality and recreational activities. Phosphorus compounds tend to attach to TDS and TSS particles; therefore, areas with high sediment loads in surface waters tend to also produce high phosphorus loads. Common sources of phosphorus in stormwater runoff include agricultural activities (fertilizers and manure), car washing, lawn fertilizers, and leaves and cut grass that are washed into stormwater flows.

Nitrogen (Nitrate/Nitrite)

Excessive concentrations of nitrate and/or nitrite in water can be harmful to aquatic wildlife. If excessive amounts of nitrates are added to water, algae and aquatic plants can be produced in large quantities. When these algae/plants die, they are decomposed by bacteria in a process that uses up oxygen (called eutrophication). Dissolved oxygen concentrations then can drop too low for fish to

breathe, leading to fish kills. Sources of nitrate/nitrite include runoff from fertilizer use, leaching of effluent from septic tanks, sewage disposal, and erosion of natural deposits.

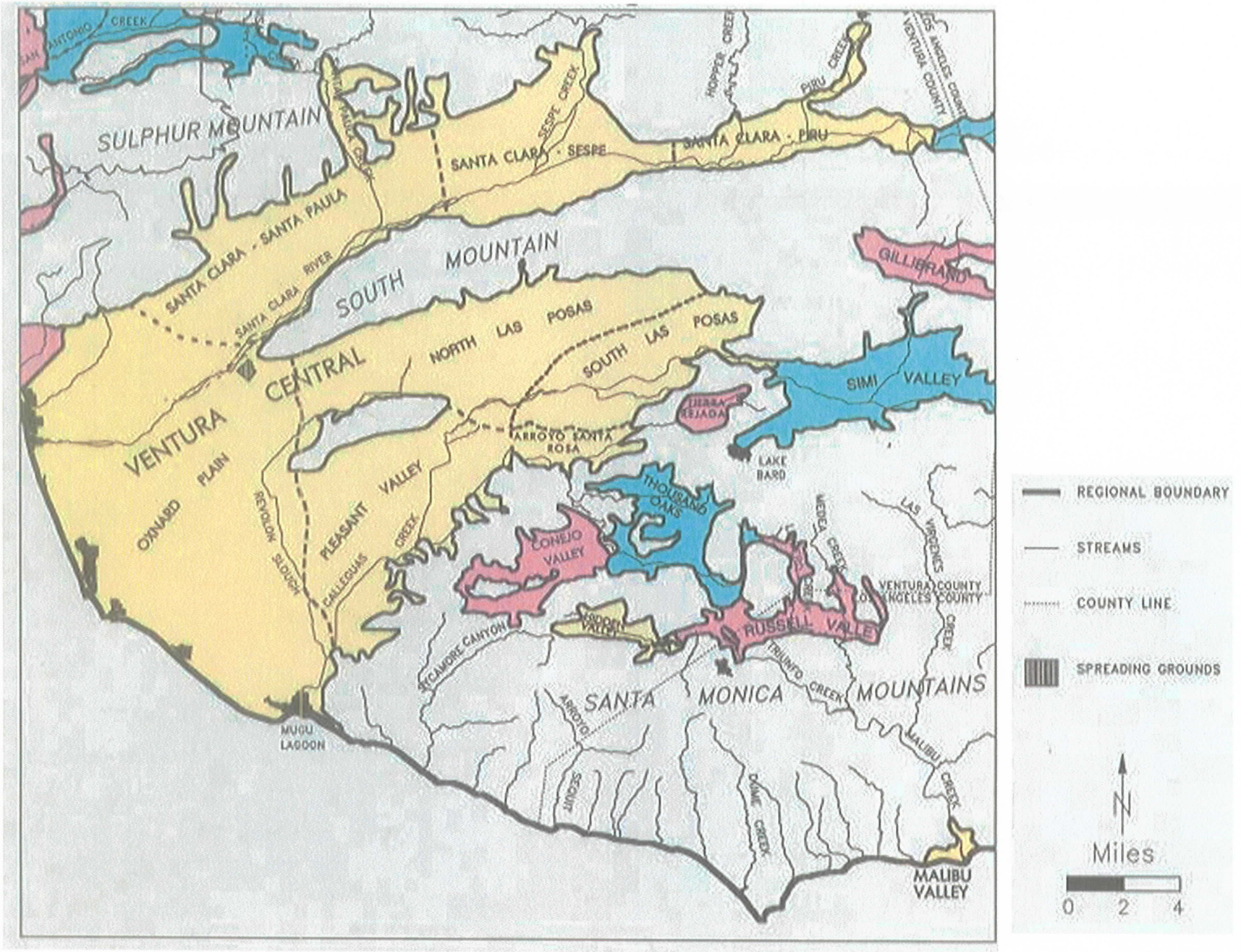
Bacteria (Fecal Coliform)

The presence of coliform bacteria is used as an indicator for the presence of fecal wastes from warm-blooded animals, including humans. Coliform bacteria themselves are not necessarily pathogenic, but they indicate the likelihood that more dangerous organisms, such as the organisms that cause salmonellosis, cholera or hepatitis, are present. Consequently, high levels of fecal coliform bacteria, regardless of the sources, imply a high risk of disease transmission. Sources of bacteria in urban runoff include sewage system overflows, malfunctioning septic tanks, pet waste, and populations of urban wildlife, such as pigeons and geese.

**Groundwater**

According to the Basin Plan, the Malibu Creek Watershed is not located directly over a regional groundwater basin. This is illustrated by Figure IV.E-1 (a reprint of Figure 2-12 of Basin Plan). The Russell Valley Groundwater Basin is located north of the project site, but it terminates prior to the confluence of Medea Creek and Lindero Creek. Therefore, groundwater in the vicinity of the project site is not used as a regional source of potable water.

The Malibu Valley Groundwater Basin, located approximately 11 miles south of the project site, is a very small alluvial basin (covering approximately 1.0 square mile of overlying surface area) located along the Los Angeles County coastline at the terminus of Malibu Creek. Recharge of this basin occurs from percolation of precipitation, runoff, and effluent from septic systems. Groundwater flows generally southward from inland areas towards the Pacific Ocean. This basin supports domestic as well as municipal/irrigation groundwater wells.




CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.E-1
Ventura Central Groundwater Basins

## ENVIRONMENTAL IMPACTS

### Thresholds of Significance

In accordance with Appendix G to the CEQA Guidelines, the proposed project would have a significant water quality impact if it would cause any of the following conditions to occur:

- Violation of any water quality standards or waste discharge requirements.
- Otherwise substantially degrade water quality.

### Project Impacts

Stormwater runoff is part of a natural hydrologic process. However, land development and construction and long-term residential activities can alter natural drainage patterns and contribute pollutants to stormwater runoff. Runoff picks up pollutants as it flows over the ground or paved areas and carries these pollutants into the storm drain system. Common sources of pollutants from construction sites include: sediments from soil erosion; construction materials and waste (e.g., paint, solvents, concrete, and drywall); and spilled oil, fuel, and other fluids from construction vehicles and heavy equipment. Typical residential activities such as washing cars and applying fertilizers to landscaping can leave residues that may eventually wash into natural drainage channels and then be transported to rivers, lakes and streams, and eventually to the ocean.

### Construction-Related Impacts

Construction of the proposed project has the potential to affect the quality of storm water runoff entering Medea Creek. There are three general sources of short-term construction-related storm water pollution that could be associated with the proposed project: (1) the handling, storage, and disposal of construction materials containing pollutants; (2) the maintenance and operation of construction equipment; and (3) earth moving activities which, when not properly controlled, may generate sediment loads from soil erosion.

The project construction site would contain a storage area for a variety of construction materials that are potential sources of storm water pollution, including: adhesives; cleaning agents; landscaping materials; plumbing, painting, heating/cooling, and masonry materials; floor and wall coverings; and demolition debris. Construction material spills can be a source of storm water pollution and/or soil contamination.

Routine safety precautions for handling and storing toxic and hazardous materials that might be associated with construction equipment, and maintaining construction equipment in proper working

condition, may effectively control the potential pollution of storm water by these materials. These common sense, "good housekeeping" procedures can also be extended to non-hazardous storm water pollutants that may be generated by construction activities such as sawdust and other solid wastes.

Soil erosion is the process by which soil particles are removed from the land surface by the action of wind or water. Soil particles transported by storm water runoff into local watercourses can have negative impacts on aquatic habitats. Soil exposed by clearing, grading, or excavation is easily eroded by wind or water. Two general strategies are typically required to prevent construction silt from entering drainage courses. First, the amount of exposed soil is typically limited and erosion control procedures are implemented for those areas that must be exposed. Appropriate dust suppression techniques, such as watering or tarping, are used to reduce erosion in areas that must be exposed. Many of the common mitigation measures for controlling fugitive dust emissions, such as covering truck loads and street sweeping, are also effective in controlling sediment transport in storm water runoff. Second, the construction area is secured to control off-site transport of pollutants. Erosion control devices, including temporary diversion dikes/berms, drainage swales, and siltation basins, are typically required to be implemented in construction areas to ensure that sediment is trapped onsite and properly removed.

Implementation of the BMPs specified in the project's SWPPP and compliance with the discharge requirements of the GCASWP would ensure that the project construction activities would not violate any water quality standards or discharge requirements, or otherwise substantially degrade water quality. Therefore, the project's short-term, construction-related water quality impacts would be less than significant.

**Long-Term Operational Impacts**

If not properly designed and constructed, the proposed project could increase the rate of urban pollutant introduction into stormwater runoff, and increase erosion and transport of sediment loads and downstream siltation, all of which constitute avoidable impacts to surface water quality. In order to prevent these potential impacts, the project would be designed in compliance with the following regulatory requirements: (1) Section 402(p) of the Federal Water Pollution Control Act, or Clean Water Act (CWA); (2) Order No. 90-079 of the Regional Water Quality Control Board, Los Angeles Region, which regulates the issuance of waste discharge requirements to Los Angeles County and Cities tributary to the County under NPDES Permit No. CA0061654; and (3) the County of Los Angeles SUSMP.

Two basic areas of concern related to the long-term operation of the proposed project are stormwater quality and quantity. BMPs such as regular sweeping of paved areas can be used to address quality concerns. BMPs that incorporate design considerations, such as channeling runoff from paved areas

into landscaped areas, can effectively address both quality and quantity considerations. In general, it is desirable to: (1) minimize the amount of paved area, use permeable types of paving materials whenever possible, (2) design onsite drainage to convey stormwater into landscaped areas, and (3) grade landscaped areas to maximize the retention of runoff. BMPs that would be implemented as a part of the proposed project are listed below in the Mitigation Measures section.

BMPs that limit the quantity of runoff from a project site often provide mitigation for water quality concerns as well. The proposed project has been designed to ensure that post-development stormwater flows do not exceed stormwater flows from pre-development conditions. By utilizing onsite detention of stormwater within the project's storm drainage system, the proposed project would not create downstream flooding or increase the potential for downstream erosion. The proposed project would achieve compliance with the SUSMP requirements by implementing the specific programs and design criteria discussed below.

***Water Quality BMPs***

As a part of the mitigation program for the proposed project, various treatment and source control water quality BMPs will be installed on the project site. These BMPs are discussed below.

*Treatment Control BMPs*

Treatment Control (structural) BMPs are permanent features of the project design that are designed to minimize water quality impacts from the operational (long-term) activities associated with site development. The BMPs discussed below would be constructed in conjunction with the proposed project and would be operational prior to the issuance of occupancy permits for the site. All structural BMPs would be maintained by the home owners' association to ensure proper functioning.

Storm Drain Clarifiers/Filtration Inlet

Three storm drain clarifiers would be constructed on-site as part of the proposed storm drain system, as shown in the Drainage Concept Plan, Figure III.D-3. These clarifiers would be located off-line from the main storm drain system and will be designed to capture the "first flush" of stormwater flows in rainfall events, as well as pollutants that may be present in dry weather (nuisance) flows. As previously discussed, the requirements of the SUSMP program require that the first 0.75 inch of rainfall runoff from a 24-hour storm be intercepted and cleansed, filtered or retained until pollutants are removed.

The three clarifiers would be constructed on the project site (i.e., cast-in-place) and would conform to the Standard Specifications of Public Works Construction. They would vary in size and inlet configuration in accordance with their specific site location, and in accordance with the amount of storm flow entering them. The designs of proprietary clarifiers (e.g., CDS units or Stormceptor units)

vary; however, the basic design includes a cylindrical underground structure that diverts flow from the storm drain into a screening device that uses the hydraulic energy of the water to screen and trap debris and pollutants. Water that enters the clarifiers would pass through a screen that traps floatable debris, sediment, and other pollutants. The pollutants settle into a central sump where they can be removed as needed. The clarifiers will be located in the storm drain system in such a way that allows the BMPs to filter the storm water from all developed areas of the project site.

In addition to the three storm drain clarifiers, the storm drain inlet located at the end of Street "E" would include a filtration device designed to treat runoff from surrounding developed areas prior to outletting into the natural drainage/receiving water. The filtration device would be made of a fabric filter body that is mounted on a metal frame located in the storm drain inlet and would provide water quality benefits similar to a storm drain clarifier. When properly maintained, filters are known to be effective at removing debris, floatable materials, and some hydrocarbon materials from stormwater.

Desilting Basin

As part of the storm drainage system on the west side of Kanan Road near the Street "C" cul-de-sac, the project would construct one desilting basin to intercept the offsite debris from the higher slopes of Ladyface Mountain before it enters the project site and the proposed storm drain, as illustrated on Figure III.D-3. Desilting basins are shallow earth-bottomed depressions that use the natural filtering abilities of the soil to remove debris from stormwater runoff. This basin will capture runoff from the offsite, undeveloped hillsides upstream of the project site and allow for sedimentation of debris and silt to occur prior to entering the storm drain system and ultimately Medea Creek. The desilting basin will be tributary to a secondary storm drain system that only captures runoff from naturally vegetated areas outside of the project site and delivers these flows directly to Medea Creek. This secondary storm drain system is designed to be separate from the system that captures runoff from the developed portion of the project site, which contains the storm drain clarifiers and the filtered inlet.

Energy Diffusers

All outlets from the onsite storm drain system will include an energy diffusion device that serves to dissipate the velocity of stormwater flows as they exit the storm drain system/project site and enter a natural waterway. Both storm drain systems would release stormwater into Medea Creek (or its tributaries). The energy diffusers, which are often constructed of rip-rap material, would prevent erosion and the degradation of creekbeds by reducing the rate of stormwater flows, thereby minimizing the potential for dislodging additional sediment into Medea Creek.

Project Design Features (PDF)

In addition to the storm water treatment BMPs discussed above, the project incorporates PDFs that are intended to further minimize downstream water quality impacts from site runoff. For example, the proposed project design would preserve large areas of open space and is designed in an efficient development pattern. The preservation of trees and other natural vegetation has been maximized and drought tolerant plants will be used for revegetation activities on manufactured slopes. Native plants require less irrigation, and consequently produce less irrigation runoff.

*Source Control BMPs*

The California Stormwater Quality Association has developed a Stormwater BMP Handbook that provides guidance on various BMPs that can be considered for incorporation into new development projects. Source Control BMPs that are incorporated into the proposed project are listed below.

Site Design & Landscape Planning

The project applicant/developer/builder will prepare and implement a Master Landscape Plan that provides planting and maintenance guidance for common landscaped areas and undeveloped building pads. The Plan will specify: (1) procedures for the proper use, handling, and storage of pesticides, herbicides and insecticides to prevent the mixing of such materials with storm waters; and (2) the project applicant/developer/builder or the Home Owners' Association will provide the above information to each new home purchaser. The landscape maintenance plan specifies the use of native species for all landscaping and vegetation and will utilize only non-toxic, easily degradable pesticides, herbicides, and fertilizers approved by State and local agencies. No use of pesticides, herbicides, and fertilizers will be permitted within designated open space areas (refer to Section I. Project Description; and Mitigation Measure F-4 and Mitigation Measure I-1). Plants which are relatively pest resistant and which require a minimum of added nutrients will be selected as landscaping materials.

Storm Drain Signage

All storm drain inlets and catch basins within the project area will be stenciled with prohibitive language (such as: NO DUMPING- DRAINS TO OCEAN), and/or graphical icons to discourage illegal dumping.

Street Sweeping

A program of roadway and driveway sweeping will be implemented by the project applicant/developer/builder. As required by the project's CC&Rs, this program will become the on-going responsibility of the Home Owners' Association upon its establishment.

### *Impacts to Basin Plan Objectives*

In 1997 and 1998, the Environmental Protection Agency's Engineering and Analysis Division conducted a study on stormwater BMPs entitled "Preliminary Data Summary of Urban Stormwater Best Management Practices". This report included data regarding the effectiveness of BMPs and summarized the findings of a previous EPA 1983 Report entitled "Results of the Nationwide Urban Runoff Program," (NURP) which provided stormwater quality data for various land uses. In addition to the 1983 data on stormwater pollutants generated by various land uses, another study of pollutants generated by various land uses is the "National Stormwater Quality Database" (NSQD), which includes findings from a research progress report by the University of Alabama and Center for Watershed Protection.

Findings from both of these studies are summarized in Table IV.E-4 below, which illustrates the median event mean concentrations (EMC) for residential land uses. For the purposes of this analysis, the average of the two study results will be used.

**Table III.E-4**
**Median Event Mean Concentrations Residential Land Uses**

| Pollutant | NURP (U.S. EPA 1983) | NSQD (Univ. of Alabama & Center for Watershed Protection, 2004) | Average EMC |
|---|---|---|---|
| Total Suspended Solids | 101 mg/L | 48 mg/L | 74.5 mg/L |
| Total Phosphorus | 0.38 mg/L | 0.3 mg/L | 0.34 mg/L |
| Nitrate/Nitrite | 0.74 mg/L | 0.6 mg/L | 0.67 mg/L |
| Fecal Coliform | N/A* | 7,750 mpn/100mL | N/A* |

* The EPA's Preliminary Data Summary of Urban Stormwater Best Management Practices" report found that urban runoff had a range of 400 – 50,000 mpn/100 mL of fecal coliform. Additionally, concentrations of fecal coliform found by NURP exhibited a large degree of variability and did not indicate any distinctions based on land use. This broad range in concentrations illustrates the highly variable nature of fecal coliform concentrations in storm water.

### *TDS/TSS and Sedimentation*

The Basin Plan provides a specific objective for the Malibu Creek Watershed of 2,000 mg/L for Total Dissolved Solids (TDS). The measurement of TDS is often used for drinking water standards, while measurements of Total Suspended Solids (TSS) are more commonly used for receiving surface waters. Consequently, there are no readily available data on the typical amount of TDS generated by residential land uses. However, as illustrated in Table IV.E-4, typical pollutant loads and concentrations for TSS are available for residential land uses. According to the average EMC of TSS for residential land uses,

approximately 74.5 mg/L of TSS would be produced by the proposed project. Therefore, assuming that the threshold for TDS (2,000 mg/L) is comparable to the threshold for TSS, the proposed project would contribute far less TSS to storm water flows than would be allowed by the Basin Plan.

The Basin Plan objective for "Solids, Suspended, or Settleable Materials" states that "Waters shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses." The EPA's "Preliminary Data Summary of Urban Stormwater BMPs" states that the typical pollutant loading for TSS in a low-density residential land use is 10 lbs/acre annually, for a total developed project site contribution of approximately 486 lbs/yr. This is the second lowest land use contributor to TSS, with Parks as the lowest (3 lbs/acre/yr) and Commercial being the highest (1,000 lbs/acre/yr). As illustrated by the discussions above, the amount of TSS generated by the operational activities of the proposed project would not cause nuisance or adversely affect the beneficial uses of receiving waters. Potential impacts are less than significant.

In addition to the Basin Plan objective for TSS, Medea Creek is listed as impaired for "Sedimentation/Siltation" on the 303(d) list of water quality limited segments. In the existing condition, debris (e.g., brush, wood, and rocks) from natural, undisturbed ground is carried by storm waters through a series of drainage courses and streams to the ocean. The total debris potential from the slopes of Ladyface Mountain that could be carried easterly through the development area of the project site is approximately 2,700 cubic yards. The proposed debris basin located near the cul-de-sac of Street "C" has been designed to intercept approximately 2,000 cubic yards of debris. This basin will require periodic maintenance, to be performed by the Home Owners' Association, in order to ensure continued proper functioning and capacity. However, assuming proper maintenance, the proposed project will intercept approximately 2,000 cubic yards of debris generated by onsite areas that currently flow unimpeded to the Pacific Ocean.

In addition to intercepting 2,000 cubic yards of debris from the undisturbed slopes of Ladyface Mountain, the development of the project would also reduce natural and barren land by approximately 48.6 acres, which would also reduce the amount of debris and silt reaching Medea Creek and potentially Malibou Lake, (or ultimately Malibu Lagoon) by approximately 2,890 cubic yards. Reductions in sediment and debris from the project development, combined with the proposed desilting basin, would reduce the total flow of debris into Medea Creek and downstream areas by approximately 4,890 cubic yards.

In conclusion, the proposed project would reduce the overall amount of sedimentation/siltation from the project site and upstream offsite areas by eliminating approximately 4,890 cubic yards of debris generated by a 50-year storm. This debris removal capability, in combination with the installation of energy dissipaters at the points of storm drainage discharge into natural water courses, would ensure that the proposed project would not violate any water quality standards or waste discharge

requirements, or otherwise substantially degrade water quality. Therefore, the project's long-term, operational-related water quality impacts would be less than significant. For further discussion of recommended mitigation measures to reduce further the less than significant run-off related impacts, see Section III.D, Surface Water Runoff/Hydrology.

***Hydrocarbons and Other Constituents***

In accordance with the Los Angeles County SUSMP, a separate storm drain system is proposed to convey storm runoff from a 50-year rainfall event from the developed areas of the project (i.e., streets and residential use areas) to proposed BMP devices (clarifiers and filtration inlet), where the "first flush" cleansing of urban runoff would occur. This system is designed to remove 85 percent of such storm water pollutants as hydrocarbon compounds (i.e., automotive oils, lubricants and other fluids) deposited, as a matter of course, along the project's street system and private driveways. Additionally, a preventive maintenance program, including regular street sweeping with equipment designed for removal of such compounds, is necessary to reduce the potential water quality impact to a less-than-significant level. Compliance with the SUSMP requirements would ensure that the proposed project would not violate any water quality standards or waste discharge requirements, or otherwise substantially degrade water quality. Therefore, the project's long-term, operational-related water quality impacts associated with hydrocarbons and other urban pollutants would be less than significant.

***Pesticides, Herbicides, and Fertilizers***

The potential exists for other deleterious matter generated by the activities of future project residents, such as pesticides, herbicides, and fertilizers, to enter the natural watercourses if not properly administered and controlled. Aside from avoidance of use and the interception and filtration or mechanical removal of such pollutants as described above, the primary means of preventing such compounds from mixing with storm waters is to use non-toxic, easily degradable pesticides and herbicides that leave no harmful constituents. The project design also includes a master landscape maintenance plan which will utilize only non-toxic, easily degradable pesticides, herbicides, and fertilizers approved by State and local agencies. Additionally, no use of pesticides, herbicides, or fertilizers will be permitted within designated open space (refer to Section I. Project Description; and Mitigation Measure F-4 and Mitigation Measure I-1). With implementation of the master landscape maintenance plan, the proposed project would not be expected to violate any water quality standards or waste discharge requirements, or otherwise substantially degrade water quality. Therefore, the project's long-term, operational-related water quality impacts associated with the use of pesticides, herbicides, and fertilizers would be less than significant.

***Floating Materials (Trash)***

As previously discussed, in accordance with the Los Angeles County SUSMP requirements, the storm drain system is proposed to convey 50-year storm runoff from the developed areas of the project site to proposed BMPs (clarifiers), for the "first flush" cleansing of urban runoff. This system will capture storm water pollutants, such as floatables and trash deposited along the project's street system and private driveways. Additionally, regular street sweeping will remove the majority of trash before there is an opportunity for it to enter the storm drain system. These BMPs would reduce potential water quality impacts from floatables to a less-than-significant level.

***TMDLs***

*Nutrients*

The EPA's "Preliminary Data Summary of Urban Stormwater BMPs" states that the typical pollutant loading for Total Phosphorus in a low-density residential land use is 0.04 lbs/acre annually, for a total developed project site contribution of approximately 1.9 lbs/yr. This is the second lowest land use contributor to Total Phosphorus, with Parks as the lowest (0.03 lbs/acre/yr) and Commercial being the highest (1.5 lbs/acre/yr).

As previously discussed, the EPA has developed TMDLs for the Malibu Creek Watershed for Nutrients (nitrogen and phosphorus). The numeric targets for Total Phosphorus in the Malibu Creek Watershed determined by the EPA are 0.1 mg/L for the summer months (April 15$^{th}$ through Nov 15$^{th}$). There is no alternative threshold for winter months specified in the TMDL. As illustrated by data presented in Table IV.E-4 above, the average EMC for residential land uses is 0.34 mg/L. Therefore, the project site would contribute approximately 0.34 mg/L of Total Phosphorus in the developed condition, which is higher than the TMDL of 0.1 mg/L determined by the EPA. Since runoff from the proposed project would violate a water quality standard (i.e., TMDL for Total Phosphorus), water quality impacts with respect to Total Phosphorus would be significant prior to mitigation.

The EPA's "Preliminary Data Summary of Urban Stormwater BMPs" states that the typical pollutant loading for Nitrate/Nitrite in a low-density residential land use is 0.1 lbs/acre annually, for a total developed project site contribution of approximately 4.86 lbs/yr. This is the lowest land use contributor to Total Nitrogen, with Freeways being the highest (4.2 lbs/acre/yr).

The numeric targets for Total Nitrogen in the Malibu Creek Watershed determined by the EPA are 1.0 mg/L during summer months (April 15$^{th}$ through Nov 15$^{th}$) and 8.0 mg/L for winter months (Nov 16$^{th}$ through April 14$^{th}$). As illustrated by data presented in Table IV.E-4 above, the average EMC for residential land uses is 0.67 mg/L. Therefore, the project site would contribute approximately 0.67 mg/L of nitrate/nitrite in the developed condition, which is below the more stringent summer threshold

of 1.0 mg/L specified by the TMDL. Since runoff quality from the proposed project would not violate the TMDL for Total Nitrogen, water quality impacts with respect to Total Nitrogen would be less than significant.

The project design features and BMPs would reduce the project's contribution of Nutrients (phosphorus and nitrogen) to less than significant levels. The proposed project involves the development of Low Density Residential land uses that will be connected to existing sewer systems, and therefore will not require septic systems. As presented in Table IV.E-2, septic systems are currently the largest contributor of Nutrients to the Malibu Creek Watershed. In addition, the project design is in compliance with the LA County SUSMP requirements, which includes the construction of storm drain clarifiers to reduce both soluble and particulate runoff loads, and which can remove up to 90% of dissolved nitrogen and phosphorus from runoff water.[7]

According to the "TMDLs for Nutrients in the Malibu Creek Watershed" (March 21, 2003), the critical time period for nutrient loadings from residential and commercial runoff is the summer period. This is because the potential for eutrophication and hypoxia (deficiency in the amount of oxygen reaching body tissues) is greater during the summer as a result of higher water temperatures.[8] Dry-weather run-off from activities such as lawn watering and fertilizing, car-washing and hosing down driveways are nutrient sources which are targeted for reduction in the TMDLs. Winter run-off is less of a problem as there are usually greater storm-flows, which serve to increase the watershed's assimilative capacity through dilution.

As previously discussed, the project design also includes a master landscape maintenance plan which will utilize only non-toxic, easily degradable pesticides, herbicides, and fertilizers approved by State and local agencies. Additionally, no use of pesticides, herbicides, or fertilizers shall be permitted within designated open space. Plants which are relatively pest resistant and which require a minimum of added nutrients will be selected as landscaping materials. In addition, the project design does not include provisions for horse-keeping on individual properties except that horse riding is allowed on the proposed Zuma Ridge Trail. Consequently, runoff from the project site can be expected to be a minor source of nutrients to the Lower Medea Creek subwatershed and to the Malibu Creek watershed as a whole. The proposed project is in accordance with the recommendations of the "TMDLs for Nutrients," for the Malibu Creek watershed and would be consistent with Section 303(d) of the Clean

---

[7] *Refer to page 35 in "Total Maximum Daily Loads for Bacteria", Malibu Creek Watershed, January 29, 2004 ( see Appendix G-2.)*

[8] *Refer to page 36 in "Total Maximum Daily Loads for Nutrients", Malibu Creek Watershed, March 21, 2003 (see Appendix G-1).*

Water Act. With the incorporation of the mitigation program described herein, potential nutrient impacts would be less than significant.

*Bacteria*

As previously discussed, the EPA has developed a TMDL for fecal coliform in the Malibu Creek Watershed of 400 organisms (most probable number- mpn) per 100 mL. As illustrated in Table IV.E-4 above, the Median EMC for fecal coliform for residential land uses is 7,750 mpn/100mL. This amount far exceeds the TMDL established by the EPA and impacts associated with bacteria generated by the proposed project would be significant prior to mitigation.

As the proposed project is the development of Low Density Residential Land Uses, it has the potential to be a major source of bacterial loading to the watershed. The TMDLs for bacteria in the Malibu Creek watershed set a source allocation for Low Density Residential uses of 1% of current levels, thereby requiring a 99% reduction in bacteria loadings to the watershed from bacteria sources. As noted in Table IV.E-4, the EPA's "Preliminary Data Summary of Urban Stormwater Best Management Practices" Report, urban runoff typically contains a range of 400 - 50,000 mpn/100 mL of fecal coliform. Additionally, concentrations of fecal coliform found by NURP exhibited a large degree of variability and did not indicate any distinctions based on land use. Therefore, this broad range in concentrations illustrates the highly variable nature of fecal coliform concentrations in storm water.

Structural controls such as the construction of on-site retention and treatment strategies targeted to a specific storm period, such as the first 0.5-1.0 inch of stormwater runoff if the bacteria wash-off pattern mimics a "first-flush" effect, may remove up to 97% of fecal coliform bacteria.[9] Such reductions are the recommended in the TMDLs as suitable methods for reducing bacteria loading to the watershed. The proposed project would implement measures to ensure compliance with the County's SUSMP which would include the construction of storm drain clarifiers and filtration inlets to filter the "first-flush" run-off to reduce bacteria loadings. In addition, a desilting basin located near the Street "C" cul-de-sac would intercept larger debris such as trash and organic matter flowing from the open space areas on the project site. In a 50-year storm event, the debris basin would catch 4,890 cubic yards of debris which would otherwise flow into Medea Creek.

Finally, the a master landscape maintenance plan and home owners' association CC&Rs would operate in accordance with recommendations in the TMDLs to include landscape design to minimize the construction of impermeable surfaces and to reduce dry-weather runoff from irrigation overspray.

---

[9] *Refer to page 35 in "Total Maximum Daily Loads for Bacteria", Malibu Creek Watershed, January 29, 2004. Appendix G-2.*

Horse-keeping is not provided for, nor expected on the project site. Consequently, the proposed project is in accordance with the recommendations of the "TMDLs for Bacteria," for the Malibu Creek Watershed and would be consistent with Section 303(d) of the Clean Water Act. Therefore, bacterial impacts to receiving waters from the proposed project would be less than significant.

***Groundwater Impacts***

*Water Quality*

As previously discussed, the project site is not located over a regional groundwater basin. The closest groundwater basin is the Russell Valley basin, located directly north of the project site. Runoff from the project site would not impact this groundwater basin because the flow of both surface water and groundwater is southerly towards the Pacific Ocean. The only groundwater basin that could be potentially impacted, albeit indirectly, would be the Malibu Valley Groundwater Basin located on the coastline at the terminus of Malibu Creek.

Surface water runoff from the project site travels down Medea Creek, through Malibou Lake, downstream via Malibu Creek, to the Pacific Ocean. This approximately 11 mile journey of surface water from the project site to the vicinity of the Malibu Creek Groundwater Basin would allow many opportunities for runoff absorption into the surrounding soils. As described in the text of the "TMDLs for Nutrients and Bacteria- Malibu Creek Watershed" prepared by the EPA, there is little flow in the Malibu Creek during the summer months and much of the natural flow that does occur in the summer in the upper tributaries of the creek comes from seepage and springs. Therefore, project site runoff is not anticipated to contribute any significant runoff volume to Malibu Creek flows that might contribute to recharge of the Malibu Valley Groundwater Basin due to evaporation and soil absorption during the summer.

During winter months, stormwater runoff from the project site would be a tiny fraction of overall surface flows in Malibu Creek. The EPA reports that "The natural hydrology of the watershed has been modified by the creation of several dams and man-made lakes, the importation of water to the system for human use, which provides most of the base-flow to the system, and the presence of the Tapia Wastewater Reclamation Facility, which provides significant flows to the system in the winter months but is largely prohibited from discharging in the summer months." Therefore, runoff from the project site is not anticipated to impact the Malibu Valley Groundwater Basin in the winter months due to the project site's small contribution to Malibu Creek flows over the Malibu Valley Groundwater Basin in comparison to winter flows from other uses in the watershed.

*Groundwater Percolation*

The proposed residential development would be constructed adjacent to Medea Creek, which infiltrates surface water into the immediately surrounding groundwater table. Pollutants from residential activities, including non-point sources such as automotive leaks, pesticides and herbicides, animal waste, and other organic matter would be transported in the surface runoff from the site during storm events. This runoff would flow into the Medea Creek and would have the potential to seep into the groundwater table below the Creek.

However, the contribution of stormwater pollutants from the project site to surface water runoff and subsequently to groundwater via infiltration, would be minimal due to the relatively small size of the project site when compared to the size of the contributory watershed. However, due to the proximity of the proposed development to Medea Creek, potential water quality impacts to local groundwater from site runoff could constitute a significant impact prior to mitigation. With the implementation of the BMPs included in the project design, including three storm drain clarifiers, the desilting inlet, and filtration inlet, potential impacts to groundwater would be reduced to a level less than significant. As previously discussed, these BMPs would be maintained by the Homeowner's Association.

The potential for percolation of surface water into the groundwater table beneath the site and in areas downstream of the project site would not be impacted by the proposed project. Foremost, little percolation occurs on the undeveloped project site due to the impermeable bedrock and the steepness of the slopes. However, the proposed project would release stormwater from its storm drains into the earth-bottom Medea Creek; any potential infiltration/percoloation to groundwaters in the project vicinity would be only slightly delayed after development. Runoff from the project site would still fully infiltrate into the ground either within the project's open space, desilting inlet, or within the soils of the creekbed. Therefore, the development of the proposed project would have a negligible and less than significant impact on the amount of percolation into the groundwater basin.

## SIGNIFIGANCE OF IMPACTS BEFORE MITIGATION

- With the combination of post development runoff flows being managed by project facilities not to exceed pre-development conditions, the elimination of 4,890 cubic yards of debris from stormwater from a 50-year rainfall event, and the installation of runoff velocity reducers at the points of storm drainage discharge into natural water courses, the project would not create downstream erosion or sedimentation that would violate any water quality standards or waste discharge requirements, or otherwise substantially degrade water quality. Therefore, the project's long-term, hydrology-related water quality impacts would be less than significant.

- Through compliance with the County's SUSMP, the proposed project would not violate any water quality standards or waste discharge requirements, or otherwise substantially degrade water quality. Therefore, the project's long-term, operational-related water quality impacts associated with hydrocarbons and other urban pollutants would be less than significant.

- With implementation of the master landscape maintenance plan, the proposed project would not be expected to violate any water quality standards or waste discharge requirements, or otherwise substantially degrade water quality. Therefore, the project's long-term, operational-related water quality impacts associated with the use of pesticides, herbicides, and fertilizers would be less than significant.

## MITIGATION MEASURES

The proposed project would be required to submit site drainage plans to the Los Angeles County Department of Public Works and other responsible agencies for review and approval prior to development of any drainage improvements. For the reasons discussed above, with the implementation of the approved drainage plans, no significant water quality impact from storm water runoff would be expected. Therefore, mitigation measures are not required under CEQA.

Notwithstanding the above, the following mitigation measures are recommended to reduce further the project's less than significant surface water quality impacts from short-term construction-related handling, storage and disposal of building materials and equipment:

E-1 Wet and dry building materials with the potential to pollute runoff shall be stored under cover and/or surrounded by berms during storm events.

E-2 Containers of paints, chemicals, solvents, and other hazardous materials shall be stored in accordance with the secondary containment regulations and under cover during storm events.

E-3 When materials are spilled, cleanup shall be immediate, automatic and routine:

1) Dry material spills (e.g., cement, mortar, or fertilizer) shall be swept up immediately, and not washed away with water or buried; and

2) Liquid spills on impermeable surfaces shall be cleaned by "dry" methods (e.g., use of absorbent materials like sand or rags).

E-4 All construction equipment and vehicles shall be inspected for and leaks repaired according to a regular schedule, specified in the Grading Plan approved by the Department of Public Works:

1) The Grading Plan shall identify specific areas of the construction site, well away from watercourses and storm drain inlets, for auto and equipment parking and routine vehicle and equipment maintenance; and

2) Major maintenance, repair jobs and vehicle and equipment washing shall be conducted off-site, or in Grading Plan designated and controlled on-site areas.

E-5 Concrete transit mixers shall only be washed out in Grading Plan designated areas where wash-water can be contained for proper disposal, or shall be washed off-site.

E-6 Portable toilets shall be inspected on a regular basis for leaks. The portable toilet leasing company shall adequately maintain, promptly repair, and replace units as needed.

The following mitigation measures are recommended to reduce further the project's less than significant surface water quality impacts from short-term site preparation activities (i.e., clearing, grading, and excavation).

E-7 All plant materials cleared from the site shall be used on-site as mulch for landscaped surfaces, or disposed of at a landfill that chips and composts plant material:

1) No plant material shall be disposed of in watercourses or left in roadways where it can clog storm drain inlets; and

2) Plant materials shall not be disposed of in trash compactors or mixed with non-recyclable wastes.

E-8 Chemical treatment used to remove existing vegetation shall be prohibited.

E-9 The Grading Plan shall delineate clearing limits, easements, sensitive or critical areas, trees, drainage courses, and buffer zones to prevent excessive or unnecessary disturbances and exposure.

E-10 Grading operations shall be phased to reduce disturbed areas and time of exposure in accordance with the approved Grading Phasing Plan.

E-11 Grading shall be limited or avoided during wet weather.

E-12 On-site construction routes shall be limited and construction entrances shall be stabilized.

E-13 Erosion control devices, including temporary diversion dikes/berms, drainage swales, and siltation basins, shall be installed around all construction areas to insure that sediment is trapped

and properly removed. Such facilities shall be maintained until replanting is sufficiently established so that erosion is minimized.

E-14 Check dams shall be used in temporary drains and swales to reduce runoff velocities and promote sedimentation.

E-15 Runoff velocities on temporarily exposed slopes shall be reduced using such techniques as terracing, rip-rap, sand bags, straw bales, and/or temporary vegetation.

E-16 Stockpiled soil and landscaping materials shall be protected from erosive runoff in accordance with the NPDES containment requirements.

E-17 Drainage courses and catch basins shall be protected with straw bales, silt fences and/or temporary swales.

E-18 Erosion control devices shall be inspected before and immediately after rainstorms, and repaired if required.

E-19 To prevent construction vehicles from tracking soil onto adjacent streets, crushed aggregate or other suitable material shall be placed on the construction roadways near the site exits.

E-20 Exposed slopes shall be revegetated as soon as work in that area has been completed. Where replanting is not immediately feasible, erosion control blankets (e.g., jute or straw matting) or hydroseeding with locally indigenous native species shall be employed to the satisfaction of the Department of Public Works. All such areas shall be completely planted with appropriate vegetation within one year after completion of construction in that area.

E-21 The project applicant/developer/builder shall prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) that will be subject to approval by various regulatory agencies (e.g., Los Angeles County Department of Public Works) before construction begins.

E-22 Upon construction of all permanent drainage improvements, the developer/grading contractor shall remove all temporary run-off-detaining structures and shall blend construction sediment with on-site soils for use on-site. The developer/grading contractor shall recycle and/or dispose of all remaining construction debris at an appropriate landfill facility, designated for receipt of such construction materials.

E-23 The project applicant/developer/builder shall be responsible for the maintenance of all on-site drainage improvements until such time as a home owners' association is prepared to take over on-going maintenance responsibilities.

The following mitigation measures are recommended to reduce further the project's less than significant surface water quality impacts from the potential release of hydrocarbons from project-related vehicles into natural watercourses:

E-24 A program of roadway and driveway sweeping shall be implemented by the project applicant/developer/builder. As required by the project's CC&Rs, this program shall become the on-going responsibility of the home owners' association upon its establishment.

The following mitigation measure is recommended to reduce further the project's less than significant surface water quality impacts from the use of pesticides, herbicides, and fertilizers:

E-25 The project applicant/developer/builder shall prepare and implement a Master Landscape Plan that provides planting and maintenance guidance for common landscaped areas and undeveloped building pads. The Plan shall specify procedures for the proper use, handling, and storage of pesticides, herbicides and insecticides to prevent the mixing of such materials with storm waters. The project applicant/developer/builder or the home owners' association shall provide the above information to each new home purchaser.

See Section III.I, Visual Qualities, for a complete description of the Master Landscape Plan.

The following facilities incorporated into the proposed project design would reduce the project's potentially significant impact to surface water quality for Total Phosphorus and Bacteria, and would further reduce the project's less than significant impact on TDS/TSS and Sedimentation, Total Nitrogen, and Floatables (trash):

E-26 The project applicant/developer/builder shall construct two separate storm water conveyance systems: one system shall collect all stormwater runoff from the 48.6 acres of development on-site and one system will collect stormwater runoff from the naturally vegetated areas surrounding property. Both stormwater systems will drain into Medea Creek. The storm drain system for the developed portion of the project site shall contain permanent BMPs designed according to Los Angeles County SUSMP requirements. These BMPs will include, at a minimum, three storm drain clarifiers and one filtration inlet, which will capture and treat the "first flush" stormwater runoff from the entire developed project site. The storm drain system for the naturally vegetated areas will include a desilting basin to capture debris and silt from stormwater runoff prior to entering Medea Creek. All project water quality BMPs will be maintained by the home owners' association.

Mitigation measures to reduce further the project's less than significant long-term downstream water quality impacts on Medea Creek, due to possible increased runoff velocities and streambank erosion,

are discussed in Section III.D, Surface Water Runoff/ Hydrology (see Mitigation Measures D-3, D-4 and D-6 to D-10).

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

Implementation of the recommended mitigation measures described in this section would reduce the project's potential water quality-related impacts to less than significant levels.

## CUMULATIVE IMPACTS

Water quality in the greater Medea Creek/Malibou Lake/Malibu Creek/Malibu Lagoon watershed system is degraded as a result of unregulated past development. In recognition of such water quality problems in this particular watershed and throughout the state and nation, there are now regulations at the local, state and federal levels intended to address the discharge of pollutants into surface waters. As a result, new developments are far "cleaner" than the unregulated developments of the past. Nevertheless, given the existing degraded water quality in the greater Medea Creek watershed, the introduction of additional urban pollutants into the system by the proposed project in combination with the related projects (see Section II.C) would further contribute to this existing degraded water quality problem. This is considered a significant cumulative impact. However, as discussed above, the project's compliance with the required water quality control programs and implementation of the recommended mitigation measures would be sufficient to reduce the proposed project's incremental impact to a less than significant level. Also, the project's development area of 48.6 acres represents approximately 0.3 percent of the entire Medea Creek watershed above Malibou Lake and only 0.08 percent of the watershed above Malibu Lagoon. Because the project's development area makes up such a relatively small portion of all the sources of water degradation within the entire watershed, its incremental contribution is not cumulatively considerable. Lastly, each related project would also be reviewed by the decision-makers for compliance with the requirements of the Regional Water Quality Control Board and the provisions of the NPDES discharge permit, and each project would be required to mitigate its individual impacts. While these measures do not address existing sources of water pollution, they would be effective in reducing future impacts.

# III. ENVIRONMENTAL IMPACT ANALYSIS
# F. BIOLOGICAL RESOURCES

This analysis summarizes information contained in comprehensive biological resource reports prepared by Envicom Corporation in compliance with the County of Los Angeles Department of Regional Planning's Significant Ecological Areas Technical Advisory Committee (SEATAC) Procedures and Biota Report Guidelines, and revised in response to review comment by SEATAC. The reports are presumed to be accurate and complete and no additional baseline biological resource surveys were performed for this analysis. However, in order to achieve compliance with changes in survey protocol and other regulatory policies instituted subsequent to the reports' preparation, additional habitat surveys for affected sensitive species were conducted by PCR Services Corporation (PCR) during Spring 1999 and Impact Sciences and The Planning Associates during the Spring 2000 and Spring 2003. Survey results are incorporated herein. Glen Lukos and Associates also performed a comprehensive jurisdictional delineation of wetlands and "waters of the United States" for this analysis.

Biological resource analyses of the Triangle Ranch property (previously known as Live Oak Ranch, the Beautiful City Site and Beautiful Homes Site) are contained in Technical Appendix C, and include the following:

- Biological Constraints Analysis for the Beautiful City Site, Agoura Hills, California; prepared by Envicom Corporation, February 14, 1997 (Appendix C-1);

- Biota Report for the Beautiful Homes Site, Los Angeles County; prepared by Envicom Corporation, March 10, 1998 (Appendix C-2);

- Biota Report Resubmittal No. 1 for the Beautiful Homes Site, Los Angeles County; prepared by Envicom Corporation, revised November 11, 1998 (Appendix C-3);

- Biota Report Resubmittal No. 2 for the Beautiful Homes Site, Los Angeles County; prepared by Envicom Corporation, revised February 9, 1999 (Appendix C-4);

- Live Oak Ranch: Los Angeles County Oak Tree Report, prepared by Paul Rogers, Poly Associates, February 25, 1999 (Appendix C-5); and

- Jurisdictional Delineation of the Triangle Ranch Property in Agoura Hills, Los Angeles County, California, Glenn Lukos and Associates, October 16, 2003 (Appendix C-6);

- PCR Services Corporation, Quino Checkerspot Butterfly Survey Report, Live Oak Ranch, June 22, 1999 (Appendix C-8);

- PCR Services Corporation, Least Bell's Vireo Survey Report, Live Oak Ranch, August 24, 1999 (Appendix C-9);

- C-10TW Biological Services, Southwestern Willow Flycatcher Survey Report, Live Oak Ranch, September 19, 1999 (Appendix C-10);

- Impact Sciences, Inc. and The Planning Associates, Focused Surveys for the Federally Endangered Lyon's Pentachaeta (*Pentachaeta Lyonii* A. Gray) and the Threatened Santa Monica Mountains dudleya (*Dudleya cymosa ssp. ovatifolia* (Britton) Moran) on Triangle Ranch, Los Angeles County, California, June 2003 (Appendix C-11); and

- Comprehensive Mixed Oak Woodland Revegetation Plan (Appendix C-12)

- Thomas Leslie Corporation, Tentative Tract No. 52419 (Triangle Ranch), undated memo (Appendix C-13).

Primary, current references for official federal sensitive species issues include the *Federal Register*, Department of the Interior U.S. Fish and Wildlife Service (USFWS) listings of federally threatened and endangered plants and animals, as well as candidate reviews for same and recovery plans. Publications consulted include:

- Federal Register, Department of the Interior, Fish and Wildlife Service, 50 CFR Pt 17.11 and 17.12 Endangered and Threatened Wildlife and Plants, October 31, 1996;

- Internet Compilation and Special Reprint, Department of the Interior, Fish and Wildlife Service, 50 CFR Part 17.11 and 17.12 Endangered and Threatened Wildlife and Plants: Endangered and Threatened Wildlife, July 31, 1997;

- Federal Register, Department of the Interior, Fish and Wildlife Service, 50 CFR Part 17 Endangered and Threatened Wildlife and Plants, Review of Plant and Animal Taxa That Are Candidates For Listing As Endangered Or Threatened Species, February 28, 1996;

- Federal Register, Department of the Interior, Fish and Wildlife Service, 50 CFR Part 17 Endangered and Threatened Species: Notice Of Reclassification Of 96 Candidate Taxa, February 28, 1996; and

- U.S. Department of the Interior, Fish and Wildlife Service, Draft Recovery Plan for Six Plants from the Mountains Surrounding the Los Angeles Basin, September 1998.

The California Department of Fish and Game's (CDFG), Natural Heritage Division's Natural Diversity Data Base (CNDDB) computer listings of sensitive habitats and species for the Calabasas and Thousand Oaks U.S.G.S. topographic quadrangles were consulted in February 1999. Other CDFG reports and publications reviewed include the following:

- Endangered, Threatened and Rare Plants of California, January 1997;
- State and Federally Listed Endangered and Threatened Animals of California, January 1999;
- Annual Report on the Status of California's State Listed Threatened and Endangered Plants and Animals, 1992;
- Special Plants, July 1997; and
- Special Animals, March 1998.

Federal and state laws consulted include

- Federal Endangered Species Act;
- California Endangered Species Act; and
- Native Plant Protection Act.

## ENVIRONMENTAL SETTING

### Wetlands and Waters of the United States

The project site lies within the Medea Creek watershed, which comprises four subdrainages including Medea Creek and the Lindero, Palo Comado and Cheseboro Canyon drainages. The drainages originate along the southern flanks of the Simi Hills, are channelized as they pass through the City of Agoura Hills, and converge in the vicinity of Malibu Junction just north of the project site. Medea Creek carries the combined flows of the drainages through the project site at an average rate of 3-5 feet per second and converges with the Triunfo Canyon drainage in the Malibu Lake impoundment to the south. Medea Creek emerges downstream of the lake as Malibu Creek, ultimately discharging into Malibu Lagoon along the coast of the

Pacific Ocean. Medea Creek broadens as it passes through and south of the project site and possesses limited areas of alluvial deposition.

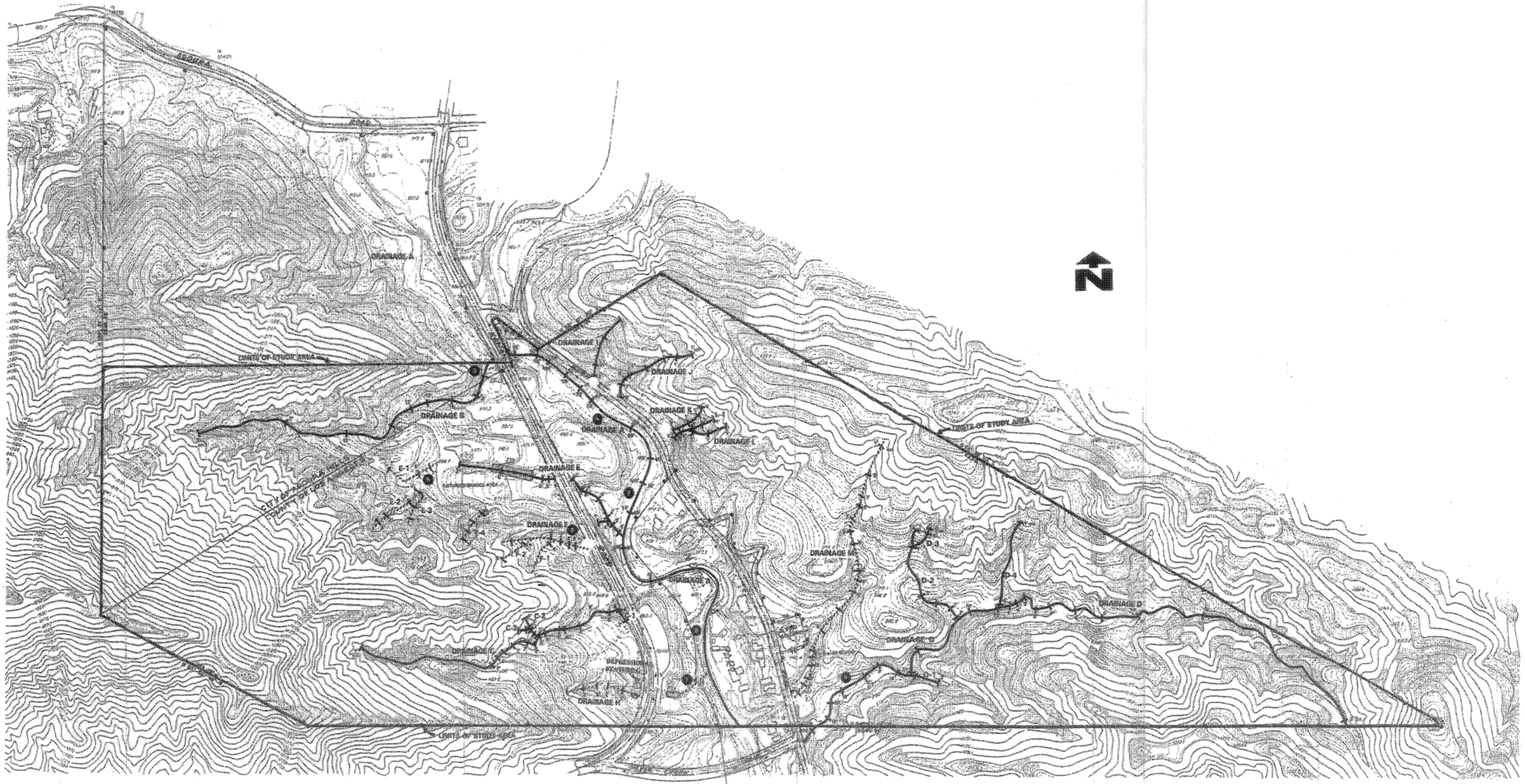
Numerous unnamed tributaries to Medea Creek dissect the project site. Medea Creek, the Lindero Canyon drainage, and two tributary drainages entering the site from the northwest (Drainage A) and the southeast (Drainage D), respectively, are shown as blue-line (perennial) streams on the USGS maps (see Figure II-8).

Activities within inland streams, wetland and riparian areas in California are regulated by three agencies at the federal, state and regional levels. The U.S. Army Corps of Engineers (Corps) Regulatory Program regulates activities within wetlands and "waters of the United States" pursuant to Section 404 of the Federal Clean Water Act; the California Department of Fish and Game (CDFG) regulates activities within streams under the Fish and Game Code Section 1600-1607; and the Regional Water Quality Control Board regulates streambed activities under Section 401 of the Federal Clean Water Act and the California Porter-Cologne Act. An assessment of jurisdictional wetlands, "waters of the United States" and streambeds on the project site was conducted by GLA ecologists and regulatory specialists in order to determine the extent of agency jurisdiction. Survey techniques employed are discussed in the *Jurisdictional Delineation of the Triangle Ranch Project in Agoura Hills, Los Angeles County, California*, contained in Appendix C-6.

***Army Corps of Engineers Jurisdiction***

The U.S. Army Corps of Engineers (Corps) regulates "discharge of dredged or fill material" into "waters of the United States," which include wetlands, pursuant to provisions of Section 404 of the Clean Water Act. Accordingly, the Corps generally asserts jurisdiction within rivers and streams to the "ordinary high water mark" (OHWM), as determined by erosion, the deposition of debris, and changes in the characteristics of the plant community. Corps jurisdictional wetlands on the project site were delineated in accordance with the routine determination methods outlined in the Corps of Engineers Wetland Delineation Manual (1987), based on hydrologic and edaphic features and vegetative composition. Other non-wetland "waters" were delineated based on the limits of the OHWM. Where qualifying criteria were observed, a series of transects were run to define the extent of jurisdiction.

A total of 35,495 linear feet of drainages on the project site were determined to be subject to both Corps and CDFG jurisdiction, as shown in Figure III.F-1. Corps jurisdiction on-site totals 4.54 acres of "waters," including 2.11 acres of jurisdictional wetlands associated with Medea Creek, as shown in Table III.F-1, Summary of Jurisdictional Areas. Medea Creek contained flowing water and is characterized as perennial (2.1 acres). Approximately 1.82 acres of the total Corps jurisdictional drainages were determined to be intermittent (seasonal), and approximately 2.38 acres represent headwaters and are characterized as ephemeral, conveying surface flow only immediately following storm events. Detailed discussions of each jurisdictional drainage investigated are contained in the *Jurisdictional Delineation of the Triangle Ranch Project in Agoura Hills, Los Angeles County, California*, contained in Appendix C-6.




Legend

—— Area Within Corps and CDFG Jurisdiction

- - - Area Within CDFG Jurisdiction Only

Source: The Planning Associates

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.F-1
Existing Jurisdictional Drainages

### *California Department of Fish and Game Jurisdiction*

The California Department of Fish and Game (CDFG) asserts jurisdiction to the bank of a stream or to the limit of the adjacent riparian vegetation. In accordance with Section 1601 of the California Fish and Game Code (Streambed Alteration), the CDFG regulates activities which "will substantially divert, obstruct, or substantially change the natural flow or bed, channel or bank of any river, stream, or lake designated by the department in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit." The total acreage of CDFG jurisdiction on the Triangle Ranch site is 9.8 acres, as shown in Table III.F-1.

## Biological Resources

Baseline surveys for biological resources were conducted from December 1996 through January 1998 and summarized in reports prepared by Envicom Corporation biologists. Envicom Corporation biota reports are supplemented with data from earlier surveys[1]. Envicom Corporation completed general surveys, floral and faunal compendia, habitat connectivity surveys, sensitive plant surveys, sensitive wildlife surveys, raptor nest searches and butterfly surveys. Follow-up sensitive species habitat evaluations and surveys were conducted in Spring 1999 by PCR biologists. Special attention was paid to federally-listed species: least Bell's vireo, southwestern willow flycatcher, Quino checkerspot butterfly, Santa Monica Mountains dudleya, and Lyon's pentachaeta. Lyon's pentachaeta and Santa Monica Mountains dudleya surveys were more recently updated in 2000 and again in Spring 2003 by Impact Sciences and The Planning Associates biologists, and again in May 2004 by Thomas Leslie Corporation.

## Regulatory Setting

Biological resources on the project site are regulated by several agencies at the federal, state and county levels. Protected sensitive species are classified by either federal or state resource management agencies, or both, as endangered or threatened, under provisions of the federal and state Endangered Species Acts. Vulnerable or "at-risk" species which are proposed for listing as threatened or endangered (and thereby for protected status) are categorized administratively as "candidates" by the U.S. Fish and Wildlife Service (USFWS). CDFG uses various terminology and classifications to describe vulnerable species. There are additional sensitive species classifications applicable in California; all are described below.

---

1 *Michael Brandman Associates, 1992, Sensitive Species Survey for the Creekside Terrace Project Site, prepared for Beautiful City, Agoura Hills, California.*

**Table III.F-1**
**Summary of Jurisdictional Areas**

| Drainage | Corps (sq. ft.) | CDFG (sq. ft.) | Corps Acres | CDFG acres |
|---|---|---|---|---|
| Medea Creek (A) | 121,285 | 195,370 | 2.78 | 4.49 |
| Tributary B | 22,030 | 22,030 | 0.51 | 0.51 |
| Tributary B-1 | 200 | 200 | 0.01 | 0.01 |
| Tributary C | 7,465 | 7,665 | 0.18 | 0.18 |
| Tributary C-1 | 500 | 500 | 0.04 | 0.04 |
| Tributary C-2 | 780 | 780 | 0.01 | 0.01 |
| Tributary C-3 | 160 | 160 | 0.01 | 0.01 |
| Tributary D | 36,145 | 44,995 | 0.83 | 1.03 |
| Tributary D-1 | 400 | 400 | 0.01 | 0.01 |
| Tributary D-2 | 1,360 | 1,360 | 0.03 | 0.03 |
| Tributary D-3 | 160 | 160 | 0.01 | 0.01 |
| Tributary D-4 | 2,100 | 2,100 | 0.05 | 0.05 |
| Tributary E | 1,550 | 6,050 | 0.04 | 0.14 |
| Tributary E-1 | 0 | 380 | 0.00 | 0.01 |
| Tributary E-2 | 0 | 785 | 0.00 | 0.02 |
| Tributary E-3 | 0 | 220 | 0.00 | 0.01 |
| Tributary E-4 | 0 | 920 | 0.00 | 0.02 |
| Tributary F | 0 | 1,070 | 0.00 | 0.02 |
| Tributary F-1 | 0 | 865 | 0.00 | 0.02 |
| Tributary F-2 | 0 | 220 | 0.00 | 0.01 |
| Tributary G | 0 | 0 | 0.00 | 0.00 |
| Tributary H | 0 | 5,165 | 0.00 | 0.19 |
| Tributary I | 495 | 495 | 0.01 | 0.01 |
| Tributary J | 1,310 | 5,050 | 0.30 | 0.17 |
| Tributary K | 340 | 7,840 | 0.01 | 0.28 |
| Tributary L | 980 | 980 | 0.02 | 0.02 |
| Tributary L-1 | 400 | 400 | 0.01 | 0.01 |
| Tributary M | 0 | 6,420 | 0.00 | 0.15 |
| **TOTAL** | **197,660** | **312,590** | **4.54** | **7.8** |

*Source: Glenn Lukos and Associates*

### *Federal Protection and Classifications*

The federal Endangered Species Act of 1973 (ESA) (as amended from 1966) defines an endangered species as "any species which is in danger of extinction throughout all or a significant portion of its range..." Threatened species are defined as "any species which is likely to become an endangered species within the

foreseeable future throughout all or a significant portion of its range." Under provisions of Section 9(a)(1)(B) of the ESA it is unlawful to "take" any listed species. "Take" is defined as follows in Section 3(18) of the Act: "... harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Further, the USFWS, through regulation, has interpreted the terms "harm" and "harass" to include certain types of habitat modification as forms of "take." Where a property owner seeks permission from a federal agency for an action that could affect a federally-listed plant species, the property owner and agency is obligated to consult with the USFWS. Section 9(a)(2)(b) of the ESA addresses the protections afforded to listed plants.

The latest federal listing of Endangered and Threatened Wildlife and Plants is identified below under "Sensitive Plants and Sensitive Wildlife." Additionally, the USFWS has instituted changes in the listing status of former candidate species. Former C1 (candidate) species are now referred to simply as candidate species and represent the only candidates for listing. They are afforded no formal protections, but are subject to emergency listing at any time. Former C2 species (for which the USFWS has insufficient evidence to warrant listing at this time) and C3 species (either extinct, no longer a valid taxon or more abundant than was formerly believed) are no longer considered as candidate species. Therefore, these species are no longer maintained in list form by the USFWS, nor are they formally protected. However, some USFWS field offices have issued memoranda stating that former C2 species are henceforth to be considered federal Species of Concern. This term is employed in this document, but carries no official protections. All references to federally protected species in this report (whether listed or candidate) include the most current published status or candidate category to which each species has been assigned by the USFWS.

***State of California Protection and Classifications***

The California's Endangered Species Act (CESA) defines an endangered species as "...a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease." CESA defines a threatened species as "... a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by this chapter. Any animal determined by the commission as rare on or before January 1, 1985 is a threatened species." Candidate species are defined as "... a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that the commission has formally noticed as being under review by the department for addition to either the list of endangered species or the list of threatened species, or a species for which the commission has published a notice of proposed regulation to add the species to either list." Candidate species may be afforded temporary protection as though they were already listed as threatened or endangered at the discretion of the Fish and Game Commission. Unlike the federal ESA, CESA does not include listing provisions for invertebrate species.

Article 3, Sections 2080 through 2085, of the California Endangered Species Act addresses the taking of threatened or endangered species by stating: "No person shall import into this state, export out of this state, or take, possess, purchase, or sell within this state, any species, or any part or product thereof, that the commission determines to be an endangered species or a threatened species, or attempt any of those acts, except as otherwise provided in ...the Native Plant Protection Act." Under the California Endangered Species Act, "take" is defined as "...hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." Exceptions authorized by the state to allow "take" require "... permits or memorandums of understanding..." and can be authorized for "... endangered species, threatened species, or candidate species for scientific, educational, or management purposes." Sections 1900 through 1913 of the California Fish and Game Code provide protection to native plants and require agency notification prior to disturbance.

The latest published listing of Endangered, Threatened and Rare Plants of California and Endangered and Threatened Animals of California is identified in below under "Sensitive Wildlife." Additionally, some sensitive mammals, birds, reptiles, amphibians and fish are protected by the state as Fully Protected Mammals, Fully Protected Birds, Fully Protected Reptiles and Amphibians, and Fully Protected Fish as described in the California Fish and Game Code, Sections 4700, 3511, 5050 and 5515, respectively. California Species of Special Concern ("Special" animals and plants) listings include all state and federal protected and candidate taxa as well as Bureau of Land Management and U.S. Forest Service sensitive species, species considered sensitive by the California Native Plant Society or National Audubon Society, and a selection of species considered to be under population stress but not formal candidates for listing. Informally listed taxa are not protected *per se*, but warrant consideration in the preparation of biotic assessments. For some species, the CNDDB is only concerned with specific portions of the life history, such as roosts, rookeries, or nest sites.

### *California Native Plant Society*

The California Native Plant Society (CNPS) is a private conservation organization dedicated to the monitoring and protection of sensitive plant species in the state. CNPS has compiled an inventory comprised of the information focused on geographic distribution and qualitative characterization of rare, threatened or endangered status of the vascular plant species of California. The list serves as the source for candidate list for listing as threatened and endangered by CDFG.

### *Resource Agency Policies and Regulations*

Federal authorization of incidental take of a listed species by a private individual or entity is granted in one of the following ways:

- ESA Section 7 Permit: Applies to federal agencies undertaking an action (i.e., permit or license issuance or federal funding) that may affect (i.e., within the nexus of U.S. Waters 404 Jurisdiction) an endangered species or a proposed species (or habitat). Federal agencies are obligated to consult

with the USFWS regarding proposed actions before issuing permits. Consultation between the "action agency" and USFWS may be formal or informal if it is determined that the agency action is not likely to adversely affect listed or proposed species or critical habitat. Private applicants may participate in the process, in accordance with USFWS regulations.

- ESA Section 10(a) Permit: Applies if project implementation is anticipated to result in incidental take (i.e., inadvertent and incidental to otherwise lawful activities) of federally-listed endangered and threatened species by non-federal entities. As issuance of an incidental take permit is a federal action subject to the National Environmental Policy Act (NEPA), a Habitat Conservation Plan and accompanying NEPA documentation (Environmental Assessment and Environmental Impact Statement or Finding of No Significant Impact) must be prepared and submitted to the USFWS for approval prior to permit issuance.

- ESA Special Rule, Section 4(d): The USFWS may initiate a special rule to allow incidental take of a threatened species in conjunction with a state-initiated plan (i.e., NCCPs, MSHCPs).

State authorization of incidental take of a listed species by a private individual or entity is granted in one of the following ways:

- CDFG Section 2081.5: CDFG is authorized to issue a permit or Memorandum of Understanding or approve or enter into an NCCP, HCP, HMP or amendment thereto if the conditions of Section 2081 are met. Such conditions include the following:

  - The take is incidental to an otherwise lawful activity;
  - The impacts of the take shall be minimized and fully mitigated. The measure required to meet this obligation shall be roughly proportional in extent to the impact of the authorized taking on the species;
  - The permit is consistent with any regulations adopted pursuant to Section 2112, and 2114; and
  - The applicant shall ensure adequate funding to implement the measures required for mitigation and for monitoring compliance with, and effectiveness of, those measures.

***Regional Agencies***

Approximately 172 acres of the project site are located within the Los Angeles County-designated 495-acre Las Virgenes Significant Ecological Area (SEA No. 6). SEAs are areas of special ecological significance within the County. The Las Virgenes SEA has been classified as Class 5, indicating that it may possess resources of scientific interest because they represent extremes in physical or geographic limitations or an unusual variation in a population or community. The Las Virgenes SEA is so designated because it may

support a number of plant species common to interior southern California, but unique in the Santa Monica Mountains. The designation of an SEA on a property subjects development on that property to a site-specific analysis of biological resources, and the potential impact of proposed development on those resources, by the SEA Technical Advisory Committee (SEATAC).

According to the *Los Angeles County Significant Ecological Areas Study*[2], unique species in this SEA were reported to include California juniper (*Juniperus californica*), linear-leaf goldenbush (*Ericameria [Haplopappus] linearifolius*) and a species of mariposa lily (*Calochortus venustus*) at the southern limit of its range. The *Biota Report for the Beautiful Homes Site*[3] (see Appendix C-2) identifies the presence of additional sensitive plants, including Lyon's pentachaeta (*Pentachaeta lyonii*), California cloak fern (*Notholaena californica*), coville's lip fern (*Cheilanthes covillei*), Nevin's brickelbush (*Brickellia nevinii*), red shank (*Adenostema sparsifolium*), Santa Monica Mountains dudleya (*Dudleya cymosa* ssp. *ovatifolia*), additional mariposa lily species (*Calochortus clavatus* ssp. *pallidus* and *C. catalinae*) and valley oak (*Quercus lobata*). It should be noted that California juniper and *C. venustus* were not found on site during the most recent field investigations by Impact Sciences and The Planning Associates. The Las Virgenes SEA also supports a variety of plant communities typical of this region of the Santa Monica Mountains, including coast live oak woodland, chaparral, coastal sage scrub and grassland.

SEATAC reviews biological resource reports prepared for projects within an SEA for potential impacts and makes assessments and mitigation recommendations. The County has established SEA Design Compatibility Guidelines, which have been incorporated into the County of Los Angeles General Plan and Zoning Ordinances.

The County of Los Angeles also regulates the protection and preservation of all ordinance-sized oak species as stated by the County Oak Tree Ordinance No. 82-0168, as amended by Ordinance No. 88-0157 (Oak Tree Ordinance). An oak tree report is required by the County, in conjunction with development applications, if a property owner seeks to physically alter land in a manner which may encroach upon the protected zone of oak trees. Specifically, the Oak Tree Ordinance requires the property owner to assess the current condition of all oaks proposed for removal and/or relocation, as well as all oaks within 200 feet of development activity (i.e., subject to encroachment as the result of project implementation).

---

2 *England and Nelson Environmental Consultants, 1976, Los Angeles County Significant Ecological Area Study, prepared for Los Angeles County and Environmental Systems Research.*

3 *Envicom Corporation, March 1998, Biota Report for the Beautiful Homes Site, Los Angeles County, California, prepared for Beautiful City Holding Corporation.*

**Plant Communities**

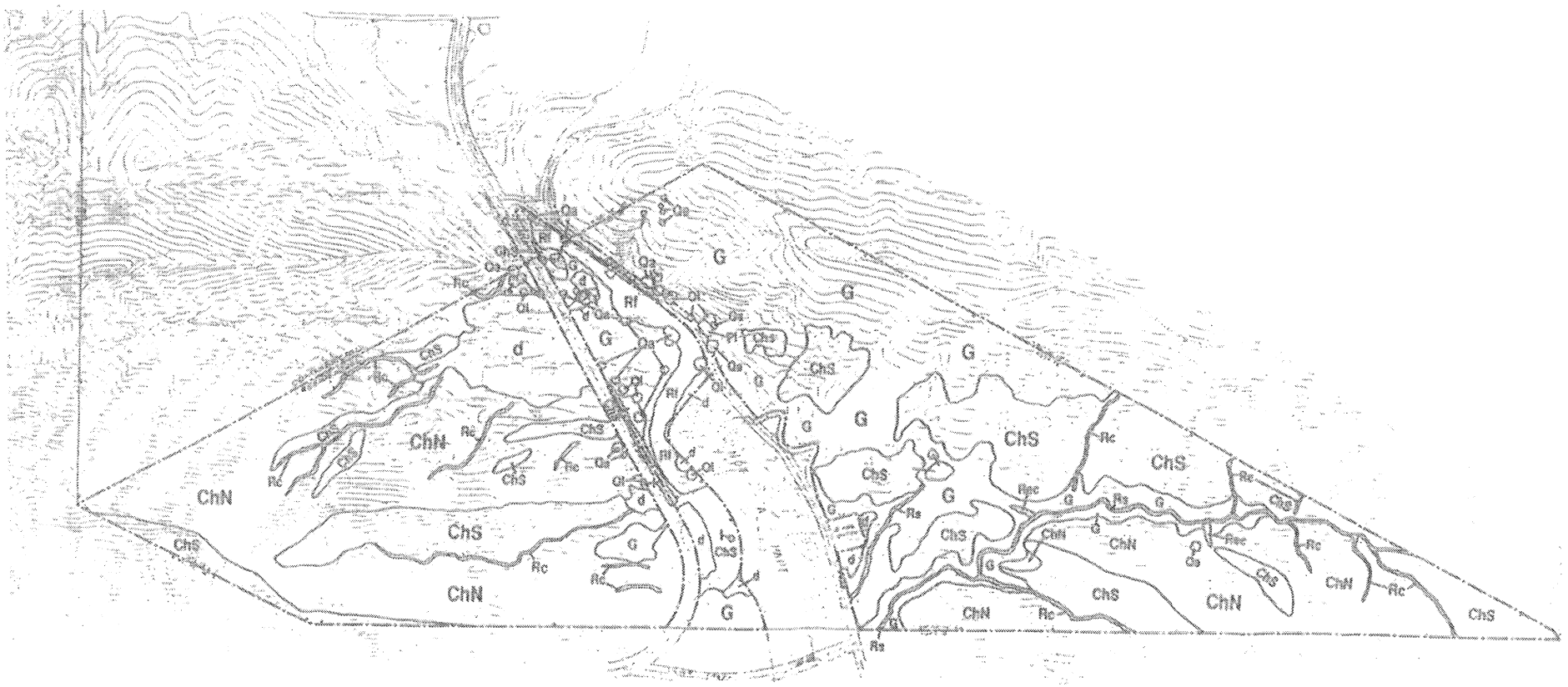
Figure III.F-2 illustrates the distribution of plant assemblages on the project site. A comprehensive floral compendium is included in the previously prepared biota reports (see Appendices C-1 and C-2).

***Willow Riparian Forest***

The Medea Creek drainage channel supports approximately 2.11 acres of well-developed Willow Riparian Forest (CNDDB Element Code 61320) dominated by arroyo willow (*Salix lasiolepis*) and red willow (*S. laevigata*). Areas of the channel apparently subject to high velocity, scouring flows support mule fat (*Baccharis salicifolia*), mugwort (*Artemisia douglasiana*), western ragweed (*Ambrosia psilostachya* var. *californica*), poison hemlock (*Conium maculatum*) and fennel (*Foeniculum vulgare*).

***Chaparral Riparian and Riparian Scrub***

Drainage M, a tributary to Medea Creek in the southeastern half of the project site, supports chaparral with scattered pockets of mulefat and willows (referred to in previously prepared biota reports as riparian scrub). Giant wildrye (*Leymus condensatus*) forms a dense thicket in one of the minor tributaries to Drainage B, as depicted on Figure III.F-2. Another small tributary to Drainage B forms a rocky waterfall, where previous biotic resource reports mention the presence of a persistent seep supporting a profusion of wet-site mosses (*Scleropodium* spp.) during the rainy winter season of 1997-98; riparian scrub covers approximately 0.9 acres of the site. Farther upstream along the drainage, channel tributaries totaling approximately 3.8 acres are dominated by chaparral shrubs. A patch of Mexican rush (*Juncus mexicanus*) marks the location of a small seep (CNDDB Element Code 45400) in Drainage G on a south-facing hillside in grassland habitat near the northern-central project site.




Source: Envicom Corporation and PCR Services Corporation

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.F-2
Vegetation Communities

***Oak Woodland***

Approximately 3.3 non- contiguous acres of coast live oak trees and Valley Oak trees, the latter approaching the southern limit of its range, are scattered primarily across the central portion of the project site. They do not form extensive woodlands with substantial canopy cover. Previously prepared biota reports mention one mature western sycamore (*Platanus racemosa)*, several valley oaks (*Quercus lobata*) and several coast live oaks (*Q. agrifolia*) adjacent to the Medea Creek but isolated by roadways (see Appendix C-1). Their presence may indicate an historically more extensive distribution of alluvial bottomland forest (i.e., Sycamore Alluvial Woodland) than remains today, but this small, disjunct assemblage no longer constitutes a distinct plant community on-site. Three mature coast live oaks are also noted to have formerly occupied a drainage on the slopes of Ladyface Mountain, to the west of Kanan Road, in a now-filled area of the project site. The project area, and the Santa Monica Mountains generally, are known to support oak and walnut woodlands; however, no walnuts are present on the project site.

An oak tree survey of the project site was performed and a report prepared in accordance with County Ordinance requirements (see Appendix C-5 and the discussion of Sensitive Plant Communities, below, for elaboration).

***Mixed Grassland***

Mixed grasslands with coastal sage scrub elements have developed along gentler south-facing slopes where sufficient soil accumulation and correspondingly more mesic conditions support their growth. Envicom biologists attempted to quantitatively distinguish stands of coastal sage scrub from chaparral and grasslands at the request of SEATAC. It was determined insufficient differentiation or uniformity of plant species existed to permit refinement of community boundaries. Coastal sage scrub species are scattered throughout the site and do not form distinct stands. Prevalent scrub species include California buckwheat (*Eriogonum fasciculatum*), coast encelia (*Encelia californica*), coast goldenbush (*Isocoma menziesii* ssp. *vernonioides*), California-aster (*Lessingia filaginafolia* ssp. *latifolia*), and California sagebrush (*Artemisia californica*). Stands of Lyon's pentachaeta (*Pentachaeta lyonii*), a state and federally-listed endangered species are also found in this vegetation. Grasslands occupy approximately 86.9 acres on the project site.

The previously prepared biota reports for the project site (Appendices C-1 through C-4) identify steep, south-facing slopes across the eastern half of the project site as rocklands, with sparse vegetation dominated by Bigelow's spike-moss (*Selaginella bigelovii*), wishbone bush (*Mirabilis californicus*), a few ferns, and succulents (*Dudleya* spp.). North-facing rocklands were observed to be more mesic and exhibit denser cover by mosses, ferns and succulents. Due to the scattered locations of such areas and their intermixing with grassland, they were not mapped as a distinct plant community.

***Chaparral***

Areas of chaparral (CNDDB Element Codes 37200 and 37900) intergrade with sage scrub and grasslands throughout the project site and occupy approximately 204.2 acres. Chaparral forms intermittent patches of relatively dense cover along south-facing slopes in the eastern project site, where dominant species include chamise (*Adenostoma fasciculatum*), laurel sumac (*Malosma laurina*), bush mallow (*Malacothamnus fasciculatus* var. *laxiflorus*), buckbrush (*Ceanothus cuneatus*), black sage (*Salvia mellifera*) and birch-leaf mountain mahogany (*Cercocarpus betuloides*). South-facing chaparral covers approximately 88.0 acres of the site.

The densest chaparral cover is found along the more mesic north-facing slopes in the eastern half of the site, particularly along drainages and sheltered slopes, and exhibit greater species diversity. Species include scrub oak (*Quercus berberidifolia*), California ash (*Fraxinus dipetala*), chaparral currant (*Ribes malvaceum* ssp. *viridifolium*), fuchsia-flowered gooseberry (*Ribes speciosum*), holly-leaf redberry (*Rhamnus ilicifolia*), poison oak (*Toxicodendron diversilobum*), orange bush monkeyflower (*Mimulus aurantiacus*), heart-leaf penstemon (*Keckiella cordifolia*), honeysuckle (*Lonicera subspicata* var. *denudata*), and wild cucumber (*Marah macrocarpus*). Approximately 116.2 acres of the total area mapped as chaparral support this assemblage.

Chaparral stands in the western half of the project site also exhibit consistent differences between north- and south-facing slopes, albeit with some variations. A single small stand of red shank (*Adenostoma sparsifolium*) occurs only along a ridgeline and its north face east of Ladyface Mountain. A single stand of bigberry manzanita (*Arctostaphylos glauca*) was also observed to be confined to a small area on north-facing slopes southwest of Ladyface Mountain.

***Disturbed***

Approximately 15.0 acres on the project site are characterized as disturbed, encompassing turnouts along Kanan and Cornell Roads, and a heavy machinery operation along Kanan Road in the western portion of the property. Also, there are two small graded areas between Kanan and Cornell Roads, and other areas have been disturbed by horse stables and wood cutting/storage activities on the east side of Cornell Road adjacent to the fire station. Developed areas along the southern boundary also slightly encroach on the project site.

**Wildlife**

Observations of wildlife species made during Envicom biologists' site visits were supplemented with information on the expected occurrences of various animal groups from appropriate literature sources. The *Biota Report*, included as Appendices C-2 through C-4, includes a comprehensive list of all animal species observed or expected to occur on the project site based on the size of the site, diversity of habitat types, relatively undisturbed conditions and connectivity to adjacent open space. Sensitive wildlife species are discussed separately in the Sensitive Species section of this document.

***Invertebrates***

Focused surveys were conducted for butterflies by Envicom in Spring 1997. Some unusual (non-butterfly) species observed include a scorpion (possibly a *Vejovis* spp.) in a grassland area east of the fire station on Cornell Road and ring-legged earwigs (*Euborellia annulipes*) which, although non-native, are being displaced by the more common non-native European earwig (*Forficula auricularia*).

As a follow-up to the 1997 work PCR conducted focused surveys for the Quino checkerspot butterfly (*Euphydrya editha quino*) in Spring 1999. Methods employed followed the USFWS survey protocol established for this species. Initially, the site was surveyed for the larval host plants, dwarf plantain (*Plantago erecta*) and owl's clover (*Castilleja exserta*). Both species were found in relative abundance at various locations on site. Adult surveys were then performed during the flight period of this species over an eight week period. No larval or adult forms of the Quino checkerspot butterfly were observed.

***Amphibians***

All of the larger drainages on the project site possessed flowing water during most surveys. Amphibians observed on-site include the Pacific chorus frog (*Pseudacris regilla*) and black-bellied slender salamander (*Batrachoseps nigriventris*). The California toad (*Bufo boreas halophilus*) is also expected to occur on-site. Other, less common amphibians could be present, given the occurrence of semi-permanent water in Medea Creek and seasonal flows in several tributaries.

***Reptiles***

The three reptile species observed during surveys include Great Basin fence lizard (*Sceloporus occidentalis biseriatus*), California side-blotched lizard (*Uta stansburiana elegans*), and western skink (*Eumeces s. skiltonianus*). Other reptiles species are anticipated given the variety of habitats present, most notably the San Diego alligator lizard (*Elgaria multicarinata webbi*), California kingsnake (*Lampropeltis getulus californiae*), California striped racer (*Masticophis l. lateralis*), and San Diego gopher snake (*Pituophis melanoleucus annectens*). Noteworthy species of special concern to resource agencies reported by MBA[4] include the San Diego coast horned lizard (*Phrynosoma coronatum blainvillei*) and coastal western whiptail (*Cnemidophorus tigris multiscutatus*).

***Birds***

As is typical during wildlife surveys, birds represented the most common form of wildlife observed on the project site. At least 34 bird species were observed, including migratory songbirds and raptors. Additional

---

[4] *Michael Brandman Associates, 1992, Sensitive Species Survey for the Creekside Terrace Project Site, prepared for Beautiful City, Agoura Hills, California.*

species are expected to utilize the project site based on habitat diversity; the riparian woodland along Medea Creek and the scattered oaks would be expected to attract migratory songbird species and open grasslands and chaparral would attract wintering and migrating raptors. Other species may also breed on the site only in summer.

### *Mammals*

Mammals were observed directly or through observation of sign, including animal trails on the ridgelines. A species commonly observed was the mule deer (*Odocoileus hemionus*); bobcat (*Felis rufus*) and raccoon (*Procyon lotor*) were inferred to be present through observation of their tracks and are expected to be uncommon on-site. Additional species directly observed include coyote (*Canis latrans ochropus*), together with sign in all habitats, and California ground squirrel (*Spermophilus beecheyi*) at grassland/chaparral ecotones. Nests believed to belong to San Diego desert woodrat (*Neotoma lepida intermedia*) were observed on exposed rock in the chaparral and high slopes of Ladyface Mountain. Botta's pocket gopher (*Thomomys bottae*) burrows were observed throughout grasslands and desert cottontail (*Sylvilagus audubonii*) were observed occasionally throughout the project site.

Other mammals expected to be common on-site include the western harvest mouse (*Reithrodontomys megalotis longicaudis*), "white-footed" mouse (*Peromyscus* spp.), San Diego dusky-footed woodrat (*Neotoma fuscipes macrotis*), and striped skunk (*Mephitis mephitis*). Smaller rodents are anticipated in the grassland/chaparral ecotone as a result of the abundant presence forage (seed) and cover.

### Wildlife Movement

The undeveloped project site represents two large areas of open space bisected by Kanan and Cornell Roads and bordered by suburban development on the southwest. The eastern half of the project site supports unrestricted wildlife movement within its boundaries and access along the southern border to dedicated regional open space in Malibu State Park, with the exception of two residentially developed parcels, Fire Station No. 65, and an area used for wood storage all of which are along Cornell Road. Wildlife movement to the west is impeded by Kanan and Cornell Roads and development located therein, although evidence of some movement was seen and is presumed to be accommodated by Medea Creek.

Medea Creek represents an important wildlife corridor through the project site for mammals, birds and amphibians, and also represents aquatic habitat for fish. Fish surveys were conducted in Medea Creek by Envicom and San Marino Environmental Associates in Fall 1998 and species present included introduced crayfish (*Procambarus clarkii* (Girard)), largemouth bass (*Micropterus salmoides*), green sunfish (*Lepomis cyanellus*), fathead minnow (*Pimephales promelas,* uncommon), black bullhead (*Ameiurus melas,* one specimen) and mosquitofish (*Gambusia affinis*). The majority of these species tolerate high water temperatures, low oxygen levels and high turbidity and organic pollution levels. No native fish species were observed or are expected based on the abundance of centrarchids (basses and similar fish).

The western half of the project site connects directly with the remainder of the undeveloped western Santa Monica Mountains along its western, southern, and eastern borders. As with the eastern project site, wildlife movement is restricted to the north and to the east by Kanan and Cornell Roads. East-west movement across the center of the project site may generally be characterized as moderately restricted by Kanan and Cornell Roads, County-designated Major Highway and Secondary Highway, respectively, with partial development along Cornell Road.

Wildlife movement on the project site, in summary, is generally unrestricted, but is impeded on the north by a major transportation corridor and urban development and inhibited through its center by Kanan and Cornell Roads and Medea Creek development. The project site also serves a regional role as an important area of undeveloped land immediately west of Liberty Canyon, a critical wildlife corridor between the Santa Monica Mountains and the Simi Hills. Accordingly, portions of the site potentially provide core habitat for wildlife resident in this part of the range, and may also provide important biotic resources for wildlife moving throughout the region.

**Sensitive Plant Communities**

Willow Riparian Forest and Freshwater Seep are considered sensitive plant communities by CDFG and are listed as CNDDB highest inventory priority communities, indicating that they are in decline throughout their respective ranges (typically threatened by channelization of waterways and urban development). They do not possess any formal listing status, but are afforded protections under CEQA.

Coast Live Oak Woodland is considered sensitive within Los Angeles County and Valley Oak Woodland is designated as a CNDDB highest inventory priority plant community. Valley oaks are typically found along flat alluvial bottomlands in association with grasslands, with a shrub or grassland understory depending on the location, whereas coast live oaks are usually found in canyons and along north-facing slopes. Oaks now form scattered clusters across the project site, in some cases cut off from stream drainages by Kanan and Cornell Roads. Oak trees on the project site were surveyed, mapped and documented in accordance with the requirements of the Los Angeles County Oak Tree Ordinance by a licensed arborist. A total of 136 oaks, including 52 valley oaks (*Quercus lobata*) and 84 coast live oaks (*Quercus agrifolia*), were identified.[5] Nineteen (19) of the trees are heritage oaks (greater than 36" diameter), including five (5) valley oaks and 14 coast live oaks. All oak species are regulated by the County Oak Tree Ordinance.

**Sensitive Plants**

Sensitive species potentially or confirmed to be present on the project site or in the project area are Summarized in Table III.F-2, Sensitive Floral Species. A total of 16 sensitive plant species were observed

---

[5] *Six trees (#1H, 2, 15, 16, 17, 133, 134H) are growing outside the project boundary.*

on the project site, including one federal Endangered/State Endangered and CNPS List 1B species (Lyon's pentachaeta), one federal Threatened and CNPS List 1B species (Santa Monica Mountains dudleya), one CNPS 1B species, three CNPS List 4 species, eight species with no official protected status and two oak species protected by ordinance. PCR's 1999 surveys and Impact Sciences and The Planning Associates'2000 and 2003 surveys paid special attention to the federally-listed plants: Lyon's pentachaeta and Santa Monica Mountains dudleya. PCR biologists investigated known locations mapped in previous surveys[6] as well as other suitable portions of the site. As a result, several additional patches were observed. The distribution of the most sensitive species across the project site is shown in Figure III.F-3, Sensitive Species Location Map; 2003 Lyon's Pentachaeta Survey (Envicom, PCR & The Planning Associates surveys). All listed plants on site (i.e., Lyon's pentachaeta and Santa Monica Mountains dudleya) are upland species and are outside federal and State Jurisdictional Waters.

***Year 2003 Lyon's Pentachaeta Survey Update***

The most recent survey (conducted jointly by Impact Sciences and The Planning Associates in Spring 2003) estimates that the population of Lyon's pentachaeta on the project site was comprised of approximately 530,000 plants distributes over 8.8 acres in May 2003 (see Appendix C-12). Pentachaeta density ranged from 0.1 to 110.5 individuals per squatter meter; the mean density was estimated at 19.8 plants per square meter. Although the 2000 survey indicated far fewer plants on the project site, no definitive population size or extent was provided. The 1999 survey estimated that 7.2 acres of the project site contained approximately 3,764,680 plants; more than seven times the density estimated by the 2003 survey. The variation in the observed plant density is attributed to the prior survey's lack of a focused protocol and precipitation variations. Figure III.F-3 indicates the Lyon's pentachaeta distribution based on Impact Sciences and The Planning Associates 2003 survey.

During May of 2003, a portion of the subject project (approximately 3,300 to 7,400 square feet) containing habitat for the Lyon's Pentachaeta was inadvertently disced by a contractor to the Los Angeles County Department of Weed Abatement. The discing was conducted without the knowledge or consent of either the property owner or the project applicant; and is not a part of the proposed project.

***Year 2003 Santa Monica Mountains Dudleya Survey Update***

With respect to the Santa Monica Mountains dudleya, the year 2003 surveys counted 597 plants within 0.1 acre on the project site. This population is nearly twice that which was surveyed in 1992 (i.e., 308 individuals). The near doubling of populations is attributable to precipitation increases.

---

[6] *Envicom Corporation, March 1998, Biota Report for the Beautiful Homes Site, Los Angeles County, California, prepared for Beautiful City Holding Corporation.*

***Year 2004 Santa Monica Mountains Dudleya Survey Update***

On May 25, 2004, biologist Thomas Leslie conducted a focused botanical field survey on the project site. The biological assessment included a resurvey of the project site where the Santa Monica Mountains dudleya had been identified during the May 2003 survey. According to Mr. Leslie, all of the "adult" dudleya identified onsite during the 2003 survey had been carefully excavated and removed from the project site, except for a few small juvenile specimens. Mr. Leslie speculates that someone with knowledge of the location of the dudleya plants, and with the intention of carefully removing the threatened plant for some reason (e.g., preservation, sale, etc.) was the trespasser/dudleya thief. There was no indication who might be responsible for this action. However, Mr. Leslie concludes that the Santa Monica Mountains dudleya will continue to exist at the dudleya removal area due to the presence of a number of small plants left intact within the rock outcrops. See Appendix C-13.

***Year 2004 Lyon's Pentachaeta Survey Update***

On May 25, 2004, Mr. Leslie also observed that at least one the 2003 study plots for Lyon's pentachaeta situated adjacent to the area where the dudleya had been removed, had also been impacted. According to Mr. Leslie, no Lyon's pentachaeta flowers or plants were present at the dudleya removal site due to the drought conditions of 2004. Therefore, it is likely that the impact to the Lyon's pentachaeta study plot was not an intentional act comparable to the removal (theft) of dudleya, but rather an ancillary action related to the "plant collector(s)" and equipment used during the course of the dudleya removal. See Appendix C-13.

**Sensitive Wildlife**

No endangered or threatened wildlife species were observed on the project site by Envicom in 1997. During Spring 1999, PCR conducted focused surveys for the federally threatened Quino checkerspot butterfly, federally endangered southwestern willow flycatcher (*Empidonax trailli extimus*) and federally and state endangered least Bell's Vireo (*Vireo bellii pusillus*). Several otherwise sensitive wildlife species were observed, including the ashy rufous-crowned sparrow (*Aimophila ruficeps canescens*), Cooper's hawk (*Accipiter cooperi*), sharp-shinned hawk (*Accipiter striatus*) and San Diego desert woodrat (*Neotoma lepida intermedia*). In addition, 1992 MBA reports mention the presence of three coastal western whiptails (*Cnemidophorus tigris multiscutatus*), one individual and sign of San Diego horned lizard (*Phrynosoma coronatum blainvillei*). Substantial suitable habitat for both species cited in MBA reports remains on-site in areas near grasslands and chaparral.

**Table III.F-2**
**Sensitive Floral Species Observed or Potentially Present On-Site**

| Scientific Name | Common Name | Status[a] | Life Form & Flowering Period | Habitat Associations | Distribution | On-Site Acreage | Observed or Potential Occurrence On-Site |
|---|---|---|---|---|---|---|---|
| *Adenostema sparsifolium* | Red shank | No official status; limited distribution in Santa Monica Mountains | Shrub or tree | Dry slopes, flats in chaparral between 500-6000 feet above sea level | Southern Central Coast, outer South Coast Ranges, Transverse and Peninsular Ranges through Baja California | 0.28 | Occurs on project site as relatively pure stand on ridge and north slope of eastern arm of Ladyface Mountain, in western project site. |
| *Aphanes occidentalis* | Alchemilla | No official status | Annual | Grassland, chaparral and woodland between 100-3600 feet above sea level | Northwestern California, Sierra Nevada foothills, Sacramento Valley, central-western and southwestern California, to Washington state and Baja California | Small population; acreage not estimated | Observed on project site along north-facing slopes in chaparral openings in southeast property, often in association with pygmy linanthus. Reported from only a few other locations in area, but believed to be easily overlooked and possible widespread. |
| *Astragalus brauntonii* | Braunton's milk-vetch | FE, CNPS List 1B | Perennial herb | Disturbed areas in chaparral below 1500 feet above sea level; asso-ciated with limestone substrates | Central South Coast Ranges, northern Peninsular Ranges (Los Angeles Basin) | | Low potential for presence on-site. |
| *Brickellia nevinii* | Nevin's brickellia | CNPS List 4 | Shrub | Dry scrub between 900-6000 feet above sea level | Inner South Coast Ranges, western Transverse Ranges, San Gabriel Mountains, desert mountains, as well as Nevada | 0.20 | A few individuals observed on the project site along upper slopes of Ladyface Mountain. |

| Scientific Name | Common Name | Status[a] | Life Form & Flowering Period | Habitat Associations | Distribution | On-Site Acreage | Observed or Potential Occurrence On-Site |
|---|---|---|---|---|---|---|---|
| *Calochortus plummerae* | Plummer's mariposa lily | FSC, CNPS List 1B | Bulbiferous perennial herb | Rocky or sandy sites, granitic or alluvial soil; associated with variety of Southern California plant communities including sage scrub, valley and foothill grassland; to 4800 feet above sea level | Los Angeles, Riverside, San Bernardino and Ventura Counties | | Not observed on-site; presence possible. |
| *Chorizanthe parryi* ssp. *Fernandina* | San Fernando spineflower | FSC | Annual herb | Sandy places in coastal or desert scrub, between 600-1000 feet above sea level | South Coast, western Transverse Ranges, San Gabriel Mountains | | Until recently, presumed extinct, extirpated from LA Basin; recently found within five miles to the north in Ventura County. |
| *Cheilanthes covillei* | Coville's lip fern | No official status; limited distribution in Santa Monica Mountains but otherwise widespread in California | Perennial herb (rhizomatous) | Crevices, bases of rocks in sun or shade | Widespread; North Coast Ranges, Sierra Nevada, San Francisco Bay area, Transverse and Peninsular Ranges, eastern Sierras, South Coast Ranges, desert mountains | 0.09 | Observed on project site on north faces of basalt outcrops in western project site, often in association with Santa Monica Mountains dudleya. |

| Scientific Name | Common Name | Status[a] | Life Form & Flowering Period | Habitat Associations | Distribution | On-Site Acreage | Observed or Potential Occurrence On-Site |
|---|---|---|---|---|---|---|---|
| *Dudleya abramsii* ssp. *Parva* | Conejo dudleya | FT | Perennial herb; May –June | Rocky or clay soils in coastal sage scrub, valley and foothill grasslands | Known only from 10 occurrences in Ventura County | | Not observed on project site; no suitable habitat observed. Low to no potential for on-site occurrence based on rarity and location of know occurrences. |
| *Dudleya cymosa* ssp. *Ovatifolia* | Santa Monica Mountains dudleya | FT, CNPS 1B | Perennial herb; March-June | Chaparral, coastal sage scrub, in association with volcanic substrates | LA, Orange and Ventura Counties | 0.1 | Several populations observed on-site. Reported by CNDDB from "Cornell Corner, along Cornell Road, 0.1-0.3 air-miles south of Malibu Junction." |
| *Dudleya multicaulis* | Many-stemmed dudleya | CNPS List 1B | Perennial herb; May – June | Rocky or clay soils in coastal sage scrub, valley and foothill grasslands | LA, Orange and Ventura Counties | | Not observed; presumed absent. |
| *Ericameria (=Happlopappus) linearifolia* | Linear-leaf or interior goldenbush | No official status; limited distribution in Santa Monica Mountains | Shrub; flowers in spring | Dry slopes, valleys below 6000 feet above sea level | Southern Sierra Nevada foothills; Sacramento Valley, southern San Joaquin Valley, central-western California, western Transverse Ranges, Mojave and western Sonoran Deserts | 39.5 | Observed on project site in association with volcanic substrate along northern exposures; also observed to be widespread in eastern project site. Reported in SEA No. 6 by England & Nelson; otherwise nearest occurrence known from Santa Clarita Valley. |

| Scientific Name | Common Name | Status[a] | Life Form & Flowering Period | Habitat Associations | Distribution | On-Site Acreage | Observed or Potential Occurrence On-Site |
|---|---|---|---|---|---|---|---|
| *Eriogonum crocatum* | Conejo buckwheat | FSC, CSC | Perennial herb; April-July | Conejo volcanic outcrops in coastal sage scrub, chaparral, valley and foothill grasslands | Ventura County | | Not observed; probably absent |
| *Fritillaria biflora* | Chocolate lily or Mission bells | CNPS List 4; uncommon | Bulb | Grassy slopes, mesas, serpentine outcrops below 3600 feet above sea level | North Coast ranges, central-western and southwestern California | Small population; acreage not estimated | Observed scattered across north-facing slopes in eastern and western property, associated with heavy soils. |
| *Gilia australis* | Southern gilia | No official status; not known from Santa Monica Mountains | Annual herb | Open sandy areas between 1500-3600 feet above sea level | Transverse and Peninsular Ranges, desert mountains | | Not observed on project site; although reported from burned slopes of Ladyface Mountain in 1978 in 1986 *Flora of the Santa Monica Mountains*, it is assumed that this was a misidentification of splendid gilia. |
| *Hemizonia minthornii* | Santa Susana tarplant | FSC, CSC | Shrub; July-November | Rocky sand-stone substrate in coastal sage scrub and chaparral | Los Angeles and Ventura Counties | | Not observed; not expected |
| *Linanthus pygmaeus* ssp. *Continentalis* | Pygmy linanthus | CNPS List 1B | Annual herb; April | Dry, open areas below 6000 feet | California floristic province | Small population; acreage not estimated | Observed on project site in chaparral openings along north slopes in southeastern property; heretofore unreported from range. |

| Scientific Name | Common Name | Status[a] | Life Form & Flowering Period | Habitat Associations | Distribution | On-Site Acreage | Observed or Potential Occurrence On-Site |
|---|---|---|---|---|---|---|---|
| *Juniperus californica* | California juniper | No official status; limited distribution in Santa Monica Mountains | Shrub or tree | Dry slopes and flats, pinyon-juniper woodland between 1500-4500 feet above sea level | Inner North and South Coast Ranges, Sierra Nevada foothills, Transverse and Peninsular Ranges, desert mountains | | Species not reported or observed on project site. SEA document (England & Nelson) reported 12 individuals present prior to 1978 Kanan brushfire in "extreme west-central corner of SEA [No.6] above Cornell Road." A single specimen remains. Closest remaining occurrence may be Newhall Ranch west of Magic Mountain. |
| *Melica californica* | California melic grass | No official status; previously reported from Santa Monica Mountains | Perennial (rhizomatous) | Open hillsides, oak woodland, coniferous forest | Northwestern and central-western California, Sierra Nevada foothills, Tehachapis, western Transverse Ranges | Scattered stands; acreage not estimated | Occasional occurrences observed near rock outcrops along north slopes in western property. Previously unreported from range. |
| *Microseris douglasii* | Douglas's microseris | CNPS List 4 | Annual herb; March-May | Cismontane woodland, coastal sage scrub, valley and foothill grasslands; typically in association with clay soils | LA, Orange, Riverside, and San Diego Cos.; San Clemente and Catalina Islands; Baja California | Not estimated | Observed extensively throughout grasslands on project site. On-site population does not appear to correspond to 2 subspecies previously reported from the range and are instead more likely represent subspecies *platycarpa*, which is heretofore unreported from this range. |

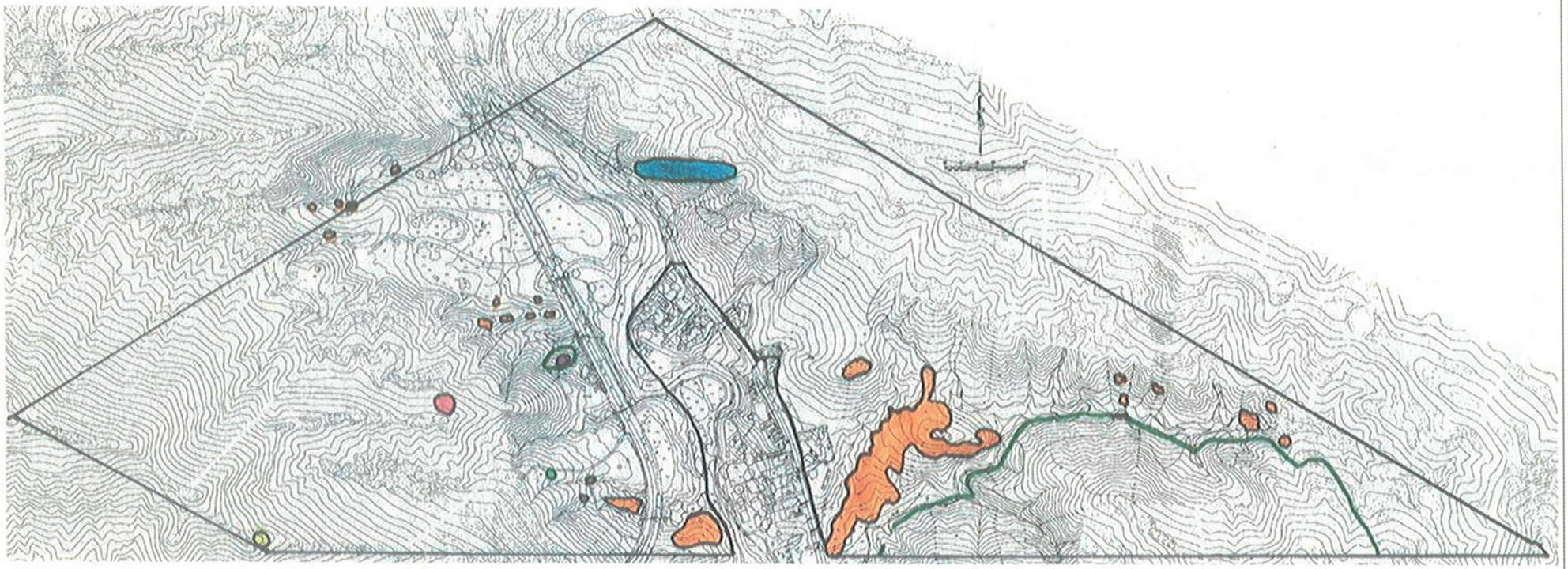
| Scientific Name | Common Name | Status[a] | Life Form & Flowering Period | Habitat Associations | Distribution | On-Site Acreage | Observed or Potential Occurrence On-Site |
|---|---|---|---|---|---|---|---|
| *Notholaena californica* ssp. *Leucophylla* | California cloak fern | No official status; uncommon; limited distribution in Santa Monica Mountains | Perennial herb (rhizomatous) | Dry, rocky slopes, rocky crevices, under rock ledges | San Gabriel and San Bernardino Mountains, Peninsular Ranges, desert ranges southeast to the Sonoran Desert. | 1.76 | Observed on project site in andesite-breccia substrate along steep, south-facing slopes in eastern project site; otherwise previously known in Santa Monica Mountains only from occurrences reported in the 1986 *Flora of the Santa Monica Mountains* at Pt. Mugu and Malibu Canyon. |
| *Orobanche fasciculate* | Clustered broom-rape | No official status; considered uncommon | Annual, non-green root parasite | Generally associated with shrubs in dry, bare places | California floristic province, Great Basin, Desert Mountains, to Yukon, central North America and Mexico | Acreage not estimated | Observed on project site restricted to rocky areas south of the Medea Creek tributary in the southeast property. Only other local occurrence reported in the 1986 *Flora of the Santa Monica Mountains* at "Cornell Corners." |

| Scientific Name | Common Name | Status[a] | Life Form & Flowering Period | Habitat Associations | Distribution | On-Site Acreage | Observed or Potential Occurrence On-Site |
|---|---|---|---|---|---|---|---|
| *Pentachaeta lyonii* | Endangered Lyon's pentachaeta | FE, SE, CNPS 1B | Annual herb; March-August | Open sandy or gravel substrates in native grassland or adjacent to rock outcrops | LA and Ventura Counties; Catalina Island | 8.8 | 2 occurrences reported on-site by CNDDB (1996) "...on small ridgetops at east end of Ladyface near Cornell Road." Species observed by Envicom, PCR, and Impact Scienes biologists in several locations on-site.; according to existing information, one of largest populations known to exist in Santa Monica Mountains. |
| *Quercus agrifolia* | Coast live oak | Regulated by LA Co. | Evergreen tree; April-June | Valleys and foothills up to 5000 feet above sea level | Mid-northern through Southern California coastal plains | 3.3 including valley oaks | 62 trees surveyed on project site |
| *Quercus lobata* | Valley oak | Regulated by LA Co. | Deciduous tree; April-June | Prefers bottomland soils below 2000 feet above sea level; can range up to 5600 feet in foothills and low mountains | Great Central Valley, inner Coast Ranges south of Mendocino, Transverse Ranges | 3.3 including coast live oaks | 30 trees surveyed on project site |

| Scientific Name | Common Name | Status[a] | Life Form & Flowering Period | Habitat Associations | Distribution | On-Site Acreage | Observed or Potential Occurrence On-Site |
|---|---|---|---|---|---|---|---|
| *Sanicula bipinnata* | Poison sanicle | No official status; uncommon in Santa Monica Mountains | Biennial/ Perennial | Open grassland or pine oak woodlands between 50-3000 feet above sea level | Northern Coast Ranges, Sierra Nevada foothills, Sacramento Valley, San Francisco Bay area, South Coast Ranges, northern and central southwestern California | No acreage estimated | Observed on project site at base of north-facing slopes in southeast portion of site. Otherwise reported only from Griffith Park. |

A
*FE* *Federal Endangered*
*FT* *Federal Threatened*
*FSC* *Federal Species of Concern*
*FC* *Federal Candidate*
*FPE* *Federal Proposed Endangered*
*FPT* *Federal Proposed Threatened*
*SE* *State Endangered*
*ST* *State Threatened*
*SPE* *State Proposed Endangered*
*SPT* *State Proposed Threatened*
*SC* *State Candidate*
*CSC* *CDFG Species of Special Concern ("Special" Plants)*
*CNPS* *List 1B Rare or Endangered in California or elsewhere*
*List 4 Plants of limited distribution*

*Source: Envicom Corp., 1998 and 1999 and PCR Services Corp., 1999.*



LEGEND

- Lyon's Pentachaeta
- Redshank
- Coville's Lip Fern
- Santa Monica Dudleya
- Cloak Fern
- Nevin's Brickellia
- Linear-Leaved Goldenbush

Source: PCR Services Corporation, Impact Sciences and The Planning Associates

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.F-3
Sensitive Species Location Map/2003 Lyon's Pentachaeta Survey

**Table III.F-3**
**Sensitive Faunal Species Observed or Potentially Present On-Site**

| Scientific Name | Common Name | Status [a] | Observed or Potential Occurrence On-Site |
|---|---|---|---|
| **Invertebrates** | | | |
| *Zerene Eurydice* | California dogface | Locally sensitive (California's state insect) | Low potential; host plant (*Amorpha*) not observed on-site |
| *Colias alexandra harfordii* | Harford's sulfur | Locally sensitive | Species may occur as transient; host plant (*Astragalus*) not observed on-site |
| *Argynnis calippe comstockii* | Comstock's fritillary | Locally sensitive | Low potential; host plant (*Viola pedunculata*) not observed on-site |
| *Melitaea g. gabbii* | Gabb's checkerspot | Locally sensitive | Low potential due to rarity in range; host plants (*Asteraceae*) present on-site |
| *Euphydryas editha quino* | Quino checkerspot | FT | Moderate potential; larval host plants (*Plantago erecta* and *Castilleja exserta*) were observed and mapped on-site and protocol surveys are currently being conducted through the end of the flight season. No individuals have been sighted. |
| *Polygonia satyrus satyrus* | Satyr anglewing | Locally sensitive | Moderate potential; host plant (*Urticaceae*) present on-site |
| *Satyrium aretorum fumosum* | Santa Monica Mountains hairstreak | FSC | Slight potential; host plant (coast live oak) relatively common on-site. |
| *Lycaena rota nubile* | Cloudy copper | Locally sensitive | Low potential as species is very rare; host plant (*Ribes*) present on-site |
| *Danaus plexippa* | Monarch | CSC (winter roost sites only) | No potential; no suitable roost sites of larval foodplants (*Asclepias*) present |
| **Vertebrates**<br>**Amphibians and Reptiles** | | | |
| *Ensatina salamander* | Monterey ensatina | U | Moderate potential |
| *Aneides lugubris* | Arboreal salamander | U | Moderate potential |
| *Taricha torosa torosa* | Coast range newt | CSC | Low potential due to disturbed stream habitat |
| *Clemmys marmorata pallida* | Southwestern pond turtle | FSC, CSC | Low potential due to disturbed stream habitat |
| *Phrynosoma coronatum blainvillei* | San Diego horned lizard | FSC, CSC | Observed on-site by MBA in 1992 surveys. |
| *Anniella pulchra pulchra* | Silvery legless lizard | FSC, CSC | Low potential; no suitable substrates on-site |
| *Cnemidopphorus tigris multiscutatus* | Coastal (western) whiptail | FSC | Observed on-site by MBA in 1992 surveys. |
| *Lampropeltis zonata pulchra* | San Diego moun-tain kingsnake | FSC, CSC | Moderate potential |
| *Diadophis punctatus modestus* | San Bernardino ringneck snake | FSC | Likely to be present on-site as resident |

| Scientific Name | Common Name | Status [a] | Observed or Potential Occurrence On-Site |
|---|---|---|---|
| *Salvadora hexalepis virgultea* | Coast patchnose snake | FSC | Moderate potential |
| *Leptotyphlops humilis* | Southwestern blind snake | U | Moderate potential |
| *Coluber constrictor mormon* | Western yellow-bellied racer | U | Likely to be present on-site as resident |
| *Masticophis flagellum piceus* | Red coachwhip | U | Likely to be present on-site as resident |
| **Birds** | | | |
| *Ardea herodias* | Great blue heron | CSC (rookeries only) | Likely to forage on-site in Medea Creek; no rookery habitat on-site |
| *Nycticorax nycticorax* | Black-crowned night heron | CSC (rookeries only) | Not likely even as visitor; no rookeries present on-site |
| *Accipiter striatus* | Sharp-shinned hawk | CSC | Observed during surveys |
| *Accipiter cooperi* | Cooper's hawk | CSC | Observed during surveys |
| *Aquila chrysaetos* | Golden eagle | CFP, CSC | Expected to forage over project site; project site is known to be within home range of one family |
| *Circus cyaneus* | Northern harrier | CSC | Moderate potential as winter visitor to grasslands |
| *Elanus luecurus* | White-tailed kite | CP, SA | Likely present as winter visitor as suitable habitat present |
| *Buteo lineatus* | Red-shouldered hawk | B | Likely to be present on-site as resident along Medea Creek |
| *Falco mexicanus* | Prairie falcon | CSC | Low potential |
| *Tyto alba* | Barn owl | SC | Likely to be present on-site as resident |
| *Athene cunicularia hypugea* | Burrowing owl | FSC, CSC | Low potential |
| *Melanerpes lewis* | Lewis's woodpecker | SC | Moderate potential |
| *Empidonax traillii extimus* | Southwestern willow flycatcher | FE, CSC | Expected as rare transient; habitat is present along Medea Creek and surveys are being performed in Spring 1999 by PCR biologists |
| *Riparia riparia* | Bank swallow | ST | Moderate potential as transient |
| *Vireo belli pusillus* | Least Bell's vireo | FE, SE | Moderate potential as transient; habitat is present along Medea Creek and surveys are being performed Spring 1999 by PCR biologists |
| *Sialia mexicana* | Western bluebird | SC | Likely to be present on-site as winter visitor; may also nest as resident in oaks |
| *Lanius ludovicianus* | Loggerhead shrike | CSC | Likely to be present on-site |
| *Dendroica petechia brewsteri* | Yellow warbler | CSC | Likely to be present on-site in migration; unlikely to nest in marginal Medea Creek habitat |
| *Icteria virens* | Yellow-breasted chat | CSC | Low potential in migration, although suitable habitat is present on-site |
| *Aimophila ruficeps canescens* | Ashy rufous-crowned sparrow | FSC | Observed on-site in chaparral habitat |

| Scientific Name | Common Name | Status [a] | Observed or Potential Occurrence On-Site |
|---|---|---|---|
| *Amphispoza belli belli* | Bell's sage sparrow | FSC, CSC | Low potential; habitat present on-site but species known only from western end of range |
| *Polioptila californica californica* | California gnatcatcher | FT | Marginal habitat on-site; not reported from region, not expected |
| **Mammals** | | | |
| *Macrotis californicus* | California leaf-nosed bat | FSC, CSC | Unknown; too little data exists to predict potential |
| *Euderma maculatum* | Spotted bat | FSC, CSC | Unknown; too little data exists to predict potential |
| *Plecotus townsendii pallescens* | Pale big-eared bat | FSC, CSC | Unknown; too little data exists to predict potential |
| *Antrozous pallidus* | Pallid bat | CSC | Unknown; too little data exists to predict potential |
| *Eumops perotis californicus* | Greater western mastiff bat | FSC, CSC | Unknown; too little data exists to predict potential |
| *Neotome lepida intermedia* | San Diego desert woodrat | FSC | Nest mounds observed in rocky areas |
| *Lepus californicus bennettii* | San Diego black-tailed hare | FSC, CSC | Low potential |
| *Bassaricus astutus* | Ringtail | CFP | Low potential due to overall rarity; may occur |
| *Mustela frenata* | Long-tailed weasel | U | Moderate potential; suitable habitat present |
| *Taxidea taxus* | American badger | SA | Moderate potential; suitable habitat present |
| *Felis concolor* | Mountain lion | U | Low-moderate potential due to rarity; may pass through area |

[a]
*FE* *Federal Endangered*
*FT* *Federal Threatened*
*FSC* *Federal Species of Concern*
*FC* *Federal Candidate*
*FPE* *Federal Proposed Endangered*
*FPT* *Federal Proposed Threatened*
*SE* *State Endangered*
*ST* *State Threatened*
*SPE* *State Proposed Endangered*
*SPT* *State Proposed Threatened*
*SC* *State Candidate*
*CSC* *CDFG Species of Special Concern ("Special" Animals)*
*CFP* *CDFG Fully Protected*
*CP* *CDFG Protected*
*SA* *Special Animal*
*B* *National Audubon Society Blue List*
*U* *Uncommon*

*Source:* Envicom Corp., 1998 and 1999 and PCR Services Corp., 1999

Table III.F-3, Sensitive Fauna Observed or Potentially Present on the Project Site, encompasses all wildlife reasonably expected on the project site according to USFWS listings, CDFG listings including the CNDDB Rarefind report (see Appendix C-1) for the Thousand Oaks and Calabasas quadrangles, and known ranges and habitat requirements of species. None of the sensitive animal species listed in the CNDDB were reported from the project site itself; the only species known to occur on-site is the San Diego horned lizard

and coastal western whiptail. Those species for which the presence of habitat or other factors indicate a moderate to high likelihood of presence are assumed to be potentially present on the project site.

## ENVIRONMENTAL IMPACTS

### Thresholds of Significance

In accordance with Appendix G to the CEQA Guidelines, a project may have a significant impact on biological resources if it would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

### Project Impacts

Project implementation would result in development of 81 single-family residential lots on approximately 48.6 acres (approximately 15 percent of the project site), with the remaining area of approximately 271.7 acres (approximately 85 percent) dedicated as open space and landscape lots. In the open space there will be 10.84 acres of fuel modification and 1.1 acres of trail.

**SEATAC Review**

The proposed project was reviewed by SEATAC on January 5, 1998, April 6, 1998, December 7, 1998, April 5, 1999, and February 2004. SEATAC minutes are included in Section VII.D of this EIR. During the April 6, 1998 meeting, SEATAC recommended that lots be deleted from the project design for mitigation to potential impacts of sensitive species. SEATAC also recommended that the extent of fuel modification be reduced wherever possible. (At that time the project proposed to develop 143 single-family lots). In response, the proposed project was redesigned and a 132-lot project was submitted to SEATAC for their December 7, 1998 meeting.

During the December 7, 1998 meeting, SEATAC recommended: (1) the development of a Master Landscape Plan, (2) further reconfiguration of the site plan to provide a more sensitively designed project for biological resources, (3) further mitigation for *Pentachaeta lyonii and Dudleya cymosa*, (4) further project redesign to reflect all mitigation measures to which the applicant will commit, and (5) redesign of site plan to cluster lots currently proposed in linear, eastern portion of the project site. In response, the proposed project was redesigned and a 123-lot single-family site design was submitted to SEATAC for the April 5, 1999 meeting. The revised design shortened the length of the linear, eastern portion of the proposed development, resulting in a more compact design that further reduced impacts to Pentachaeta lyonii, Drainage B and to linear-leaved goldenbush. The Master Landscape Plan was also submitted at this time, and is included in this EIR as Figure I-7 and discussed in Section I (Project Description), Section III.F (Biological Resources - Mitigation Measure F-4) and in Section III.I (Visual Qualities). Mitigation for impacts to *Pentachaeta lyonii and Dudleya cymosa* was also submitted (included in this EIR as measures F-1 and F-2).

During the April 5, 1999 meeting, SEATAC stated that the 123-lot site plan did not meet SEA compatibility criteria. SEATAC recommended that the eastern extension should be removed to reduce impacts to *Pentachaeta lyonii* and to avoid crossing drainage courses; and that the population of *Dudleya cymosa* be retained.

While SEATAC concluded that no further SEATAC review of the biota report was required, the proposed project was further redesigned and reduced in scale to lessen impacts to sensitive biological resources on-site and in response to SEATAC recommendations regarding sensitive site resources and habitat connectivity. Development is proposed partially within previously disturbed areas of the site. In particular, development has been sited to avoid direct impacts to the majority of on-site populations of the federally and state endangered Lyon's pentachaeta. Eighty-two percent of the Lyon's pentachaeta is being preserved in areas adjacent to large expanses of permanent open space (Impact Sciences & The Planning Associates, 2003).

During February 2004, SEATAC again reviewed the proposed project and made the following points: (1) the loss of 20 percent of occupied *Pentachaeta lyonii* habitat is significant; (2) more appropriate habitat management should be proposed; (3) potential impacts to Red-legged frog critical habitat and downstream

impacts to Medea should be addressed; (4) the plant palette contains species unacceptable in the area; (5) units at the end of the eastern cul-de-sac should be removed; and the proposed project is still considered by SEATAC to be inconsistent with the SEA..

***Plant Communities***

Project implementation including building pads, streets, utilities, fuel modification, retaining walls, line of sight clearance, and trails, would result in removal or substantial alteration of approximately 27.5 acres of grassland; 16.1 acres of hillside chaparral; 0.95 acres of riparian chaparral; 0.4 acres of riparian scrub; and 0.6 acres of oak tree habitat. Approximately 10.2 acres of disturbed area would also be developed. (The Planning Associates, Plant Communities-Quantities Memo).

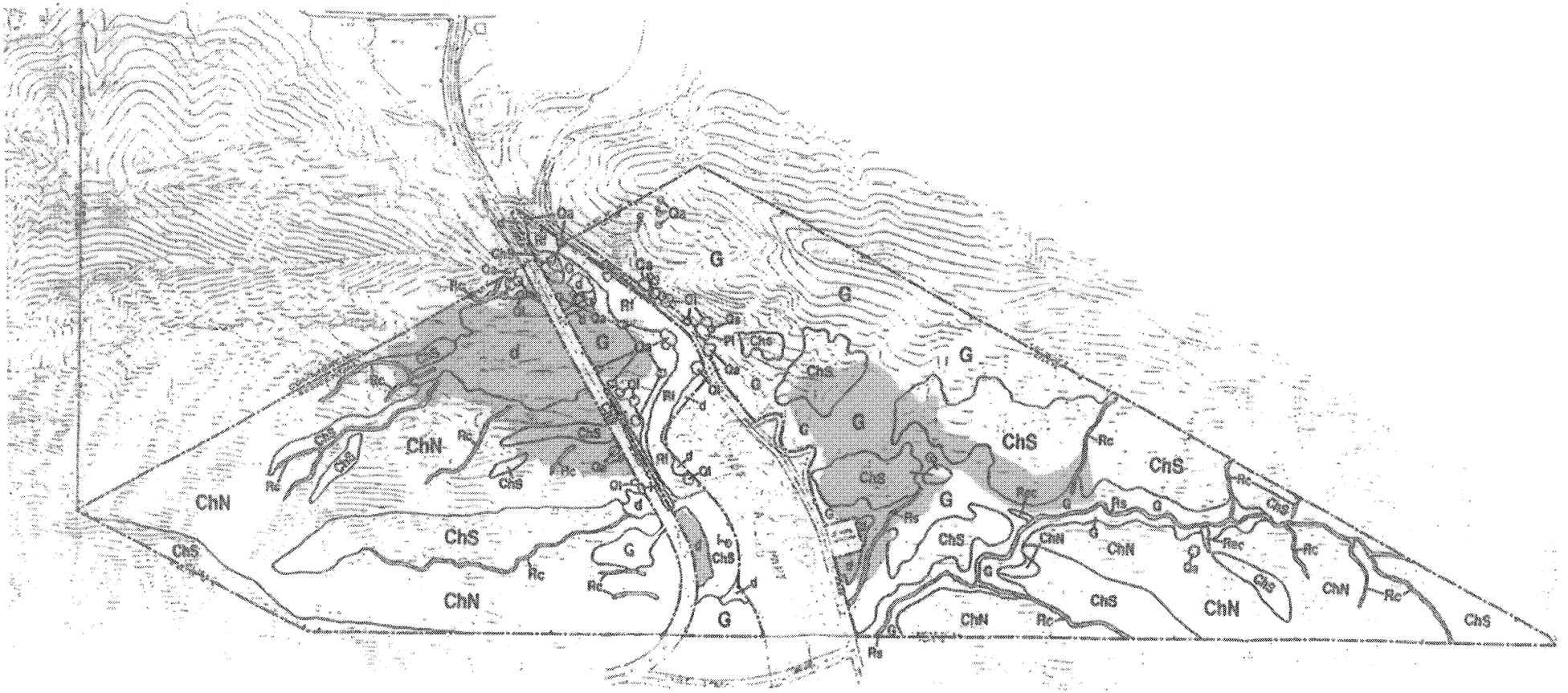
In response to SEATAC comments, the present project configuration represents decreased impacts on grassland and sensitive oak woodland habitats, and increased impacts on less sensitive chaparral and disturbed areas, as compared to initial development designs. Sage scrub–grassland, chaparral and chaparral mixed with mulefat do not represent sensitive plant communities, although they do represent habitat for plants and animals, including some sensitive species. Impacts to associated sensitive plant species, as well as to County-regulated oaks, are discussed under Impacts to Sensitive Plant Species, below. The project has undergone redesign in response to SEATAC concerns regarding wildlife impacts, connectivity with open space, lessening impacts to wildlife movement and the current project configuration retains 271.4 acres as open space (258.4 acres as undisturbed, natural open space) and achieves connectivity with adjacent areas of open space, minimizing impacts on wildlife movement. Much of the development is concentrated along Kanan and Cornell Roads, proximate to existing development within already disturbed (i.e., graded) areas. Therefore, removal of grasslands, chaparral, and mixed chaparral with mulefat constitutes adverse, but less than significant, impacts with respect to plant communities. Project impacts to on-site plant communities are mapped in Figure III.F-4.

Project implementation is not anticipated to directly impact the Willow Riparian Forest in Medea Creek, as no construction within the Willow Riparian Forest is proposed or required. Impacts referred to later in this report are characterized as indirect and adverse, but not significant with the implementation of water quality mitigation and invasive plant management. The project configuration would also avoid the Freshwater Seep in the north-central project site.

***Sensitive Plant Species***

Project implementation would result in direct and potential indirect impacts to three of the 16 sensitive plant species known to be present on the project site. Figure III.F-5 Project Impact Map – Sensitive Species, shows the project footprint and proposed areas of impact and avoidance with respect to seven of the sensitive plant species, based upon the year 2003 survey update. Specifically, project implementation would result in

the removal of approximately 1.55 acres of federally and state endangered Lyon's pentachaeta (17.6 percent of the area occupied by the species on-site) and the preservation of 7.25 acres or 82.3 percent of the area occupied by the species on-site (Impact Sciences &The Planning Associates, 2003); 0.1 acres of federally threatened Santa Monica Mountains dudleya habitat (the entire on-site population); and 1.0 acres of the sensitive, but unlisted, linear-leaved goldenbush (3) percent of the on-site population). Loss of a portion of the on-site Lyon's pentachaeta population requires a Federal Endangered Species Act (FESA) Permit from USFWS and a California Endangered Species Act (CESA) Permit/MOU from CDFG, pursuant to CDFG Section 2081.5 of the Fish and Game Code. Pursuant to Section 1913 (c) of the Fish and Game Code and the Native Plant Protection Act, the applicant must notify CDFG at least 10 days in advance of initial grading to allow salvage of listed plants. Losses of individuals of the listed Lyon's pentachaeta and Santa Monica Mountains dudleya populations and habitat represent significant impacts on biological resources. The linear-leaved goldenbush is not included on the CNPS lists, has no official status, and is limited distribution in Santa Monica Mountains; therefore, the loss of 1.0 acre of linear-leaved goldenbush constitutes an adverse, but less than significant, impact. Coville's Lip Fern, California cloak fern, red shank and Nevin's brickelbush lie entirely outside the project footprint and would not be directly affected by project implementation.

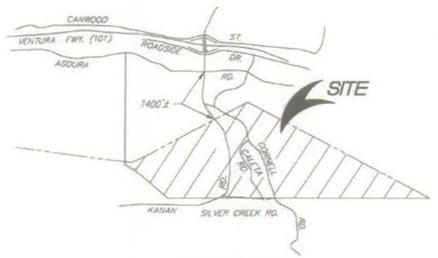



Source: Envicom Corporation and PCR Services Corporation

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.F-4
Project Impacts Map: Vegetation Communities

SCALE: 1" = 200'




VICINITY MAP
N.T.S.

ROADWAY HAS BEEN WASHED OUT. NOT A THROUGH ACCESS.

## LEGEND

- LYON'S PENTACHAETA 2003
- REDSHANK
- CLOAK FERN
- SANTA MONICA MOUNTAINS DUDLEYA
- LINEAR-LEAVED GOLDEN BUSH
- NEVIN'S BRICKELLIA
- COVILLE'S LIP FERN

Source: Wagner Halladay Inc., June 2004

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.F-5
Project Impacts Map: Sensitive Species - 2003 Update Survey

As previously stated, the development has been partially redesigned in response to SEATAC comments and other considerations and, accordingly, the present design represents a more sensitive design regarding impacts to Lyon's pentachaeta populations. Areas of the project in close proximity to the Lyon's pentachaeta have been pulled back to the maximum extent practicable. Nonetheless, project implementation would result in separate and direct significant impacts on biological resources with respect to each sensitive plant species subject to removal.

Project operations could also potentially result in indirect impacts to sensitive plants related to encroachment of non-native ornamental plants used in landscaping, contaminated urban runoff and increased levels of disturbance from unauthorized intrusion by humans and pets. Such impacts have the potential to cause substantial diminishment of habitat and would be considered significant.

Project implementation would result in the removal of approximately 0.6 acres of mixed oak woodland on the project site, including Valley Oak Woodland. While this community is designated by CDFG as highest priority inventory, it is not formally protected by this designation. However, both valley and coast live oaks are regulated under the County's Oak Tree Ordinance. As stated in the Oak Tree Report, project implementation is anticipated to directly remove 18 trees. Additionally, the project development would encroach upon (i.e., impact) 17 oak trees. Removal of, and encroachment upon, on-site oaks constitutes significant biological resource impacts. However, compliance with Oak Tree Permit mitigation requirements, which specify replacement of oaks at a 2:1 ratio (10:1 for heritage trees) and other protective measures for trees subject to encroachment would reduce impacts to less than significant levels. A comprehensive mixed oak woodland revegetation plan is proposed to mitigate impacts to oak tree habitat (see Appendix C-12).

***Wildlife and Wildlife Movement***

Project implementation would result in the removal of scrub-grassland, chaparral, oak woodland, and riparian habitat used by a range of wildlife. Development is concentrated along Kanan and Cornell Roads, and in already disturbed areas to the maximum extent feasible to reduce impacts to on-site vegetation. Wildlife movement across the project site is already impeded by Kanan and Cornell Roads and residential development along Medea Creek. Project implementation would serve to further impede wildlife movement within and across the project site, except along Medea Creek, which would remain intact following project implementation. The existing habitat connections to open space south of the project site, where most on-site wildlife movement is probably concentrated (due to development to the north, along U.S. Highway 101), would remain largely unaffected by project implementation. Moreover, project implementation would not have a direct impact on the Liberty Canyon wildlife movement corridor to the east; the project site provides natural habitat for species using this corridor but does not lie within the corridor itself.

Project implementation would result in the loss of approximately 48.6 acres of wildlife habitat. Approximately 271.7 acres on-site would remain as undeveloped open space, particularly along the southeast, eastern and western borders, 10.84 acres of which would be subject to the requirements of the Los Angeles County Fuel Modification Program (see Section III.K.1, Fire Protection Services). Therefore, substantial on-site habitat resources would be retained. Accordingly, total project impacts to area wildlife habitat as a result of the development (i.e., 60 acres) would be less than significant.

Concerning wildlife movement through the site, the proposed project could interrupt east-west movement via Medea Creek and Drainage B. As proposed, residential dwellings would be constructed proximal to these drainages and "spillover" impacts from human activity including night lighting and noise, as well as cats and dogs, could potentially alter the behavior of wildlife now using the site for movement. This would be considered a significant adverse impact.

***Sensitive Wildlife Species***

Project implementation would result in the removal of habitat for a variety of sensitive wildlife species observed or potentially present on the project site. Species observed on the project site and subject to potential impacts related to habitat loss include San Diego horned lizard, coastal western whiptail, sharp-shinned hawk, Cooper's hawk, ashy rufous-crowned sparrow and San Diego desert woodrat. Sensitive wildlife species moderately likely or expected on the project site and potentially subject to habitat loss include invertebrates (satyr anglewing); reptiles and amphibians (Monterey ensatina, arboreal salamander, San Diego mountain kingsnake, coast patchnose snake, southwestern blindsnake, western yellow-bellied racer, red coachwhip, coastal western whiptail, and San Bernardino ringneck snake); birds (great blue heron, golden eagle, northern harrier, white-tailed kite, red-shouldered hawk, Lewis's woodpecker, western bluebird, loggerhead shrike and yellow warbler); and mammals (longtailed weasel and American badger). Project implementation would directly result in potentially significant impacts to these species through habitat removal. Additional, indirect potential significant impacts include increased levels of disturbance from human activity and intrusion by domestic pets and increased levels of ambient noise and light.

Protocol surveys were conducted for Quino checkerspot butterfly, least Bell's vireo and southwestern willow flycatcher based on the presence of suitable habitat. None of these species were detected on site.

***Wetlands and Waters of the United States***

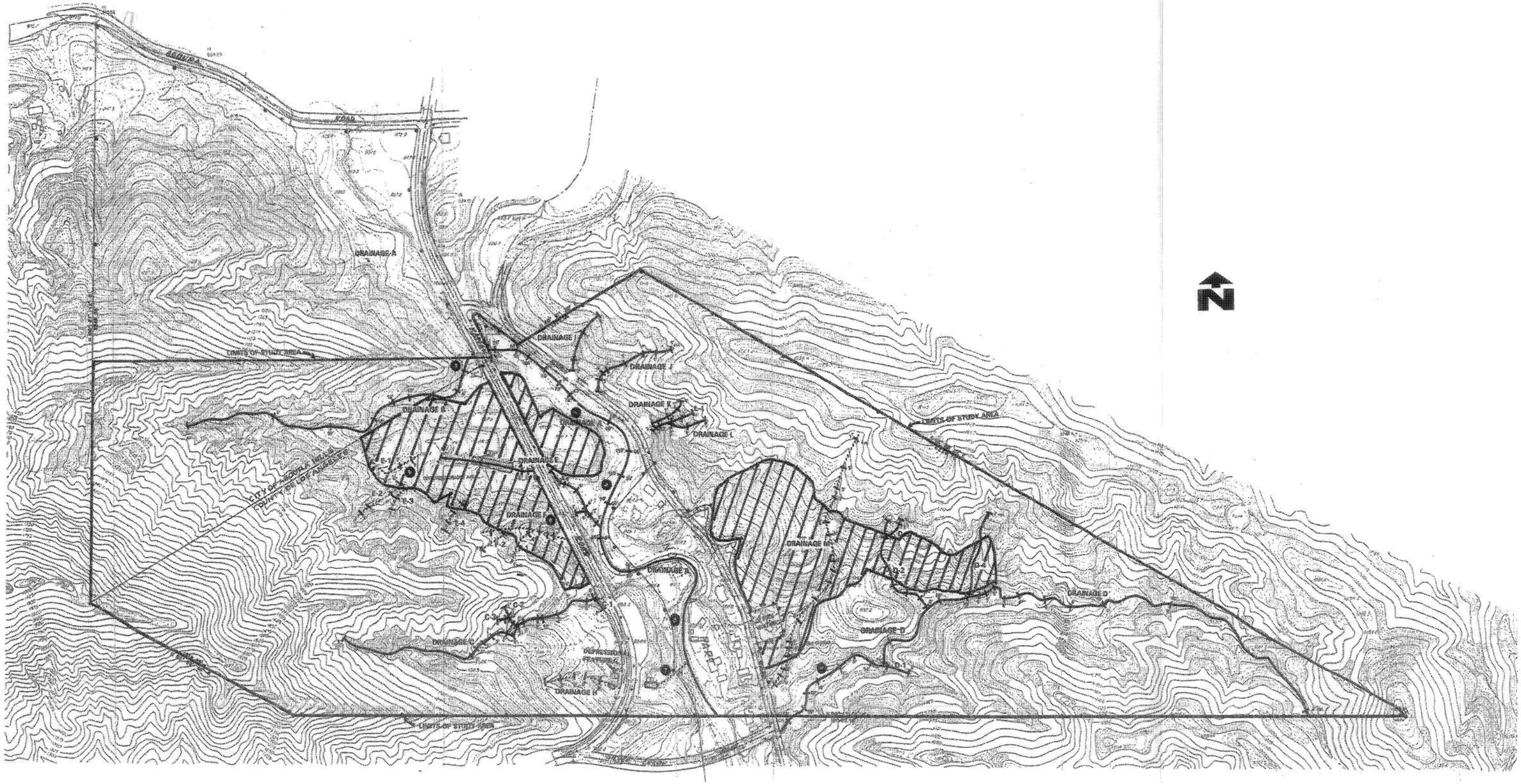
Project implementation would involve grading and filling portions of twelve main drainages, their tributaries and adjacent slopes, and direction of downstream flow through the construction of underground culverts. Energy dissipaters would be used to reduce downstream impacts from the outflow structures. Impacted drainages are all tributary to Medea Creek and include B, C, D, E, F, G, H, I, J, K, L, M, as shown in Figure III.F-6. Total impacts to "waters of the United States" would be 0.08 acres. The majority of the drainages to be filled are ephemeral. Direct impacts to jurisdictional waters are not considered to be significant. Indirect impacts resulting from fragmentation of the drainages are considered to be less than significant. No direct impacts are anticipated to Medea Creek or wetlands.

***Compatibility with the SEA***

Of the 172 acres of the project site which lie within SEA No. 6, approximately 22.9 acres, representing 5.0 percent of the total SEA, would be developed with residential units and related facilities.

***SEA Compatibility Criterion 1: The requested development is designed to be highly compatible with the biotic resources present, including the setting aside of appropriate and sufficient undisturbed areas.*** Criterion 1 deals with overall biological compatibility and set-aside of open space (OS), 271 acres of OS have been proposed as a part of this project. However, contrary to SEATAC's recommendation that the project not extend east of Cornell road, the extension of the eastern portion of the project, with residences on only one side of a relatively straight road, and the isolated pair of parcels east of the cul-de-sac, does not minimize fragmentation. Thus the project is not in conformance with SEA Compatibility Criterion 1.

***SEA Compatibility Criterion 2: The requested development is designed to maintain water bodies, watercourses and their tributaries in a natural state.*** The project design is inconsistent with SEA Criterion No. 2 insofar as project implementation would result in the filling of 0.08 acre (35,495 linear ft.) of jurisdictional waters of the United States, encompassing nine ephemeral tributary drainages to Medea Creek. The project has been designed to avoid direct impacts to Medea Creek and most of the onsite tributary drainages. Access to the portion east of Cornell Road is proposed to be taken along a drainage course south of the fire station; culverts will be required along impacted drainages to allow current storm flow patterns to continue.




Legend
—— Area Within Corps and CDFG Jurisdiction
- - - Area Within CDFG Jurisdiction Only

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.F-6
Impacts on Jurisdictional Drainages

***SEA Compatibility Criterion 3: The requested development is designed so that wildlife movement corridors (migratory paths) are left in an undisturbed and natural state.*** SEA Criterion No. 3 addresses retention of wildlife corridors in a natural, undisturbed state. Project implementation is not anticipated to reduce or confine existing movement pathways within and through the project site. The proposed project is in substantial conformance with this criterion.

***SEA Compatibility Criterion 4: The requested development retains sufficient natural vegetative cover and/or open spaces to buffer critical resource areas from said requested development.*** SEA Criterion No. 4 specifies appropriate open space or vegetative buffers to protect critical resource areas from proposed uses. Insofar as the project footprint eliminates the Santa Monica Mountains dudleya population and habitat, and eliminates and abuts some Lyon's pentachaeta populations, the proposed project is not compatible with this criterion.

***SEA Compatibility Criterion 5: Where necessary, fences or walls are provided to buffer important habitat areas from development.*** SEA Criterion No. 5 allows the installation of fences or walls to buffer habitat from development. Project implementation would include such elements where appropriate to separate developed areas and designated open space, while avoiding obstruction of wildlife movement, and would be compatible with this guideline.

***SEA Compatibility Criterion 6: Roads and utilities serving the proposed development are located and designed so as not to conflict with critical resources, habitat areas or migratory paths.*** SEA Criterion No. 6 discourages conflicts between project roadways and utility infrastructure and critical resources, habitat areas and migratory paths. The access east of Cornell through the drainage course south of the fire department renders the project inconsistent with Criterion No. 6.

## LEVEL OF SIGNIFICANCE BEFORE MITIGATION

The following are significant impacts for which mitigation is required:

- Removal of sensitive plant species habitat including 1.55 acres (or 17.3 percent) of Lyon's pentachaeta (7.25 acres or 82.7 percent, preserved) and 0.10 acres of Santa Monica Mountains dudleya habitat.
- Encroachment of urban pollutants, invasive species, and human intrusion into open space containing sensitive plant species.
- Potential loss of habitat and habitat connectivity for sensitive wildlife species.
- Encroachment into the Las Virgenes SEA and incompatibility with SEA Guidelines Nos. 1, 2, 4 and 6.

- Impacts to 0.08 acres of jurisdictional "waters of the United States."
- Removal of approximately 0.6 acres of mixed oak woodland on the project site, including Valley Oak Woodland.

The following impacts would be less than significant. Mitigation is not required for these impacts:

- Removal of grasslands, chaparral, and mixed chaparral with mulefat constitutes adverse, but less than significant, impacts with respect to plant communities.
- Species with no formal status but known to be uncommon in the Santa Monica Mountains, are not formally protected and their removal constitutes adverse, but less than significant, impacts. Coville's Lip Fern, California cloak fern, red shank and Nevin's brickelbush lie entirely outside the project footprint and would not be directly affected by project implementation.
- Total project impacts to area wildlife as a result of the development (i.e., 48.6 acres) would be less than significant.
- Removal of 18 oak trees and the encroachment upon 17 oak trees. Compliance with the Oak Tree Permit mitigation requirements would reduce impacts to individual trees to less than significant levels.

**MITIGATION MEASURES**

The following mitigation measures are required to either partially reduce impacts or to reduce some impacts to less than significant levels, however, overall impacts to biological resources from project implementation would remain significant.

F-1 In order to reduce impacts to Santa Monica Mountains dudleya, the following measures shall be implemented:

1) Due to the illegal removal of all mature Santa Monica Mountains dudleya from the project site, the implementation of a translocation program will only be able to assist the few juvenile dudleya that remain on the project site. The translocation of juvenile plant species of this nature is considered risky. However, in an effort to propagate the survival of the remaining plants on site, the project applicant shall translocate the remaining impacted individuals of the species to new locations with suitable habitat and substrates at higher elevations on Ladyface Mountain or other appropriate areas. The new locations of the translocated dudleya will be kept confidential, as to eliminate the risk from further illegal poaching. The translocation program shall be reviewed, approved, and implemented by the DRP Biologist prior to issuance of any grading permit. This mitigation measure is understood to be experimental in nature and represents only partial mitigation.

2) During the flowering period of the species and prior to the translocation of impacted individuals, the project applicant shall retain a biologist knowledgeable about the species to collect seeds from the site. These seeds will be given to a nursery specializing in the propagation of native plants for germination and establishment. At the end of one year's growth germinated individuals will be planted in appropriate receiver sites to consist of the translocation area identified in mitigation measure F-1-1 above and/or protected suitable habitat areas identified in conjunction with the National Park Service and/or the Santa Monica Mountains Conservancy. A minimum of 50 seeds will be collected, germinated and replanted from each of the impacted individuals. Responsibility for implementing this measure shall be vested with the project applicant through the collection phase at which time responsibility may be transferred to the project site's Homeowners Association or any future owner of the dedicated open space on-site (i.e., this entity will also be responsible for retaining a project biologist for any off-site replantings).

F-2 In order to reduce impacts to Lyon's pentachaeta, the following mitigation measures have been developed in response to SEATAC recommendations:

1) The project shall implement appropriate means to maintain the preserved populations of Lyon's pentachaeta. This may include manual means such as using hand or power tools to prune, thin and remove vegetation that would outcompete Lyon's pentachaeta. Specifications for implementing such manual controls shall be consistent with the USFWS Recovery Plan for the species and CDFG Code shall be included in the approved Master Landscape Plan and Fuel Modification Plan for the project;

2) Responsibility for implementing the long-term aspects of the Management Plan for the Lyon's pentachaeta shall be specified in the CC&Rs and shall be vested with the project site's Homeowners' Association or any future owner of the dedicated open space. The owners of the dedicated open space areas shall comply with all relevant federal and state regulations and conditions. The applicant shall endow a fund sufficient for implementing the management Plan for the Lyon's pentachaeta on the site. The amount of the endowment shall be determined on the basis of anticipated minimum operational cost and projected third party oversight, as determined by an appropriate third party management entity. This shall be a one-time endowment by the applicant to the homeowners' association or any future owner. The homeowners' association shall then be responsible for all future costs; and

3) Following the initial endowment, future homeowners or controlling entities shall contribute to a specific-purpose fund, which will be available to implement the Management Plan for Lyon's pentachaeta. The amount of annual contributions shall be determined as adequate to provide for past cost overruns and expected or identified contingencies over the minimum operational cost

of the Management Plan. The special-purpose fund shall be used only for the intended purpose and shall be divulged to all prospective homeowners.

F-3 The project applicant shall develop and implement a Fuel Modification Plan approved by LACFD that incorporates the following measures:

1) Preservation and avoidance of sensitive plant populations, especially Lyon's pentachaeta;

2) Development of fuel modification zones for all hazard areas;

3) Preservation of native plants with low fuel volume;

4) Use of non-invasive, SEATAC and Los Angeles County Fire Department (LACFD)-approved native plants, and avoidance of CalEPPC-listed invasive plants;

5) Listing of fire abatement measures, including removal of deadwood, irrigation, mowing and maintenance of oak trees for each hazard area. Any areas in which oak understories or deadwood removal take place shall be mitigated for as part of the oak woodland revegetation plan.

6) The final Fuel Modification Plan shall be reviewed and approved by SEATAC and the DRP Biologist prior to issuance of the grading permit.

F-4 The project applicant shall develop, implement and maintain a Master Landscape Plan to be reviewed by SEATAC and the DRP Biologist in order to prevent the introduction of exotic plants into undeveloped open space areas. The Master Landscape Plan shall be compatible with the Fuel Modification Plan and shall address the design, implementation and maintenance of all landscaping, common areas, undeveloped building pads pending sale, and private grounds. The Master Landscape Plan shall include a plant palette of acceptable ornamental and native species to be used and shall be reviewed by a qualified biologist. Planting requirements on privately held parcels and common areas shall be recorded within the CC&Rs of the homeowners' association and each homeowner. In addition, a buyer's awareness brochure will be distributed at the time of sales which will provide educational information on the benefits of maintaining habitat values and the problems associated with invasive plants. This information shall also contain a list of prohibited plant species. A qualified biologist shall examine the dedicated open space and common areas on an annual basis, starting with the installation of the first landscaping and lasting five years after complete buildout, to determine if invasive ornamentals have escaped to adjacent natural areas and, if necessary, recommend alternative plants and methods for control.

F-5 The project applicant shall dedicate 271.7 acres (including landscape lots) as open space under the long-term management of the homeowners' association or other future owner of the open space. Of

this total, approximately 260 acres will remain natural and undisturbed by fuel modification. Open space shall be subject to the following restrictions:

1) No off-road vehicle (ORV) use, including ATVs, SUVs or bicycles;

2) No hunting;

3) No weapons, including firearms, airguns, BB guns, slingshots, paintball guns, crossbows, bows or any other device that shoots a projectile used to hunt or maim animals or people;

4) No camping, fires or trailer parking; and

5) No ancillary structures such as corrals, sheds, gazebos, decks, pools or treehouses.

F-6 The project applicant may employ chain link fencing or other wildlife-excluding fencing only around the immediate vicinity of residences and associated yards. Fencing passable by wildlife may be employed in common areas and no fencing may be allowed outside designated lots.

F-7 In order to minimize impacts on sensitive plant and wildlife species, the project applicant and future homeowners (as provided in the CC&Rs) shall:

1) Prohibit introduction of chemical pesticides into natural areas during project construction or operations;

2) Restrict chemical pesticide use to developed lots and avoid use within 200 feet of streamcourses or drainages;

3) Prohibit use of poison to control rodents in common areas and open space; and

4) Inform homeowners of their responsibilities with regard to proper pesticide use prior to purchase of property.

F-8 In order to reduce impacts on sensitive and other wildlife species, the project applicant shall develop a lighting program that addresses the following:

1) All outdoor lighting shall be shielded and directed away from adjacent open space areas;

2) Any street lighting shall be low-intrusion or have no impact on wildlife, such as sodium-type fixtures; and

3) Excessive outdoor lighting shall be avoided; outdoor lighting shall represent the minimum required to conform to applicable ordinances.

F-9 The project applicant shall comply with all state and federal agency regulations and conditions. This may include, but not be limited to, the preparation of a conceptual mitigation plan and analysis of alternatives. Opportunities for on-site habitat restoration and enhancement shall be evaluated prior to the investigation of off-site opportunities. Mitigation ratios for impacted habitat areas shall be no less than 1:1 for on-site mitigation and no less than 2:1 for mitigation.

F-10 In order to reduce impacts to San Diego Horned Lizard and the Coastal Western Whiptail, the following measures shall be implemented:

The project applicant shall translocate impacted individuals of the species to new locations with suitable habitat on site or other appropriate areas. The translocation program shall be reviewed and approved by the DRP Biologist.

F-11 In addition to complying with the Oak Tree Ordinance, the project applicant/developer shall develop, implement and maintain a Comprehensive Mixed Oak Woodland Revegetation Plan to be reviewed and approved by the DRP Biologist prior to the issuance of grading permits. All tree plantings shall be subject to a five-year monitoring effort by an independent certified arborist. This monitoring effort shall consider growth, health, and condition of the subject trees in order to evaluate the project's success. The project developer/homeowners' association shall implement the recommended remedial actions should any of the tree plantings exhibit poor or declining health.

**LEVEL OF SIGNIFICANCE AFTER MITIGATION**

- The loss of 1.55 acres (17.3 percent) of on-site Lyon's pentachaeta population out of a total population of 8.8 acres (82.7 percent or 7.25 preserved) remains significant following implementation of the proposed mitigation measures, as this species is sufficiently rare that the proposed measures are not considered to entirely mitigate the loss of the species.
- Loss of 0.1 acres of Santa Monica Mountains dudleya habitat remains significant following mitigation, as the proposed relocation mitigation measure is considered experimental.
- Loss of habitat connectivity for sensitive wildlife species remains significant following mitigation.
- Encroachment into the Las Virgenes SEA and incompatibility with SEA Compatibility Criteria Nos. 1, 2, 4 and 6 remains significant following mitigation.
- Impacts to individual oak trees would be reduced to a less-than-significant level by compliance with the Oak Tree Ordinance. Impacts to oak tree habitat would be mitigated by implementation of the Comprehensive Mixed Oak Woodland Revegetation Plan.

## CUMULATIVE IMPACTS

Project implementation would contribute to the regional loss of natural resources, including sensitive plant communities, listed plant species and wildlife habitat connectivity. Potential direct impacts are primarily associated with loss of plant and animal habitat and open space, and increased unauthorized human and domestic pet activity in the area. Indirect impacts include increased potential for contaminated urban runoff in waterways and increased levels of ambient noise and light. However, as determined through the analyses provided in Sections III.E. Water Quality, III.G. Noise, and III.J. Light and Glare, mitigation measures are provided which are sufficient to reduce these incremental impacts to a less-than-significant level.

# IV. ENVIRONMENTAL IMPACT ANALYSIS
# G. CULTURAL RESOURCES - ARCHAEOLOGY

The following reports are summarized below and incorporated by reference. Copies of these reports are on file at the UCLA Archaeological Information Center. Due to the sensitive nature of the information contained in these reports, they are available for review by qualified researchers only.

- W & S Consultants, Phase I Archaeological Survey and Cultural Resources Assessment of the Beautiful City Project Area, Los Angeles, County, California, March 17, 1997[1]

- W & S Consultants, Phase II Text Excavations and Determination of Significance at CA-LAN-421, -2077, -2078, -2079, -2080, -2481, -2482 and -2483, Tract 52419, Los Angeles County, March 15, 1999[2]

## ENVIRONMENTAL SETTING

### Prehistoric Background

The project site is situated in a zone known prehistorically to have comprised a portion of the Canaliño culture area, and historically to have been a part of the Chumash ethnolinguistic sphere. In general archaeological terms, the region of the Canaliño culture area is known to have first been occupied during the Early Millingstone period, which dates back to about 9000 years B.P. (before the present). During this period subsistence is believed to have emphasized plant resources, and site assemblages are dominated by large-sized and relatively crude chopping, grinding and pounding tools. At about 3500 years B.P., the prehistoric inhabitants of the region are said to have made a transition to a more hunting-oriented economy, which occurred during the duration of the Intermediate period, lasting to about A.D. 1200. Artifacts diagnostic of this period include large, stemmed projectile points, probably used as spear or dart points. The Intermediate period was replaced subsequently by the Late Prehistoric, or Canaliño period, which lasted until the time of Spanish missionization during the last two decades of the 18th century. The Canaliño period witnessed an expansion of aboriginal culture which included a substantial growth in population, the establishment of permanent settlements on the coast, a high degree of sociopolitical complexity and the development of a very sophisticated maritime

---

1 *This cultural resources survey inventories and evaluates known historical and prehistoric archaeological sites lying within the project area, and identifies and records previously unknown cultural resources. It provides baseline data from which subsequent assessments of the adverse impacts to these resources can be made and from which management recommendations for further study or treatment of the archaeological sites can be developed.*

2 *The Phase II report provides a summary of field methods and findings at each site. Final recommendations for the management of each of these sites, based on these findings, are also presented.*

economy. It was during the Canaliño period that the ethnolinguistic group now known as the Chumash achieved levels of cultural and social sophistication perhaps unrivaled by hunter-gatherer groups anywhere else in the world.

The term "Chumash" strictly applies to a group of people united only by the use of a series of closely related Hokan languages, sharing a number of similar cultural traits, and stretching from Topanga Canyon inland to Mt. Pinos and along the coast to the San Luis Obispo area. That is, it implies no necessary sociopolitical unity (as in a single "tribe") and, in fact, a series of different Chumash languages and political units existed at the time of Spanish contact. In the southeasternmost region of the Chumash, including the area now occupied by the subject property, Ventureño Chumash was spoken.

The first indication of aboriginal occupation in the Conejo Corridor, including the subject property, dates to the beginning of the Intermediate period. This comprised the initial occupations of a series of "site complexes". Theses are agglomerations of small habitation and special purpose sites that tend to be localized in relatively restricted areas. One such complex was present on the upper reaches of Medea Creek, in modern Oak Park. Another probably existed in the vicinity of Cornell Corners, immediately north of the study area, although this is as yet undocumented or studied.

**Archaeological Records Search**

According to the maps, site records and reports on file at the UCLA Archaeological Information Center (AIC), six prehistoric archaeological sites had been recorded within the subject property. However, examination of the historical Calabasas 1903 and Triunfo Pass 1943 15-minute topographical quadrangle maps revealed no historical structures or features that might have previously existed on the property.

**Archaeological Field Survey**

An intensive on-site Phase I archaeological field survey was conducted in March 1997. Conditions for the field survey were, in general, moderate to good, and essentially all areas within the project boundaries could be viewed with confidence. The six previously recorded prehistoric archaeological sites were relocated and assessed, while three more prehistoric sites were newly discovered and recorded during the field survey. To protect these resources, their locations are not disclosed.

The previously recorded sites are presented below:

- CA-LAN-314: This site was discovered, recorded, and subsequently destroyed in 1965 as a result of on-site construction. The site was described as consisting of "midden and shell" and reportedly burials had been dug up during the construction. The March 1997 revisit to the site confirmed that

all topsoil from the area had been removed, thereby effectively eliminating the site. Therefore, CA-LAN-314 is no longer an extant cultural resource.

- CA-LAN-421: When first discovered, this site was estimated to be about 40 by 50 feet in size, and was said to contain core tools, flakes, scrapers and other stone tools. When relocated and examined during the March 1997 revisit, the site was found to contain primary and secondary flakes of metavolcanic and chalcedony lithic materials, a metavolcanic scaper plane, and a sandstone mano. The site was found to be essentially in tact, although its site area is now thought to be approximately 200 by 200 feet.

- CA-LAN-2077: This site was originally described as a scatter of chalcedony flakes and a quartz awl, found within an area measuring about 30 by 20 meters in size. When relocated by the March 1997 resurvey, the site proved to contain a low density of metavolcanic and chalcedony primary flakes. There has been some grading disturbance to the outer (western) edge of the site, but otherwise the site appears to be largely intact. Very localized conditions at this site appear to be depositing soils, suggesting that some natural deposition as a result of colluvial processes may be present here. During the resurvey this site was measured as approximately 35 meters in diameter.

- CA-LAN-2078: This site is immediately north of the original location CA-LAN-314. When first found in 1992, the site consisted of two chalcedony flakes and one piece of abalone. The size of the site at that time was estimated to be about 9 by 5 meters. During the March 1997 revisit, heavy grass cover was found to blanket the recorded site area. As a result, only a single chalcedony fake was relocated. However, there was no evidence to suggest that the recorded site area had been disturbed. Therefore, it is inferred that a small intact site is still present at this location, as originally recorded.

- CA-LAN-2079: In 1992, this site was originally reported as a lithic scatter containing chalcedony flakes and cores, found within an area estimated at 70 by 20 meters in size. The 1997 revisit confirmed the presence of this site, and found it to be still intact and largely as previously described. The presence of metavolcanic flakes and cores were noted during the revisit.

- CA-LAN-2080: This site was originally recorded as a low-density scatter of chalcedony flakes. It was estimated to be about 15 by 10 meters in size at the time of discovery. The 1997 resurvey found the site to consist of a quarry/workshop associated with an exposure of metavolcanic cobbles. Six flakes and a core, in addition to a few pieces of chalcedony, were noted. Also, the size of the site has been re-estimated to be approximately 25 meters in diameter. The site has experience considerable horse trampling, and although it is unlikely that the site originally contained a subsurface deposit, this recent horse trampling may have introduce some of the surficial cultural remains below the ground surface.

- Isolates: A single isolated artifact - a chalcedony flake - was also recorded during the 1992 survey. Another possible "isolate", two pieces of cut animal bone, were also recorded in 1992, but from the description these seem unlikely to have been archaeological in nature. These isolates could not be relocated during the 1997 survey, but the 1992 recording of them has served to adequately mitigate any adverse impacts that they might suffer, due to the development of the property.

The Phase I archaeological survey also resulted in the discovery of three new archaeological sites:

- CA-LAN-2481: This intact site, consisting of Tivela and Haliotis shell fragments, along with about two dozen chalcedony and metavolcanic flakes, appears to be a small habitation. The site area is estimated at about 65 by 100 meters in size.

- CA-LAN-2482: This site consists of an extensive, low-density lithic scatter, now cut into two loci by on-site construction activities. A blanket fill is present along the northern boundary of Locus B and it is possible, if not likely, that portions of this locus are buried by this material. Chert, chalcedony, and metavolcanic flakes, shatter and cores were observed on the site, which is estimated to be about 100 by 200 meters in overall size. Although the central portion of this site has been destroyed, large intact portions of this site are still extant.

- CA-LAN-2483: This site consists of a low-density lithic scatter containing chert and metavolcanic flakes and shatter. The site is measured at about 20 by 10 meters in overall size. The site surface has suffered from some disturbance, but overall can be considered intact.

## ENVIRONMENTAL IMPACTS

### Thresholds of Significance

In accordance with Appendix G to the CEQA Guidelines, the proposed project would have a significant impact on the environment if it would:

- Cause a substantial adverse change in the significance of a unique archaeological resource (as defined in Section 21083.2(g) of the California Public Resources Code); or

- Disturb any human remains, including those interred outside of formal cemeteries.

### Project Impacts

Current development plans indicate that seven of the eight known archaeological sites within the project area would be impacted by the proposed grading or other construction activities. Because the proposed development would have a direct adverse affect on these resources, a Phase II archaeological test excavation was conducted to evaluate and determine the significance of those sites: CA-LAN-421, -

2077, -2078, -2079, -2080, -2481, -2482 and -2483. Fieldwork, laboratory processing and cataloging, and artifact analyses on these sites were completed in January 1999.

**Fieldwork Rationale and Approach**

Phase II archaeological fieldwork at the eight Live Oak Ranch sites was intended to establish the nature and significance of each site, and thereby to provide baseline data from which a determination of the ultimate disposition of these cultural resources could be made. This required the collection of a representative sample of artifacts and archaeological indicators from each of these cultural resources, the establishment of the vertical and horizontal boundaries of any cultural deposits that might be present, and an analysis of the recovered artifact assemblage from these archaeological localities.

Procedures followed in the collection of data useful for establishing the nature and significance of the sites included mapping, surface collecting of artifacts lying on the ground surface, and test excavation of pits to establish the presence or absence of a subsurface archaeological deposit, as well as to characterize such a deposit if found to be present. A detailed discussion of fieldwork methodology is presented in the Final Report on the Phase II Test (March 15, 1999).

The results of these field procedures for each of the eight sites are summarized below, along with the final recommendations for their treatment:

- CA-LAN-421 - Two test pits excavated on the site failed to reveal evidence of a subsurface deposit. Based on this fact, the site appears to be a surface lithic scatter. All extant surface artifacts were collected from the ground surface during our Phase II test. This small collection of artifacts appears to reflect plant-processing activities. No temporally diagnostic artifacts were found.

- CA-LAN-2077 - The three test pits excavated on the site failed to find any evidence of a subsurface deposit with the site which, instead, apparently represents a surface lithic scatter. A small collection of formal tools and archaeological indicators were recovered from the surface of the site. These suggest that CA-LAN-2077 was a minor quarry/workshop, situated to exploit locally available chalcedony and metavolcanic cobbles. No temporally diagnostic artifacts were found.

- CA-LAN-2078 - Three test pits were excavated on this site. These revealed the presence of an organically enriched midden deposit that contains abundant lithics artifacts, faunal and shellfish remains, and a high density of shell beads. The site appears to be a small habitation. Temporal diagnostics (shell beads and an atlatl point fragment) suggest that it was occupied from the Intermediate into the Late Prehistoric Period, or roughly from before A.D. 500 to about A.D. 1500.

The site is largely intact with the midden deposit averaging roughly 45-50 cm in depth. This subsurface deposit is entirely contained within a low terrace adjacent to a stream, which covers an area about 150 feet E-W by 150 feet N-S.

Development within the defined midden deposit at CA-LAN-2078 has the potential to result in adverse impacts to cultural resources. Following CEQA Guidelines §15064.5, it is therefore recommended that adverse impacts be mitigated through site preservation and avoidance.

- CA-LAN-2079 - Three test pits were excavated on the site. None of these contained evidence of a subsurface deposit or subsurface artifacts. The site surface was found to contain a small quantity of surface lithics; primarily flakes and angular assay shatter resulting from the exploitation of locally occurring chalcedony and metavolcanic cobbles. No temporal diagnostics were found on the site.

- CA-LAN-2080 - One test pit was excavated at this small site. It revealed no evidence of subsurface remains of any kind. The few extant surface artifacts present at this locale were mapped and collected. These indicate that, like other sites within the study area, CA-LAN-2080 was a small quarry/workshop oriented towards the exploitation of locally available metavolcanic and chalcedony cobbles. No temporal diagnostics were found at this site.

- CA-LAN-2481 - Four test pits were excavated on this site. These failed to show any evidence for subsurface archaeological remains. A small surface collection of tools and lithic debitage was recovered from the site; thus, CA-LAN-2481 is a surface lithic scatter. The surface artifacts suggest that the site was used for plant processing activities. No temporal diagnostics were found at this location.

- CA-LAN-2482 - A total of six pits were excavated at this site; three on each loci. No subsurface remains were found in either location. Instead the site was found to consist entirely of a low-density surface lithic scatter, with the function of the site oriented towards the exploitation of locally available chalcedony and metavolcanic cobbles. No temporal diagnostics could be found on this site.

- CA-LAN-2483 - Three test pits were excavated on the site. None contained subsurface archaeological materials. A small collection of surface remains was found and collected from the site. These suggest that it functioned as a small quarry/workshop that was used for the exploitation of the locally available lithic materials. Again, no temporal diagnostics were found at this location.

**Native American Participation**

Native American participation in the Phase II test excavations at the project site was provided by the California Indian Council, with Mr. Richard Angulo serving as monitor and liaison. The California

Indian Council concurs with the archaeological recommendations outlined below. Thus, the proposed project design has accommodated the cultural resource protection requests of the Native American community.[3]

**Ladyface Mountain**

There is no evidence that Ladyface Mountain was (or is) sacred to Native Americans. According to Mr. Angulo, the name "Ladyface Mountain" is modern and of Euro-American invention. Any ascription of sacredness or importance as a "cultural icon" to Ladyface Mountain, likewise, is a modern invention.

Chumash ethnographic data collected by John Peabody Harrington and Alfred Kroeber almost one hundred years ago from the same region corroborates Mr. Angulo's statements. In none of their works did either anthropologist identify Ladyface Mountain as a scared place, nor did they even record a Chumash place-name for it, although other places in the vicinity were so identified, such as Triunfo Canyon.

The archaeological record also corroborates Mr. Angulo's statement. No locales known to be sacred, such as rock art sites, have been recorded on Ladyface Mountain, even through such sites are common in other portions of the Conejo Corridor, such as in the Conejo Mountain vicinity.

Also, there is no evidence that grading along its eastern base will be offensive to the local Native American community, especially given that this same Native American community has overseen the archaeological work within the proposed project area, and concurs with the cultural resource recommendations that have been made. Moreover, the local Native American community recognizes that the eastern footslope of Ladyface Mountain was graded many decades ago and, thus, that the area is far from pristine.

Lastly, Ladyface Mountain is not included on any county, state or federal listings of important cultural or historical resources, and it is not known to maintain any unusual sensitivity in terms of archaeological resources. It has no demonstrated connections to or associations with important historical events or personages. Therefore, it is improbable that Ladyface Mountain is eligible for such listing. No significant cultural resource-related impacts to Ladyface Mountain have been identified.

---

[3] *Mr. Angulo, as member of the California Indian Council and Native American monitor for the project, was raised in Agoura, and is of Chumash descent. He has been active in local Native American affairs for the last 20 years, during which time he has been a spokesperson for this community.*

## SIGNIFICANCE OF IMPACTS BEFORE MITIGATION

According to the threshold criteria discussed above, the project would have a significant impact on archaeological resources if it caused a substantial adverse change in the significance of a unique archaeological resource (as defined in Section 21083.2(g) of the California Public Resources Code); or if it disturbed any human remains, including those interred outside of formal cemeteries.

Seven of the eight sites investigated during the Phase II fieldwork proved to be surface lithic scatters. These sites are CA-LAN-421, -2077, -2079, -2080, -2481, -2482 and -2483. Per Section 21083.2(g) of the California Public Resources Code, none of these seven sites have been determined to be a unique archaeological resource.[4] Nevertheless, the fieldwork has resulted in the collection of scientifically consequential information from and about these cultural resources. Based on CEQA Guidelines §15064.5(c)(4), the Phase II test excavations and surface collections have served to completely and adequately mitigate all adverse impacts that might accrue to these sites as a result of development. Furthermore, no evidence has been uncovered that the project would disturb any human remains. Therefore, development impacts on cultural resources within the described area of these seven sites will be less than significant.

CA-LAN-2078 is a small midden deposit/habitation site that contains scientific information useful for the understanding of the prehistory of this portion of southern California. Development within the confines of this site, therefore, has the potential to result in adverse impacts to significant cultural resource. Mitigation is required.

## MITIGATION MEASURES

Development impacts on cultural resources within archaeological sites CA-LAN-421, -2077, -2079, -2080, -2481, -2482 and -2483 have been reduced to a less than significant level by the Phase II recovery of scientifically consequential information from and about these cultural resources. No additional archaeological work or mitigation procedures are required for these sites. However, the

---

[4] *According to Section 21083.2(g) of the California Public Resources Code, a "unique archaeological resource" means an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:*

*(1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.*
*(2) Has a special and particular quality such as being the oldest of its type or the best available example of its type.*
*(3) Is directly associated with a scientifically recognized important prehistoric or historic event or person.*

following measures are recommended so that in the event that subsurface remains are uncovered, they may be evaluated and treated.

**G-1** All excavation and grading shall be monitored by an archaeological monitoring team, consisting of one archaeologist and one Chumash archaeological consultant, if available.

**G-2** In the event that subsurface archaeological remains are uncovered, construction in the area of the find shall be temporarily halted until the deposit has been adequately evaluated. If recognizable features are encountered they shall be subjected to rapid but professional excavation. After the find has been evaluated, and appropriate mitigation measures implemented, construction may resume.

**G-3** If human remains are encountered, the Coroner shall be contacted immediately, and proper legal procedures shall be followed to determine the disposition of the remains.

Potential project impacts to CA-LAN-2078 would be avoided by the following project applicant proposed measure:

**G-4** CA-LAN-2078 shall be preserved in an open space lot. No development shall be permitted in the described area of CA-LAN-2078.

While Mitigation Measure G-4 would avoid project impacts to CA-LAN-2078, the following measures are also recommended to ensure that the development activities do not inadvertently intrude upon the site:

**G-5** An archaeologist shall be retained to stake the boundaries of CA-LAN-2078, and to monitor any grading that might occur adjacent to it.

**G-6** Should development plans change and preservation of CA-LAN-2078 is determined not to be feasible, a Phase III data recovery (salvage excavations) shall be conducted for this site.

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

The Phase II test excavations and surface collections have served to completely and adequately mitigate all adverse impacts that might accrue to CA-LAN-421, -2077, -2079, -2080, -2481, -2482 and -2483 as a result of development. Therefore, development impacts on cultural resources within the described area of these seven sites would be less than significant. The proposed mitigation measures for CA-LAN-2078 would reduce project impacts to a less than significant level.

## CUMULATIVE IMPACTS

Development of the proposed project in conjunction with the related projects listed in Section II. B would result in further development of residential, commercial, and institutional uses in the surrounding areas of unincorporated Agoura and the City of Agoura Hills. There is a potential that one or more of the related projects might encounter archaeological resources during the course of development. This potential is determined by such factors as whether exploitable archaeological resources (such as water, plant and animal food sources, shelter, and suitable lithic material for making tools) occur at any given related project site and the type of proposed development activities at that site. Of course, not all archaeological resources are of equal value. While some have the potential to be scientifically significant due to rarity or their ability to provide new information, CEQA requires no further consideration of a "nonunique archaeological resource" other than the simple recording of its existence by the lead agency, if it so elects. Therefore, the significance of cumulative impacts to archaeological resources is not determined simply by the frequency of the encounter but more to the point by the nature of that encounter. Furthermore, with archaeological resources, the mere fact of an encounter does not imply an adverse impact. With appropriate mitigation, such an encounter may lead to the recovery of scientifically highly important remains that would not even have been exposed without these activities. Thus, such encounters can easily be considered beneficial impacts of development. Because the discovery of archaeological resources is a fairly rare event and the discovery of scientifically important archaeological resources is an even more rare event, and because the discovery of rare archaeological resources may lead to their recovery rather than their destruction, it is unlikely that there would be a significant adverse cumulative impact to archaeological resources. Also, as discussed above, the mitigation measures recommended for the proposed project would be sufficient to reduce its potential incremental impact to a less than significant level.

# III. ENVIRONMENTAL IMPACT ANALYSIS
# H. NOISE

## ENVIRONMENTAL SETTING

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise is commonly defined as unwanted sound. Sound is characterized by various parameters that describe the rate of oscillation of sound waves, the distance between successive troughs or crests, the speed of propagation, and the pressure level or energy content of a given sound wave. In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level.

The unit of sound pressure ratioed to the level barely detectable by a young person with good auditory acuity is called a decibel (dB). Because sound or noise can vary in intensity by over one million times within the range of human hearing, a logarithmic loudness scale similar to the Richter Scale for earthquake magnitude is used to keep sound intensity numbers at a convenient and manageable level. Since the human ear is not equally sensitive to all sound frequencies within the entire spectrum, noise levels at maximum human sensitivity are factored more heavily into sound descriptions in a process called "A-weighting" written as dB. Any further reference to decibels written as "dB" should be understood to be A-weighted.

Time variations in noise exposure are typically expressed in terms of a steady-state energy level equal to the energy content of the time varying period (called Leq), or, alternately, as a statistical description of the sound level that is exceeded over some fraction of a given observation period. Finally, because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law requires that, for planning purposes, an artificial dB increment be added to quiet time noise levels in a 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL).

An interior CNEL of 45 dB is mandated by multiple family dwellings in Title 24 of the California Code of Regulations. In 1988, the State Building Standards Commission recommended that the 45 dB CNEL interior standard be expanded to include all habitable rooms for all residential occupancy, including single family. The County of Los Angeles requires a 45 dB CNEL interior standard for all residential occupancies. Since typical noise attenuation within residential structures with closed windows is about 20 dB, an exterior noise exposure of 65 dB CNEL is generally the noise/land use compatibility guideline for new residential dwellings in California. A 65 dB CNEL exterior level is also the noise threshold where noise begins to substantially interfere with enjoyment of any outdoor recreational amenity such as a yard, patio, spa/pool, etc. Mitigation of exterior noise to at least 65 dB

CNEL is normally required for residential projects in Los Angeles County for any usable outdoor space. A level of 65 dB CNEL exterior and 45 dB CNEL interior is therefore the applicable noise standard for the proposed project.

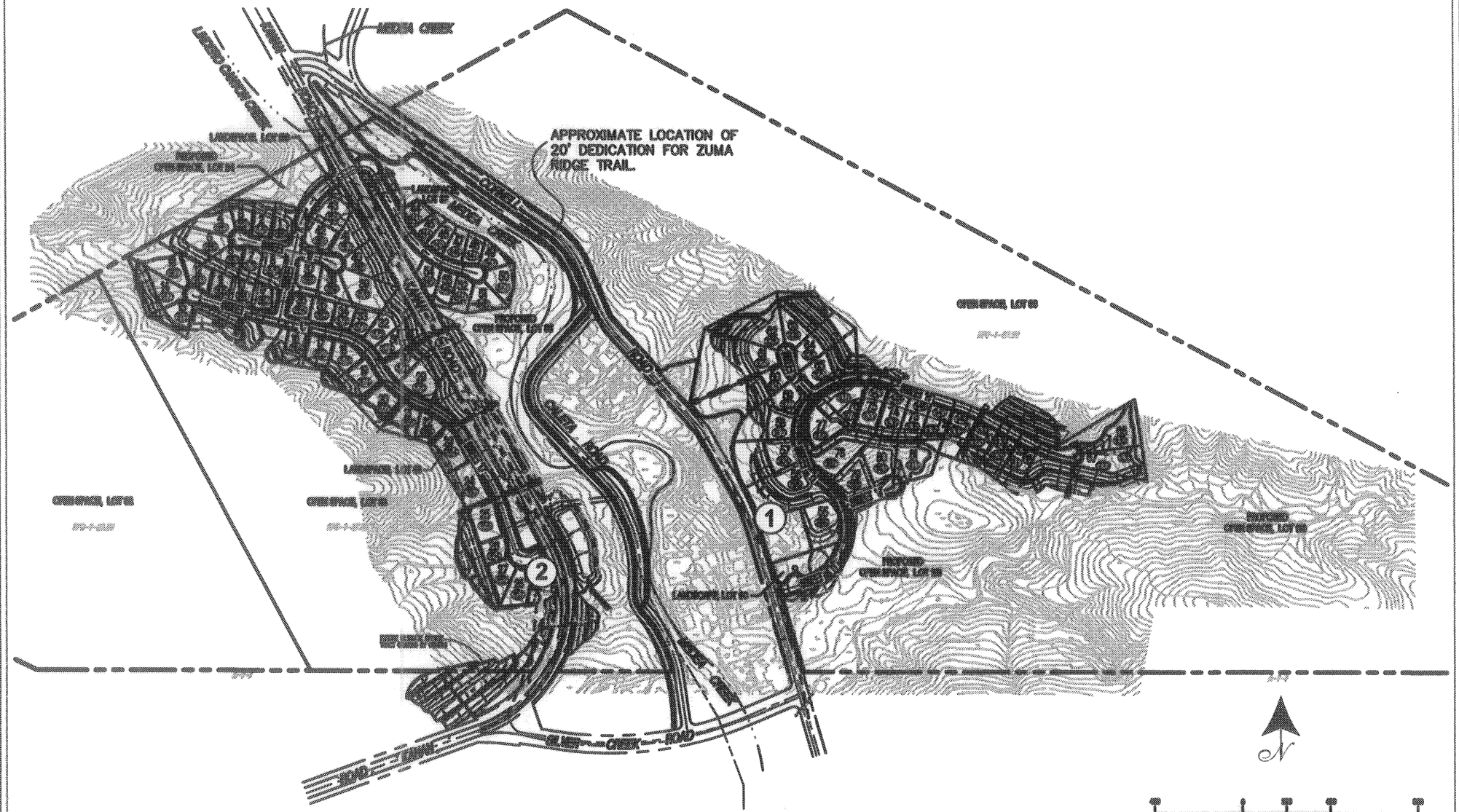
**Ambient Noise Environment**

Existing noise levels around the project site derive mainly from the major and secondary highways in the area. The project site itself is vacant and undeveloped, but because of the semi-developed nature of the surrounding areas and traffic generated on these major roadways, there is elevated baseline noise at the project site that is confined almost exclusively to Kanan and Cornell Roads.

Short-term (30 minutes) on-site noise measurements were made in order to define the existing project site baseline noise levels, as well as to help predict project site noise exposure. Monitoring was previously conducted on December 17, 1998. Current noise monitoring was conducted on September 17, 2003, and again on September 25, 2003, due to a malfunction in equipment at the second site. Larson-Davis Labs Model 700 Dosimeter digital sound meter, Serial No. 3203 was used to perform measurements on September 17, 2003, and Serial No. 3109 was used on September 25, 2003.

The sound level meter was placed at two different locations. The meter at Site 1 was placed 50 feet east of the Cornell centerline, near the existing Fire Station. The meter at Site 2 was placed 50 feet west of the Kanan Road centerline, north of the intersection of Silver Creek Road. See Figure H-1 for noise monitoring locations. The 2003 Leq readings are slightly higher than the 1998 readings. Results of the noise monitoring for all dates are shown in Table H-1.

Experience has shown that observed mid-afternoon, short-term Leqs are 2-3 dB lower than the calculated 24-hour CNEL for typical suburban traffic environments. This relationship would suggest that the current measured level of 62 dB on Cornell Road is equivalent to a CNEL of 64-65 dB at that location. Similarly, the 2003 measured level of 67 dB on Kanan Road translates to an approximate CNEL of 70 dB. Results show that the Cornell Road site has levels that meet the County standard by a small margin within 50 feet of the roadway centerline. The Kanan Road site is above the County standard at this distance and can be attributed to heavier roadway traffic with higher travel speeds.




Source: Wagner Halladay, Inc., August 2003; Hans Giroux & Associates, October 2003.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.H-1
Noise Monitoring Locations

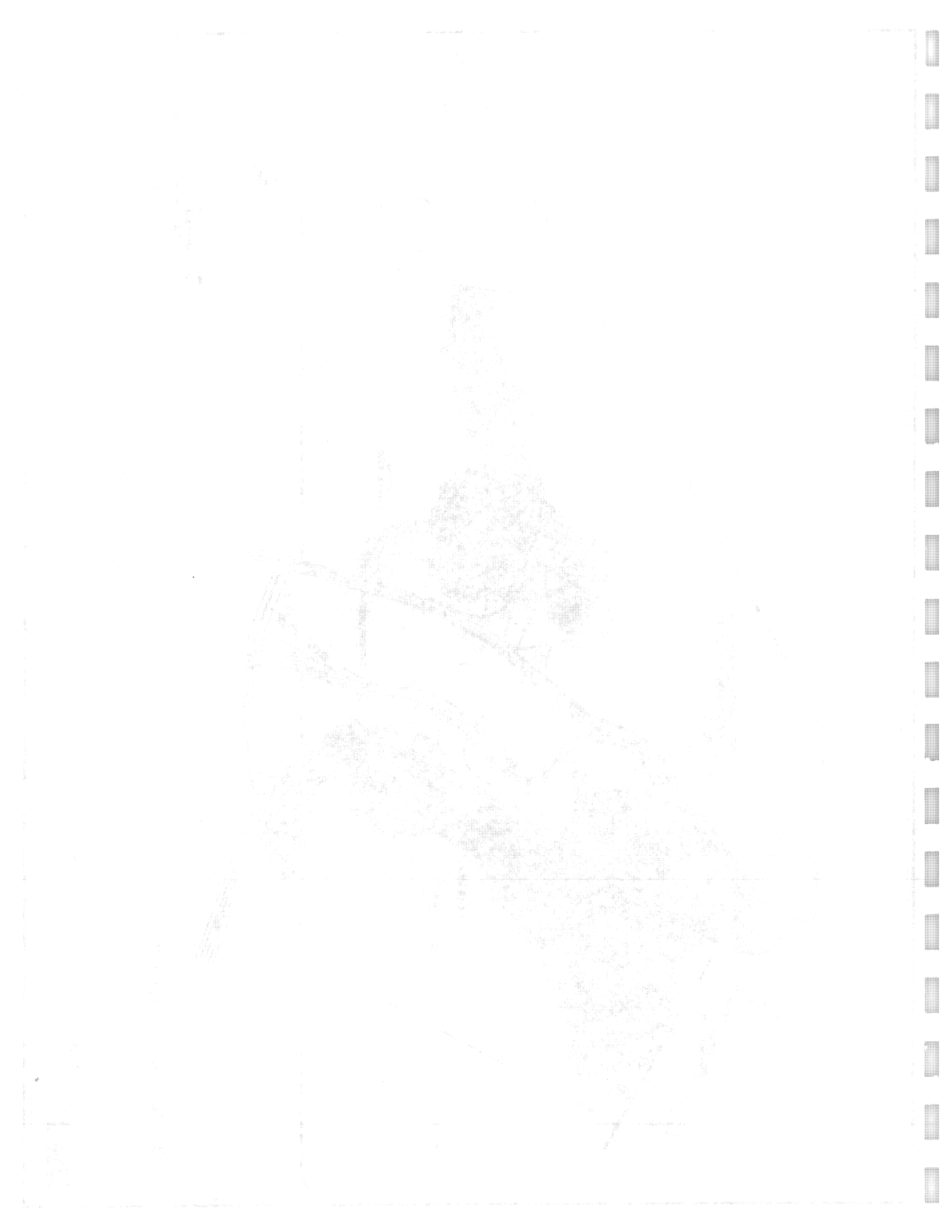


**Table H-1**

**Short-Term Baseline Noise Monitoring Results (dB)**

| December 17, 1998 | Leq | *Lmax* | Lmin | $L_{10}$ | $L_{33}$ | $L_{50}$ | $L_{90}$ |
|---|---|---|---|---|---|---|---|
| **Site 1** | | | | | | | |
| Cornell Road, near Fire Station | 61.5 | 74.5 | 41.0 | 67.0 | 56.5 | 50.0 | 43.5 |
| **Site 2** | | | | | | | |
| Kanan Road, north of Silver Creek Rd. | 66.1 | 75.5 | 45.5 | 70.0 | 66.0 | 63.0 | 51.0 |

| September 17, 2003 | Leq | *Lmax* | Lmin | $L_{10}$ | $L_{33}$ | $L_{50}$ | $L_{90}$ |
|---|---|---|---|---|---|---|---|
| **Site 1** | | | | | | | |
| Cornell Road, near Fire Station | 61.9 | 78.5 | 43.0 | 66.5 | 57.0 | 51.0 | 45.0 |
| **Site 2** | | | | | | | |
| Kanan Road, north of Silver Creek Rd. | * | * | * | * | * | * | * |

| September 25, 2003 | Leq | *Lmax* | Lmin | $L_{10}$ | $L_{33}$ | $L_{50}$ | $L_{90}$ |
|---|---|---|---|---|---|---|---|
| **Site 1** | | | | | | | |
| Cornell Road, near Fire Station | 62.2 | 86.5 | 40.0 | 64.5 | 53.0 | 48.5 | 43.0 |
| **Site 2** | | | | | | | |
| Kanan Road, north of Silver Creek Rd. | 66.8 | 83.0 | 44.0 | 70.0 | 64.5 | 60.0 | 49.5 |

*Meter malfunction.

A comparison was made between the sound level measurements made on September 25, 2003, and the levels that would be predicted by the federal highway traffic noise prediction model (FHWA Model) for

the observed traffic mix and 45 mph travel speed on Kanan Road at the monitoring site. A similar comparison was made for the Cornell Road site. The measurement versus model calibration is presented in Table H-2.

**Table H-2**
**Noise Measurements Versus Model Calibration**

| Location | Hourly Traffic | | | Predicted Noise (dB) | Sept. 25, 2003 Measured Noise (dB) |
|---|---|---|---|---|---|
| | Auto | Medium Truck | Heavy Truck | | |
| Kanan Road | 690 | 18 | 16 | 68 | 67 |
| Cornell Road | 146 | 14 | 0 | 62 | 62 |

The calibration was within ±1 dB at both locations. Use of the FHWA Model with a 45 mph assumed travel speed near the measurement location appears to be an appropriate analysis tool for this project requiring no model adjustment.

The 45 mph travel speed reflects site-specific conditions near the measurement sites as traffic slows near the Silver Creek curve on Kanan Road and a small hill on Cornell Road. The observed travel speeds along the straight segment of Kanan Road between Cornell and Silver Creek Roads is 50 to 55 mph (depending upon volumes). Cornell Road north of the fire station experiences speeds of 40 to 50 mph. For purposes of analysis, the traffic noise impact calculations near project residences was evaluated for an assumed average travel speed of 55 mph on Kanan Road and 45 mph on Cornell Road.

## ENVIRONMENTAL IMPACT

### Thresholds of Significance

CEQA Guidelines identify significant impacts as those that cause standards to be exceeded where they are currently met. An impact is also considered significant if it substantially worsens an existing unacceptable noise environment. The tests for potential noise impact significance include the following criteria:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?
- For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

There are no airports or airstrips within the project vicinity. Potential impacts would derive from any violation of applicable standards for noise or vibration, or for any substantial increases above background conditions.

"Substantial" is not defined in any guidelines. The accuracy of sound level meters and of sound propagation computer models is no better than ± 1 dB. This is also the human loudness difference discrimination level under ideal laboratory conditions. As previously noted, most people cannot distinguish a change in the noise environment that differs by less than 3 dB between the pre- and post-project exposure if the change occurs under ambient conditions. For the purposes of this analysis, an increase of 3 dB that creates or worsens an area of noise/land use incompatibility would be considered a significant degradation of noise quality.

Temporary noise sources such as from construction are generally allowed a greater deviation from the background in defining "substantial." Most jurisdictions limit the hours of noise generation to hours of least sensitivity. If a numerical standard is applied, it is typically a property line noise performance standard. Los Angeles County has adopted both time limits and performance standards in establishing impact significance. A violation of either criterion would be considered significant.

For construction activities, the Los Angeles County Noise Ordinance (Section 12.08.440 of the County Code) limits the hours of allowable construction activities and establishes noise performance standards at the nearest residential structures. Section 12.08.440(A) limits the allowable hours of construction activities to 7:00 a.m. to 7:00 p.m. on Monday through Saturday except in an emergency. The noise performance standards in Section 12.08.440(B) of the Code restrict noise at affected structures.

County Code, Section 12.08.440(B) states as follows:

Noise Restrictions at Affected Structures. The contractor shall conduct construction activities in such a manner that the maximum noise levels at the affected buildings will not exceed those listed in the following schedule:

1. At Residential Structures.
   a. Mobile Equipment. Maximum noise levels for non-scheduled, intermittent, short-term operation (less than 10 days) of mobile equipment:

| | **Single-Family Residential** | **Multi-Family Residential** | **Semi-Residential/ Commercial** |
|---|---|---|---|
| Daily, except Sundays and legal holidays, 7:00 a.m. – 8:00 p.m. | 75 dB(A) | 80 dB(A) | 85 dB(A) |
| Daily, 8:00 p.m. – 7:00 a.m. and all day Sunday and legal holidays | 60 dB(A) | 65 dB(A) | 70 dB(A) |

Noise levels exceeding 75 dB(A) would be significant at the nearest homes to the project site. Stationary emissions sources have more stringent noise performance standards. As per County definition, equipment to be used to develop building pads, construct slopes, excavate utilities, pour foundations, etc. are all considered "mobile equipment."

**Project Impact**

Noise impacts from residential development typically derive from project-related traffic. Traffic noise from an individual project will be superimposed upon the no-project baseline. Unless there are few cars under baseline conditions, the project noise increment is typically masked by the background. Traffic noise impacts at levels causing noise compatibility standards to be exceeded are almost always cumulative from all overall development and not from any single project.

While individual project-related traffic noise impacts are normally less-than-significant, the impact of the ambient acoustic environment on a particular project may actually be of greater concern. The impact of the environment as a constraint on project development, rather than the project on the environment, may be the principal noise impact analysis issue for the proposed project site.

Temporary construction noise would occur during site preparation and building assembly. Such sources are short-term and, thus, would not affect the long-term noise exposure in the project vicinity.

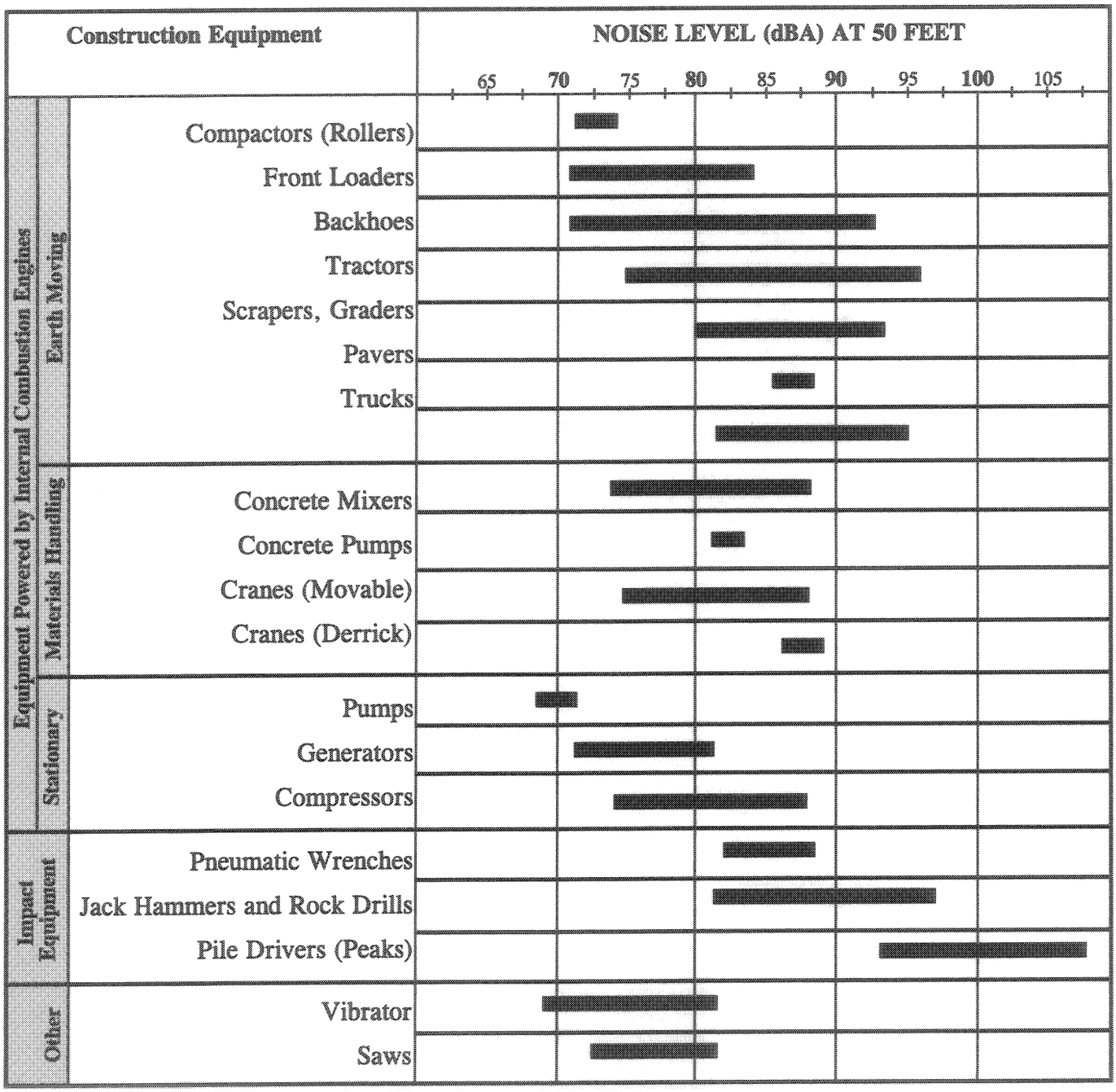
**Construction Noise Impacts**

Temporary construction noise impacts vary markedly because the noise strength of construction equipment ranges widely as a function of the equipment used and short-term variations are strongly influenced by topographical factors that may somewhat change during the course of the project. Construction noise tends to occur in discrete phases dominated initially by earth-moving sources and later for finish construction. The heavy equipment noise typically ranges up to about 90 dB at 50 feet from the source. Figure H-2 summarizes the noise generation for typical construction activities. The higher levels on the noise spectrum from each type of source tends to be the short-term maximum. The lower part of the range reflects the longer-term average.

Point sources of noise emissions are atmospherically attenuated by a factor of 6 dB per doubling of distance. The loudest construction would require more than 1,000 feet of distance between the source and a nearby receiver to reduce the 90 dB source strength to a generally acceptable 65 dB exterior exposure level. Construction noise would be audible at existing residences near the proposed project site, both at residences along Cornell Road and southeast of Caleta Road. For purposes of analysis, and as a worst-case scenario, only the nearest residences were analyzed for construction noise impacts. Any mitigation required to reduce noise impacts at the nearest residential units and implemented at other residences would offer a greater benefit of noise reduction for the residences at greater distances.

The residence closest to the project site grading and construction activities is the home located on the east side of Cornell Road, adjacent to the construction area, specifically adjacent to proposed lots 59 and 60. The existing residence backs up to proposed lots 59 and 60, but is separated from the properties by an easement. Its backyard is approximately 50 feet from the grading area of the contour fill slopes associated with lots 59 and 60. The building pad of each lot is situated above the fill slopes, so the existing residence is situated below the properties of lots 59 and 60. The maximum noise impact would derive from construction of fill slopes east of the closest residence.

The noise performance/significance standard is based upon a peak noise level (Lmax). Several pieces of equipment may operate on a building pad or slope. However, only one piece at a time will typically be operating at full throttle at any location closest to any off-site homes, and only one piece can occupy a given small area at any point in time. One very loud piece of construction equipment operating at full throttle closes to any outdoor residential usable space was used as a prototype noise impact source.




Source: EPA PB 206717, Environmental Protection Agency, Dec. 31, 1971,"Noise from Construction Equipment & Operations".

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.H-2
Typical Construction Equipment
Noise Generation Levels

A bulldozer with a 90 dB noise maximum was presumed to be the peak noise generator during grading and slope construction. The peak noise impact levels for grading activity associated with the contour fill slopes and building pads are presented in Table H-3.

**Table H-3**
**Peak Construction Equipment Noise Levels**

| Peak Equipment Noise Level @ 50 ft. (dB) | Distance to Residence (feet) | Peak Noise Level at Residence (dB) | Mitigation Required (dB) |
|---|---|---|---|
| Bulldozer-90 | Backyard to Contour Slopes 50 | 90* | -15 |
| Bulldozer-90 | Backyard to Building Pad 150 | 81* | -6 |

*Exceeds L.A. County Noise Performance Standards.

As indicated above, the peak noise levels associated with grading both contour fill slopes and building pads at lots 59 and 60 would exceed the County standards at the nearest residence. The setback needed to not exceed the 75 dB performance standard at the nearest residence from heavy equipment operations under direct line-of-sight conditions is 300 feet. Grading would be required within 300 feet of some off-site residences, and the 75 dB noise ordinance standard would be exceeded. While "excess" construction noise of 6 dB for grading of building pads closest to existing home is mitigable with erection of a temporary barrier berm at the edge of the pad, the noise impacts from grading the contour/manufactured slopes as close as 50 feet of any residence under line-of-sight conditions cannot be mitigated due to the nature of the terrain. This is considered a temporary, but significant, noise impact.

One unique noise issue is that blasting may be required if hard-rock formations are encountered that do not yield to normal pressure applied by dozers or graders. Construction blasting is achieved by a series of sequenced charges that are detonated sequentially such that each new small blast enhances the traveling shock wave used to crack the rocks. The purpose of blasting is to fracture rocks, and not to expel them. Such blasting does not create ejected material as might be seen in a Hollywood movie. The associated noise during a controlled blast is a loud thump similar to a large wave crashing on the shore. The rock drills used to place the charges are often considered noisier than the blast itself.

Controlled blasting will not create noise or vibration impacts that would significantly affect adjacent residents.

Drilling for placement of ANFO (ammonium nitrate fertilizer and fuel oil) explosive entails placement of the rig, stabilizing the unit, drilling and blowing the cuttings out of the hole. The measured noise level during a hard-rock drilling sequence produced an average noise level of 89 dB at 50 feet from the unit. The maximum was not reported, but would presumably be in the low- to mid-90 dB range. A drill rig reference noise level was assumed to be 95 dB (Lmax).

Under direct line-of-sight conditions, geometrical spreading losses would reduce the 95 dB maximum to a 75 dB maximum (County standard) at 500 feet from the source to the receiver. If there is intervening terrain or any temporary barrier, the potential noise impact "envelope" would be much reduced. The placement of a possible drilling rig for possible blasting is not known at this time. Placement of the rig within 500 feet with a direct line-of-sight to any outdoor residential usable space would be a potentially significant impact. Erection of a 10-foot high temporary earthen berm, or construction of a framework of suspended acoustical mats with a minimum sound transmission class (STC) of 25 at least 12 feet high shall be required for drilling within 500 feet with a direct line-of-sight of any backyard outdoor patio, pool, or similar use.

If any fractured rock from blasting is further crushed onsite to be used as base material for fill slopes, the crusher has a similar noise profile (90 dB) as a bulldozer. Rock crushing within 300 feet of any occupied home could cause the 75 dB standard to be exceeded. If the crusher operates for more than ten (10) days at a given location, it becomes a "stationary source" under the County noise ordinance. Stationary sources have a more stringent standard than temporary (mobile) sources. If a mobile rock crusher is used on the project, it may not operate within 300 feet of any residence without full screening, and it may not operate for more than the (10) days at any given location before relocation to another crushing site.

**Local Roadway Noise Modification**

The proposed development would generate 834 vehicle trips per day (Kimley-Horn & Associates, July 2003). Traffic noise changes on area-wide roadways were calculated using the FHWA Highway Traffic Noise Model (FHWA-RD-77-108) initialized with traffic input parameters (i.e., traffic volumes) supplied by Kimley-Horn & Associates. The impact analysis was conducted along the primary project access routes (Kanan & Cornell Roads). The 24-hour CNEL for four scenarios (2003 existing, 2006 with ambient growth, 2006 with growth and project, and 2006 cumulative) in dBA CNEL at 50 feet from the roadway centerline is shown in Table H-4. The corresponding distance from the roadway centerline to the residential exposure standard (65 dB CNEL) is shown in Tables H-5

and H-6.

**Table H-4**
**Traffic Noise Impact Analysis**
**(CNEL in dB @ 50 Feet from Roadway Centerline)**

| Segment | 2003 Existing dB | 2006 Ambient dB | 2006 with Project dB | 2006 Cumulative dB |
|---|---|---|---|---|
| **Kanan Road** | | | | |
| Agoura Road - Cornell Road | 72.2 | 72.3 | 72.5 | 72.9 |
| South of Cornell Road | 71.6 | 71.7 | 71.8 | 72.3 |
| **Cornell Road** | | | | |
| East of Kanan Road | 62.7 | 62.8 | 63.0 | 63.2 |

Note: Under line-of-sight conditions, no intervening structures or terrain.

The proposed project would create a maximum traffic noise impact of 0.2 dB above the no project (ambient growth) contribution along both Cornell Road and Kanan Roads. Noise level changes of less than 3 dB are barely detectable by the human ear. The proposed project is too small to have a significant traffic noise impact given the baseline levels of traffic and associated noise already present in the area.

**Table H-5**
**Traffic Noise Impact Analysis**
**(Distance to the 65 dB CNEL [feet] from Roadway Centerline)**
**Acoustically "soft" conditions, (downstairs yards)**

| Segment | 2003 Existing (feet) | 2006 Ambient (feet) | 2006 with Project (feet) | 2006 Cumulative (feet) |
|---|---|---|---|---|
| **Kanan Road** | | | | |
| Agoura Road – Cornell Road | 150 | 155 | 160 | 170 |
| South of Cornell Road | 140 | 140 | 140 | 155 |
| **Cornell Road** | | | | |
| East of Kanan Road | <50 | <50 | <50 | <50 |

Note: Under line-of-sight conditions, no intervening structures or terrain.

**Table H-6**
**Traffic Noise Impact Analysis**
**(Distance to the 65 dB CNEL [feet] from Roadway Centerline)**
**Acoustically "hard" conditions, (upstairs bedroom windows)**

| Segment | 2003 Existing (feet) | 2006 Ambient (feet) | 2006 with Project (feet) | 2006 Cumulative (feet) |
|---|---|---|---|---|
| **Kanan Road** | | | | |
| Agoura Road – Cornell Road | 265 | 270 | 280 | 310 |
| South of Cornell Road | 230 | 235 | 240 | 270 |
| **Cornell Road** | | | | |
| East of Kanan Road | <50 | <50 | <50 | <50 |

Note: Under line-of-sight conditions, no intervening structures or terrain.

**Exterior Noise Standard Compliance (Kanan Road)**

As shown in Table H-5, downstairs usable outdoor space at any proposed home with a rear or side yard within the 170 feet contour line of Kanan Road would experience traffic noise impacts under line-of-sight conditions. An impact analysis was conducted for any yard or patio area within the 170-foot noise impact zone for a receiver at 10 feet inside the rear lot line for each property. A total of 11 lots along Kanan Road would require mitigation in order to comply with the County exterior noise standard of 65 dB CNEL. These lots are Lots 29-32; Lots 39-41; Lot 43; Lots 52-54.

The source receiver distance was measured for each potentially affected lot, the maximum noise loading was calculated, and the barrier height was determined under direct line-of-sight conditions needed to mitigate the level to 65 dB CNEL or less. The results of the exterior mitigation analysis are shown in Table H-7. Barrier heights of five (5) feet (masonry block, 3/8-inch glass or 5/8-inch plexiglass) would achieve 65 dB CNEL or less at all affected yards (except Lots 43 and 54 which need a six (6) foot barrier).

The mitigation analysis does not incorporate any small enhancement of sound reduction effectiveness due to grade separation between affected lots and Kanan Road. The elevation difference may reduce the required wall height by 1 foot or less, or the 5-foot high wall may create a 1-2 dB extra margin of safety relative to the standard. The small noise effect of incorporating site-specific grade separation was therefore ignored and the more conservative barrier recommendation shown in Table H-7 was retained.

**Table H-7**
**Usable Exterior Space Noise Impact Analysis**
**(Rear yards within 170 feet of Kanan Road C.L.)**

| Lot No. | Dist. to C.L.[a] (feet) | Noise Level (dB CNEL)[b] | Mitigation Needed (dB) | Max. Barrier Height (feet) |
|---|---|---|---|---|
| 29 | 130 | 69 | 4 | 5 |
| 30 | 135 | 69 | 4 | 5 |
| 31 | 140 | 68 | 3 | 5 |
| 32 | 150 | 68 | 3 | 5 |
| 39 | 130 | 69 | 4 | 5 |
| 40 | 130 | 69 | 4 | 5 |
| 41 | 130 | 69 | 4 | 5 |

| | | | | |
|---|---|---|---|---|
| 43 | 80 | 71 | 6 | 6 |
| 52 | 170 | 68 | 3 | 5 |
| 53 | 90 | 70 | 5 | 5 |
| 54 | 70 | 71 | 6 | 6 |

[a] From patio at 10 feet inside property line.
[b] At top of any barrier.

### Interior Noise Compliance

Building facades along Kanan Road with a complete line-of-sight as far as 310 feet from the roadway centerline may have noise levels exceeding 65 dB CNEL. When exterior levels exceed 65 dB CNEL, enhanced noise attenuation features are necessary to achieve a mandatory 45 dB CNEL maximum beyond simply closing single-paned windows. The hierarchy of structural noise mitigation possibility is presented in Table H-8.

**Table H-8**
**Structural Noise Mitigation**

| Exterior to Interior Reduction Desired (dB) | Measure(s) Needed |
|---|---|
| 0-10 | None |
| 10-20 | Close single-paned windows facing roadway. Provide supplemental ventilation. |
| 20-25 | Close standard dual-paned windows. Provide supplemental ventilation. |
| 25-30 | Close upgraded dual-paned windows. Provide supplemental ventilation. Baffle vents and line ducts with absorbers. |
| >30 | Custom upgrades (dual layer drywall, triple-paned windows, steel doors, etc.) |

The homes that may require slightly upgraded acoustical treatments having windows within 310 feet of Kanan Road under direct line-of-sight conditions (see Table H-6), and the needed level of structural mitigation, are shown in Table H-9. The structural noise mitigation requirement for this tract ranges from 21-26 dB for affected homes in this tract. As seen in Table H-8, the use of "standard" dual-paned windows, in conjunction with central air conditioning to allow for window closure, would allow the interior noise standard to be met.

Final verification of the ability to meet interior standards must be provided at the building plan stage. For carpeted bedrooms, the exterior to interior noise reduction with closed windows is almost equal to the sound rating (sound transmission class, or "STC") of the windows facing the roadways. Selection of dual-paned windows with a minimum STC of 26 is therefore recommended for all lots shown in Table H-9 in order to meet the 45 dB CNEL interior standard.

**Table H-9**
**Interior Noise Compliance Mitigation Analysis**
**(Upstairs bedroom windows facing Kanan Road)**

| Lot No. | Distance (C.L. to façade) (feet) | Noise Loading (dB CNEL) | Mitigation Needed (dB) |
|---|---|---|---|
| 21 | 275 | 66 | 21 |
| 22 | 220 | 67 | 22 |
| 23 | 180 | 67 | 22 |
| 24 | 175 | 67 | 22 |
| 25 | 180 | 67 | 22 |
| 26 | 220 | 67 | 22 |
| 27 | 220 | 67 | 22 |
| 28 | 170 | 68 | 23 |
| 29 | 140 | 68 | 23 |
| 30 | 145 | 68 | 23 |
| 31 | 150 | 68 | 23 |
| 32 | 160 | 68 | 23 |
| 39 | 130 | 69 | 24 |
| 40 | 130 | 69 | 24 |
| 41 | 130 | 69 | 24 |
| 43 | 90 | 70 | 25 |
| 44 | 160 | 68 | 23 |
| 45 | 170 | 68 | 23 |

| | | | |
|---|---|---|---|
| 46 | 180 | 67 | 22 |
| 51 | 230 | 66 | 21 |
| 52 | 180 | 67 | 22 |
| 53 | 100 | 70 | 25 |
| 54 | 80 | 71 | 26 |

## LEVEL OF SIGNIFICANCE BEFORE MITIGATION

Grading within 300 feet within full view of any occupied residence would cause the short-term noise standard of 75 dB to be exceeded. This is a significant impact and mitigation is required. .

Drilling for the placement of explosives for rock fracture blasting within 500 feet of any residence backyard, patio, etc., under a clear line-of-sight, would create a significant temporary noise impact. Mitigation is required.

Placement of a rock crusher within 300 feet with a direct view of any outdoor residential space would cause a significant temporary noise impact. Operation of the crusher for more than 10 days at any single location within 1,500 feet of a residence could exceed the more stringent "stationary source" criterion in the noise ordinance.

No significant off-site noise impacts deriving from traffic pattern changes were identified requiring impact mitigation.

Exterior noise levels at usable spaces such as patios could exceed 65 dB CNEL for any residence immediately adjacent to Kanan Road. This is a significant impact and mitigation is required.

Upstairs facades of any proposed residence within 310 feet of the centerline could have noise levels that do not allow interior standards to be met with closed single-paned windows. This is a significant impact and mitigation is required.

## MITIGATION MEASURES

### Construction Impacts

**H-1** Grading and construction contractors shall comply with the Los Angeles County Noise Ordinance Section 12.08.440, which limits allowable hours of construction activities and prohibits the creation of any excessively loud, unnecessary or unusual equipment noise.

**H-2** Where grading for elevated building pads would be conducted within 300 feet of an existing

residence, temporary noise barriers shall be erected.

**H-3** Drilling for the placement of explosives for rock fracture blasting within 500 feet of any residence backyard, patio, etc., under a clear line-of-sight, shall require construction of a temporary 10-foot high earthen berm or a 12-foot high framework with suspended sound blankets (rated at STC=25 or higher) that interrupts such a line-of-sight.

**H-4** If on-site crushing is conducted, a noise-control plan shall be submitted and approved by the Los Angeles County Department of Health Services staff outlining crusher placement, noise protection and any periodic equipment relocation to stay within the less stringent "mobile source" noise limits.

**H-5** For proposed residences located along Kanan Road where exterior noise levels exceed 65 dB CNEL, sound barriers shall be provided as follows:

- A 5-foot high rear and side yard noise wall shall be provided for any patio space at Lots 29-32, 39-41, and 52-53.

- A 6-foot high barrier for rear and side yards shall be provided at Lots 43 and 54.

Sound barriers shall be concrete masonry block, transparent plastic or glass, or some combination thereof with a combined area density of 3.5 pounds per square foot.

**H-6** The following interior noise mitigation measures shall be provided for all residence facades within 310 feet of the Kanan Road centerline under line-of-sight conditions:

- Upstairs facades shall have dual-paned windows in all livable space with a minimum sound rating of STC=26 or higher.

- All homes shall be provided with central air conditioning systems.

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

Short-term construction-related noise impacts would remain significant after implementation of the recommended mitigation measures. Offsite noise impacts deriving from traffic pattern changes would be less than significant. Onsite noise impacts from vehicle noise on Kanan Road would be reduced to less than significant levels by the implementation of the recommended mitigation measures.

## CUMULATIVE IMPACTS

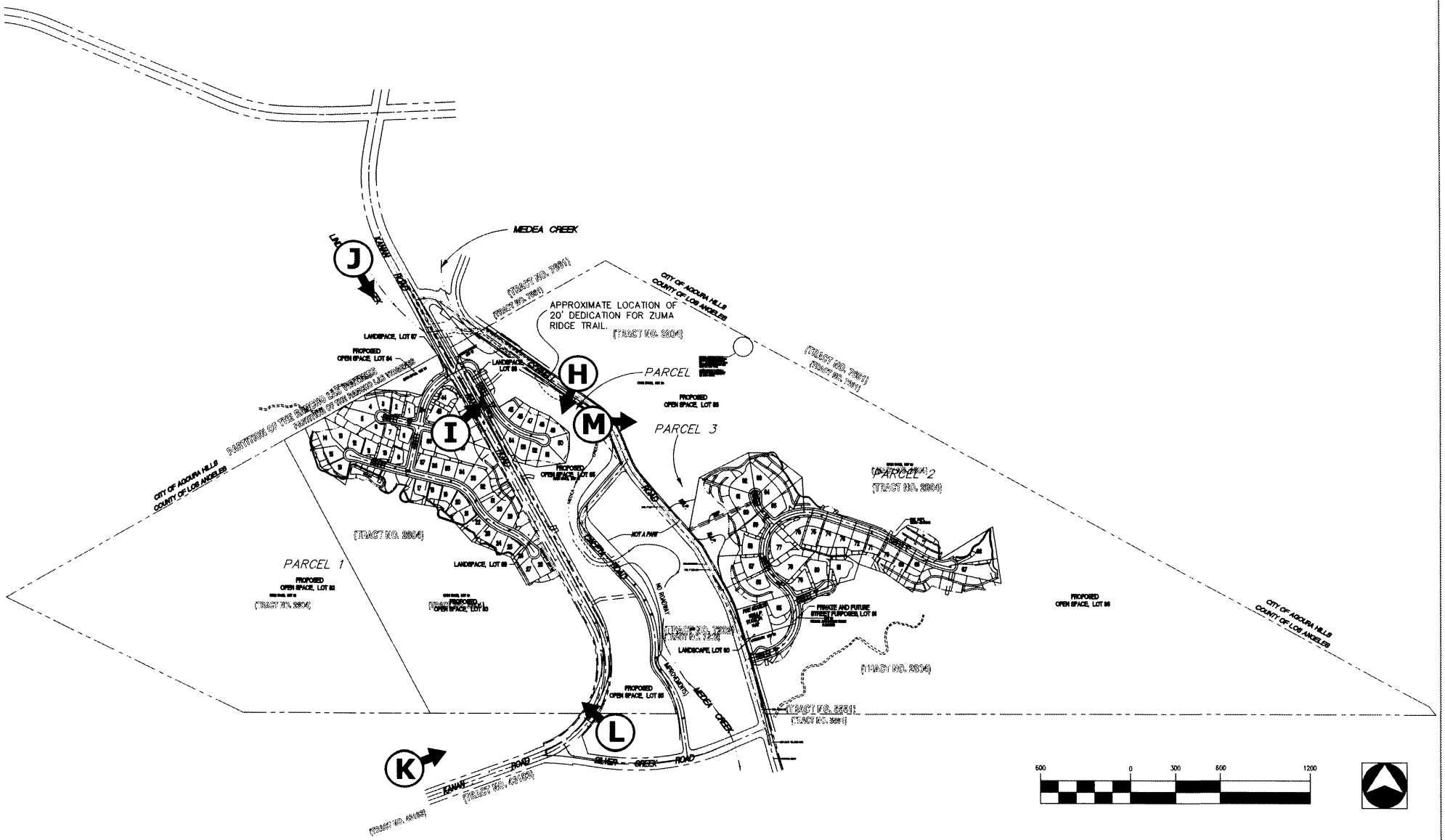
The combined effects of the proposed project, continuing development, and the related projects are incorporated into the noise analysis presented above (see Table H-4). The maximum cumulative noise level increase (ambient growth plus the proposed project plus related projects) is 0.7 dB above existing conditions. This increase would occur along Kanan Road, between Agoura and Cornell Roads. Since a 3-dB increase is the threshold for a noticeable change in the noise environment, the cumulative impact is considered adverse, but less than significant. The project contribution to this cumulative increase is 0.2 dB, which is not detectable, and therefore not cumulatively considerable. Traffic noise impacts from the proposed project would thus be both individually, as well as cumulatively, less than significant.

# III. ENVIRONMENTAL IMPACT ANALYSIS
# I. VISUAL QUALITIES

## ENVIRONMENTAL SETTING

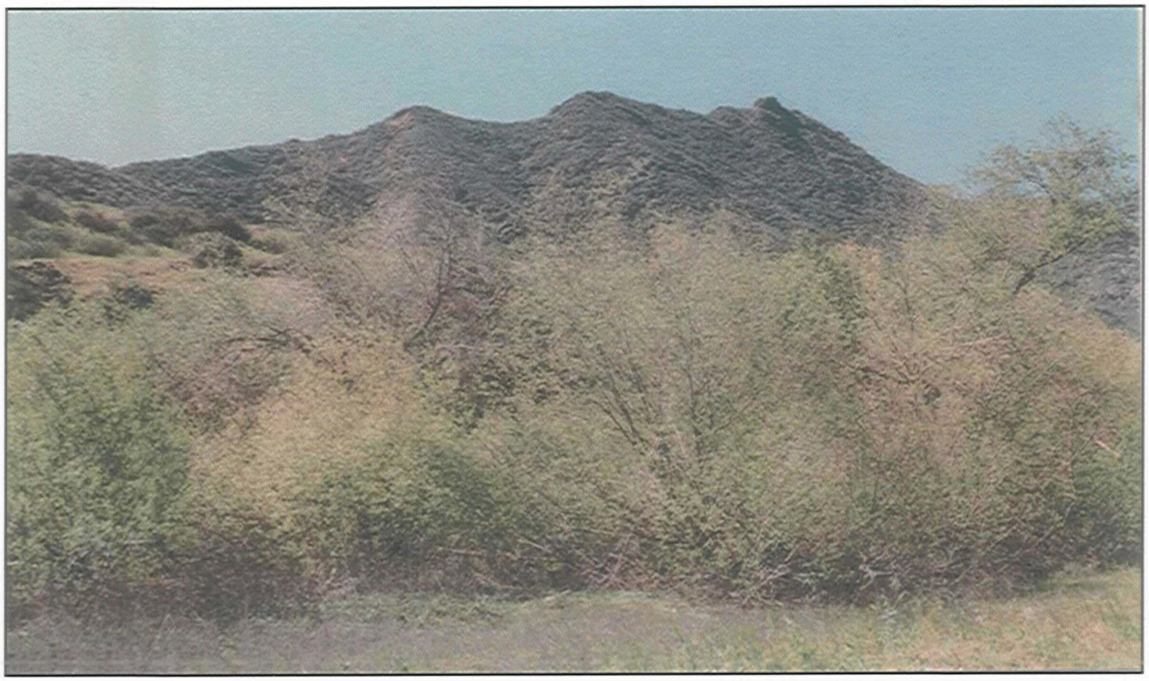
The setting for the project site is the Santa Monica Mountains, renown for their highly scenic features and their dramatic impact on resident and visitor alike. The project site contains many of these scenic features, such as prominent ridges, steep slopes, bold rock outcroppings, and dense vegetation. The most dramatic feature of the project site is Ladyface Mountain, which forms the western portion of the project site and, off-site, soars to a height more than 1,200 feet above Medea Creek. The slopes of Ladyface are steep and rugged, alternately covered by dense chaparral and exposed to the bedrock (see Figure II-5, Photograph G, Section II). During wet years, runoff from the heights of Ladyface Mountain flows through deep drainages on its flanks. Medea Creek, which flows through the relatively flat valley bottom, supports riparian woodland that attracts both hikers and a wide variety of wildlife (see Figure III.I-1, Photograph Location Map, and Figure III.I-2, Photograph H). Unlike Ladyface Mountain, the hillside slopes on the eastern portion of the site appear rounder and gentler. These hillsides are largely covered with grasslands, which bloom with wildflowers in the spring. Bands of barren rock interspersed with the grasslands lend contrasting colors to the hillsides, adding to their aesthetic appeal (see Photograph I).

Although the project area has high scenic values, it is not set within a pristine location. Rather, it is the undeveloped land that currently separates the substantial residential community located to the south from the rapidly urbanizing City of Agoura Hills to the north. For an aerial photograph showing the relationship of the project site to existing nearby development, see Figure I-3, Surrounding Vicinity Aerial Photograph. As shown in Figure I-3, residential development is located adjacent to and southerly of the project site on both the north and south sides of Silver Creek Road. South of Silver Creek Road there is substantial residential development along Cornell Road and within the communities of Cornell Road Ranchos and Wagon Road Ranchos. The community of Medea Valley Estates is south of the project site off of Kanan Road. Additionally, the project site surrounds existing single-family residences located along the east and west sides of Cornell Road, south of Caleta Road, and along Caleta Road itself. The project site also wraps around L.A. County Fire Station No. 65 (see Photographs II-B through II-F, Section II).



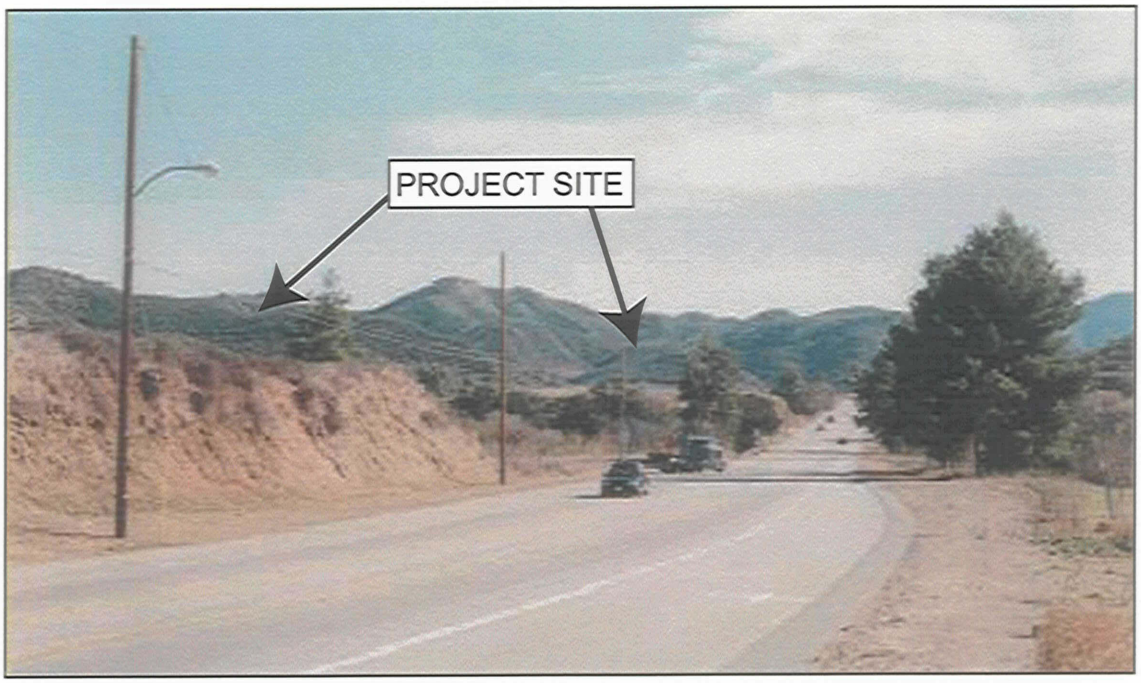

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.I-1
Photograph Location Map - Locations H to M



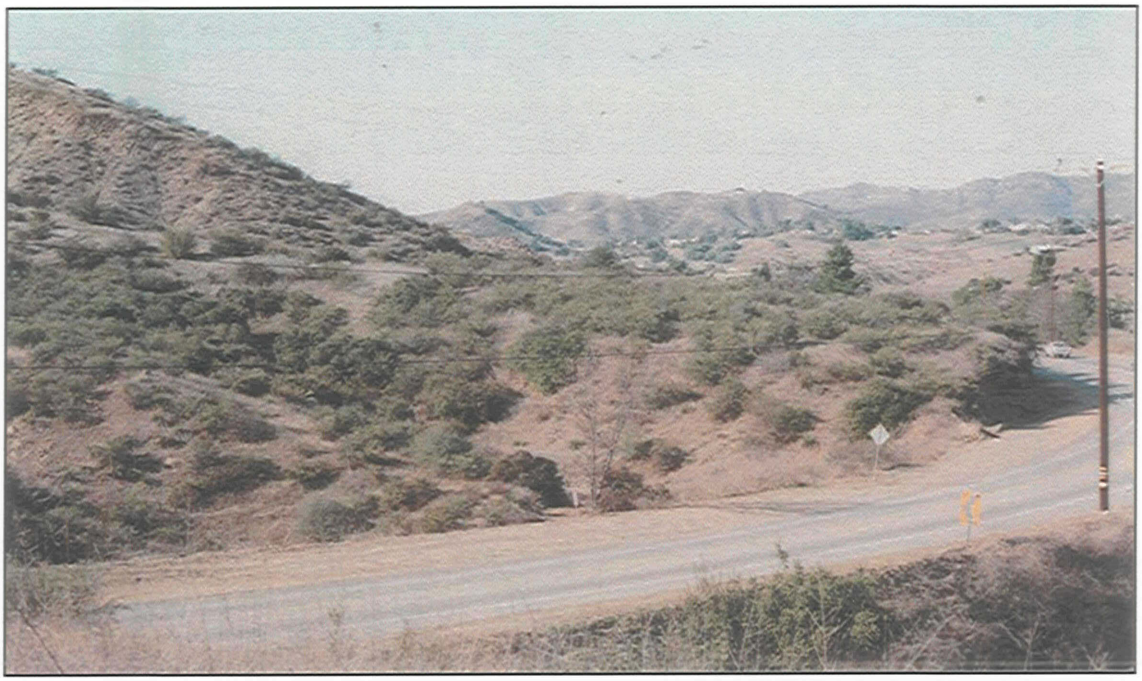
Photograph H: View of riparian vegetation along Medea Creek with Ladyface Mountain in the background.

Photograph I: View of the prominent ridgeline that forms the east boundary of the project site. This area will be retained as open space in its current condition.




Photograph J: First view of the project site for passengers in southbound vehicles on Kanan Road. The truck in the center of the photo is pulling out from Cornell Road, approximately 400 feet north of the project site.

Photograph K: Approximation of the first views of the project site from northbound vehicles on Kanan Road, on the south side of Ladyface Mountain.



Photograph L: View looking northerly along Kanan Road from vicinity of Silver Creek Road. This easterly trending spur from Ladyface Mountain prevents view of the western protion of the project site from northbound vehicles.

Photograph M: Looking southeasterly along Cornell Road at on-site portion of the northwesterly trending ridge that will be preserved in this current condition as open space.

Visually, the communities of Cornell Road Ranchos and Wagon Road Ranchos are minimally intrusive. Residences in these communities tend to have low profiles, are well setback from Cornell Road, and are heavily landscaped. Medea Valley Estates is a suburban-style subdivision, although its visual impact is somewhat mitigated by its being situated below the Kanan Road grade. In contrast, housing fronting on Cornell Road adjacent to the project site occurs with minimal setbacks and little landscaping. With perimeter walls along their property lines and two story structures, these residences create visual barriers that obstruct views of the surrounding mountains (see Figure II-2, Photograph II-B). Equally intrusive are large residences that have been developed south of Silver Creek Road along such streets as Medea Mesa Road and Countryside Drive. As the most visually prominent man-made features south of the project site, these residences dominate the visual landscape between the project site and Paramount Ranch (see Figure II-3, Photograph D).

**Santa Monica Mountains North Area Plan**

The Santa Monica Mountains North Area Plan identifies four "particularly significant scenic routes" – the Ventura Freeway, Mulholland Highway, Las Virgenes Road, and Kanan/Dume Road. The project site is adjacent to Kanan/Dume Road and is largely visible from it. The project site is minimally visible from the Ventura Freeway due to topographic constrains, intervening commercial development, and the below-grade alignment of the freeway in the vicinity of Kanan Road. The project site is not visible from either Mulholland Highway or Las Virgenes Road. The Plan also identifies five routes with scenic qualities. The project site is only visible from one of these routes with scenic qualities - Cornell Road.

Goal IV-4 of the Plan addresses scenic resources: "An environment that retains the area's scenic beauty, including specific natural features and broad vistas."

According to the Plan, "views of natural features are the focus of scenic preservation and enhancement." However, the Plan's policies "do not assume a total exclusion of development from scenic areas as being necessary to protect scenic qualities. Their intent is to require and achieve a sensitive balance between development and the natural features of the area (page IV-25).

***City of Agoura Hills Ladyface Mountain Specific Plan***

The project site is not located within the City of Agoura Hills and is not subject to the City's Ladyface Mountain Specific Plan's regulation, which basically applies to the north facing slopes of the mountain. Nevertheless, a portion of the project's development area is located on the lower slopes of Ladyface Mountain, adjacent to the City of Agoura Hills, and for that reason this discussion is provided. The Specific Plan does not prohibit development within the Ladyface Mountain study area, rather it provides a set of guidelines to ensure that development occurs in a well coordinated, environmentally

sensitive and aesthetically pleasing manner (page III-1). Plan guidelines cover landscaping, architectural design, oak tree protection, fuel modification, and public art.

**Views of the Project Site**

Currently, public views of portions of the project site are available from the Ventura Freeway (US-101), Kanan Road, Cornell Road, and possibly from some locations within Paramount Ranch. Views of the project site from privately owned properties are also available from residences along Cornell Road, Caleta Road, Silver Creek Road and various residences farther to the south. There are no views of the project site from Mulholland Highway, which is situated approximately 1.5 miles to the south.

***Current Views of the Site from the Ventura Freeway***

Views of the project site from the Ventura Freeway are limited to the higher elevations of Ladyface Mountain and the prominent ridge on the east. Views of the lower elevations on the project site (including the proposed development areas) are blocked by the two prominent ridges that frame the property: on the west, the northerly ridgeline of Ladyface Mountain; on the east, the prominent northwesterly trending ridge. These two opposing ridges form a scissors-like constriction which eliminates views of the project development area from vehicular traffic on the Ventura Freeway.

***Views of the Site from Kanan Road - Southbound***

There are no views of the development portion of the project site from Kanan Road in the vicinity of the Ventura Freeway. Existing commercial development and street landscaping located between the Ventura Freeway and Agoura Road (see Figure II-2, Photograph A) combine with intervening topography to eliminate such views.

Passengers traveling in southbound vehicles on Kanan Road have progressively changing views of the project site. The first opportunity for views of the development area occurs approximately five hundred feet northerly of the Kanan/Cornell Roads intersection (see Figure III.I-3, Photograph J). From this point south for a distance of approximately 3,200 feet, portions of the project site west of Kanan Road and between Kanan and Cornell Roads pass sequentially into and out of view. While the site's eastern ridgeline is visible along Kanan Road, views of the lower elevations of the eastern portion of the project site are intermittent, with intervening terrain, vegetation and existing residences along Cornell Road causing obstruction of views.

***Views of the Site from Kanan Road - Northbound***

With the exception of the area immediately south of the project site, which is a developed residential community, most of the southern reach of Kanan Road passes through a rugged, undeveloped, and highly scenic portion of the Santa Monica Mountains. Intervening terrain obstructs all views of the

project site from the south until vehicles on Kanan Road begin their last descent out of the mountains before approaching the Ventura Freeway corridor. The project site first becomes visible from northbound vehicles approximately 0.4 miles southwesterly of the site on a long descending straightaway on the southern slopes of Ladyface Mountain. At this point the northwesterly trending ridge on the east side of Cornell Road first becomes visible (see Figure III.I-3, Photograph K). While intervening Ladyface Mountain obstructs views of all other portions of the project site from this location (see Figure III.I-4, Photograph L), the existing residential community on the south and east side of Kanan Road (e.g., Medea Valley Estates) is prominently visible.

Passengers traveling northbound on Kanan Road also have progressively changing views of the project site. As northbound vehicles approach the project site's southerly property line the existing residential development along Cornell Road comes into view. Portions of the project site located between Kanan Road and Cornell Road are partially visible, although a series of road cuts on the east side of Kanan Road largely restrict views into that area. At the southern end of the project site steep, cliff-like slopes on the inside curve of the roadway prevent views of the existing terrain on the west side of Kanan Road (see Figure III.I-4, Photograph L). As vehicles continue to move northward, views of the proposed development area on the east side of Cornell are left behind, and new views of the eastern slopes of Ladyface Mountain become dominant.

***Views of the Site from Cornell Road - Southbound***

Cornell Road is a scenic roadway aligned through the middle of the project site. For passengers in southbound vehicles, the northwest trending ridge to the east and the dense vegetation of Medea Creek on the west are the prominently visible features viewed along the northerly stretch of Cornell Road. Whereas the views of the hillsides to the east are more or less unobstructed (see Figure III.I-4, Photograph M), creek side vegetation and high intervening terrain effectively block views of the western portion of the project site (including the lower slopes of Ladyface Mountain -- see Figure III.I-2, Photograph H). North of Caleta Road, the intervening high ground gives way and the western portion of the project site becomes visible for a distance along Cornell Road of approximately 450 feet. At Caleta Road, these views of the western portion of the project site give way to views of adjacent residential development lining the west side of Cornell Road. From Caleta Road south to the project's southern property line (a distance of approximately 1,900 feet) residences along Cornell Road more or less continuously obstruct views of the western portion of the project site (see Figure II-2, Photograph B). From its intersection with Kanan Road, Cornell Road extends approximately 3,800 feet to the project site's southern property line.

***Views of the Site from Cornell Road - Northbound***

South of the project site Cornell Road follows a winding alignment dictated by complex mountainous terrain. Consequently, northerly views of the project site are intermittent and of short duration. Views

of the project site easterly of Cornell Road are non-existent until one reaches the property, due to the presence of a major intervening ridge at the site's southerly property line. Brief distant views of the higher elevations of Ladyface Mountain are available from some locations, but the lower elevations are mostly not visible due to intervening terrain and vegetation. As northbound vehicles approach Silver Creek Road, the lower slopes of Ladyface Mountain come into view, but the dominant visual features in this area are the existing large homes to the west of Cornell Road (see Figure II-3, Photograph D). North of Silver Creek Road, the same visual conditions exist for northbound vehicles as for southbound vehicles.

***Views from Paramount Ranch***

For the most part the project site is not visible from Paramount Ranch, a unit of the Santa Monica Mountains National Recreation Area. Certainly, the project's development areas are not visible from the main parking fields and Western Town portion of the park. From these locations, existing vegetation along Medea Creek (within the Park) and intervening terrain south of the project site block all views of the site. However, it is possible that hikers at the northern end of Paramount Ranch and at higher elevations on the west side of Medea Creek will be able to see the higher elevations of the project site. Substantial residential development exists between Paramount Ranch and the proposed project site, including Medea Valley Estates, Wagon Road Ranchos, and Cornell Road Ranchos (see Figure I-3).

***Hiking and Equestrian Trails***

The Santa Monica Mountains North Area Plan indicates one proposed public hiking and equestrian trail in the vicinity of the project - the Zuma Ridge Trail (also referred to as the Zuma Canyon Regional Trail). According to the North Area Plan (Page IV-30):

> *The Zuma Ridge Trail is planned to eventually link Simi Valley to the sea, providing a continuous trail connection from the Arroyo Simi Equestrian park through the Simi Hills to Zuma Canyon. Portions of the regional trail are maintained by the County of Los Angeles and the Santa Monica Mountains Trail Council.*

No final alignment for the Zuma Ridge Trail has been established, however, the Los Angeles County Department of Parks and Recreation's Master Plan proposed trail system in the vicinity of the project site indicates a general trail alignment along Kanan Road.

***Views from Existing Residences***

As previously discussed, existing residential development exists along both sides of Cornell Road south of Caleta Road, and along both Kanan and Cornell Roads south of Silver Creek Road. The project site is visible from these residences to varying degrees depending on their location and orientation. The project site is most visible from those residences along Cornell Road south of Caleta and along the north side of Silver Creek Road; it is less visible to residences on the south side of Silver Creek Road. For the most part, the existing residences of Medea Valley Estates, Wagon Road Ranchos, and Cornell Road Ranchos, do not have direct views of the proposed development areas, although some have views of the higher elevations and ridgelines.

## ENVIRONMENTAL IMPACTS

### Thresholds of Significance

In accordance with Appendix G to the CEQA Guidelines, the project would have a significant impact on aesthetics if it would cause any of the following conditions to occur:

- A substantial adverse effect on a scenic vista.
- Substantially damages scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway,
- Substantially degrades the existing visual character or quality of the site and its surroundings.

### Proposed Project Features

Residential enclaves have been sited on the gentler slopes of the project site to minimize grading and visibility and to maximize open space. Where practical, enclaves have been sited on previously disturbed areas to minimize intrusion into undisturbed portions of the site. On steeper slopes of the eastern enclave, 11 split-level building pads have been designed to minimize grading. Contour grading techniques (i.e., variable slope grades and undulating "daylight" elevations) would be used to minimize the alteration of natural landforms and smoothly transition manufactured slopes back into the natural contours of adjacent undisturbed areas. Landscaping and highway setbacks are proposed to buffer views of development areas. Most residential lots have been sited to prevent structures from breaking ridgeline views as seen from Cornell Road, and all on-site utility lines would be placed underground. Additionally, to protect vistas of Ladyface Mountain, the maximum elevation of a proposed building pad in the western portion of the property is 915 feet above sea level. To maintain architectural control of future residences built by the individual lot owners, the project proposes a set of CC&Rs that would establish the "ground rules" for aesthetic compatibility with the surrounding open space and existing development in the area.

A Landscape Concept Plan has been developed and incorporated as an integral element of the proposed site plan (see Figure I-7). The intent of the landscape plan is the preservation and enhancement of the site's natural character while minimizing the visual intrusion of roadways, housing, and engineering improvements. Major features of the landscape plan include preserving some of the existing live oak trees through avoidance and/or incorporating planted crib-type retaining walls that minimize the extent of development impact. Native plant species would be used for slope plantings to create a compliment to the adjacent natural landscape character. Site access points would be enhanced with native plant species, including oak trees, to create visual buffers along Kanan Road and Cornell Road. Also, meandering drifts of native plants would be used to reflect a natural landscape appearance compatible with the project's intended semi-rural character. Distinctive plant palettes that emulate existing, adjacent plant communities, (i.e., oak woodland, chaparral, riparian, etc.) would be used for landscaping, with plant and seed stock collected locally to insure the use of plant material well adapted to the site's climate and soil characteristics. Crib walls would be undulated to blend into the natural contours of the site and covered with vegetation for visual concealment. The landscape plan also provides for buffer zones adjacent to sensitive plant communities. Resident access would be precluded from these open space areas.

The development enclave to the east of Cornell Road would have a semi-rural appearance while the enclaves to the west of Cornell Road would be more suburban in appearance. Approximately 271.7 acres (or 85 percent of the project site) would be retained as open space (including landscaped lots). Three sections are presented in Figures III.I-5 and III.I-6 that demonstrate how the proposed landscape plan (with the use of lot siting and spacing, street trees, planted crib walls, and perimeter trees) would integrate the development areas into the surrounding undisturbed landscape.

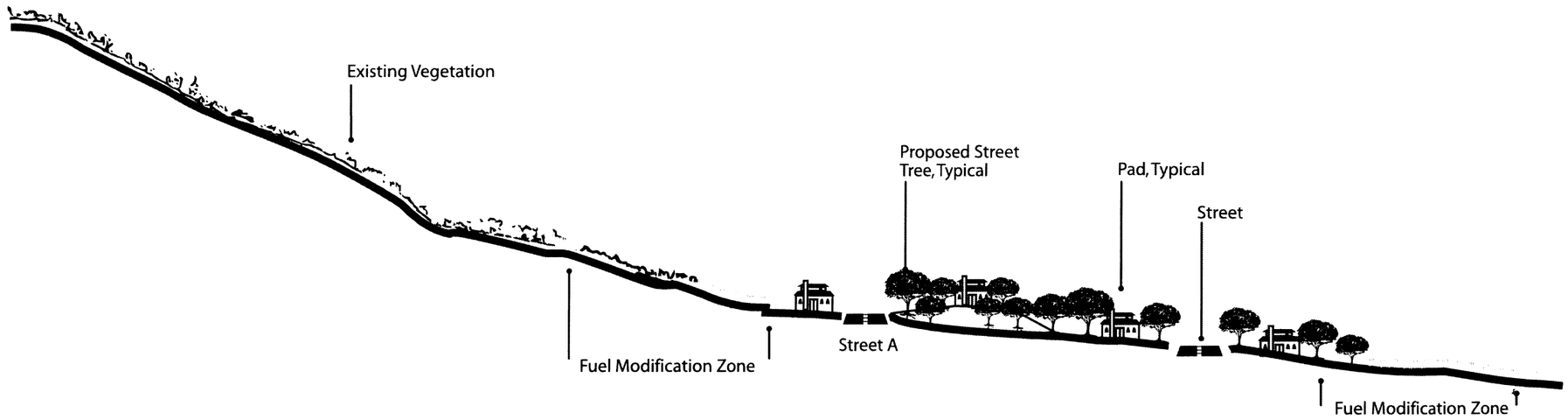
**Water Tank Site**

As discussed in Section I – Project Description, the proposed site plan indicates a potential water tank site in the northeastern portion of the project site. The potential water tank is not required for and is not a part of the proposed project. Rather, such a water tank site has been requested by the LVMWD as an improvement to the "backbone" system that would provide additional storage and help maintain pressures in the area during periods of high demand. The ultimate location of the tank has not been determined, but will be subject to a future a Tank Siting Study to be prepared by the LVWMD. LVMWD would conduct all tank site-related grading and would build, own and maintain the tank.

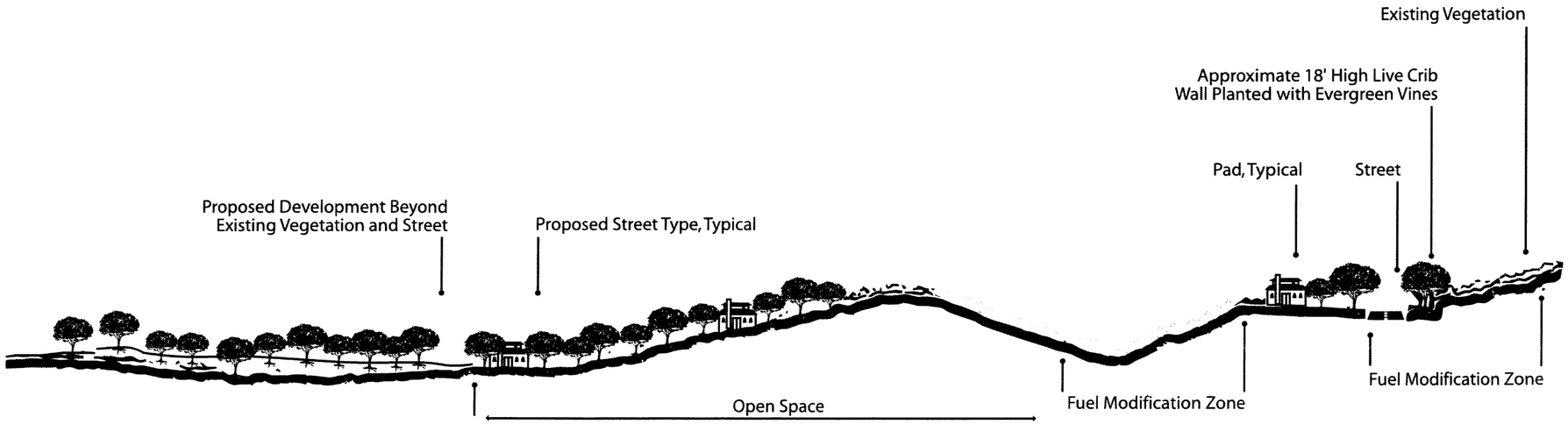
**Project Impacts**

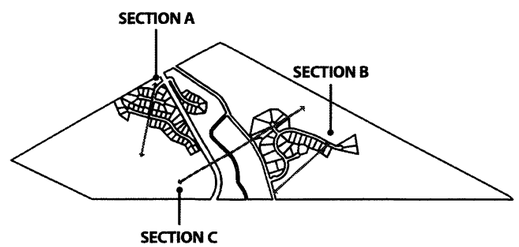
The proposed project would convert approximately 48.6 acres (or approximately 15 percent of the project site) from its current condition to a residential setting. Due to the size of the project site, the nature of its terrain, and a project design that would develop the residences in distinct enclaves, only portions of development area would be visible from any given location. Passengers traveling on Kanan

## SECTION A




## SECTION B



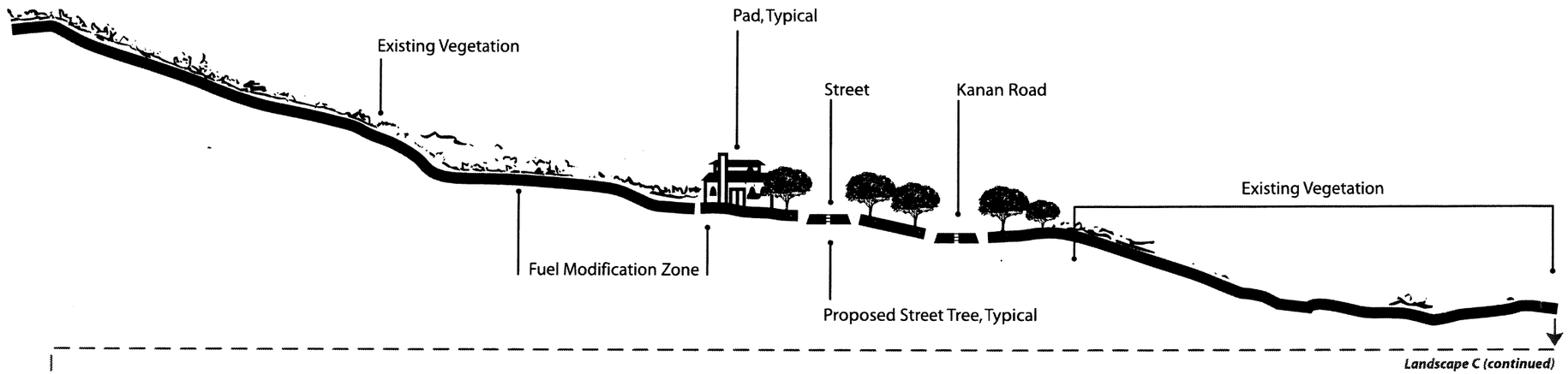



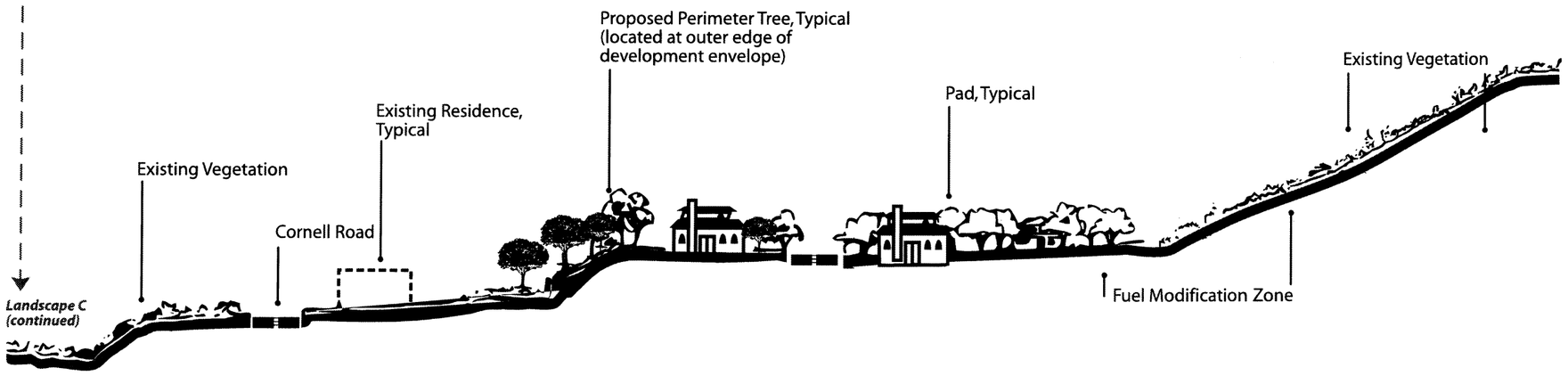

Source: Dizin' Landscape Architects, August 2004

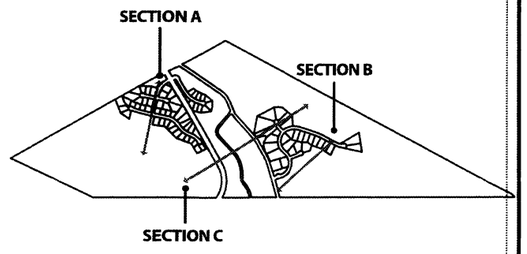


Figure III.I-5
Landscape Sections A-A and B-B

## SECTION C




Source: Dizin' Landscape Architects, August 2004

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.I-6
Landscape Section C-C

and Cornell Roads would have progressively changing views of the development areas as they pass through the project site, with one area coming into view as another area passes out of sight.

***View Simulations***

The following analysis provides five computer simulations of what the project is expected to look like after construction is completed. For each simulation, a "before" photograph indicates existing conditions. Photographs of the "before" views were taken in September 2004. The simulations approximate the appearance of the proposed structures. Their locations and elevations are accurately depicted, and are based upon computer modeling of the grading plan. The perspective depicted in the simulations is also accurate. However, the depiction of the proposed structures is only intended to give the sense of their appearance. No architectural plans have been developed for the proposed homes; therefore, depictions of the homes is strictly generic and is not intended to suggest any specific architectural styles, color schemes or exterior building materials. The depiction of proposed landscaping reflects the preliminary landscape plan concept, including fuel modification, but not specific plant materials. The existing views and visual simulations are presented in Figures III.I-7 through III.I-11. The following paragraphs present brief discussions of each visual simulation:

*Visual Simulation No. 1*

Existing View: This view looks northwest along Kanan Road toward the proposed development area on the west side of Kanan Road.

Proposed View: This simulation approximates the future view looking north from the shoulder on the east side of Kanan Road just south of the "C" Street cul-de-sac. The homes on the manufactured slope above Kanan Road are Lots 28 through 33 and Lot 40. Because of their setbacks and the resulting line-of-sight restrictions created by the manufactured slope, the lower portions of these homes are not visible from the roadway. As shown, landscaping of the contoured slope would be with native vegetation (generically depicted in the simulation). While trees would also provide some screening, the intent of the landscaping is to blend the development in with the surrounding undisturbed hillside vegetation. The post and rail fencing also emphasizes the project's semi-rural concept. This location also permits a view along a short distance of "C" Street to reveal the most southerly of the few homes on the west side of street (i.e., Lots 25 - 27). The view demonstrates that the homes set farther back from Kanan Road are less visible and that the front tier of homes would largely block the views of the homes behind them. From this location the silhouette of Lady Face Mountains is not broken by the proposed homes, except along the lowest portion of the descending ridge.

*Visual Simulation No. 2*

Existing View: This view looks north along Kanan Road toward the proposed development area on the east side of Kanan Road. The partially visible hill mass in the center of view is a graded knob, which has been covered with artificial fill to a depth of approximately 15 feet.

Proposed View: As can be seen in this simulation, the proposed project would remove the artificial fill from the partially graded knob and would level the area for development. The proposed homes would be situated approximately at grade with Kanan Road. Consequently, the homes would not break the silhouette of the open space ridgeline behind them. The view also demonstrates the effectiveness of existing vegetation (where it exists) to block views of these homes; however, the vegetation is sparse and for the most part the homes would be exposed to views along Kanan Road.

*Visual Simulation No. 3*

Existing View: This south looking view is from the east side of Kanan Road just south of Cornell Road intersection. The area shown is the northerly portion of the proposed development area on the west side of Kanan Road. Approximately 10.2 acres of this area has been previously disturbed by the temporary storage of grading equipment and the stockpiling of fill material to be used in a nearby commercial development project. A descending secondary ridge on the east side of Lady Face Mountain is visible in the background.

Proposed View: This simulation shows the "A" Street entrance to the proposed enclave on the west side of Kanan Road. The home in the foreground is Lot 44. The homes on Lots 42 and 43 are partially visible behind it. The area to the north of the "A" Street entrance (right of photograph) would be preserved as Open Space Lot 84. The area fronting on Kanan Road south of the "A" Street entrance (center of right of photograph) would be preserved as Landscape Lot 87. The simulation demonstrates the proposed use of local rock for low walls and monuments, post and rail fencing, retention of existing oak trees, and landscaping with native vegetation. The view also demonstrates that the homes would not break the higher elevations of the Lady Face Mountain silhouette.

*Visual Simulation No. 4*

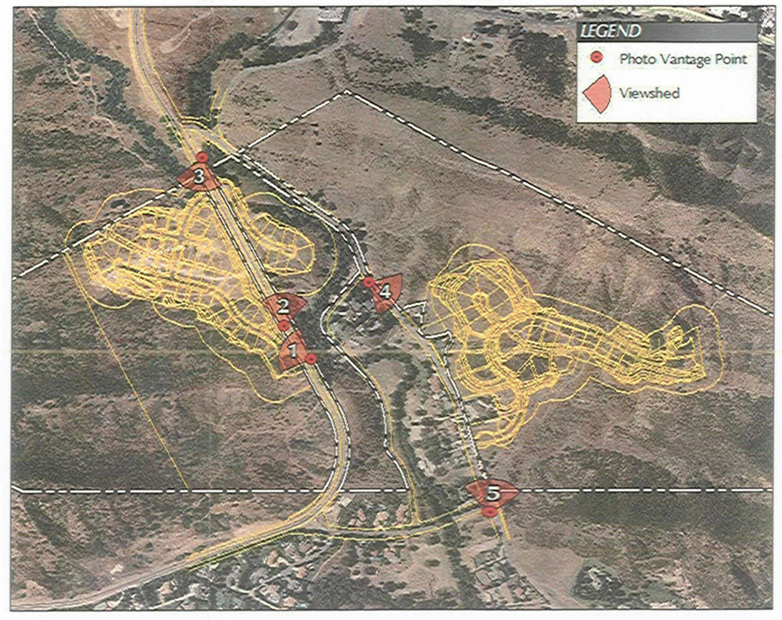
Existing View: This view looks southeast along Cornell Road toward the proposed development area on the east side of Cornell Road. Currently, the view consists of vacant hillsides and the silhouette of the ridgeline in the background.

Proposed View: As can be seen in this simulation, the view of vacant hillsides would be replaced by views of the proposed homes, graded terrain, and fuel modification zones. The proposed homes would be situated above the Cornell Road grade and would largely eliminate the silhouette of the open space ridgeline behind them.

*Visual Simulation No. 5*

Existing View: This view looks north from Cornell Road toward the proposed development area on the east side of the road. Currently, the view consists of vacant hillsides and the silhouette of the ridgeline in the background. Portions of Fire Station No. 65 are visible in the vegetation at the left of the photograph. Outside of the photograph's field of vision are the existing homes along the west side of Cornell Road.

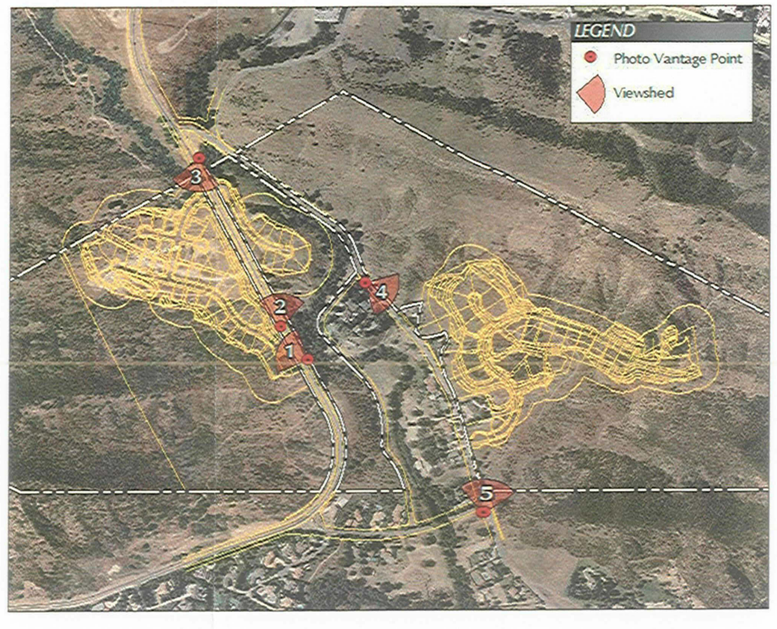
Proposed View: As can be seen in this simulation, the majority of the proposed homes would have substantial setbacks from Cornell Road, compared to the minimal setbacks of the existing homes on the west side (see Photograph B, Figure II-2). Although situated above the adjacent Cornell Road grade, from this location the proposed homes would not break the ridgeline's silhouette. Rather than eliminate views of the existing hillsides and ridgeline (as seen in Visual Simulation No. 4), from this angle the homes would be seen as tucked into the hillsides well below the ridgeline. Also shown in the simulation are the entrance to the enclave with monument and low walls/fencing (set back from Cornell Road) and revegetation of the slopes in the foreground. At the rear of the development area the crib wall along "E" Street is partially visible between the homes. Although not shown in the simulation, it is the intent of the landscape plan to use wall plantings which, as they mature, would make the walls appear to recede into the surrounding landscaping.




Source: Dizin, December 2004.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.I-7
Visual Simulation 1



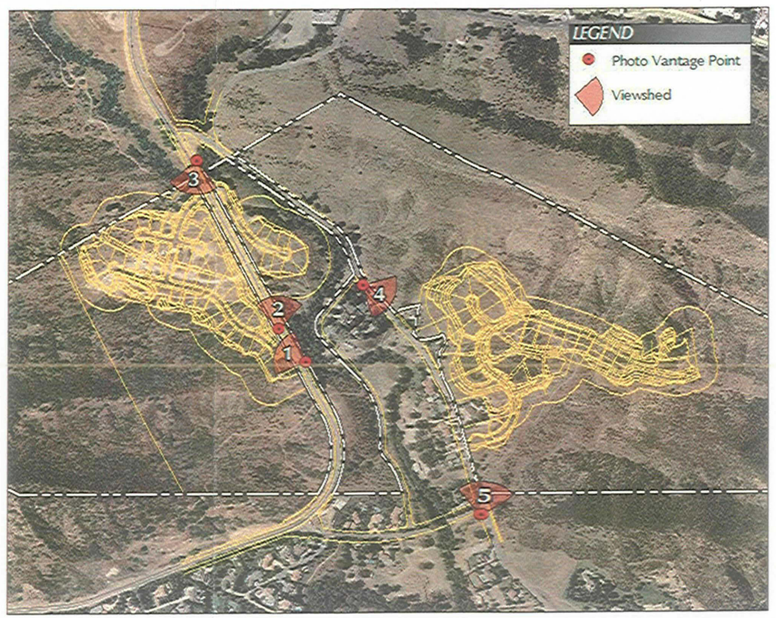

Source: Dizin, December 2004.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.I-8
Visual Simulation 2

EXISTING VIEW

PROPOSED VIEW

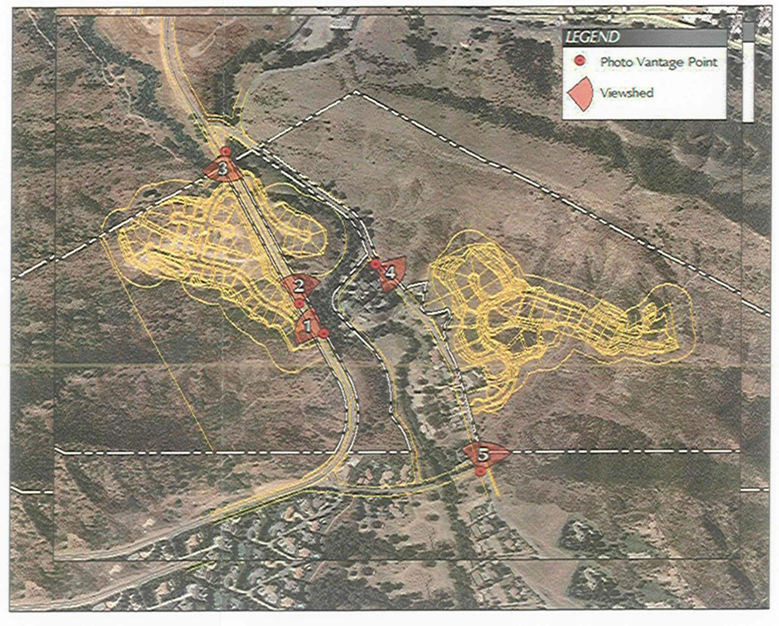



Source: Dizin, December 2004.

Source: Dizin, December 2004.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.I-10
Visual Simulation 4




Source: Dizin, December 2004.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.I-11
Visual Simulation 5

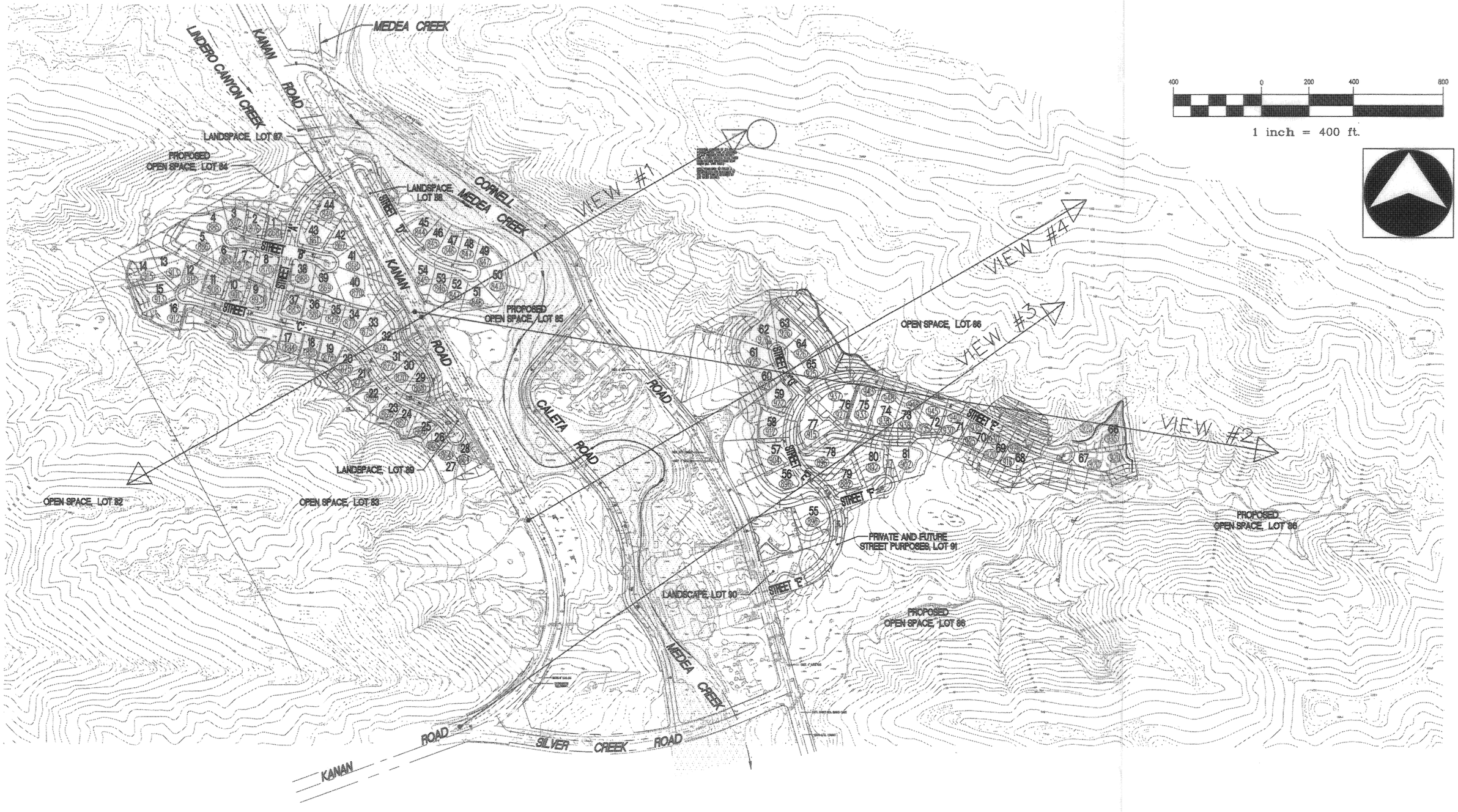
***Future Views of the Site from Kanan Road - Southbound***

Traveling south on Kanan Road, the proposed residential enclaves would first come into view approximately five hundred feet northerly of the Kanan/Cornell Roads intersection. From this location, residences on both sides of Kanan Road would be visible. On the west side of Kanan Road residences would be set behind a minor ridge and raised above the adjacent highway grade. As a consequence, only the residences closest to the highway would be visible. Views of residences set farther back from the highway would be blocked by the closer structures and landscaping, or else would be out of the highway's line-of-sight. As vehicles continue southward much of the residential development on the lower slopes of Ladyface Mountain would pass out of sight due to a contour-graded slope that would rise as much as 35 feet above the roadway. Landscaped with native vegetation, this slope area would provide visual screening for all but the rooflines of the closest residences to Kanan Road. That these residences would typically not be visible from adjacent Kanan Road is demonstrated in View Analysis Profile 1 (see Figure III.I-13). Also, see Figure III.I-12 for a plan view of the View Analysis Profiles. Significantly, View Analysis Profile 1 also demonstrates that in locations where this slope is tall enough, views of Ladyface Mountain from Kanan Road would also be eliminated by the proposed contoured slope.

On the east side of Kanan Road in the northern portion of the site, 11 homes would be developed along the "D" Street cul-de-sac where a knoll currently blocks easterly views from adjacent Kanan Road. When developed, the knoll would lowered and prominently visible residences would be located adjacent to Kanan Road (see View Analysis Profile 1 – Figure III.I-13). Upon passing this area, the proposed residential enclave on the east side of Cornell Road would come into prominent view (see View Analysis Profile 2 – Figure III.I-13).

***Future Views of the Site from Kanan Road – Northbound***

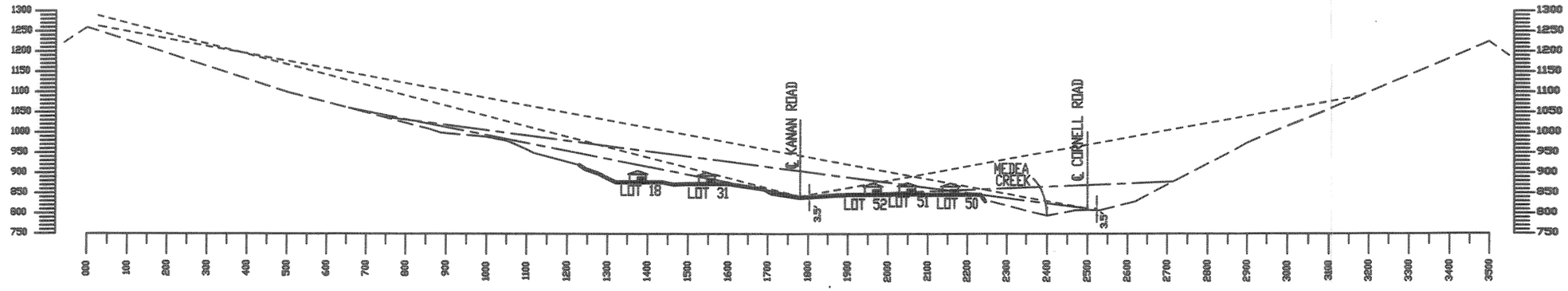
As discussed above, the project site first becomes visible from northbound vehicles approximately 0.4 miles southwesterly of the site on a long descending straightaway on the southern slopes of Ladyface Mountain. From the south side of Ladyface Mountain northbound travelers would have unimpeded views of the residential enclave on the east side of Cornell Road (see Figure III.I-3, Photograph K and View Analysis Profile 3 – Figure III.I-14). Other portions of the project site would not be seen from this location because of the intervening slopes of Ladyface Mountain. However, as northbound vehicles approach the project site's southerly property line the existing residential development along Cornell and Caleta Roads also come into view.



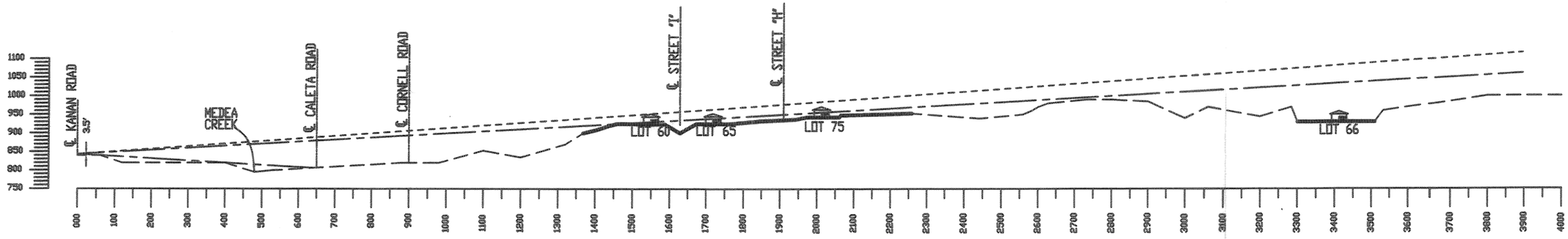

Source: Wagner Halladay, Inc., June 2004

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.I-12
View Analysis Map




VIEW ANALYSIS PROFILE NO. 1




VIEW ANALYSIS PROFILE NO. 2

## LEGEND:

- EXISTING GROUND
- PROPOSED GRADED/IMPROVED SURFACE
- LINE OF SIGHT OVER STRUCTURES AND/OR OBSTRUCTIONS
- LINE OF SIGHT AFFORDED BY TERRAIN

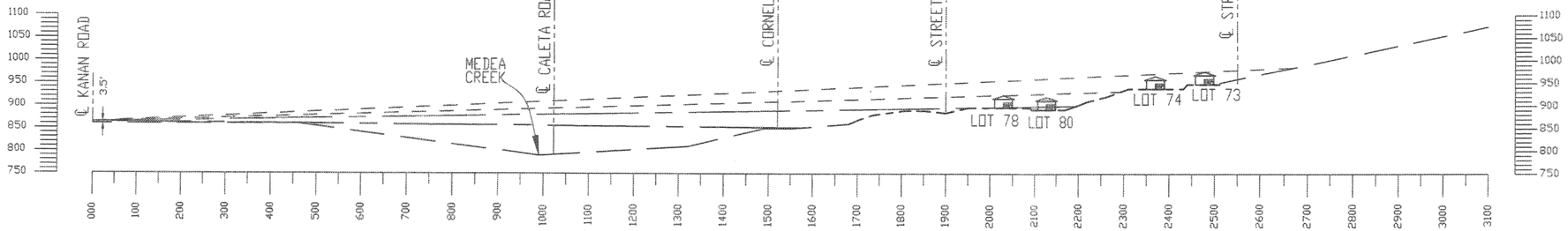
0 0 0 0 0 0

( IN FEET )
1 inch = 300 ft.

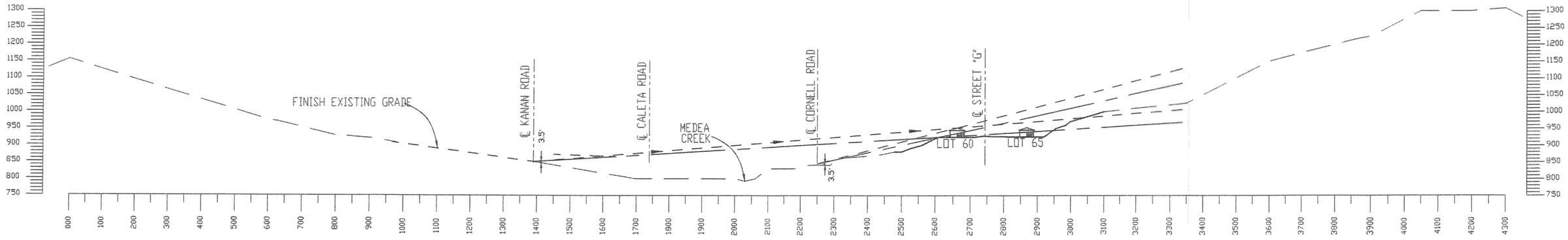
Source: Wagner Halladay, Inc., August 2003

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.I-13
View Analysis Profiles 1 & 2




VIEW ANALYSIS PROFILE NO. 3




VIEW ANALYSIS PROFILE NO. 4

LEGEND:

EXISTING GROUND
PROPOSED GRADED/IMPROVED SURFACE
LINE OF SIGHT OVER STRUCTURES AND/OR OBSTRUCTIONS
LINE OF SIGHT AFFORDED BY TERRAIN

GRAPHIC SCALE

0 0 0 0 0 0

( IN FEET )
1 inch = 300 ft.

Source: Wagner Halladay Inc., June 2004

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.I-14
View Profiles 3 and 4

***Future Views of the Site from Cornell Road - Southbound***

For passengers in southbound vehicles, the northwest trending ridge to the east and the dense vegetation of Medea Creek on the west would continue to be the prominently visible features viewed along the northerly stretch of Cornell Road. The creek side vegetation would partially screen views of the residential enclave between Cornell and Kanan Roads and portions of the residential development on the west side of Kanan Road. As southbound travelers pass the southerly end of the "D" Street enclave, the southerly portion of the residential development on the west side of Kanan Road would become visible for a few moments. But by the time the southbound vehicle reaches Caleta Road views of the western portions of the project site would give way to views of the existing residential development lining the west side of Cornell Road. From Caleta Road south to the project's southern property line residences along Cornell Road would continue to block views of the western portion of the project site, just as they do currently.

The residential enclave on the east side of Cornell Road would first come into view from southbound vehicles in the vicinity of Caleta Road. From this point south various views into this development area would be continuous until the southbound vehicle approaches the southerly property line. After that, the eastern portion of the project site would drop out of view, and the western portion would only be visible in hind view.

***Future Views of the Site from Cornell Road - Northbound***

As previously described, northerly views of the project site from Cornell Road south of the project site would be intermittent, of short duration, and restricted to the western portion of the property. There would be no views of the proposed development on the east side of Cornell Road due to the intervening ridge at the site's southerly property line. Brief distant views of the higher elevations of Ladyface Mountain would remain from some locations, but the development areas on the lower slopes of Ladyface Mountain would generally not be visible due to intervening terrain and vegetation. As northbound vehicles approach Silver Creek Road, the lower slopes of Ladyface Mountain (and some development areas) would come into view, but the dominant visual features in this area would continue to be the existing large homes to the west of Cornell Road. North of Silver Creek Road, the same visual conditions exist for northbound vehicles as described above for southbound vehicles.

***Views of Crib Walls***

In order to reduce the extent of grading, the project incorporates a series of planted crib walls, some of which would be visible from Kanan and Cornell Roads (see Figure III.I-15, Crib Wall Plan). In the western portion of the site planted crib walls will mostly be located in the rear of yards and not generally visible from Kanan Road. A possible exception is a wall (approximately 320 feet in length) located on the north side of Lots 1-4, which would reach a maximum height of 17 feet. A glimpse of

this wall could be briefly visible from southbound vehicles on Kanan Road. Also, a low wall (maximum height of five feet and approximately 300 feet in length) will be placed on the west side of Kanan Road in the vicinity of the southern "C" Street cul-de-sac.

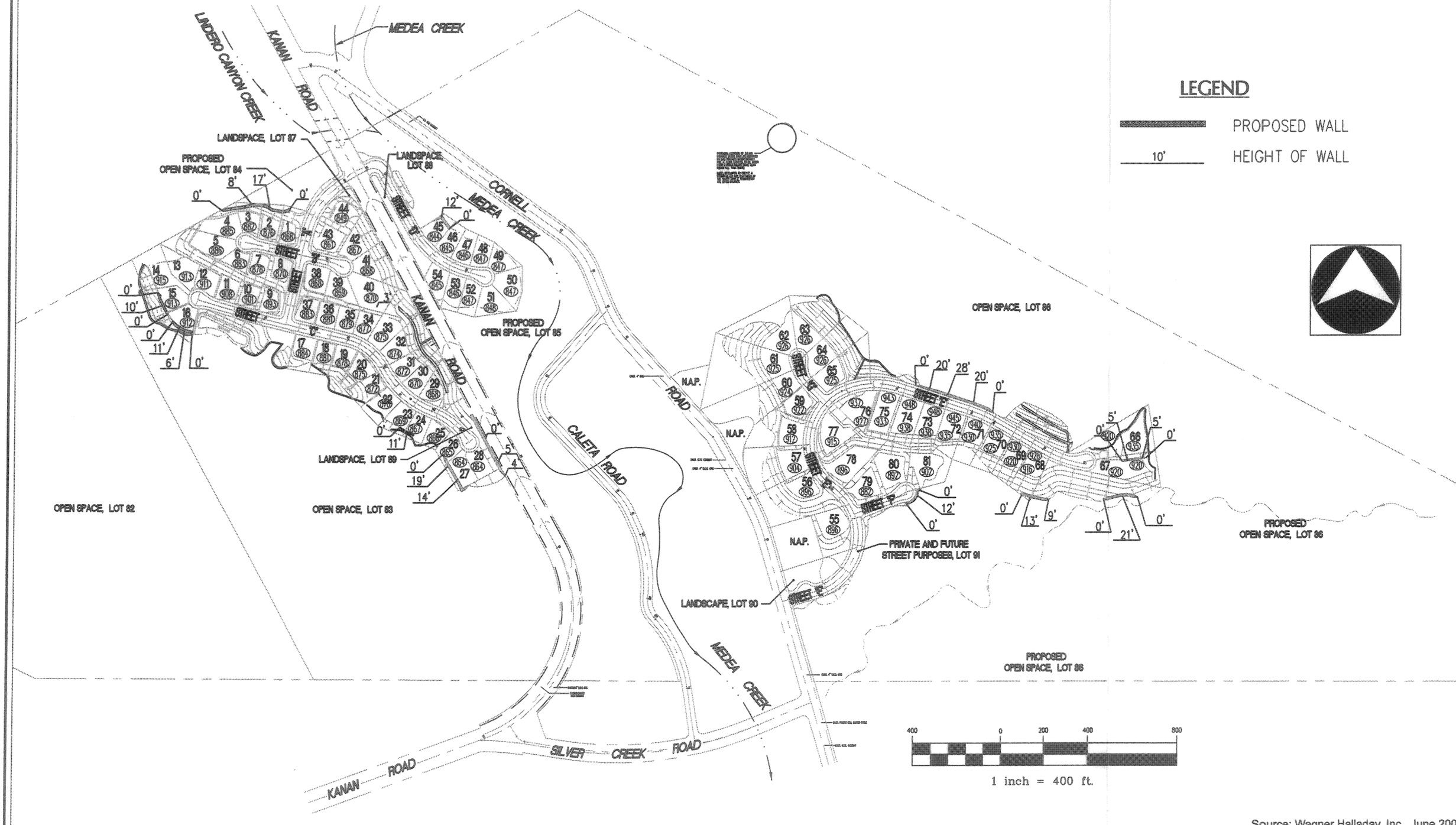
In the central portion of the project site, a wall would wrap around the back side of Lot 44 Approximately 100 feet in length, this wall would have a maximum height of 12 feet. If visible at all, this wall would only be seen from Cornell Road. However, it is unlikely the wall would be visible due to the intervening thicket of vegetation along Media Creek (see Figure III.I-2, Photograph H).

In the eastern portion of the site, the walls are setback farther from the highway. For example, a planted crib wall, approximately 375 feet long, would be constructed along "E" Street. This wall would reach a maximum height of 28 feet in one area; although, the wall height would vary from grade level to its 28-foot maximum height, depending upon the adjacent terrain. At its closest approach, this wall would be over 800 feet from Cornell Road. The intent of the landscape plan is that, once the intervening homes are constructed and the concealing landscaping has matured, this wall would no longer be visible from off-site public vantage points (see Landscape Section B-B, Figure III.I-5). Figure III.I-16, Crib Wall Design Concept, presents typical heights, sections, elevations, and planting detail of proposal crib walls.

Another wall on the east side of Cornell Road would be located below Lot 68 (maximum height of 13 feet, length of 130 feet). This wall is approximately a thousand feet from Cornell Road and tucked behind intervening hills. It would not be visible from either Cornell or Kanan Roads. A third wall is proposed below Lot 67. Although it would be 140 feet long and would reach a maximum height of 21 feet, this wall would not be visible from Cornell Road, since it is also tucked into a canyon. A fourth wall is located at the "F" Street cul-de-sac, below Lot 81. This wall would have a maximum height of 12 feet, and a length of approximately 100 feet. It is possible that portions of the wall would be visible from views on Cornell Road looking above Fire Station No. 64 and the proposed residence on Lot 55.

**Water Tank Site**

The siting and construction of the future Cornell Tank will be conducted by the LVMWD and is not a part of the proposed project. While approval of the proposed project may be conditioned to require the Developer to dedicate a site for the tank and easements, no water tank-related aesthetic and view impacts would occur as a result of the proposed project.




Source: Wagner Halladay, Inc., June 2004

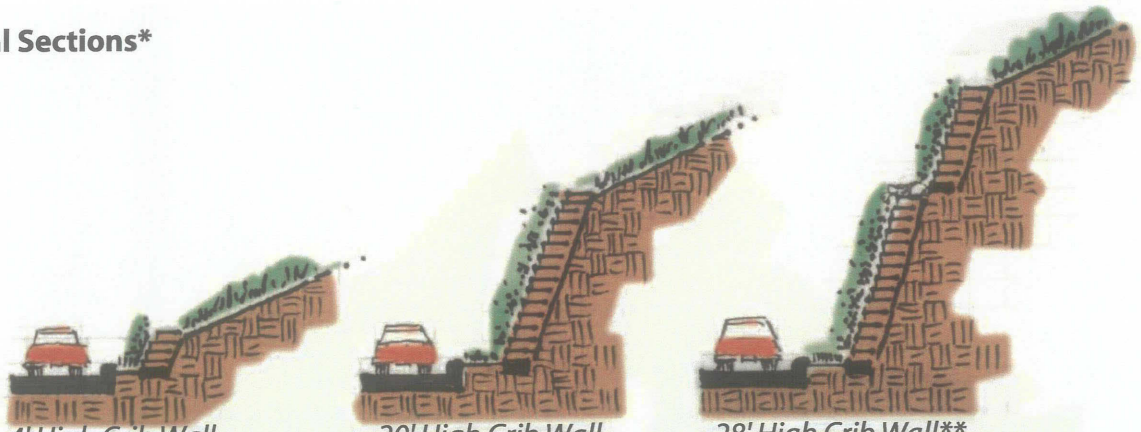
CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.I-15
Crib Wall Plan

## Design Concepts

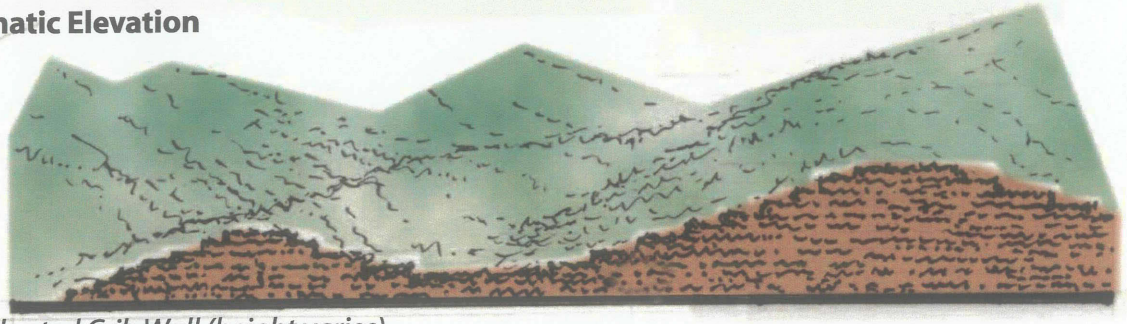
Retaining walls shall vary in height from four feet to approximately twenty eight feet as noted on the engineers drawings. Whenever possible these shall be planted crib walls, planted with evergreen vines to help minimize the visual impact on the surrounding area.

### Typical Sections*



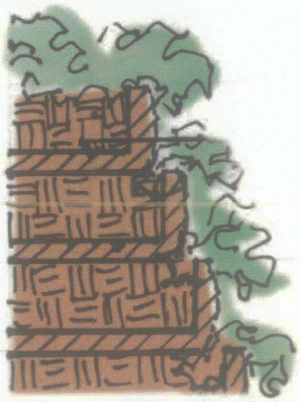
*4' High Crib Wall* *20' High Crib Wall* *28' High Crib Wall***

### Schematic Elevation



*Planted Crib Wall (height varies)*

### Enlarged Section



*Planting Pocket with Evergreen Vines*

* Plant with evergreen vines

** Whenever possible, walls which exceed 20' height shall step back as shown.

Source: dizin Landscape Architects.

In the short-term, views of some of the proposed planted crib walls could be considered to substantially degrade the existing visual character or quality of the site and its surroundings. Therefore, the walls would have a significant short-term impact on the visual qualities of the project site. However, with construction of intervening homes, several of the walls would cease to be visible from offsite locations. Additionally, as the wall landscaping matures, views of the remaining visible walls would be "softened" as the walls would appear to recede into the surrounding landscaping. Therefore, long-term visual quality impacts of these walls would be reduced to less than significant levels.

***Views of Cut and Fill Slopes***

The tallest onsite cut slope would be located in the eastern portion of the site. Located above Lot 63, this slope would reach a height of approximately 70 feet. Although visible from Kanan Road, the visual effect of this slope cut would be largely attenuated by its distance from the highway (approximately one quarter of a mile). This slope would be approximately 650 feet from Cornell Road. Another cut slope on the east side of Cornell Road (approximately 70 in height) would be located above Lots 68-70

The tallest fill slope would also be located on the east side of Cornell Road. Located below Lots 61 and 62 79, this fill slope would reach a height of approximately 70 feet.

Some views of the manufactured slopes could be considered to substantially degrade the existing visual character or quality of the site and its surroundings. Therefore, the cut and fill slopes would have a significant impact on the visual qualities of the project site and it surroundings.

***Impacts to Ladyface Mountain***[1]

The western portion of the project site (approximately 124 acres) consists of the eastern facing slopes of Ladyface Mountain. Residential development would be sited on approximately 21.5 acres (or 17 percent) of this portion of the ownership. The remaining onsite portion of the Ladyface Mountain (approximately 83 percent) would be permanently preserved as open space. Moreover, the project concentrates development in areas of Ladyface Mountain previously disturbed by earlier activities. Of the total Ladyface Mountain development area, 10.2 acres (or approximately 47 percent) have been previously disturbed by earlier grading activities.

---

1 *The status of Ladyface Mountain as a "cultural icon", if such may be said to even exist, appears to have resulted from attempts at self-promotion of the region by Art Whizin, owner of the original Whizin's Restaurant at Cornell Corners. Mr. Whizin acknowledged that the mountain was so-named by his father and, in the early 1970's attempted to promote its importance to the local archaeological community by taking archaeological field classes to its peak. No consequential interest was generated in the archaeological community by Whizin's efforts. Ladyface Mountain has no unusual or outstanding archaeological sensitivity or Native American significance.*

The City of Agoura Hills' Ladyface Mountain Specific Plan has established a prohibition on development on Ladyface Mountain above the 1,100-foot contour line. The project is consistent with this restriction; the highest building site on the slopes of Ladyface Mountain (Lot 14) is planned for an elevation of 915 ASL, 185 feet below the City of Agoura Hill's height limit and more than 1,120 feet below the peak. The project does not build on major Ladyface Mountain ridgelines; all residences are tucked into the lower, gentler slopes, and are concentrated as much as possible on previously disturbed land. However, the creation of fill slopes along the west side of Kanan Road would block some views of the Ladyface Mountain profile from some locations along Kanan Road. For an additional discussion of Ladyface Mountain, see Section III.G, Cultural Resources - Archaeology.

***Views From Paramount Ranch (SMMNRA)***

As previously discussed, the proposed project's residential development areas would not be visible from the main activity areas of Paramount Ranch. However, it is possible that hikers at the northern end of Paramount Ranch and at higher elevations on the west side of Medea Creek would be able to see the higher elevations of the project site and perhaps, some of the residential development. There is considerable existing residential development situated between the proposed project and Paramount Ranch (see Figure I-3), and northerly views from Paramount Ranch are already substantially effected by that closer development. Consequently, the proposed project would not cause (1) a substantial adverse effect on a scenic vista as viewed from Paramount Ranch, (2) substantial damage to scenic resources as viewed from Paramount Ranch, or (3) substantial degradation of the existing visual character or quality of the site and its surroundings as viewed from Paramount Ranch. Therefore, proposed project impacts to Paramount Ranch would be less than significant.

***Views From Zuma Ridge Trail***

The proposed project would implement the Los Angeles County Department of Parks and Recreation's proposed trail system in the vicinity of the project site by dedicating an on-site 20-foot trail easement in the general vicinity of Medea Creek/Caleta Road (see Figure I-6). The trail location is not finalized and may be moved to a location on Kanan Road and/or may never be built unless a source of funds becomes available. While the proposed project would provide the trail easement, it is proposed that construction and maintenance of the trail would be the responsibility of the Los Angeles County Department of Parks and Recreation. However, ultimate maintenance responsibility would be subject to a Maintenance Agreement to be reached between the project applicant and the Department of Parks and Recreation. This trail dedication is considered a beneficial project impact and no adverse impacts have been identified. This conclusion is in keeping with the policy of the Los Angeles County Department of Parks and Recreation that, as long as the project does not physically interfere with the

alignment of a designated trail, the project's visibility from the trail is not considered a significant adverse impact.[2]

## LEVEL OF SIGNIFIGANCE BEFORE MITIGATION

*Scenic Vistas*

As discussed above, the proposed residential enclaves have been designed to maximize open space and take advantage of the existing terrain to minimize the visibility of the proposed homes. Only portions of the residential enclaves would be visible from any location. However, portions of the proposed development are adjacent to and visible from Kanan Road, a scenic route, and from Cornell Road, a route with scenic qualities. Both of these highways were thus designated by the Santa Monica Mountains North Area Plan because of the high quality of the scenic vistas within their viewsheds. Within the vicinity of the project site, those resources include (but are not limited to) scenic vistas of Ladyface Mountain and nearby undeveloped hillsides, Medea Creek and its valley, and the steep and complex topography of the interior mountains that form a visual backdrop for the project site.

The proposed project would introduce a residential development into the scenic vistas afforded by Kanan and Cornell Roads, resulting in a substantial alteration of existing vistas. In some places, the existing terrain would be altered and the natural forms of the hillsides reshaped into horizontal planes to support the proposed development. Portions of the new residential development would be clearly visible from both northbound and southbound traffic on both Kanan and Cornell Roads. In particular, there would be loss of views of Ladyface Mountain from Kanan Road. Therefore, the proposed project would have a significant impact on scenic vistas as viewed from Kanan and Cornell Roads.

*Damage to Scenic Resources*

Within the vicinity of the project site, scenic resources include (but are not limited to) expanses of undeveloped hillsides, steep and complex topography, rugged rock outcroppings, a meandering water course, and undisturbed native vegetation. Concentrating the proposed homes in enclaves provides the opportunity to maximize open space on the project site and preserve those resources. As designed, approximately 271.7 acres (or approximately 85 percent of the project site) would remain open space following project development. The proposed site plan, utilizing previously disturbed land to the maximum extend possible, would also minimize the impacts to the most sensitive scenic resources on the project site. For example, there would be no grading of ridgelines and no alteration of Medea Creek. Furthermore, there would be no development on the slopes of Ladyface Mountain above the

---

[2] *Personal communication from Jim McCarthy, Trails Coordinator, Department of Parks and Recreation, July 23, 1998.*

915-foot contour line, which is 185 feet below the City of Agoura Hill's height limit and more than 1,120 feet below the peak of the mountain.

However, the proposed project would cause landform alterations to approximately 48.6 acres (or 15% of the project site), due to grading. Fuel modification for fire prevention purposes would result in view alterations to an additional 28.7 acres of currently undisturbed native habitat. The native vegetation of the project site and the surrounding Santa Monica Mountains constitutes a major scenic resource. Within the proposed development areas, grading would transform the complex terrain of the hillsides into more regular ordered patterns of horizontal planes. The rugged natural forms of the project site and the surrounding Santa Monica Mountains constitute major scenic resources.

Notwithstanding that the proposed project would preserve approximately 271.7 acres of the project site as open space, substantial portions of the 48.6-acre development "footprint" would involve the removal or alteration of existing scenic resources such as major landforms and undisturbed native vegetation, which would substantially impact scenic resources. Therefore, the proposed project's impacts on scenic resources would be considered significant.

*Existing Visual Character or Quality of the Project Site and Its Surroundings*

As previously discussed, the residential enclaves have been designed to create a suburban and semi-rural residential community that avoids the appearance of a "tract" development. A curvilinear street plan would be used to avoid straight rows of houses. To avoid the appearance of "mass grading" the project site has been designed to avoid the project site's steeper slopes, and development has been concentrated in enclaves in order to maximize open space. The design effect would be the predominance of the remaining open space.

However, while the proposed project has been designed to preserve the existing visual character and quality of the project site, the development of the proposed project would transform the undisturbed hillsides of the project site into a residential community, a change that would substantially affect the existing visual character and/or quality of approximately 15 percent of the project site. Particularly with respect to the existing homes along Cornell Road and the residential communities to the south, the proposed homes would substantially affect the visual character or quality of the open space to which the existing community has become accustomed.

Because the assessment of aesthetic impacts involves subjective judgments, there will always be an element of controversy regarding the determination whether a proposed change in the visual environment constitutes an adverse physical effect. While some may consider the introduction of a residential development into undisturbed hillsides as a significant intrusion under any circumstances, others may consider the proposed project as an asset to the community and desire to purchase homes there. Nevertheless, for the purposes of this analysis, the proposed development would substantially

affect the existing visual character or quality of the project site and its surroundings. Therefore, project impacts with respect to existing visual character would be considered significant.

## MITIGATION MEASURES

While the proposed Landscape Concept Plan is a proposed part of the project, the following mitigation measure is recommended to assure that the Landscape Concept Plan would be implemented as proposed:

I-1 The project applicant/developer/builder shall prepare and implement a Landscape Plan that provides planting and maintenance guidance for common landscaped areas, slopes, and undeveloped building pads. The project applicant/developer/builder shall be responsible for the Plan's implementation until such time as a homeowners' association is prepared to take over landscape maintenance responsibilities. The Landscape Plan shall be subject to the review and approval by the Los Angeles County Departments of Public Works and Regional Planning, as well as SEATAC, prior to issuance of the grading permit. To ensure its implementation, the Landscape Plan shall be incorporated into the project's Conditions, Covenants, and Restrictions (CC&Rs). Major features of the landscape plan shall include:

1) A listing of plant species appropriate for use for both temporary slope stabilization purposes and long-term landscaping designs for common slope and private yard areas. The plan shall emphasize the use of drought-tolerant, fire retardant, native plant species. Only non-invasive non-native plant species shall be included in the listing of acceptable planting materials. In addition, wherever practical, plants which are relatively pest resistant and which require a minimum of added nutrients shall be utilized in landscaping;

2) Requirements that all proposed private residential landscape plans conform to the project's landscape plan requirements for plant material selection, irrigation systems, and the use of pesticides, herbicides, and fertilizers;

3) Retention of a landscape contractor thoroughly familiar with the provisions of the Landscape Plan, by the project's homeowners' association, for ongoing implementation of the Landscape Plan; and

4) Preservation and protection of existing trees and shrubs, wherever possible. Procedures for the care and maintenance of native trees retained on private properties shall be specified.

In addition, the following measures are also recommended:

I-2 All public utilities shall be situated underground.

I-3 Where feasible, drainage devices (terrace drains, benches and intervening terraces) visible from surrounding areas shall be bermed and placed in swales.

I-4 Concrete drains and all other drainage devices shall be tinted with an appropriate earth tone to effectively conceal them from surrounding views.

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

The proposed project features and recommended mitigation measures would reduce project impacts to the Kanan Road scenic highway. However, the loss of scenic vistas, damage to scenic resources, and alteration of existing visual character would remain as significant impacts. Impacts to Paramount Ranch (SMMNRA) would be less than significant.

## CUMULATIVE IMPACTS

There are no related projects near enough to the project site to have a measurable, direct cumulative visual quality impact at the project site. A review of Figure II-13 reveals that most of the related projects are located along the Ventura Freeway Corridor, an area that is experiencing rapid growth. To the north of the project site, the two nearest related projects (i.e., No. 6, Creekside Center, and No. 10, Ted Moore Agoura Village) are located at the intersection of Agoura and Kanan Roads. There are no direct lines-of-sight between these developments and the project site. To the south, the nearest related project is the development of five single family lots on Kanan Road. Again, there are no direct lines-of-sight between this small related project and the proposed project. Therefore, these related projects would not combine with the proposed project to create the loss of scenic vistas, damage to scenic resources, and/or alteration of existing visual character. All other related projects are even farther away from the project site and would not combine with the proposed project to create cumulative visual quality impacts. Therefore, cumulative visual quality impacts would be less than significant.

# III. ENVIRONMENTAL IMPACT ANALYSIS
# J. LIGHT AND GLARE

## ENVIRONMENTAL SETTING

Currently, the vacant project site has no lighting and is dark at night. However, there is a variety of lighting sources in the vicinity of the project and some of that lighting spills-over onto the subject property. The closest off-site lighting, and the most directly affecting the project site, includes: street lighting along Kanan Road; private residences located along Cornell and Caleta Roads; and County Fire Station No. 65. Street lighting is restricted to the east side of Kanan Road, and consists of 25-foot poles set approximately 200 feet apart. This layout creates "hot spots" of around 1.5 foot-candles[1] directly below the light fixture and provides a minimum illumination level of 0.4 foot-candles between light fixtures (see Figure III.J-1, Existing Street Lighting)

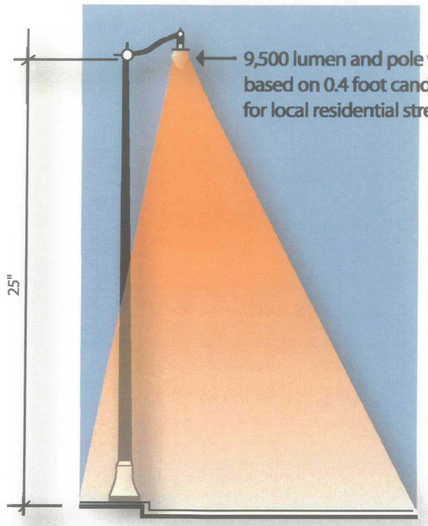
Cornell Road has no streetlights and is quite dark on moonless nights. However, existing residences on Cornell Road, from Caleta Street southward, tend to be illuminated with security and aesthetic lighting on exterior walls and landscaping, gates and driveway are frequently illuminated, and it is common for diffuse interior lighting to shine through the windows. Some homes have lighted tennis courts. County Fire Station No. 65 is also well illuminated with flood lighting and bright illumination of its identification sign.

North of the project site, a diversity of bright night lighting within the City of Agoura Hills (i.e., vehicle headlights on the Ventura Freeway and local streets, street lighting, and the concentration of commercial uses along Kanan, Agoura, and Roadside Roads) creates sufficient atmospheric "glow" to substantially reduce night sky visibility. While intervening hills prevent the direct illumination of the project site by these light sources, on cloudy nights the project site receives reflected light from the City of Agoura Hills.

Low intensity atmospheric illumination also emanates from the residential developments to the south of the project site, particularly from the Medea Valley area, which takes access from Kanan Road. The individual residences south of Silver Creek Road tend to compensate for the lack of street lighting by

---

[1] *A footcandle is a unit of measure of the intensity of light falling on a surface, equal to one lumen per square foot and originally defined with reference to a standardized candle burning at one foot from a given surface. Source: The American Heritage® Dictionary of the English Language, Fourth Edition Copyright © 2000 by Houghton Mifflin Company.*




**Standard Roadway Light Pole**
(Per County Requirements)
N.T.S.

**LEGEND**
**Standard Roadway Lighting**

**Light Pole**
- 1.5 foot candle and greater
- 1.4 to .8 foot candle
- .7 to .4 foot candle

Source: dizin Landscape Architects, May 2004.

illuminating their front yards and landscaping, perimeter walls, entrance gates and driveways. Bright interior lighting is also prevalent in the area. Residential lighting in the Cornell Road Ranchos and Wagon Road Ranchos area tends to be very low intensity, although landscape lighting such as the flood lighting of individual oak trees in the Cornell Road Ranchos is common. The combined effect of these various sources of night illumination is an area-wide low-level atmospheric "glow" that reduces night sky visibility and engenders a semi-rural ambiance.

The undeveloped project site is currently an "island" of nighttime darkness between existing areas of illuminated development located to the north and the south. As a result, although there is no night lighting on the project site, the night sky above the site reflects the general low level of illumination in the area. Moreover, peripheral areas of the project site along existing roadways receive direct spillover lighting from vehicle headlights and adjacent off-site locations.

Several categories of sensitive light receptors can be identified in the project vicinity. The first category consists of nearby residents who have actively sought the less illuminated environment of the Santa Monica Mountains for their homes. The second category is made up of visitors to the Santa Monica Mountains National Recreation Area (and particularly Paramount Ranch), who come to this area specifically to seek the dark night sky of the mountains. The last category consists of wildlife on the project site and in the surrounding undeveloped hillsides whose circadian rhythms are balanced by undisturbed cycles of light and dark.

## ENVIRONMENTAL IMPACTS

### Thresholds of Significance

In accordance with Appendix G to the CEQA Guidelines, the proposed project would have a significant impact if it created a new source of substantial light or glare which would adversely affect nighttime views in the project area.

Thresholds for impacts to biological resources relative to night lighting are presented in Section III.F.

### Proposed Project

A full project description is provided in Section I of this EIR. Minimal night lighting would be provided for the proposed private enclave located on the east side of Cornell Road.[2] Standard streetlights mounted on 25-foot tall poles would be placed at street intersections where safety illumination is most critical. Cul-de-sacs and interior streets would be lit by pedestrian-type bollard

---

[2] *Los Angles County Code Section 21.32.150 provides that street lighting systems may be waived if the advisory agency finds that street lights will not be in keeping with the neighborhood pattern.*

lighting (3-5 feet in height). Where practical, streetlights would be sited to direct light away from off-site sensitive receptors. Figure III.J-2, Standard Street Light Layout Concept, demonstrate the lighting levels that would result from the provision of low level street lighting in the residential enclave east of Cornell Road.

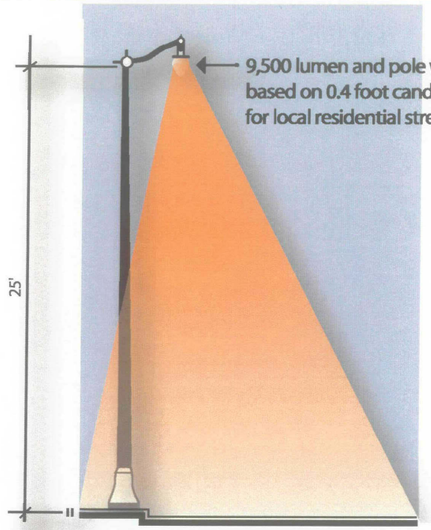
Both residential enclaves west of Cornell Road would be required to provide standard subdivision street lighting, in conformance with Los Angeles County Subdivision regulations (Title 21, Section 21.32.140). Such street lighting typically consists of streetlights mounted on 25-foot tall poles, spaced 150 feet on center, and located on both sides of the roadway in a staggered layout. This configuration is intended to create a consistent level of illumination for roadways throughout the project site. Proposed fixtures would produce approximately 1.5 foot candles or greater at the source, and would be fitted with directional shields to help minimize lighting of areas beyond the roadway (See Figure III.J-2).

**Project Impacts**

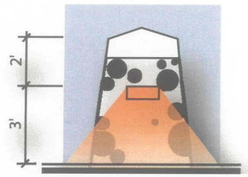
Project development would result in the introduction of several sources of lighting onto the project site, resulting in increased nighttime illumination. Environmental impacts associated with increased nighttime illumination include decreased night sky visibility, changes in aesthetic qualities and, when new lighting spills-over onto adjacent properties, there is the potential to interfere with certain functions, including vision, sleep, and privacy. For the proposed project, approximately 48.6 acres of the project site would be converted from its currently dark night condition to a residential setting with various levels of night illumination. The approximately 271.7 acres to be retained as open space (or approximately 85 percent of the project site) would not be illuminated and, except for immediately adjacent areas that may receive spill-over illumination, would continue to provide a dark nighttime backdrop for current and future residents in the area.

***Development Areas Adjacent to Kanan Road***

The brightest and most prevalent lighting source would be the County required street lighting on new residential streets located on the east and west of sides of Kanan Road. A comparison of Figure III.J-2, Standard Street Light Layout Concept, with Figure III.J-1, Existing Street Lighting, indicates the anticipated increased lighting on the project site. For the development portions of the project site




**Standard Roadway Light Pole**
(Per County Requirements)
N.T.S.




**Multi- Purpose Bollard Lighting**
N.T.S.

**LEGEND**
**Standard Roadway Lighting**

**Light Pole**
- 1.5 foot candle and greater
- 1.4 to .8 foot candle
- .7 to .4 foot candle

Source: dizin Landscape Architects, May 2004.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.J-2
Standard Street Light Layout Plan

adjacent to Kanan Road, this street lighting would create new brightness[3] and could spillover onto adjacent habitat areas.[4]

The new homes within the project site can also be expected to introduce such other new lighting sources as exterior security lighting, interior lighting, aesthetic landscape lighting, and entrance gate and driveway lighting.[5] The new homes that are visible from offsite locations would be perceived primarily by the interior glow visible through windows. This window lighting would be set against the relatively dark exteriors of the homes and the hillsides that form a backdrop for the homes. The brightness from these glowing windows would be visible from offsite locations, but would not create glare.[6] Exterior landscape, access, and security lighting would also be visible from offsite locations.

*Lighting Impacts to Existing Residences*

The combined affect of the above mentioned new lighting sources would be a substantial increase in light that would adversely affect nighttime views in the vicinity of Kanan Road. Current residents along Cornell and Caleta Roads and some located immediately south of Silver Creek Road would directly experience the transformation of the development areas adjacent to Kanan Road from currently dark conditions to illuminated residential settings. For these residents, the required street lighting and the secondary sources of lighting (i.e., exterior security lighting, interior lighting, aesthetic landscape lighting, etc.) would create new sources of substantial light which would adversely affect nighttime views in the project area. Therefore, without mitigation, this impact would be considered significant.

---

3 *Brightness is what an individual sees or perceives largely as a result of the luminance of the source or surface. The luminance of a source or surface is the intensity of the source or surface in the direction of an observer.*

4 *According to the Traffic and Lighting Division, Los Angeles County Department of Public Works (September 18, 2000), standard street lights on 25 feet mounted height with full cut-off luminare west of Cornell Road under County Code would not significantly increase sky illumination and glare. The illuminating Engineering Society standards states that candle power per 1,000 lamp lumens generated from a cut-off luminaire does not exceed 2.5 percent at an angle of 90 degrees above nadir horizontal and 10 percent of a vertical angle of 80 degrees above nadir.*

5 *As noted above, this type of individual residential lighting is already fairly common amongst the existing residences along Cornell Road and in the residential developments south of Silver Creek Road.*

6 *Glare is the sensation produced by a bright source within the visual field that is sufficiently brighter than the level to which the eyes are adapted to cause annoyance, discomfort or loss in visual performance and visibility (i.e., blinding light). Disability glare is caused by stray light scattered within the eye, which reduces the contrast of the retinal image. Streetlights, pedestrian lights, floodlights, and landscape lights as well as bright reflectors, can contribute to disability glare. Discomfort glare is caused by high contrast or a non-uniform distribution of luminance in the field of view. Discomfort glare can be reduced by decreasing the luminance of the light source, by increasing the background luminance around the source, or by adjusting the aiming angle of the source. Nuisance, or annoyance, glare occurs when light appears where it does not belong. (Source: Illuminating Engineering Society (IES) Handbook, 9th Edition).*

Recommended mitigation includes CC&Rs that prohibit the use of exterior uplighting fixtures for building facades and trees, require a downlight component for all exterior-building mounted fixtures, and prohibit "glowing" fixtures[7] that would be visible from existing communities or public roads.

Direct lighting impacts from the proposed development areas adjacent to Kanan Road would decrease with distance from the project site, and most residents south of Silver Creek Road would not have direct views of the new lighting due to such factors as intervening terrain, structures, and landscaping. Therefore, lighting impacts to existing homes south of Silver Creek Road would be less than significant.

***Lighting Impacts to Scenic Highways***

Passengers in vehicles traveling along Kanan Road, and to a lesser extent along Cornell Road, would have direct views of the new lighting in the vicinity of Kanan Road. Night lighting impacts to passengers in vehicles on Kanan Road, a designated scenic highway (see Section III.I), would be partially attenuated by two factors. First, there is already a bright level of street lighting on Kanan Road adjacent to the proposed development areas (see Figure III.J-1). Second, passengers in vehicles on Kanan Road would only have brief views of the night lighting. New lighting in the vicinity of Kanan Road would be visible from vehicles on Kanan Road for a distance of approximately 3,200 feet (see Section III.I). Hence, at an average travel speed of 54-55 mph (see Section III.L), the new lighting would be visible to vehicles on Kanan Road for approximately 40 seconds. The combined effect of (1) the existing street lighting and (2) the relatively brief period the street lighting would be visible, suggests that the passengers in vehicles on Kanan Road would not experience substantial new light or glare which would adversely affect nighttime views in the project area. Therefore, night lighting impacts to the Kanan Road scenic highway would be less than significant.

From Cornell Road, the effect of the new lighting within the development enclaves to the west would be largely obscured by intervening vegetation, terrain, and existing residences. Also, limited lines-of-sight exist along Cornell Road (due to its curvilinear alignment) which further reduce views of the development areas to the west. Consequently, the proposed new development in the vicinity of Kanan Road would not create new sources of substantial light or glare which would adversely affect nighttime views as seen from Cornell Road. Therefore, with respect to Cornell Road, the night lighting impact from the proposed new development to the west would be less than significant.

---

[7] *A glowing fixture is a lantern style fixture, or any fixture that allows light through its vertical components.*

***Development Area East of Cornell Road***

As discussed above, street lighting for the proposed private enclave located on the east side of Cornell Road would be maintained at the minimum levels necessary for safety and identification purposes. This low level of street lighting would not be expected to create new sources of substantial light or glare which would adversely affect nighttime views in the project area east of Cornell Road. However, the new homes within this residential enclave would also introduce exterior security lighting, interior lighting, aesthetic landscape lighting, and entrance gate and driveway lighting onto the currently dark hillsides. While these additional sources of lighting would be visible from offsite locations, they would not be bright enough to create glare.

Current residents along Cornell and Caleta Roads and some located immediately south of Silver Creek Road would experience the transformation of the residential enclave on the east side of Cornell Road from its currently dark condition to a residential setting. For these residents, the combination of low level street lighting, exterior security lighting, interior lighting, landscape lighting, and entrance gate and driveway, would create a substantial increase in lighting that would adversely affect nighttime views in the project area. Therefore, without mitigation this impact would be considered significant. As discussed above, mitigation measures that include CC&R controls over external residential lighting are recommended to reduce the affect of the new lighting.

It is also discussed above that direct lighting impacts from the residential enclave on the east side of Cornell Road would decrease with distance from the project site, and most residents south of Silver Creek Road would not have direct views of the new lighting due to such factors as intervening terrain, structures, and landscaping.

Passengers in vehicles traveling along Kanan Road would have distant views of the new street lighting and external residential lighting within the enclave on the east side of Cornell Road. For example, at its closest approach, a minimum distance of approximately 900 feet separates vehicles on Kanan Road from the entrance to this enclave, and a minimum distance of approximately 1,100 feet separates those vehicles from the nearest proposed residence. Given this separation distance, the screening effects of intervening roadside vegetation, terrain, and existing residences along Cornell Road, and the relatively high speeds of travel (54 to 55 mph), the new lighting on the east side of Cornell Road would not create a substantial increase in lighting that would adversely affect nighttime views from Kanan Road.

For vehicles on Cornell Road, the effect of the new lighting within this residential enclave would be more intrusive but of short duration, due to Cornell's curvilinear alignment and substantial intervening topography. As discussed in Section III.I, Visual Qualities, views of this residential enclave roughly extend between Caleta Road on the north and the project site's southern boundary, a distance of approximately 1,900 feet. At an average travel speed of 44 to 47 mph (see Section III.L, Traffic and Access), the night lighting from the residential enclave on the east side would be visible to passengers

in vehicles on Cornell Road for approximately 29 to 27 seconds. Given the short period of time the enclave would be visible from passing cars, and the difficulty of seeing into the enclave due to the steep adjacent hillsides and the curvy and hilly alignment of the roadway, the new lighting on the east side of Cornell Road would not create a substantial increase in lighting that would adversely affect nighttime views from Cornell Road.

**Vehicle Headlights**

Vehicle headlights are another source of night lighting that would be added to the project site. Because much of the development area is elevated above Kanan and Cornell Roads, there is the potential that vehicle headlights would: 1) glare toward off-site viewers, and 2) would contribute to the overall scale and mass of site illumination. Vehicle headlights pose the additional concern of potentially illuminating natural habitat areas. However, vehicle headlights would not constitute a new source of substantial light or glare which would adversely affect nighttime views in the project area for the following reasons: 1) most of the project's internal roads are short and curvilinear, hence headlights would not be pointed in any given direction for more than a few moments; 2) most of the streets are double loaded with residences, hence the residences and landscaping would create many obstructions that prevent headlights from glaring outward; and 3) the project consists of clusters of development with multiple roadways and entrances, hence vehicle movement would be disbursed rather than concentrated at any one location. Therefore, vehicle headlights would not create a substantial increase in lighting that would adversely affect nighttime views in the project area; hence, impacts from vehicle headlights within the residential enclaves would be less than significant.

**Night Sky Illumination**

The increased number of lighting fixtures on the project site could contribute to existing night sky brightness, which tends to be more noticeable on cloudy evenings. However, the existing sky glow visible from the project site vicinity is the cumulative result of development throughout the western Santa Monica Mountains, and particularly from the intensive development along the US-101 Freeway corridor. The project lighting would not make any material contribution to the already-present sky glow.

Notwithstanding the above, it is possible that the increased lighting from the project site would have an effect on the dark night environment of Paramount Ranch (SMMNRA). However, project night lighting impacts to Paramount Ranch are not anticipated to be significant for the following reasons: 1) there are no direct line of sight views of the project site from the lower elevation activity areas of the park, and it is unlikely that many people will hike the park's steep mountainous slopes at night; and 2) substantial residential development currently exists between the project site and Paramount Ranch. Light from nearer existing development will negate the effect of the more distant Triangle Ranch.

**Reflective Glare**

While direct glare is primarily a nighttime problem from unshielded lighting, reflective glare is generally a daytime problem. Reflectivity is primarily a problem of glare from the sun reflected into the eyes of drivers in vehicles on nearby roadways. The most common sources of daytime reflective glare are exterior building materials (such as windows and roofing materials). To a lesser extent, street-paving materials can also produce glare. For the proposed project, reflective glare is not expected to be a significant problem for the following reasons: 1) most of the residences are well setback from and elevated above both Kanan and Cornell Roads; 2) the development plan proposes to provide substantial natural vegetation landscaping which will form screens to block the reflection from potentially glaring surfaces; 3) and residences will not be constructed with reflective exterior building materials. While daytime glare is more of a nuisance than a significant environmental concern, mitigation measures have been suggested to further reduce this less-than-significant nuisance (see Section III.I, Visual Qualities).

**Night-Lighting Impacts to Wildlife**

A number of wildlife species are likely to be adversely affected by the intrusion of lighting from the development area into adjacent habitat. Most affected would be nocturnal species that rely on the cover of darkness to hunt, or are otherwise shy around human activity. Examples of these species include great horned owl, barn owl, mountain lion, ringtail, and several bat species. Night-lighting also confuses the internal day-night patterns of many wildlife species. Some bats, however, would benefit from the lighting as it may attract and concentrate insects.

The project's preservation of approximately 271.7 acres of open space (plus the adjacent existing open space to the east and the west) would provide substantial remaining habitat and ample opportunity for those light-sensitive wildlife species to withdraw to unaffected portions of the project site. Hence, there should be no significant impact to nocturnal wildlife associated with the introduction of night lighting within the development areas. However, impacts from night lighting on wildlife in neighboring habitats would be further reduced through shielding and/or directing lights away from adjacent open space. In addition, it is anticipated that vegetation barriers and trees would provide some filtering of light from the development area.

## LEVEL OF SIGNIFICANCE BEFORE MITIGATION

The project's introduction of street lighting, window glow, and external lighting (i.e., landscape, security, and access) would create new sources of substantial light or glare which would adversely affect nighttime views from nearby existing residences in the project area. Without mitigation this would be a significant impact.

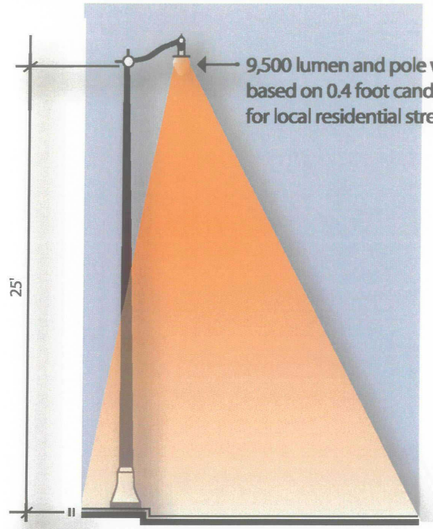
The project's new lighting would not create new sources of substantial light or glare which would adversely affect nighttime views from vehicles on Kanan and Cornell Roads. Therefore, nighttime impacts to scenic highways would be less than significant.

Vehicle headlights within the proposed residential enclaves would not create new sources of substantial light or glare which would adversely affect nighttime views in the project area. Therefore, vehicle headlight impacts would be less than significant.

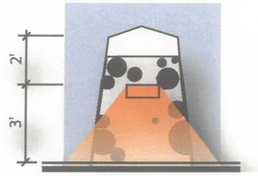
The project's new lighting would not create new sources of substantial light or glare which would adversely affect nighttime views from Paramount Ranch. Therefore, night lighting impacts to Paramount Ranch would be less than significant.

## MITIGATION MEASURES

Because of the significant night lighting impacts associated with the installation of standard streetlights west of Cornell Road, the project applicant proposes an alternative lighting plan designed to reduce the "mass" of on-site illumination and the unintentional spillover of light onto adjacent natural areas and off-site properties. Title 21 of the Los Angeles County Subdivision Code allows for such modification of its requirements since "the requirement for street lighting systems as provided in Section 21.32.140 may be waived if the advisory agency finds that street lights will not be in keeping with the neighborhood pattern." The major feature of the applicant's Lighting Mitigation Plan is the elimination of standard street lights west of Cornell Road and the in-lieu use of low-level, low-intensity, decorative lights. Street lighting west of Cornell Road would be comparable to the low level of lighting to be provided east of Cornell Road. Under the Lighting Mitigation Plan, the lowest applicable Illuminating Engineering Society (I.E.S,) recommended footcandle levels would be provided on-site to generate safe, but low level, illumination. Standard street lights on 25-foot poles (generating 1.5 foot candles, or greater, at the light source) would only be installed at street intersections where safety illumination is most critical. Cul-de-sacs and interior streets would be lit by "pedestrian" type bollard lighting (3-5 feet in height), which generate 0.9 foot candles and greater at the source. Figure III.J-3, indicates the level of site illumination expected from the proposed Lighting Mitigation Plan.




**Standard Roadway Light Pole**
(Per County Requirements)
N.T.S.




**Multi- Purpose Bollard Lighting**
N.T.S.

**LEGEND**
**Standard Roadway Lighting**

**Light Pole**
- 1.5 foot candle and greater
- 1.4 to .8 foot candle
- .7 to .4 foot candle

**Light Bollard**
- .9 foot candle and greater
- .8 to .4 foot candle
- 3 foot candle and less

Source: dizin Landscape Architects, May 2004.

The level of lighting in the Lighting Mitigation Plan is achieved by a combination of appropriate lighting fixtures and design criteria for their installation and use. The design criteria driving the Lighting Mitigation Plan include the following:

- Entrance and street lighting shall focus illumination downward and into the project site. A combination of shielding, screening, and directing the lighting away from off-site areas shall be utilized to minimize "spill-over" effects onto adjacent roadways, properties and open space areas. Wherever possible, lighting fixtures shall be located on the shielded side of the visual barriers.

- Lighting fixtures that cut-off light directed to the sky shall be installed in combination with an expanded tree canopy to minimize atmospheric light pollution.

- Where feasible, topographic barriers and new tree landscaping shall be used as filtering devices, with shrubs and hedges as additional screening;

While the proposed lighting mitigation plan is expected to reduce lighting impacts created by the standard street lighting requirements to a less than significant level, the following mitigation measures are recommended to insure that proposed Lighting Mitigation Plan is implemented as proposed:

J-1 The project applicant shall implement the proposed Lighting Mitigation Plan as presented in Figure III.J-3, installed to the satisfaction of the Los Angeles County Department of Public Works and the Los Angeles County Fire Department.

J-2 Project street lighting shall be the lowest intensity necessary for security and safety purposes, while still adhering to the recommended levels of the Illuminating Engineering Society of North America.

J-3 Street light source color temperature shall be warm and identifiable with incandescent (i.e., 2500 to 3200 degrees Kelvin, incandescent = 2700 degrees Kelvin).

J-4 In order to minimize illumination wash onto adjacent areas, street lighting shall utilize non-glare fixtures directed downward onto the project site.

J-5 Street lights shall be oriented to minimize off-site impacts (i.e., the maximum candlepower shall be aimed away from the off-site viewer and the physical unit shall be located on the shielded side of visual barriers, such as shrubs and walls).

J-6 Exterior buildings finishes shall be non-reflective and use natural subdued tones.

J-7 All roofs visible from the Kanan and Cornell Roads shall be surfaced with non-reflective materials.

J-8 Atmospheric light pollution shall be minimized by utilizing street lighting fixtures that cut-off light directed to the sky.

J-9 Project CC&Rs shall include the following restrictions on outdoor lighting for private residences:

1) The use of exterior uplighting fixtures for building facades and trees shall be prohibited.

2) Design limits on the amount of landscape lighting per square foot of yard area shall be established.

3) Only downlighting for exterior-building mounted fixtures shall be permitted.

4) Use of "glowing" fixtures that would be visible from existing communities or public roads shall be prohibited. A glowing fixture is a lantern style fixture, or any fixture that allows light through its vertical components

5) Use motion detectors, shall be encouraged.

6) Tennis court lighting shall be shielded from off-site locations with landscaping and windscreens; tennis court lighting fixtures shall have distribution types and cut-off characteristics that limit spill light that can be seen from off-site; and

7) Gate and driveway illumination shall be shielded from off-site locations and directed into the property.

In order to reduce further the less-than significant disruptive effect of night lighting on the nocturnal behavior of some wildlife species, the following measure is recommended:

J-10 The adverse effects of night-lighting (street, residential, outdoor security etc.) on natural open space shall be mitigated by provision of one or more of the following:

1) low-intensity street lamps only near the edge of development;

2) low-elevation lighting poles; and

3) shielding by internal silvering of the globe or external opaque reflectors.

The following measures have been recommended by the Los Angeles County Department of Public Works, Traffic and Lighting Division:

J-11 Proposed light spacing for decorative lights shall meet the minimum required illumination levels for a residential roadway which is based on 0.4 footcandles.

J-12 A street lighting layout plan for the proposed decorative lights shall be submitted to the Los Angeles County Department of Public Works Street Lighting Section for review and approval.

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

Implementation of the proposed Lighting Mitigation Plan and the recommended mitigation measures would reduce street lighting impacts to a less than significant level. Project impacts due to the introduction of exterior security lighting, aesthetic landscape lighting, entrance gate and driveway lighting would be reduced to a less than significant level by implementation of the recommended mitigation measures. Night lighting impacts to wildlife will be reduced to a less than significant level by the project design and the recommended mitigation measure. Night lighting impacts to Paramount Ranch and daytime reflective glare impacts are less than significant.

## CUMULATIVE IMPACTS

There are no related projects near enough to the project site to have a measurable, direct cumulative night lighting impact at the project site. A review of Figure II-13 and Table II-1 reveals that most of the related projects are located along the Ventura Freeway Corridor, an area that is experiencing rapid growth where pockets of bright commercial night-time illumination either already exist or are developing. To the north of the project site, the two nearest related projects (i.e., No. 6, Creekside Center, and No. 10, Ted Moore Agoura Village) are located at the intersection of Agoura and Kanan Roads. There are no direct lines-of-sight between these developments and the project site. To the south, the nearest related project is the development of five single family lots on Kanan Road. Again, there are no direct lines-of-sight between this small related project and the proposed project. All other related projects are even farther away from the project site and would not combine with the proposed project to create a substantial increase in lighting that would adversely affect nighttime views in the project area. Therefore, cumulative light and glare impacts would be less than significant.

# III. ENVIRONMENTAL IMPACT ANALYSIS
# K. LAND USE COMPATIBILITY

## ENVIRONMENTAL SETTING

### Los Angeles County General Plan

The Los Angeles County Board of Supervisors adopted the County of Los Angeles General Plan (General Plan) on November 25, 1980. The General Plan (countywide chapters and elements) "address issues which transcend local community interests, and are intended to identify and promote the broader public interests of the County..."[1] The County General Plan is currently in the process of being updated, although it is not expected to be adopted prior to the year 2004. Among the matters that will be addressed in that new plan will be revisions to the plan's Land Use Element, including an updated section on Significant Ecological Areas and the incorporation of the recently adopted Santa Monica Mountains North Area Plan.[2]

#### *Existing Land Use Designations*

The Los Angeles County General Plan Land Use Policy Map (Figure III.K-1) designates the 320.3 acres of the project site as follows:

- Non-Urban (R): A total of 148 acres of the project site are designated Non-Urban. The General Plan describes Non-urban lands as those that "primarily include mountain, foothill, and high desert areas of the County, not currently planned for urban use or scheduled to receive an urban level of service. The intent of this classification is to maintain the character of dispersed non-urban settlements and communities; provide for agricultural and mineral production; preserve areas of significant natural and scenic resources; and avoid intensive development of areas subject to natural hazards or lacking essential services and facilities...Non-urban residential uses are permitted subject to established density, design and service standards."[3]

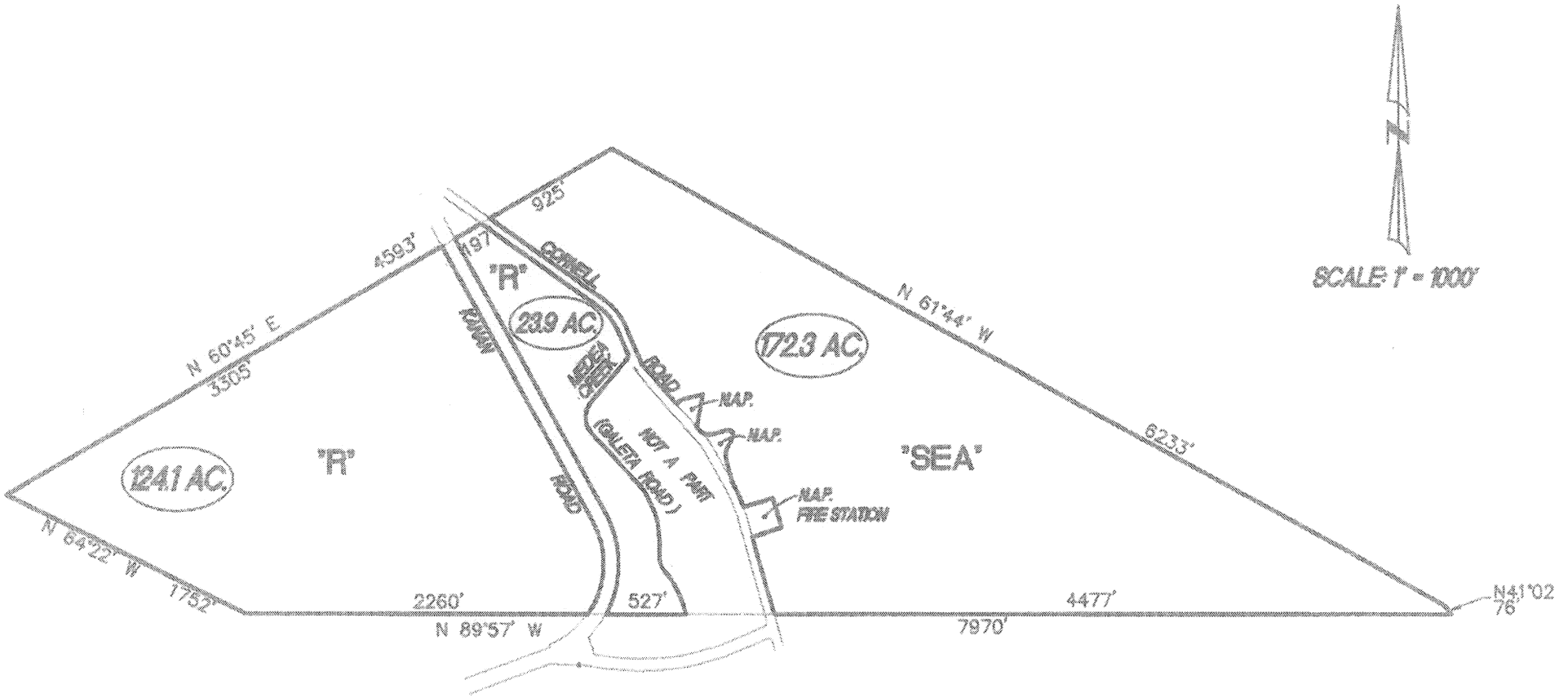
---

1 *Los Angeles County General Plan, Page 4.*

2 *Initial Study. Los Angeles County General Plan Comprehensive Update and Amendment, (undated), Page 13.*

3 *Ibid, Page III-24.*

# LOS ANGELES COUNTY GENERAL PLAN
# LAND USE POLICY EXHIBIT




## LOS ANGELES COUNTY LAND USE DESIGNATIONS:

| | | |
|---|---|---|
| "R" | – NON-URBAN | 148.0 AC |
| "SEA" | – SIGNIFICANT ECOLOGICAL AREA | 172.3 AC |

Source: Wagner Pacific Inc.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.K-1
Los Angeles County General Plan

- Significant Ecological Area (SEA): A total of 172.3 acres of the project site are located within the Las Virgenes Significant Ecological Area (SEA No. 6). SEAs are designated as Special Management Areas on the Los Angeles County Land Use Policy Map. According to the General Plan,

  > *This designation identifies lands having important biological resources. This classification, as set forth in the Conservation and Open Space Element, includes habitats of rare and endangered species, sites with critical fish and wildlife values, relatively undisturbed areas of typical natural habitat and regionally scarce biotic resources. The intent of the Countywide General Plan is to preserve and enhance, to the extent possible, SEAs for the benefit of present and future County residents.*
  >
  > *In addition to regulated scientific study and limited recreational activities, a range of more intensive uses may be permitted within SEAs where it can be demonstrated by a detailed biotic survey and project analysis that the proposed development is highly compatible with the resource values present...*[4]

  Applicants for private development within an SEA must comply with the review procedures for an SEA (i.e., Conditional Use Permit). Conditional Use Permit No. 97-178 filed in part for the SEA for this project.)

**Santa Monica Mountains North Area Plan**

Land use designations for the project site are established by the Santa Monica Mountains North Area Plan (SMMNAP), which the Los Angeles County Board of Supervisors adopted on October 24, 2000. This plan replaces the Malibu/Santa Monica Mountains Interim Area Plan in its entirety, and is a component of the Los Angeles County General Plan.

The adoption of the SMMNAP by the County of Los Angeles fulfilled the County's obligation to prepare an updated plan for the unincorporated portions of the County that is encompassed by the multi-jurisdictional Ventura Freeway Corridor Areawide Plan. The Ventura Freeway Corridor Areawide Plan represents the collaborative efforts of the County of Los Angeles; the Cities of Agoura Hills, Calabasas, and Westlake Village; the Las Virgenes Unified School District; the Las Virgenes Municipal Water District; and the National Park Service. The Corridor Plan will be consulted as a policy statement by Los Angeles County staff and decision makers for background information about the

---

[5] *Ibid, Page III-28.*

region as well as for general guidance as to the issues, resources and activities which were identified by the communities in the Corridor as being of special concern."[5]

***Existing Land Use Designations***

Land use designations, for the project site, under the SMMNAP are presented in Figure III.K-2. The Land Use Policy Map of the SMMNAP would permit a maximum of 108 dwelling units on the project site. However, the ultimate maximum number of dwelling units permitted on this site, or any other site within the jurisdiction of the Plan, could be reduced by a variety of factors including various provisions of the Los Angeles County Subdivision and Planning Code. For the project site, the application of the slope density formula reduces the maximum number of dwelling units on the project site to 81 units.

The SMMNAP designates the subject property as follows:

- *Mountain Lands 5 (N5)* - 172.3 acres of the project site located east of Cornell Road are designated N5. Lands designated *Mountain Lands* consist of "those rolling hillside areas, steep slopes, and isolated remote mountain lands with difficult or no access...Permitted uses include low density single family housing...Clustering of uses may be beneficial in helping to reduce disturbances to the topographic, vegetative and biological settings.[6] Development within this designation shall not exceed a maximum density of one dwelling unit per 5 acres (1 du/5ac). The Plan would permit up to 34 dwelling units on the project site's 172.3 acres located east of Cornell Road; and

- *Rural Residential 2 (N2)* - 148 acres of the project site located west of Cornell Road are designated N2. "The Rural Residential land use category is intended to provide for low density single family detached housing in a setting consistent with the Area Plan's definition of 'rural' area.[7] Development within this designation shall not exceed a maximum density of one dwelling unit per 2 acres - 1 du/2ac). The Plan would permit up to 74 dwelling units on the project site's 148 acres located west of Cornell Road.

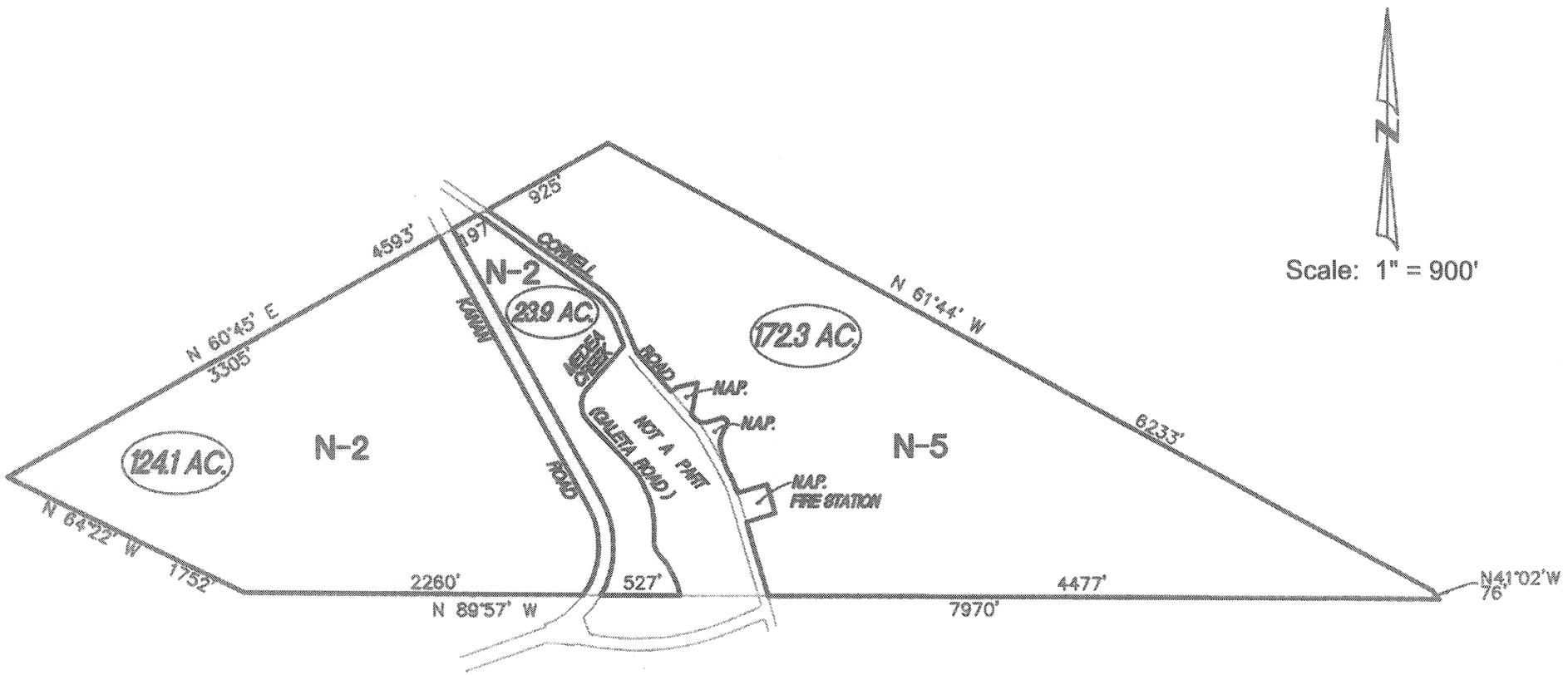
---

[5] *Santa Monica Mountains North Area Plan October 24, 2000, Pages 6-7*

[6] *Ibid., Pages VI-57*

[7] *"A way of life characterized by living in a non-urban or agricultural environment at low densities without typical urban services. Equestrian and agrarian activities are often appropriate in such areas. Urban services and facilities not normally found in rural areas include curbs, gutters and sidewalks; street lighting, landscaping and traffic signalization; mass public transit; and commercial facilities dependent on large consumer volumes such as regional shopping centers." Ibid., Page G-88.*

# SANTA MONICA MOUNTAINS NORTH AREA PLAN



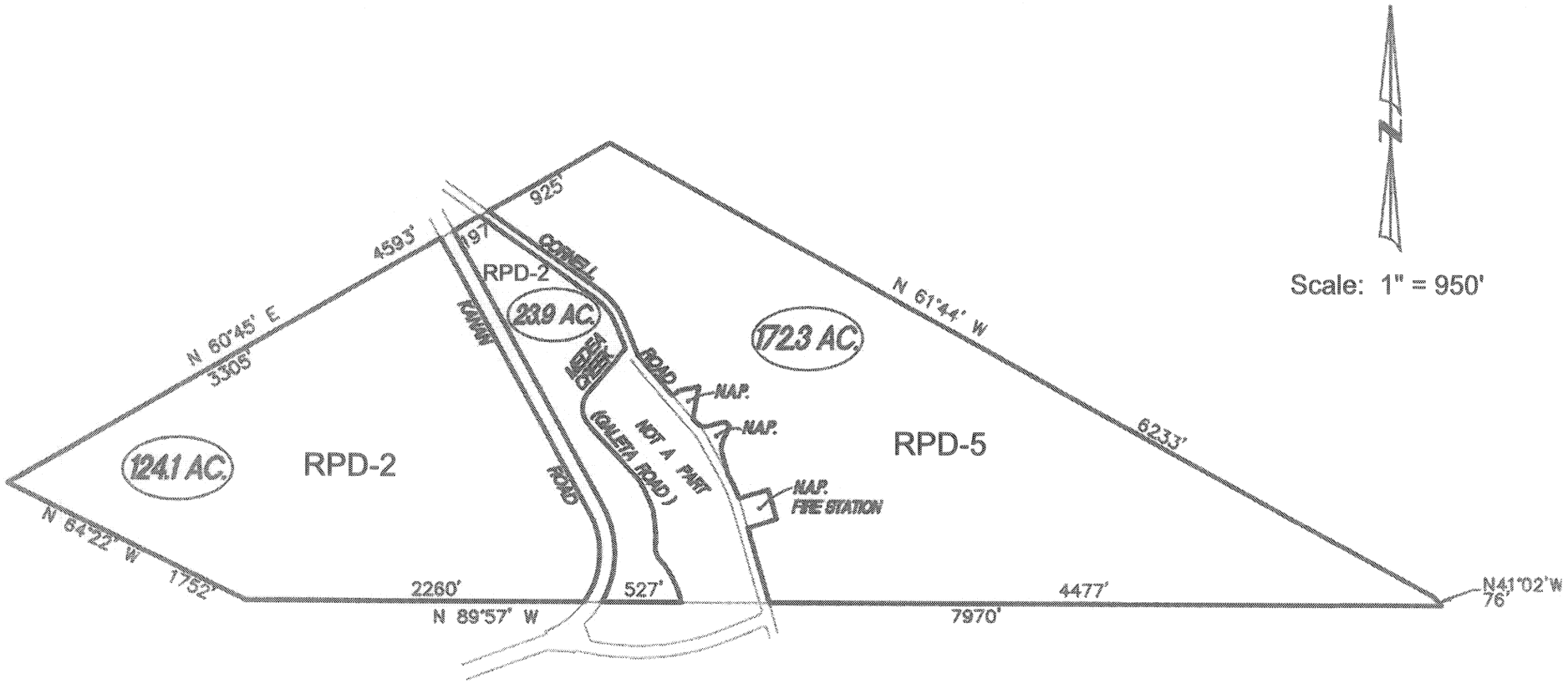

## AREA DESIGNATIONS:

| | | |
|---|---|---|
| N-5 | MOUNTAINOUS (1DU/5AC MAXIMUM) | 172.3 AC. |
| N-2 | RURAL RESIDENTIAL (1DU/2AC MAXIMUM) | 148.0 AC. |
| | TOTAL | 320.3 AC. |

Source: Wagner Pacific, Inc.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.K-2
Santa Monica Mountains North Area Plan




## ZONING DESIGNATION:

RPD-2 - 0.5/DU
RPD-5 - 0.2/DU

## TOTAL AREA

172.3 Acres
148.0 Acres

Source: Wagner Pacific, Inc.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.K-3
Existing Zoning

- *Significant Ecological Areas* - 172.3 acres of the project site that is located east of Cornell Road are designated as Significant Ecological Area - Las Virgenes SEA No. 6. This SEA designation and the criteria for development of land in SEA areas are set by the Los Angeles County General Plan, and have been discussed in greater detail in this Section above (see Los Angeles County General Plan, Existing Land Use Designations). An application for a discretionary review of the proposed project, in the context of the SEA, has been submitted for this project under Conditional Use Permit No. 97-178.

**Los Angeles County Zoning Code**

***Existing Zoning***

Existing County of Los Angeles zoning of the subject property is presented in Figure III.K-3, Existing Zoning Map, and consists of:

- RPD-5 - 0.2/DU (Residential Planned Development, One Dwelling Unit Per Five Acres Maximum): Approximately 172.3 acres of the site are zoned RPD-5 - 0.2/DU. The boundaries of the portion of the project site designated in the RPD-5 - 0.2/DU zone are co-terminus with the portions of the site designated N5 (one dwelling unit per five acres) in the SMMNAP. According to the Los Angeles County Zoning Code, the Residential Planned Development Zone permits any use permitted in the R-1 (Single Family Residential) Zone within the confines of the maximum number of single family home units that can be approved under the specific zone designation (i.e., one dwelling unit per 5 acres). Projects proposed for development within the RPD zone, however, are subject to discretionary review by the Regional Planning Commission through the Conditional Use Permit. According to the Los Angeles Zoning Code, "It is the intent of planned residential development to promote residential amenities beyond those expected under conventional development, to achieve greater flexibility in design, to encourage well planned neighborhoods through creative and imaginative planning as a unit, and to provide for appropriate use of land which is sufficiently unique in its physical characteristics or other circumstances to warrant special methods of development. In further implementing planned development, it is further declared the purpose of this section is to reduce developmental problems in hillside areas and to preserve areas of natural scenic beauty through the

encouragement of integrated planning, integrated design and unified control of development.[8] An application for a discretionary review of the proposed project, in the context of the purpose and development standards of the RPD zone, has been submitted for this project under Conditional Use Permit No. 97-178.

- RPD-2 - 0.5/DU (Residential Planned Development - One Dwelling Unit Per Two Acres Maximum) - Approximately 148 acres of the site are zoned RPD-2 - 0.5/DU. The boundaries of the portions of the project site designated in the RPD-2 - 0.5/DU zone are co-terminus with the portions of the site designated N2 (one dwelling unit per two acres) in the Santa Monica Mountains North Area Plan. The description of the RPD - 5 - 0.2/DU, above, describes in detail the intent and application of the RPD zone.

**Santa Monica Mountains National Recreation Area - Land Protection Plan/General Management Plan**

The project site is not located within the boundaries of the Santa Monica Mountains National Recreation Area (SMMNRA) and is not proposed for any form of public lands acquisition (see Figure II-6).[9] Nevertheless the following brief discussion is provided for informational purposes:

The Santa Monica Mountains Land Protection Plan prepared by the U.S. Department of the Interior/National Park Service in June of 1984 and updated in January of 1987, identifies the lands needed to protect significant natural, cultural, and scenic resources and to provide for public recreational and educational use of the SMMNRA. Each of these uses is predicated on the dedication and/or ownership of the properties, within the boundaries of the SMMNRA, as either public or private open space; they do not apply to land that is in private ownership with land uses other than open space (e.g., housing). The Addendum to the Plan prepared in 1987 includes revisions made to the 1984 Plan, which clarify and further justify proposed federal interests in land under the Plan's jurisdiction. The Plan also establishes priorities for protection of these resources.

---

8 *Los Angeles County Zoning Code, Sections 22.20.460.A and B, RPD, Residential Planned Development Zone.*

9 *The project site is, however, located within the Santa Monica Mountain Zone which comprises 75,000 acres of land beyond the boundaries of the Santa Monica Mountains National Recreation Area. The SMMZ was established in 1978, and includes the entire Santa Monica Mountains range (urban and rural areas alike). Local and state agencies are responsible for land use regulations within this zone, but the National Park Service retains, by law, reviewing authority on projects involving federal funds, permits, or licenses that may affect the recreation area. Santa Monica Mountains National Recreation Area Final General Management Plan/Environmental Impact Statement, July 2002, page 20.*

The Final General Management Plan/Environmental Impact Statement, dated July 2002, is a document prepared for the SMMNRA by the National Park Service. It describes and analyzes five alternatives for managing the SMMNRA. The approved plan will provide a framework for managing development, visitation, and natural and cultural resources for the next 15 to 20 years.[10] As is the case in the aforementioned Land Protection Plan, each of the alternatives described by the GMP/EIS plan is predicated on the dedication and/or ownership of the properties, within the boundaries of the SMMNRA, as either public or private open space; they do not apply to land that is in private ownership with land uses other than open space (e.g., housing).

The alternatives discussed in the plan were the: Recreation, Education, Preservation, No Action and the Preferred Alternatives. Using the Preferred Alternative as a guide for the future management of the SMMNRA, eighty percent of the Recreation Area would be designated for preservation, fifteen percent would be designated for moderate intensity use, and five percent would be designated for high intensity use.[11] It should be noted that in this alternative, the subject property is designated as "Land Recommended for Boundary Study."

The General Management Plan designates lands beyond the current Santa Monica Mountains National Recreation Area legislative boundary as "Land Recommended for Boundary Study" in recognition of areas contiguous with the existing park that are of scenic, natural, cultural and recreational value. Studies of these areas may lead to inclusion in the SMMNRA, which would take an act of Congress. When projects are located within a recommended boundary study, the National Park Service takes an advisory role when evaluating land use types and intensities.

**Santa Monica Mountains Comprehensive Plan**

The Santa Monica Mountains Comprehensive Plan, prepared by the Santa Monica Mountains Comprehensive Planning Commission, and adopted February 1979, is a "comprehensive and specific plan which is capable of implementation for the conservation and development (of the mountains) consistent with the preservation of resource." The intent of the Plan is to guide resource agencies, local jurisdictions, and developers in the Santa Monica Mountains on decisions regarding development and resource management. Neither the Comprehensive Plan nor the Commission has regulatory power over land use within Los Angeles County.

The Comprehensive Planning Commission was replaced by the Santa Monica Mountains Conservancy, a state agency whose mission it is to acquire lands within the Santa Monica Mountains for open space

---

10 *Ibid, pre-Table of Content.*

11 *Ibid, page 6*

and environmental preservation purposes." The Plan designated the project site for residential uses as follows:

- *1 Dwelling unit/20 to 40 Acres*: Approximately 291.4 acres, comprised of the 124.1 acre portion of the site west of Kanan Road and the 172.3 portion of the site east of Cornell Road are designated for 1 Dwelling unit/20 to 40 Acres. This designation would permit from 14.57 to 7.29 dwelling units on those portions of the site.

- *1 Dwelling unit/1 to 4.9 Acres*: Approximately 28.9 acres comprised of the portion of the site located east of Kanan Road and west of Cornell Road are designated for 1 Dwelling unit/ 1 to 4.9 Acres. This designation would permit from 28.9 to 5.9 dwelling units on that portion of the site.

The designations, as proposed in the Comprehensive Plan, would have permitted the maximum development of 43 dwelling units on the site.

**Existing Community Land Use**

The project site is located within an area that is surrounded by privately owned land, with the exception of County Fire Station No. 65 located on the east side of Cornell Road.

The 320.3-acre subject property encompasses two private single family residences, constructed on parcels that are approximately 10,000 square feet or smaller on the east side of Cornell Road, as well as County Fire Station No. 65. The project site also encompasses private legal lots, that average 15,000 square feet, located between Cornell Road (west side) and Caleta Road. While not all of the parcels have been developed, and in a few instances homes appear to have been constructed across property lines, a single family home can be built on each of these legal lots. It should also be noted that some of the homes in the aforementioned area have been constructed in the floodway of Medea Creek.

The west side of Cornell Road between Caleta Road and Silver Creek Road is developed with residential parcels typically a third of an acre or greater in size, and typically do not include commonly held private open space. While the densities in this area may in places be considered rural, the nature of much of the residential development, itself, is more similar to what is observed in local suburban areas. Many properties, although large, have extensive areas of impervious surfaces, including areas occupied by the footprints of large homes, driveways, swimming pools and decks, on-site parking areas, tennis courts and/or basketball courts (with and without lights), etc.. Exotic species seem to dominate the landscaping of these residentially developed properties.

Silver Creek Road, located southerly of the site and bifurcated by Medea Creek, is developed with single family residences on both its north and south sides. Property owned by the Los Angeles County

Flood Control District is also located along that road. Parcels in this area approximate one acre or greater in size, some having portions that are designated as flood hazard/building restricted areas. Southerly and adjacent to these parcels is the area known as Medea Valley, which is accessed in part from Kanan Road (via Castle View Drive) and Cornell Road (via West Wagon Road.) Single family homes are developed on parcels that are, for the most part, slightly less or more than an acre. The aforementioned developments are readily visible to travelers on both Cornell and Kanan Roads, as they move in a northerly or southerly direction past the subject property.

Separated by a major ridgeline on or near the project site's south boundary east of Cornell Road is the gated development known as Cornell Road Ranchos. Access to this development is via Wagon Road. This single-family development is characterized by large parcels of five acres and greater in size, stretching back approximately one-quarter mile from Cornell Road in a man-made valley. The visibility of development in that area is very limited from surrounding areas including Cornell and Kanan Road, and the subject property.

There is no ridgeline development in the areas described above. Development occurs along the major roads, in canyons and valleys, and along hillsides. Some of the homes described above have private recreation facilities (e.g., pools and tennis courts). Some properties, particularly in the Wagon Road area, have equestrian facilities (e.g., corrals, riding rings). Neither common open space areas nor clustering of residential units, however, appear to be a feature of the existing residential developments in the area.

With the exception of the Cornell Road Ranchos, much of the existing development in the area has a suburban or semi-rural ambiance (even though more rural development may exist beyond public views). This impression comes from views of walled and gated homes fronted by large parking areas. The impression is further supported by the fact that most of these development areas were extensively graded (cut and filled) to provide large pads and improved roads to accommodate these residences. Outdoor lighting in the aforementioned areas is limited to that installed and used by individual homeowners (i.e., no streetlights).

Most of the residential development in the area has been constructed without sidewalks, curbs, or gutters, and street lighting is generally absent. Lighted tennis courts, however, are evident in the area (see also Section III.H, Light and Glare, for a further discussion of street lighting).

## ENVIRONMENTAL IMPACTS

### Thresholds of Significance

In accordance with Appendix G to the State CEQA Guidelines, the proposed project could have a significant environmental impact if it would:

- Physically divide an established community
- Conflict with any applicable land use plan, policy or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purposes of avoiding or mitigating an environmental effect.
- Conflict with any applicable habitat conservation plan or natural community conservation plan.

### Los Angeles County General Plan

The proposed project is consistent with the Los Angeles County General Plan land use designations, and does not require nor propose an amendment to the County General Plan.

### Santa Monica Mountains North Area Plan

As discussed above, the proposed project is consistent with the Santa Monica Mountains North Area Plan land use designations, and does not require nor propose an amendment to the Santa Monica Mountains North Area Plan.

The Santa Monica Mountains North Area Plan includes other goals, objectives and policies that are generally applicable to the proposed project. The policies implement the goals and objectives that are outlined in the Community Plan. Consistency of the proposed project with applicable policies is addressed in Table III.K-1.

**Table III.K-1**

**Santa Monica Mountains North Area Plan Consistency Analysis**

| Goal/Policy | | Project (w/ Mitigations) Consistency/Comments |
|---|---|---|
| **Biological Resources Goals and Policies (Goal IV-1): An environment that retains significant animal and plant communities in an undisturbed condition and provides the highest possible protection for Significant Ecological Areas.** | | |
| IV-1 | Place primary emphasis on the preservation of large, unbroken blocks of natural open space and wildlife habitat areas, and protect the integrity of habitat linkages. As part of this emphasis, support programs for the purchase of open space, reduce grading and the need for vegetation clearance, and develop design criteria for the construction of highways and other infrastructure improvements that meets environmentally-sensitive standards similar to those imposed on new development. | **Inconsistent.**–The project site contains a total of 320 acres of natural habitat, of which 271.7 acres will be preserved as permanent open space (85 percent of the project site). The portion of open space to the east of Cornell will not be unbroken due to the linear projection of lots 66 through 74. Nevertheless, the proposed project is not expected to sever the existing habitat connections to open space south of the subject property and will not directly impact the Liberty Canyon wildlife movement corridor to the east. The project as proposed will require approximately 427,000 cubic yards of fill material, which will be balanced onsite. |
| IV-3b | Require development designs that protect and preserve significant, viable habitat areas and habitat linkages/wildlife corridors in their natural condition within designated habitat areas of rare, threatened or endangered species, prohibit disturbance of protected biotic resources. | **Inconsistent.** The proposed project would result in direct and potential indirect impacts to three (3) of the fourteen (14) sensitive plant species known to be present on the project site. Development of the proposed project would result in the elimination of the on-site population of Santa Monica Mountains dudleya (Federal Threatened), 18% of the on-site Lyon's pentachaeta (Federal and State Endangered), and losses to oak trees and woodland habitat (0.6 acres of the 3.3 acres of non-contiguous habitat , or 18% of total such habitat area). |
| IV-3c | Within the following areas, preserve plant communities which contribute to animal reproduction (including plant diversity, faunal resting areas, foraging areas and food sources), or when unavoidable, require the replacement of such plant communities so as not to result in a measurable reduction in the reproductive capacity of sensitive plant and animal communities:<br>• riparian areas and wetlands subject to state and federal regulations (such as blue line streams on USGS quadrangles);<br>• riparian woodlands, Sycamore-alder riparian woodlands, | **Substantial conformance.** The proposed project will preserve the 5.06 acres of on-site oak woodland and riparian habitat, and impacts will be mitigated, including replacement. No direct impacts are anticipated to Medea Creek, to the willow riparian forest in Medea Creek or to wetlands. The proposed project will comply with all state and federal agency regulations, including on-site or off-site restoration.<br><br>The proposed project will not affect the existing habitat connections to open space south of the subject property and will not directly impact the Liberty |

| | | |
|---|---|---|
| | Southern and Valley oak woodlands and California walnut woodlands; and<br>• animal habitat linkages/wildlife corridors. | Canyon wildlife movement corridor to the east. |
| IV-3d | Where plants listed as 'special' or 'of concern' by the California Natural Diversity Database (California Department of Fish and Game) are present, require that new development not result in a net reduction in the number of these plants. Maintenance of the number of plants may be accomplished by replacement in another part of the site or off-site in the appropriate habitat, with a monitoring program approved through the Conditional Use Permit process – which includes a requirement for at least one season of successful reproduction (i.e., producing seed that germinates the following year, assuming the weather co-operates) before any disturbance of the existing habitat is permitted – to ensure the survival of the species in the replacement habitat. | **Inconsistent.** The proposed project would result in direct and potential indirect impacts to three (3) of the fourteen (14) sensitive plant species known to be present on the project site. These include the *Lyon's pentachaeta,* the Santa Monica Mountains dudleya, and the unlisted, linear-leaved goldenbush.<br><br>Development has been sited to avoid direct impacts to the majority of on-site populations of the federally and state endangered Lyon's pentachaeta. Mitigation for losses to Santa Monica Mountains dudleya will involve the experimental translocation of individuals to new locations and collection of seeds to be germinated and established at suitable locations. Because successful relocations of Santa Monica Mountains dudleya are unknown, it is concluded that the project is inconsistent with this policy until successful relocations are well documented. |
| IV-6 | Buffer zones shall be established adjacent to areas of important preserved biological resources, including natural streams and drainages. Such buffer zones shall be of an adequate width so as to protect biological resources from grading and construction activities, as well as from the long-term use of adjacent lands, the need for extensive lighting, and increased erosion and runoff, including winter stream flows. Permitted land modification activities within preservation and buffer areas are to be limited to those that are consistent with the maintenance of the reproductive capacity of the identified resource. The land uses and design of development adjacent to a vegetative preservation area, as well as activities within the designated buffer area, shall not disturb natural drainage patterns to the point that preserved vegetative resources receive too much or too little water to permit their ongoing health. | **Inconsistent.** Areas of the proposed project will displace the existing on-site population of Santa Monica Mountains dudleya and some populations of Lyon's pentachaeta. A portion of the remaining Lyon's pentachaeta population will be affected by brush clearance activities.<br><br>Although no buildings will be constructed within the required 50-foot flood hazard setback from the Medea Creek capital flood plain boundary, this setback is not considered a sufficient buffer to protect natural streams and drainages. |
| IV-7 | New landscape planting adjacent to areas of preserved biological resources shall not include invasive, non-indigenous species which | **Consistent.** The proposed project will utilize native plant species to blend the development area with the natural character of the site and the surrounding |

| | | |
|---|---|---|
| | could supplant native species and negatively impact the preserved resource. References to the appropriate species for landscape use in the area – such as the lists available from the California Native Plant Society, Santa Monica Mountains Chapter – should be used. | environment. |
| IV-8 | Required preservation of natural biological habitats and habitat linkages should be ensured by land dedications in fee title wherever appropriate to a public agency which has the authority to manage, preserve or enhance park and open space lands. Secondary alternatives are conservation easement, granting of development rights or other similar protection measures. Financing for the long-term maintenance of such areas should be assured through endowments or other public funding mechanisms. | **Consistent.** 271.7 acres of permanent open space, which is considered natural habitat, will be dedicated to an appropriate public agency. |
| **Hillside Management Goals and Policies (Goal IV-2): Hillside areas that retain their natural topographic character and native vegetative communities, and hillside development which protects public health and safety, minimizes erosion and development-induced runoff, and protects ridgelines and views from key public lands, trails and scenic highways.** | | |
| IV-9 | New development projects shall be designed to protect significant natural features, and to minimize the amount of grading. | **Substantial conformance.** Although the project intends to concentrate its development on slopes of less than 25%, the total amount of grading is estimated to be 498,421 c.y. of cut and 427,483 c.y. of fill. Development encroaching onto Ladyface Mountain and in the drainage south of the fire station will impact these significant natural features. |
| IV-10 | In areas over 25% slope, use special architectural and design techniques to ensure that development conforms to the natural land form, such as split level foundations, variable setbacks, and structures which blend with the natural environment in shape, materials and colors. | **Consistent.** Split-level pads and variable setbacks will be used in steeper terrain. Contour grading techniques will be used to minimize the alteration of natural landforms and to smoothly transition manufactured slopes back into natural contours of adjacent land. |
| IV-11 | Grading in areas over 50% slope shall be severely limited to those circumstance where clustering is not possible and when demonstrated safety hazards and environmental degradation – including increased erosion, runoff and watershed impacts and aesthetic feature will be avoided. | **Inconsistent.** Private and future Street "E," with a length of 1,236 feet, requires grading in an area with over 50% slope. Lots toward the end of Street "E" are not clustered, and end Lots 66 and 67 are served by this extension, resulting in manufactured slopes approximately 140 feet above Lot 66 and 125 feet below Lot 67 as well as a 21-foot high retaining wall. |

| | | |
|---|---|---|
| IV-12 | Discourage the use of manufactured slopes in excess of ten vertical feet (10'), and require that any such slopes be land-form graded ("Land-form grading" is a contour grading method which creates manufactures slopes that have curves and varying slope ratios in the horizontal and vertical planes, and are thus designed to simulate the appearance of surrounding natural terrain). | **Inconsistent.** Retaining walls and cut and fill slopes will exceed ten vertical feet (10'). Retaining walls with heights in excess of 10' are located behind lots 2 and 3, 15, 16, 24, 26, 27, 12, 71-74, and below lots 67, 68, and below the Street "F" cul-de-sac |
| IV-13 | Ensure that the overall project design/layout of hillside developments adapts to the natural hillside topography and protects ridgelines and natural-appearing views from surrounding vantage points such as highways, parkways and overlooks. Overall, emphasize fitting the project into its hillside setting rather than altering the hillside to fit the project. | **Substantial conformance.** The proposed project concentrates development on the gentler slopes to minimize grading and visibility; employs contour grading techniques to smoothly transition manufactured slopes back into the natural contours of adjacent undisturbed areas, and uses landscaping and highway setbacks to buffer views of development areas. Residential lots have been sited to prevent structures from breaking ridgeline views as seen from Kanan and Cornell Roads. However, development on Ladyface Mountain will impact the natural-appearing view of this area.<br><br>The closest parkland to the project site and the only parkland that has views of the project site is Paramount Ranch. While the higher slopes of Ladyface Mountain and the ridgeline on the east side of Cornell Road may be visible from some limited mountainous slopes, there are no views of the development area from Paramount Ranch. There is also intervening residential development adjacent to Paramount Ranch that is visible from the park.<br><br>There are no public overlooks from which project development will be visible. |
| IV-16 | Encourage clustering of dwellings in hillside areas as a means of decreasing the overall need for grading, thereby preserving the natural appearance of the hillside and maximizing the amount of open space. Do not, however, permit clustering of dwellings to result in urban character subdivisions within rural areas. Require that steep lands that are preserved in open space be permanently protected through, preferably open space dedications to a public agency which has the authority to manage, preserve or enhance park and open space lands, wherever appropriate, or secondarily, | **Inconsistent.** The linear character of development east of Cornell Road is inconsistent with clustering.<br><br>271.7 acres of the subject property are proposed as permanent open space, to be dedicated to an appropriate public agency. |

| | | |
|---|---|---|
| | effective easements. | |
| **Water Quality Goals and Policies (Goal IV-3): Riparian corridors, watersheds and downstream coastal resources which are protected to the greatest extent possible from the impacts of development and from recreational activities of residents and users of the jurisdiction under the North Area Plan.** | | |
| IV-18 | New development shall be sited and designed to minimize the increase in run-off into the watershed that results in downstream pollution and increased size of flood plains in coastal lagoons – as required by Regional Water Quality Control Board and Los Angeles County regulations. All new development shall incorporate best management practices (BMPs) – as updated periodically with new technology – to reduce runoff and erosion, such as the following:<br>• Minimizing new road and driveway lengths and the size of parking areas and other paved surfaces;<br>• Maximizing the use of pervious surfaces wherever public safety and adequate access can be achieved;<br>• Designing residential streets for minimum required pavement widths consistent with the provision of adequate, safe access;<br>• Using permeable materials for private sidewalks, driveways, and interior roadways;<br>• Promoting the use of shared driveways;<br>• Using efficient irrigation practices such as drip irrigation, installing timers, etc.<br>• Using reclaimed water and graywater on site wherever possible, and;<br>• Providing stormwater retention basins on site wherever possible. | **Substantial Conformance.** The proposed project will incorporate BMPs to reduce runoff and erosion. The BMPs include Treatment Control BMPs (e.g. storm drain clarifiers/filtration inlets, desilting basin, energy diffusers); Source Control BMPs (e.g., site design & landscape planning, storm drain signage, street sweeping).<br><br>The master landscape maintenance plan and homeowners' association CC&Rs would operate in accordance with recommendations in the TMDLs to include landscape design to minimize the construction of impermeable surfaces and to reduce dry weather runoff from irrigation overspray.<br><br>The Master Landscape Plan would provide planting and maintenance guidance for common landscaped areas and undeveloped building pads. The Plan will specify procedures for the proper use, handling, and storage of pesticides, herbicides and insecticides to prevent the mixing of such materials with storm waters. The landscape maintenance plan specifies the use of native species all landscaping and vegetation and will utilize only non-toxic, easily degradable pesticides, herbicides, and fertilizers approved by State and local agencies. NO use of pesticides, herbicides, and fertilizers will be permitted within designated open space areas. Plants which are relatively pest resistant and which require a minimum of added nutrients will be selected as landscaping materials.<br><br>Plants which are relatively pest resistant and which require a minimum of added nutrients will be selected as landscaping materials. In addition, the project design does not include provisions for horse-keeping. Consequently, runoff from the project site can be expected to be a minor source of nutrients to the Lower Medea Creek subwatershed and to the Malibu Creek watershed as a whole. The proposed project is in accordance with the recommendations of the "TMDLs for Nutrients," for the Malibu Creek watershed and would be |

| | | |
|---|---|---|
| | | consistent with Section 303(d) of the Clean Water Act.) |
| IV-19 | All new development shall incorporate BMPs which promote infiltration of stormwater – on-site wherever possible – where it will not exacerbate geologic hazards. Examples of BMPs include:<br>• Using pervious materials for parking lots, sidewalks, etc.<br>• Installation of bioswales, French drains, cisterns, etc.<br>• Directing rooftop and parking lot runoff to landscaped areas<br>• Constructing subregional infiltration basin, wet ponds or constructed wetlands. | **Consistent.** The project will incorporate BMPs that promote the infiltration of storm water. The project will construct on-site storm drains, terrace drains and swales, a debris basin, and a separate storm drain system to convey 50-year storm runoff from the developed areas of the project to proposed urban storm water runoff clarifiers, where first flush cleansing of urban runoff can be achieved. All storm water flows will be returned to natural drainage courses before discharging from the project site.<br>Use of pervious paving materials in driveways and other hardscape areas is also an option to the builder/developer to increase infiltration. |
| IV-22 | New development projects shall include strict provisions to prevent sediments and silts from entering and impacting storm drains and waterways or create the need for channelization of streams, including the incorporation of pervious surfaces and other BMPs. | **Consistent.** Erosion control devises will be installed around all construction areas to insure that sediment is trapped and properly removed. BMPs will be employed to reduce runoff and erosion. |
| IV-23 | Prohibit the non-emergency storage of construction or landslide materials on the shoulders of roads adjacent to stream banks. | **Consistent.** The proposed project will prohibit the non-emergency storage of construction or landslide materials on the shoulders of roads adjacent to stream banks |
| IV-24 | Limit clearing and grading of native vegetation to the minimum amount needed to create a building pad, allow access, and provide fire protection. | **Substantial conformance.** With the exception of landscaping lots, clearing and grading of native vegetation are limited to the minimum amount needed to create building pads, allow access, and provide fire protection. |
| IV-25 | Require appropriate – typically native – ground cover to prevent erosion in areas cleared of brush. Vegetate slopes with plants that establish deep root systems and have low water requirements. | **Consistent.** With the exception of portions of the fuel modification areas, the project site will be landscaped with native vegetation. Fuel modification and landscape plans are to be reviewed by the DRP and FD prior to the issuance of grading permits. |
| IV-26 | Manage the location of livestock, including horses, and the collection of/disposal of animal wastes in a manner that is protective of streams and natural drainages and the quality of water runoff and ground water. | **Inconsistent.** Although the project is not designed as a horse keeping community, an on-site 20-foot trail easement is proposed in the general vicinity of Medea Creek/Caleta Road for riding and hiking purposes for the Zuma Ridge Trail, which may have negative impacts on water quality. |
| IV-27 | Require setbacks from natural streams and drainages which are adequate to protect them from development impacts in high storm flows. | **Consistent.** No buildings will be constructed within a 50-foot flood hazard from the Medea Creek capital flood plain boundary. |

| | | |
|---|---|---|
| IV-28 | Establish retention basins to diminish the impacts of stormwater runoff and to provide for greater groundwater recharge. | **Consistent.** The proposed project will incorporate on-site storm drains, terrace drains and swales, and a debris basin. All storm water flows will be returned to natural drainage courses before discharging from the project site. |
| **Scenic Resources Goals and Policies (Goal IV-4): An environment that retains the area's scenic beauty, including specific natural features and broad vistas.** | | |
| IV-29 | Maintain and enhance the visual quality of vistas along the unincorporated portions of identified scenic routes and routes with scenic qualities, including:<br>*Scenic routes:*<br>• Ventura Freeway<br>• Mulholland Highway<br>• Las Virgenes Road<br>• Kanan-Dume Road<br>*Routes with scenic qualities:*<br>• Agoura Road<br>• Chesebro Road<br>• Cornell Road<br>• Old Topanga Canyon Road<br>• Topanga Canyon Boulevard | **Inconsistent.** Lots and roadways are situated to avoid breaking views of major ridgelines. However, the development proposed west of the Kanan Road will result in a partial loss of views of Ladyface Mountain from Kanan Road, which is considered an important visual resource in this area. |
| IV-31 | Preserve in their natural state, topographic features of high scenic value, including significant canyon walls, geological formations, creeks, and waterfalls. Preserve the area's hillside backdrop in its present state to the extent feasible and control the design of development on ridgelines so that it will not interfere with significant scenic views. | **Inconsistent.** The development of the site is highly constrained due to the presence of sensitive plants (Lyon's pentachaeta, Santa Monica Mountains dudleya, etc.), drainage courses (including Medea Creek), and significant scenic resources (including Ladyface mountain.) Most of the residential units proposed are situated on the west side of Kanan Road, affecting views of Ladyface Mountain. |
| IV-32 | Ensure that any alteration of the natural landscape from earth-moving activity, as well as new development, blends with the existing terrain of the site and surroundings. | **Substantial conformance.** The proposed project employs contour grading techniques to smoothly transition manufactured slopes back into the natural contours of adjacent undisturbed areas. A landscaping plan utilizing native vegetation is required. |
| IV-33 | Limit the extent of vegetation clearance to that required for fire safety, and where possible, site structures so that no vegetation clearance encroaches on adjacent properties; consider the size and | **Inconsistent.** Portions of the development will require fuel modification on neighboring properties to the northwest of Kanan Road. |

| | | |
|---|---|---|
| | siting of development to reduce the level of vegetation clearance needed. | |
| IV-34 | Design and site buildings, including clustered development, so as to be compatible and harmonious with the surrounding environment. For example, designs should incorporate mature stands of trees, rock outcroppings, streams, lakes, and reservoirs and other such natural features. | **Substantial conformance.** The proposed project will use native plant species and local building materials (e.g. local stone for entrance monuments, etc.) in order to blend the development area with the natural character of the site and the surrounding environment. Development on slopes of Ladyface Mountain is a scenic impact. Of the 136 oak trees covered by the Oak Tree Ordinance, the project would save 116 trees, or 85 percent. Of the 310.1 undisturbed acres of natural features, the project would preserve 271.7 acres or 88 percent. |
| **Open Space Goals and Policies (Goal IV-5): An integrated open space system that preserves valuable natural resources, manages water resources, and provides a variety of recreational opportunities, and a coordinated program among federal, state, and local agencies for the consistent management of public lands.** | | |
| IV-39 | In the conditions of approval setting aside lands for open space, clearly define the land's intended open space functions, and ensure that the management and use of such lands are consistent with those intended open space functions. | **Consistent.** The project conditions of approval setting aside the 271.7 acres proposed for preservation as natural habitat will clearly define that the land is to function as natural habitat and will ensure that the management and use of the open space are consistent with the intended function of the open space as natural habitat. |
| IV-40 | Treat all parcels within existing subdivisions that were set aside as open space, as permanent deed-restricted open space on the Land Use Policy Map. | **Consistent.** Out of the total 320 acres, 271.7 acres of open space will be preserved permanently and future subdivision of it would be prohibited. |
| IV-41 | Preserve open space corridors which physically link open space and habitat areas to populated areas as well as to complementary recreational uses. | **Substantial Conformance.** Out of the total 320 acres, 271.7 acres of open space will be preserved as open space. The portion of open space to the east of Cornell will not be unbroken due to the linear projection of lots 66 through 74. Nevertheless, the proposed project is not expected to sever the existing habitat connections to open space south of the subject property and will not directly impact the Liberty Canyon wildlife movement corridor to the east.<br><br>The project site is located one-quarter mile from the U.S. 101 Freeway. Residential subdivisions are located to the south of the project site, including Cornell Road Ranchos, Wagon Road Ranchos and Medea Valley Estates. In |

| | | |
|---|---|---|
| | | addition, the project site surrounds existing single-family residences located along the east and west sides of Cornell Road and there is also residential development along Cornell Road, south of the project site and along Silver Creek Road. Large-scale commercial developments are proposed immediately to the north of the project site, including the 93,000 square-foot Creekside Retail Center and the Ted Moore-Agoura Village project, which include 20,000 square feet of office space, 21,000 square feet of retail space, 14,000 square feet of restaurant space, 10,000 square feet of daycare facility and 95 apartment units.<br><br>The project proposes to dedicate to the County of Los Angeles a 20-foot easement in the vicinity of Medea Creek/Caleta Road for riding and hiking purposes for the Zuma Ridge Trail will physically link open space and habitat areas to populated areas as well as to complementary recreational uses. |
| IV-42 | Structure the pattern and character of planned development so as to be compatible with and complementary to open space resources. | **Consistent.** Structure and character of the project are designed to be compatible with and complementary to open space resources. |
| IV-43 | Diverse methods, including fee simple acquisition, purchase of development rights, regulations, and/or development density and clustering incentives, are appropriate where open space preservation is achieved. | **Consistent.** The 271.7 acres of permanent open space will be dedicated to an appropriate conservation agency. |
| IV-44 | Implement adequate legal protections to ensure the preservation in perpetuity of designated open space lands. | **Consistent.** The 271.7 acres of permanent open space will be dedicated to an appropriate conservation agency. |
| IV-45 | Preserve open space that protects streams and watersheds, prevents vegetation clearance or grading of steep areas and helps reduce development-induced runoff. | **Inconsistent.** Some lots will be situated on the boundary of the 50-foot flood hazard from the Medea Creek capital flood plain boundary to meet minimum building requirements with no buffer. Since watersheds are not defined by setbacks, this minimum setback is not sufficient for stream and watersheds protection. Development of the project requires grading into hillside area.<br><br>The grading operation for the project will include approximately 0.38 acres of grading in areas of steep terrain (over 50% slope). |
| **Recreation and Trails Goals and Policies (Goal IV-6): A variety of recreational opportunities affording a range of experiences from wilderness to** | | |

| | | |
|---|---|---|
| **parks, including public trail access to public lands – all in a manner that respects natural resources.** | | |
| IV-47 | Locate recreational facilities of all types in a manner consistent with the environmental values of the land, taking special care to avoid impacts on riparian areas. Regulate the intensity, timing, types and location of recreational facilities to protect resources and established neighborhoods and rural communities. | **Inconsistent.** The project proposes a 20-foot trail easement in the general vicinity of Medea Creek/Caleta Road for riding and hiking purposes, consistent with the Los Angeles County Department of Parks and Recreation's proposed alignment for the Zuma Ridge Trail. The ultimate trail alignment will be designed specifically to avoid all riparian areas. Actual trail construction improvements will be determined by the Los Angeles County Department of Parks and Recreation. |
| IV-48a | Encourage opportunities for dispersed recreation when consistent with environmental values and protection of natural resources. Provide passive recreational experiences within undeveloped natural areas consistent with the tolerance, capabilities and character of such areas. Natural areas with limited road access and the presence of sensitive environmental resources are to be limited to activities that are keyed to solitude and appreciation of the values of the natural environment. | **Consistent.** The project proposes a 20-foot trail easement in the general vicinity of Medea Creek/Caleta Road for riding and hiking purposes, consistent with the Los Angeles County Department of Parks and Recreation's proposed alignment for the Zuma Ridge Trail. The ultimate trail alignment will be designed specifically to avoid all riparian areas. Actual trail construction improvements will be determined by the Los Angeles County Department of Parks and Recreation. |
| IV-48b | Within natural areas intended for the protection of vegetative, habitat and scenic resources, regulate use to preserve resource values. | **Inconsistent.** The project as designed will result in significant impacts in biological and visual resources. |
| IV-48c | Expand trail systems for hiking, mountain bike riding, and equestrian uses to accommodate projected demands, following an evaluation that has considered such impacts as environmental quality and the safety and enjoyment of all users. Multi-use trails should be constructed wherever feasible. The trails system should provide linkages between major regional trails and area recreational facilities. | **Substantial conformance.** The project proposes an on-site 20-foot trail easement in the general vicinity of Medea Creek/Caleta Road for riding and hiking purposes, consistent with the Los Angeles County Department of Parks and Recreation's proposed alignment for the Zuma Ridge Trail. The ultimate trail alignment will be designed specifically to avoid all riparian areas. Actual trail construction improvements will be determined by the Los Angeles County Department of Parks and Recreation. . |
| IV-48d | Ensure that the routing and improvement of trails facilities is compatible with the resource values of adjacent lands. | **Consistent.** The project proposes a 20-foot trail easement in the general vicinity of Medea Creek/Caleta Road for riding and hiking purposes, consistent with the Los Angeles County Department of Parks and Recreation's proposed alignment for the Zuma Ridge Trail. The ultimate trail alignment will be designed specifically to avoid all riparian areas. Actual trail construction |

| | | |
|---|---|---|
| | | improvements will be determined by the Los Angeles County Department of Parks and Recreation. |
| IV-48e | Relocate or redesign any trails that may exist within environmentally sensitive areas to enhance their use and protect natural resources. | **Inconsistent.** The project proposes 20-foot trail easement in the general vicinity of Medea Creek/Caleta Road for riding and hiking purposes, consistent with the Los Angeles County Department of Parks and Recreation's proposed alignment for the Zuma Ridge Trail. The ultimate trail alignment will be designed specifically to avoid all riparian areas. Actual trail construction improvements will be determined by the Los Angeles County Department of Parks and Recreation. |
| IV-48f | Prohibit motorized off-road vehicle use on the area trails system; restrict mountain bike use to those trails specifically designed and identified for such use and where conflict with equestrian and hiking uses would not occur. | **Consistent.** The project does not propose off-road vehicle or mountain bike uses. |
| IV-48g | Preserve public rights by obtaining trail easements where the public has acquired these rights through use, or where the trail is depicted on Map 4 (Hiking Trails) of this plan. | **Consistent.** The project proposes a 20-foot trail easement in the general vicinity of Medea Creek/Caleta Road for riding and hiking purposes, consistent with the Los Angeles County Department of Parks and Recreation's proposed alignment for the Zuma Ridge Trail. The ultimate trail alignment will be designed specifically to avoid all riparian areas. Actual trail construction improvements will be determined by the Los Angeles County Department of Parks and Recreation. |
| IV-49b | Ensure that an appropriate portion of preserved open space areas is devoted to recreational facilities, consistent with the mountains area environment. At the periphery of areas devoted to dispersed recreation provide the following:<br>• provide sufficient staging areas along trails-including space to accommodate horse trailers, where needed and appropriate-to ensure adequate access to the trails system,<br>• campgrounds, roadside rests and picnic areas in areas of suitable land capability,<br>• visitor information, and day use facilities. | **Consistent.** The project preserves a total of 271.7 acres of permanent open space and proposes a 20-foot trail easement in the general vicinity of Medea Creek/Caleta Road for riding and hiking purposes, consistent with the Los Angeles County Department of Parks and Recreation's proposed alignment for the Zuma Ridge Trail. The ultimate trail alignment will be designed specifically to avoid all riparian areas. Actual trail construction improvements will be determined by the Los Angeles County Department of Parks and Recreation.<br><br>The project does not propose to provide staging areas for trails, campgrounds, roadside rests, public picnic areas, visitor information or day use facilities. |
| **Seismic Hazards Goals and Policies (Goal V-1): Minimal risks to life and property, and minimal economic and social dislocation related to potential** | | |

| | | |
|---|---|---|
| **seismic activity.** | | |
| V-1 | In areas susceptible to potential seismically induced landslides, emphasize avoidance of development over the implementation of engineering solutions. | **Consistent.** The proposed project site is not within any Alquist-Priolo Special Studies Zone. No active or potentially active faults have been mapped on or near the project site. Portions of the project site are susceptible to seismically-induced landslides. Implementation of the recommendations contained in the project's geotechnical reports and compliance with the Los Angeles County Building Code would reduce slope stability impacts to a less than significant level. |
| V-2 | When creating an engineered slope, use land-form grading techniques to recreate a natural hillside appearance. | **Consistent.** The proposed project employs contour grading techniques to smoothly transition manufactured slopes back into the natural contours of adjacent undisturbed areas. |
| **Flood Hazards Goals and Policies (Goal V-2): A built environment and flood control system that manages floodwaters so as to minimize the potential for loss of life, physical injury , property damage, economic loss and social dislocation.** | | |
| V-3 | Prohibit construction which could impede storm flows within floodways, and avoid development within potential flood hazard areas. | **Consistent.** No buildings will be constructed within a 50-foot flood hazard from the Medea Creek capital flood plain boundary. |
| V-4 | Retain stream courses in their natural state, along with development designs that respect natural flow. | **Consistent.** The main onsite drainage, Medea Creek, will not be impacted by the project. On the Cornell Road side, the project was redesigned to avoid drainages. |
| **Fire Hazards Goals and Policies (Goal V-3): A built environment designed to minimize the potential for loss of life, physical injury, property damage, economic loss and social dislocation due to wildland fires.** | | |
| V-10 | In fire hazardous areas with significant biological resources, place a higher priority on avoiding development than on designing mitigation measures that would require intrusive fuel breaks and fuel modification areas to protect new development. | **Inconsistent.** Development is proposed within and near areas of significant biological resources, and fuel modification will require additional vegetation clearance. |
| V-11 | Minimize potential biological impacts of fuel modification activities by limiting modification areas to those necessary to protect existing development, whenever feasible, and by emphasizing the planting of fire resistant vegetation that is compatible with the area's natural vegetative habitats, rather than the use of open fuel breaks. | **Consistent.** The vegetation surrounding the development will be thinned to meet the FD's requirements. The project will plant fire resistant vegetation where appropriate. |
| V-12 | Require that new development within areas subject to wildland | **Inconsistent.** The project site is located approximately one-quarter mile south |

| | | |
|---|---|---|
| | fires be designed and sited in a manner which minimizes the threat of loss from wildland fires (located low on slopes, or set well back from tops of slopes) while avoiding the need for massive vegetation clearance; such designs should facilitate access by firefighting equipment and provide adequate evacuation routes for residents. Improvements shall be set back from public lands where possible – particularly where required vegetation clearance may affect the public lands. However, massive vegetation clearance should be avoided where safety is not an issue in order to protect the area's natural environment. | of U.S. 101 (Ventura Freeway), and is concentrated low on slopes, along the Kanan Road and Cornell Road. The project will extend vegetation clearance into the neighboring property, which is not public lands. Roads and lots are proposed within fire hazards area east of Cornell Road. |
| V-13 | Prohibit development in areas with insufficient water pressure, fire flows or other accepted means for adequate fire protection unless such safety measures can be reliably provided. | **Consistent.** According to the LVMWD, all units and hydrants in the proposed project will receive water at pressures which meet district standards. All units within the proposed project would have service connections below an elevation of 1076 feet and may experience maximum pressures greater than 80 psi. All of the units would require individual pressure reducing valves ahead of the building plumbing to limit pressures to not more than 80 psi, as required by the Uniform Plumbing Code.<br><br>The proposed project's water service improvements would also serve fire safety needs. Fire hydrants and fire flows would be provided as required by the Fire Department. Also, water main improvements would be provided as determined necessary by the Las Virgenes Municipal Water District. Street widths and cul-de-sac radii would be sized, per Fire Department requirements, to accommodate fire-fighting equipment. |
| V-16 | Require that structures within rural areas be located along a paved, all-weather, and publicly accessible road in a manner which avoids the need for firefighters to move equipment on to private properties without adequate turnaround space. If a structure cannot feasibly be sited in this manner, require that interior fire sprinklers be installed. | **Consistent.** All structures will be located along paved, all-weather, and accessible roads. The residential enclave to the east of Cornell Road will be private and gated, but will be accessible to emergency service personnel. All access will provide adequate turnaround space with a minimum of 32–foot minimum radius per the County of Los Angeles design standards. |
| **Geologic Hazards Goals and Policies (Goal V-4): A built environment designed and engineered to minimize the potential for loss of life, physical injury, property damage, economic loss and social dislocation due to non-seismic induced geological phenomena.** | | |

| | | |
|---|---|---|
| V-17 | Emphasize avoidance of geologic hazards. Where avoidance is infeasible or undesirable, ensure through available engineering solutions that buildings will not be adversely impacted by geologic hazards. | **Consistent.** Proposed structures will not be located in areas of geologic hazards. |
| V-18 | Restrict structures for human occupation in areas characterized by unstable geologic conditions, and limit grading of slopes in excess of 25 percent. | **Substantial Conformance.** Proposed structures will not be located in areas characterized by unstable geologic conditions. However, approximately 7.84 acres with slopes in excess of 25 percent will be graded. |
| V-19 | Limit in-field discretion to modify approved grading plans to that which is necessary to deal with truly unanticipated conditions, and to protect public health and safety. Ensure that in-field grading modifications do not create significant adverse impacts that were not previously addressed during the project's environmental clearance. | **Consistent.** All grading will be conducted in accordance with the Los Angeles County Grading Ordinance, the requirements of the Los Angeles County Department of Public Works, and the specific recommendations and requirements of the comprehensive geotechnical report(s). Grading activities will be in substantial conformance with the grading plan approved by the Los Angeles County Department of Public Works. |
| **Noise Goals and Policies (Goal V-7): Lands and land uses which are sensitive to noise-inducing, but not limited to, wildlife habitats and public lands that are shielded from excessive mobile and stationary noise.** | | |
| V-24 | Require development projects to demonstrate that: 1) no adverse noise effects on the adjacent uses will occur from the project, and 2) no adverse effects will occur on the project from adjacent influences, if the project is proposed within a 60dBS or greater CNEL noise contour and would create or impact noise sensitive land uses. | **Substantial Conformance.** Off-site noise impacts derived from traffic pattern changes will be less than significant. On-site noise impacts from vehicle noise on Kanan Road would be reduced to less than significant levels with mitigation. Short-term construction-related noise impacts will be significant. |
| V-25 | Use the policies within the Noise Element of the General Plan to determine the compatibility of land use when evaluating proposed new land uses within the jurisdiction of the North Area Plan. That document shall be used as a guide to assist in determining the acceptability of noise for existing or proposed land uses. Where a new land use is proposed to be located adjacent to a use which has a different noise standard, prohibit the new use from creating noise levels in excess of the adjacent use's standard at the property line. | **Consistent.** Off-site noise impacts derived from traffic pattern changes will be less than significant. On-site noise impacts from vehicle noise on Kanan Road would be reduced to less than significant levels with mitigation. Short-term construction-related noise impacts will be significant. |
| V-26 | Prohibit, wherever feasible, new development from increasing ambient noise levels by more than 3 dB(A) within any natural area or sensitive land use.? | **Consistent.** The maximum increase of ambient noise levels caused by operational conditions of the proposed project would be 0.2 dB(A). |

| | | |
|---|---|---|
| **Development and Open Space Goals and Policies (Goal VI-1): An integrated open space system that preserves valuable natural resources, manages water resources, and provides a variety of recreational opportunities, and a coordinated program among federal, state, and local agencies for the consistent management of public lands.** | | |
| VI-2 | Direct the location and intensity of new land uses in conformance with the environmental threshold carrying capacities as outlined in Figure 1 ~ 'Environmental Thresholds and Appropriate Levels of Development.'<br>Figure 1 provides that, in areas whose environmental values are such that any alteration of the natural landscape would create significant environmental impacts, including lands that have previously been committed to open space as environmental mitigation in order to protect environmental resources, and have any of the following characteristics, land use should be limited to environmental education, research, and enhancement programs. Development, including developed recreation, is generally inappropriate:<br>• Slopes in excess of 50 percent.<br>• Primary ridgelines forming a skyline.<br>• Habitat areas of rare, threatened, or endangered species identified by federal or state law.<br>• Archaeological sites that have been preserved in place as mitigation for a previous development project.<br>• Flood ways as defined by Federal Emergency Management Agency (FEMA). | **Inconsistent.** The proposed project will eliminate the onsite population of Santa Monica Mountains dudleya and will displace approximately 18% of the on-site population of Lyon's pentachaeta.<br><br>Approximately 0.38 acres of slopes over 50% are proposed to be graded. |
| VI-3 | Preserve areas of diverse topography with large areas unbroken by man-made slopes, and long-range vistas of open ridgelines and mountain slopes which defined the extent of urban and suburban development. | **Substantial Conformance.** 271.7 acres of the subject property are proposed as permanent open space, to be dedicated to an appropriate public agency.<br><br>The project site is located one-quarter mile from the U.S. 101 Freeway. Residential subdivisions are located to the south of the project site, including Cornell Road Ranchos, Wagon Road Ranchos and Medea Valley Estates. In addition, the project site surrounds existing single-family residences located along the east and west sides of Cornell Road and there is also residential |

| | | |
|---|---|---|
| | | development along Cornell Road, south of the project site and along Silver Creek Road. Large-scale commercial developments are proposed immediately to the north of the project site, including the 93,000 square-foot Creekside Retail Center and the Ted Moore-Agoura Village project, which include 20,000 square feet of office space, 21,000 square feet of retail space, 14,000 square feet of restaurant space, 10,000 square feet of daycare facility and 95 apartment units.<br><br>Ladyface Mountain will continue to stand 1,120 vertical feet above the project, and will be visible from most areas in the vicinity of the project. There will be a partial loss of views of Ladyface Mountain from Kanan Road, which is considered an important scenic resource in the area, due to development proposed west of Kanan Road. |
| VI-4 | Preserve compact, well-defined suburban areas which are bounded by rural residential and natural open space. Commercial and office areas should be of low design. | **Substantial Conformance.** The project site is located one-quarter mile from the U.S. 101 Freeway. Residential subdivisions are located to the south of the project site, including Cornell Road Ranchos, Wagon Road Ranchos and Medea Valley Estates. In addition, the project site surrounds existing single-family residences located along the east and west sides of Cornell Road and there is also residential development along Cornell Road, south of the project site and along Silver Creek Road. Large-scale commercial developments are proposed immediately to the north of the project site, including the 93,000 square-foot Creekside Retail Center and the Ted Moore-Agoura Village project, which include 20,000 square feet of office space, 21,000 square feet of retail space, 14,000 square feet of restaurant space, 10,000 square feet of daycare facility and 95 apartment units.<br><br>271.7 acres of the subject property are proposed as permanent open space, to be dedicated to an appropriate public agency. |
| VI-5 | Limit ridgeline development occurring on hillside and mountainous areas, following closely those North Area Plan policies and standards designed to protect the resources and views of these areas. | **Inconsistent.** The proposed project sites residential development on gentler slopes located near existing roadways and development. However, grading and placement of lots on the slopes of Ladyface Mountain will impact views in this area. |
| VI-6 | Preserve open space corridors that link major open spaces areas, | **Substantial conformance.** The proposed project sites residential development |

| | | |
|---|---|---|
| | natural habitats and public park lands to activity centers, other open space, and scenic routes to help define suburban form and beautify the region. | near existing roadways, and leaves open corridors for wildlife movement along Medea Creek and in the northern portion of the property. |
| **Pattern and Character of Development Goals and Policies (Goal VI-2): A pattern of rural land use that complements the largely suburban development of adjacent cities, with a resulting design that promotes social, environmental, and economic well-being in a manner that reflects the environmental carrying capacity of the land within the North Area Plan's jurisdiction and its unique characteristics.** | | |
| VI-13 | In addition to maintaining low densities within rural areas, require the provision/protection of the features that contribute to rural character and rural lifestyles, including, but not limited to:<br>• retention of the natural terrain and vegetation in hillsides areas, rather than creation of large, flat pads with non-native landscaping;<br>• natural features and streams which are protected by adequate development setbacks;<br>• large lots that offer the ambiance of privacy and solitude in a rural setting;<br>• rural road sections without curbs, gutters, or sidewalks;<br>• opportunities for the keeping of horses;<br>• limited or no commercial development;<br>• irregular placement of dwellings on individual lots and variations in designs that result in custom-look housing;<br>• an impressive physical setting, comprised of large areas of natural hillside, oak woodlands, canyons, riparian areas, and wildlife; and a visual character dominated by natural environmental features;<br>• preservation of openness and scenic beauty of the community's natural environment;<br>• preservation of significant environmental features, and incorporation of open spaces into the fabric of new developments;<br>• a lack of night lighting and existence of dark skies, enhancing the visibility of stars at night; | **Substantial conformance.** Project grading follows the natural terrain and development is limited to 15 percent of the project site. The project site has been designed to avoid the site's steeper slopes, in most instances. In steeper terrain, split-level pads are proposed to minimize grading (Lots 66-76); Lots 63-65 are not split-level.<br><br>The drainage south of the fire station east of Cornell Road will be impacted by the access road to this portion of the development.<br><br>Development of the slopes of Ladyface Mountain will impact the scenic qualities of this area.<br><br>The project meets requirements for setbacks from flood hazards and natural areas.<br><br>The proposed project offers large lots offering the ambiance of privacy and solitude in a rural setting. The development east of Cornell Road is proposed to be a private, gated community. Rural standards will be applied: no sidewalks, curbs or gutters would be provided, and street lighting would be kept at the minimum required for safety purposes.<br><br>Proposed residences located in enclaves west of Cornell Road will range in size from 10,020 to 33,977 square foot lots with building pads ranging from 6,200 to 21,545 square feet. The project proponent will request a waiver from standard Los Angeles County Subdivision Code requirements for these residential enclaves, so that rural standards will be maintained. |

| | | |
|---|---|---|
| | • hillside residential development designs which feature natural, rather than manmade forms, and which emphasize the use of custom foundations in place of slab construction;<br>• size and height of houses and flat pad areas in hillside settings to those which are consistent with character of the natural setting; limit such features as tennis courts and paved areas; and<br>• protection of hilltops and ridgelines by prohibition of grading in those areas, unless required to provide or improve safety access to existing improvements. | The proposed project will construct curvilinear roads that follow site topography. Large building pads and lots are proposed to avoid the common tract appearance of large houses squeezed onto smaller lots. To preserve the existing semi-rural and rural character of Kanan Road and Cornell Road, the proposed project will maintain a setback of 50 feet from future right-of-way for all but three residential lots along those roadways.<br>The project proposes no commercial development.<br><br>Future homes have not been designed; therefore, for analytical purposes only, this EIR assumes an average house size of 5,000 square feet and a maximum height of 45 feet. Building footprints will be depicted on CUP Exhibit "A".<br><br>Rural standards require street lighting only to the point necessary to protect the public safety. In addition, project mitigation is designed to preserve dark skies, and project impacts concerning preservation of dark skies are reduced to less-than-significant levels.<br><br>Building footprints will be depicted on the Exhibit "A" to the conditional use permit. |
| Figure 1 (p. VI-48) | In areas with significant environmental features where a certain degree of development may be tolerated without significant environmental impacts (provided that development is appropriately clustered), where those areas have either (1) hillsides with a slope between 25 and 50 percent; (2) susceptibility to high water runoff; (3) habitat areas of "candidate" species, riparian and wetland vegetative communities, woodland areas, and areas that provide connectivity between core wildlife habitats where few linkage options are available; or (4) lands mapped as part of a County Significant Ecological Area (SEA) or a SEA buffer area (although development may be clustered into the least sensitive portions of the site in order to preserve and protect natural features), land use should be limited to undeveloped and developed recreation and low | **Inconsistent.** The project site is highly constrained and the degree of development currently proposed will result in significant impacts in biological and visual resources.<br><br>Portion of the proposed development is located within County designated SEA and is determined to be not compatible with the SEA criteria. |

| | | |
|---|---|---|
| | intensity rural use.<br><br>While the primary use of these lands is preservation of environmental resources, development may be clustered into the least sensitive portions of the site in order to preserve and protect natural features. Water and runoff should be prevented, and natural drainages protected, based upon State and local standards and regulations. Development should not be the visually dominant feature when viewed from designated scenic corridors. Manufactured open space areas, such as manmade slopes and introduced landscaping, should blend in with the surrounding natural environment. | The linear character of development east of Cornell Road is inconsistent with clustering. |
| VI-14 | In addition to considering the mass and scale of the entire development or structure, restrict the total square footage of and grading for rural structures to a size that maintains the area's open character, and is compatible with the open space characteristics of the surrounding hillsides. Within antiquated subdivisions, limit the mass, scale, and total square footage of structures and grading to a size which is compatible with the size of the parcel upon which the structure is placed so as to avoid a crowded appearance in the built environment. | **Substantial Conformance.** The project limits development to 15 percent of the project site and will preserve 271.7 acres as permanent open space.<br><br>The project site is located one-quarter mile from the U.S. 101 Freeway. Residential subdivisions are located to the south of the project site, including Cornell Road Ranchos, Wagon Road Ranchos and Medea Valley Estates. In addition, the project site surrounds existing single-family residences located along the east and west sides of Cornell Road and there is also residential development along Cornell Road, south of the project site and along Silver Creek Road. Large-scale commercial developments are proposed immediately to the north of the project site, including the 93,000 square-foot Creekside Retail Center and the Ted Moore-Agoura Village project, which include 20,000 square feet of office space, 21,000 square feet of retail space, 14,000 square feet of restaurant space, 10,000 square feet of daycare facility and 95 apartment units.<br><br>Ladyface Mountain will continue to stand 1,120 vertical feet above the project, and will be visible from most areas in the vicinity of the project. There will be a partial loss of views of Ladyface Mountain from Kanan Road, which is considered an important scenic resource in the area, due to development proposed west of Kanan Road. |

| | | |
|---|---|---|
| | | The proposed project offers large lots offering the ambiance of privacy and solitude in a rural setting. The development east of Cornell Road is proposed to be a private, gated community. Rural standards will be applied: no sidewalks, curbs or gutters would be provided, and street lighting would be kept at the minimum required for safety purposes.<br>Proposed residences located in enclaves west of Cornell Road will range in size from 10,020 to 33,977 square foot lots with building pads ranging from 6,200 to 21,545 square feet. The project proponent will request a waiver from standard Los Angeles County Subdivision Code requirements for these residential enclaves, so that rural standards will be maintained.<br><br>The proposed project will construct curvilinear roads that follow site topography. Large building pads and lots are proposed to avoid the common tract appearance of large houses squeezed onto smaller lots. To preserve the existing semi-rural and rural character of Kanan Road and Cornell Road, the proposed project will maintain a setback of 50 feet from future right-of-way for all but three residential lots along those roadways.<br>The project proposes no commercial development.<br><br>Rural standards require street lighting only to the point necessary to protet the public safety. In addition, project mitigation is designed to preserve dark skies, and project impacts concerning preservation of dark skies are reduced to less-than-significant levels. |
| VI-15 | Require that new developments use architectural and siting features which are compatible with adjacent existing and planned developments, and include the following:<br>• compatibility with prominent design features existing in the immediate area (i.e. trees, landforms, historic landmarks);<br>• compatibility with existing structures;<br>• the natural environment (i.e. hillsides, washes, native vegetation, community landscaping). | **Inconsistent.** The proposed project will impact 9.8 acres of CDFG jurisdictional area and includes development on hills of Ladyface Mountain. Ladyface Mountain will continue to stand 1,120 vertical feet above the project, and will be visible from most areas in the vicinity of the project. There will be a partial loss of views of Ladyface Mountain from Kanan Road, which is considered an important scenic resource in the area, due to development proposed west of Kanan Road.<br><br>The project site is located one-quarter mile from the U.S. 101 Freeway. |

| | | |
|---|---|---|
| | | Residential subdivisions are located to the south of the project site, including Cornell Road Ranchos, Wagon Road Ranchos and Medea Valley Estates. In addition, the project site surrounds existing single-family residences located along the east and west sides of Cornell Road and there is also residential development along Cornell Road, south of the project site and along Silver Creek Road. Large-scale commercial developments are proposed immediately to the north of the project site, including the 93,000 square-foot Creekside Retail Center and the Ted Moore-Agoura Village project, which include 20,000 square feet of office space, 21,000 square feet of retail space, 14,000 square feet of restaurant space, 10,000 square feet of daycare facility and 95 apartment units.<br><br>The proposed project offers large lots offering the ambiance of privacy and solitude in a rural setting. The development east of Cornell Road is proposed to be a private, gated community. Rural standards will be applied: no sidewalks, curbs or gutters would be provided, and street lighting would be kept at the minimum required for safety purposes.<br>Proposed residences located in enclaves west of Cornell Road will range in size from 10,020 to 33,977 square foot lots with building pads ranging from 6,200 to 21,545 square feet. The project proponent will request a waiver from standard Los Angeles County Subdivision Code requirements for these residential enclaves, so that rural standards will be maintained.<br><br>The proposed project will construct curvilinear roads that follow site topography. Large building pads and lots are proposed to avoid the common tract appearance of large houses squeezed onto smaller lots. To preserve the existing semi-rural and rural character of Kanan Road and Cornell Road, the proposed project will maintain a setback of 50 feet from future right-of-way for all but three residential lots along those roadways.<br>The project proposes no commercial development.<br><br>Rural standards require street lighting only to the point necessary to protet the public safety. In addition, project mitigation is designed to preserve dark skies, |

| | | |
|---|---|---|
| | | and project impacts concerning preservation of dark skies are reduced to less-than-significant levels.<br><br>Opportunities for on-site wildlife corridors and habitat linkages with adjacent open space will remain a feature of the project site. |
| VI-16 | Require that new developments provide a transition to surrounding development, for example:<br><br>• the bulk of new structures should relate to the area's environment and to the adjacent development;<br><br>• setbacks from streets and adjacent properties should relate to the scale of the structure, the function of the street, and the intended character of the development, and should encourage pedestrian scale and uses; and<br><br>multi-story residential structures should be made less imposing by using exterior profile designs that complement the contours of the land; variance from height restrictions shall generally not be permitted. | **Substantial Conformance.** The project clusters development on 15 percent of the project site, near existing highways, to preserve the sensitive environmental resources onsite.<br><br>The project site is located one-quarter mile from the U.S. 101 Freeway. Residential subdivisions are located to the south of the project site, including Cornell Road Ranchos, Wagon Road Ranchos and Medea Valley Estates. In addition, the project site surrounds existing single-family residences located along the east and west sides of Cornell Road and there is also residential development along Cornell Road, south of the project site and along Silver Creek Road. Large-scale commercial developments are proposed immediately to the north of the project site, including the 93,000 square-foot Creekside Retail Center and the Ted Moore-Agoura Village project, which include 20,000 square feet of office space, 21,000 square feet of retail space, 14,000 square feet of restaurant space, 10,000 square feet of daycare facility and 95 apartment units.<br><br>Curvilinear roads following the lay of the land are proposed, rather than rectilinear roads forced into the land. Residential lots within view of public roadways and nearby residences have been sited to minimize straight rows of houses. The linear character of development east of Cornell Road is inconsistent with clustering.<br><br>Large building pads are proposed. Rural standards will be applied to residences proposed on the Cornell Road side: no sidewalks, curbs or gutters will be provided and street lighting will be kept at the minimum required for safety purposes. Proposed residences on the Kanan Road side will be smaller, but still |

| | | |
|---|---|---|
| | | large (ranching from 10,200 to 25,800 square feet), and the project will request that rural standards also be allowed in this area.<br><br>The project proposes 81 units on 320 acres, or 1 dwelling unit per 3.95 acres.<br><br>The project will have setbacks of 50 feet from future right-of-way for all by three residential lots along Kanan Road and Cornell Road. |
| VI-17 | Require that new developments respect viewsheds and view corridors from public parks and trails, and scenic highways to the greatest extent possible:<br>• preserve and enhance, where applicable, view corridors from public roadways, which are oriented toward existing or proposed community amenities, such as parks, open space, or natural features.<br>• encourage variations in architectural and landscape components which provide visual interest, but do not create abrupt changes or cause discord in the overall character of the neighborhood; and<br>• provide appropriate transitions between different projects and suburban/rural land use transitions, including the provision of buffer areas, landscaping and other similar treatments (e.g. hedges, fences, berms, or landscaped open space). In providing transitions and buffers, physical barriers should not be placed in areas needed for drainage or wildlife movement (e.g. across stream courses or habitat linkages). | **Inconsistent.** The proposed development will impact views of Ladyface Mountain from Kanan Road, although large area of open space will be preserved.<br><br>Appropriate native vegetation will be utilized in landscaping to maintain overall character of the area, although<br><br>Project location and the development provides sufficient buffer from surrounding development from land use perspective. However, the overall design of the project does not provide sufficient buffer to drainage courses.<br><br>The proposed project will not affect the existing habitat connections to open space south of the subject property and will not directly impact the Liberty Canyon wildlife movement corridor to the east. |
| VI-18 | Encourage the clustering of development, particularly within lands designated either *Mountain Land* or *Rural Residential*, for the primary purpose of preserving significant environmental features; clustered development should meet the following criteria:<br>• the resulting design shall provide public amenities beyond basic County requirements – such as improved circulation for the surrounding area, additional dedicated open space, additional | **Substantial Conformance.** The extension of development east of Cornell Road is not of a clustered nature and will impact a population of Lyon's pentachaeta directly through construction activities and through brush clearance activities.<br>The proposed project will preserve 271.7 acres of permanent open space, substantial coast live oaks and the majority of the on-site *Lyon's pentachaeta*, and will provide a 20-foot dedicated easement for riding and hiking purposes |

| | | |
|---|---|---|
| | protection of environmentally sensitive lands and/or the construction/maintenance of public facilities such as trails;<br>• the resulting intensity and character of the developed area which results from clustering is compatible with – although not necessarily identical in appearance to – the surrounding environment;<br>• lot coverage and pad grading should not result in an urban appearance, and side yard setbacks should prevent an urban-subdivision appearance;<br>• the result of clustering development shall yield a more desirable and environmentally sensitive development plan and preserve significant environmental features; and<br>• areas preserved in open space as the result of clustering are to be restricted to open space in perpetuity. | for the Zuma Ridge Trail.<br><br>The Project maintains the continuation of existing settlement patterns. It is located a quarter mile from the 101 Freeway and is surrounded by residential development on both its northerly and southerly boundaries. In addition, the Project proposes lot sizes compatible with surrounding residential development.<br><br>The proposed project preserves the area's semi-rural ambiance by maintaining development setbacks from public roadways, minimizing or avoiding street lighting, and avoiding construction of sidewalks, curbs and gutters.<br>Areas preserved as open space will be restricted to open space in perpetuity. |
| VI-20 | Limit structure heights in suburban and rural areas to ensure compatibility of new development with the respective characteristics of the surrounding settings and sites. | **Consistent.** Characteristics of the proposed project is consistent with existing housing in the immediate area, the height of the proposed homes will not exceed the maximum allowable building height of 45 feet. |
| VI-21 | Encourage siting of developments to include setbacks that protect public lands, streams, scenic features, views, and other natural features and that maximize open space areas; project density and structure placement shall be consistent with the need to minimize vegetation clearance for fire protection. | **Inconsistent.** The project uses landscaping and highway setbacks to buffer views of development areas. Residential lots have been sited to prevent structures from breaking ridgeline views as seen from Kanan and Cornell Roads.<br><br>No buildings will be constructed within a 50-foot flood hazard from the Medea Creek capital flood plain boundary. Some lots will be situated on the boundary of the 50-foot flood hazard from the Medea Creek capital flood plain boundary to meet minimum building requirements with no buffer. Since watersheds are not defined by setbacks, this minimum setback is not sufficient for stream and watersheds protection.<br><br>The project meets requirements for setbacks from flood hazards and natural areas.<br><br>The project proposes 81 units on 320 acres, or 1 dwelling unit per 3.95 acres. |

| | | |
|---|---|---|
| | | The proposed density is consistent with the applicable land use designations of the North Area Plan for the property. |
| VI-22 | Preserve and enhance low density residential neighborhoods through enforcement of land use and development standards, ensuring that adjacent non-residential uses are buffered from residences in harmonious and attractive ways. | **Consistent.** The project will preserve the surrounding 271.7 acres as permanent open space. These open space lands will be dedicated to an appropriate public agency and will buffer the proposed residences from encroaching commercial development. |
| VI-23 | Retain existing rural communities primarily for low intensity, rural residential uses. | **Consistent.** The project proposes 81 units on 320 acres, or 1 dwelling unit per 3.95 acres. The proposed density is consistent with the applicable land use designations of the North Area Plan for the property.<br><br>The proposed project preserves the area's semi-rural ambiance by maintaining development setbacks from public roadways, minimizing or avoiding street lighting, and avoiding construction of sidewalks, curbs and gutters. |
| VI-24 | Co-ordinate the provision of greenbelts and open space within individual developments and community areas so as to foster and enhance local identity and sense of place and to connect trails and open space/wildlife corridors wherever possible. | **Consistent.** A total of 271.7 acres of the project site, or 85 percent (including the required 70% open space) of the subject property, will be preserved as permanent open space. The proposed project will also dedicate an on-site 20-foot trail easement in the vicinity of Medea Creek/Caleta Road for riding and hiking purposes for the Zuma Ridge Trail. |
| VI-25 | Incorporate sufficient areas of open space in suburban development projects, including pedestrian spaces, sidewalks, and useable open space, to maintain a sense of openness in developed areas. | **Consistent.** A total of 271.7 acres of the project site, or 85 percent (including the required 70% open space) of the subject property, will be preserved as permanent open space. |
| VI-26 | Exterior lighting—except that needed for safety—discouraged. Require that new exterior lighting installations use low intensity directional lighting and screening to minimize light spillover and glare onto residential neighborhoods and park lands, thereby preserving—to the extent consistent with public safety—a natural night sky. Street lights shall be permitted only where required for safety. | **Consistent.** Rural development standards will be applied on the Cornell Road side of the project and the applicant is requesting that rural standards also be applied on the Kanan Road side. Rural standards require street lighting only to the point necessary to protect the public safety. Project mitigation is designed to preserve dark skies, and project impacts concerning preservation of dark skies are reduced to less-than-significant levels. |
| VI-27 | Promote extensive landscaping in new suburban developments, while emphasizing the use of native and drought-tolerant plant materials as well as low volume irrigation and prohibiting the use of non-native invasive species, require the use of regional native | **Consistent.** The proposed project will utilize native plant species and local building materials (e.g. local stone for entrance monuments, etc.) in order to blend the development area with the natural character of the site and the surrounding environment. |

| | | |
|---|---|---|
| | plants in rural developments and near natural areas, as identified by such sources as the California Native Plant Society, Santa Monica Mountains Chapter. | |
| **Balancing Highway Capacity and Environmental Sensitivity Goals and Policies (Goal VII-1): A transportation system consistent with the area's rural and scenic quality, environmental threshold carrying capacities, and planned growth.** | | |
| VII-4 | Encourage aesthetic design of road improvements, such as rock faced culverts, consistent with financial constraints and safety considerations. | **Consistent.** The project will provide landscaping and buffers to block views of developed areas from Kanan Road and Cornell Road. The project will provide new and attractive landscaping on this largely unmaintained section of Kanan Road that currently has no trees or brush. |
| VII-5 | Maintain a quality visual experience along the entire scenic highways, through protection and enhancement of views and the development of appropriate landscaping and roadside exhibits. | **Inconsistent.** Development on Ladyface Mountain will impact the scenic nature of this area. |
| VII-6 | In reviewing projects that generate substantial amounts of "off-peak" traffic, analyze the intrusiveness of project traffic as a land use compatibility issue in addition to the traditional roadway capacity analysis. | **Consistent.** The proposed project does not generate substantial amounts of "off-peak" traffic. During the evening peak hour, the project would generate 89 vehicle trips, or approximately one trip every 40 seconds. During "off peak" periods, the traffic generation would be substantially less than this less-than-significant amount of traffic. |
| VII-7 | Limit requirements for curb, gutters, sidewalks, and streetlights to urban/suburban areas, unless required by public safety considerations. | **Consistent.** Rural standards (no sidewalks, curbs or gutters would be provided, and street lighting would be kept at the minimum required for safety purposes) will be applied to development east of Cornell Road.<br>The project proponent is requesting a waiver from standard Los Angeles County Subdivision Code requirements for the proposed residences located in enclaves west of Cornell Road. |
| **Managing Highway Carrying Capacity Goals and Policies (Goal VII-2): A safe and efficient highway network which can accommodate projected future growth in traffic in a manner consistent with protection of environmental resources and existing neighborhood.** | | |
| VII-15 | Limit the intensity of development in rural and mountainous area to that which can be provided with adequate access that does not create significant adverse impacts. | **Consistent.** The project site is located a quarter mile from the 101 Freeway and is surrounded by residential development on both its northerly and southerly boundaries. Site is accessible through existing roadways. |

**SEA No. 6**

***SEA Compatibility Criterion 1: The requested development is designed to be highly compatible with the biotic resources present, including the setting aside of appropriate and sufficient undisturbed areas.*** Criterion 1 deals with overall biological compatibility and set-aside of open space (OS), 271 acres of OS have been proposed as a part of this project. However, contrary to SEATAC's recommendation that the project not extend east of Cornell road, the extension of the eastern portion of the project, with residences on only one side of a relatively straight road, and the isolated pair of parcels east of the cul-de-sac, does not minimize fragmentation. Thus the project is not in conformance with SEA Compatibility Criterion 1.

***SEA Compatibility Criterion 2: The requested development is designed to maintain water bodies, watercourses and their tributaries in a natural state.*** The project design is inconsistent with SEA Criterion No. 2 insofar as project implementation would result in the filling of 0.08 acre (35,495 linear ft.) of jurisdictional waters of the United States, encompassing nine ephemeral tributary drainages to Medea Creek. The project has been designed to avoid direct impacts to Medea Creek and most of the onsite tributary drainages. Access to the portion east of Cornell Road is proposed to be taken along a drainage course south of the fire station; culverts will be required along impacted drainages to allow current storm flow patterns to continue.

***SEA Compatibility Criterion 3: The requested development is designed so that wildlife movement corridors (migratory paths) are left in an undisturbed and natural state.*** SEA Criterion No. 3 addresses retention of wildlife corridors in a natural, undisturbed state. Project implementation is not anticipated to reduce or confine existing movement pathways within and through the project site. The proposed project is in substantial conformance with this criterion.

***SEA Compatibility Criterion 4: The requested development retains sufficient natural vegetative cover and/or open spaces to buffer critical resource areas from said requested development.*** SEA Criterion No. 4 specifies appropriate open space or vegetative buffers to protect critical resource areas from proposed uses. Insofar as the project footprint eliminates the Santa Monica Mountains dudleya population, and eliminates and abuts some Lyon's pentachaeta populations, the proposed project is not compatible with this criterion.

***SEA Compatibility Criterion 5: Where necessary, fences or walls are provided to buffer important habitat areas from development.*** SEA Criterion No. 5 allows the installation of fences or walls to buffer habitat from development. Project implementation would include such elements where appropriate to separate developed areas and designated open space, while avoiding obstruction of wildlife movement, and would be compatible with this guideline.

***SEA Compatibility Criterion 6: Roads and utilities serving the proposed development are located and designed so as not to conflict with critical resources, habitat areas or migratory paths.*** SEA Criterion No. 6 discourages conflicts between project roadways and utility infrastructure and critical resources, habitat areas and migratory paths. The access east of Cornell through the drainage course south of the fire department renders the project inconsistent with Criterion No. 6.

**Los Angeles County Zoning Code**

The proposed project is consistent with the existing RPD-5-.02 du and RPD-2-.05 du zoning of the project site. The project, therefore, does not require nor propose a Zone Change.

**Los Angeles County Subdivision Code**

Residential enclaves to the west of Cornell Road are proposed to be developed in accord with Los Angeles County Subdivision Code requirements for developments wherein any lot is less than 20,000 square feet in size. Lot sizes in this area of the proposed project range from approximately 10,020 to 33,977 square feet; building pads range from approximately 6,200 to 21,545 square feet. Due to the smaller average lot size in this area, standard subdivision requirements include the provision of streetlights, sidewalks, curbs and gutters. However, the project applicant is requesting the Advisory Agency to waive these standard requirements in the area west of Cornell Road since they are not in keeping with the existing neighborhood pattern, and because the overall density of the development is approximately one dwelling unit (DU) per 1.6 acres. The County's minimum requirements for such waivers (e.g., 1 D.U./15,000 square feet for roads, and 1 D.U./20,000 square feet for curbs and gutters) are not met in the area west of Kanan Road because of the effort by the applicant to cluster development in that area.

The development to the east of Cornell Road is proposed as a private community with a security gate at the Street "E" entrance. Proposed residences in this area would be on large, custom lots. Lot sizes would range from approximately 15,420 to 70,654 square feet, while building pads would range from approximately 9,725 to 20,770 square feet. By County ordinance[12] there would be no sidewalks, curbs, or gutters east of Cornell Road, and street lighting would be kept to the minimum required for safety purposes.

---

[3] *Los Angeles County Subdivision Ordinance Section 21.32.070 for roads, Section 21.32.190 for sidewalks, and Section 21.32.140 for street lighting.*

**Santa Monica Mountains National Recreation Area - Land Protection Plan/General Management Plan**

As discussed above, the project site is not located within the boundaries of the Santa Monica Mountains National Recreation Area (SMMNRA) and is not proposed for any form of public lands acquisition. As such, no impact to the Santa Monica Mountains National Recreation Area - Land Protection Plan/ General Management Plan would occur.

However, the National Park Service has indicated that: (1) the project site represents a scenic gateway into the SMMNRA when traveling along Kanan and Kanan Roads, (2) the project site was formerly part of the original Paramount Movie Ranch, (and 3) the parcel contains sites of natural and cultural significance.[13]

With respect to the project site being a scenic gateway into the SMMNRA, it should be noted that the project site is located between the urbanized Ventura Freeway corridor to the north and existing residential development to the south. The reader is referred to Figure I-3 for an aerial photograph of the project site in relationship to the surrounding area. With respect to the Paramount Movie Ranch, the project site has been in continuous ownership by the current owner for approximately 45 years. As noted above, residential development now separates the project site from Paramount Ranch. Project impacts to Paramount Ranch are discussed in Sections III.I (Visual Qualities) and III.J (Light and Glare); no significant impacts were identified. Project impacts to Lyon's Pentachaeta (*Pentachaeta lyonii*), Santa Monica Mountains dudleya, oak trees, riparian habitats, and on-site vegetation are discussed in Section III.F (Biological Resources). Project impacts to archaeological resources on the project site are discussed in Section III.G (Cultural Resources - Archaeological).

**Santa Monica Mountains Comprehensive Plan**

The Santa Monica Mountains Comprehensive Plan is not applicable to the proposed project site.

**Land Use Compatibility**

The proposed project is within an approximately half-mile zone of undeveloped land between existing commercial (retail and service), and business park/manufacturing to the north and residential development to the south. The project proposes only single family residential uses and no commercial or quasi-commercial uses on the project site.

---

[13] *Correspondence from Woody Smeck, Superintendent, Santa Monica Mountains National Recreation Area, to Christopher A. Joseph & Associates, September 5, 2003.*

The proposed project has an overall density of almost one dwelling unit per 1.6 acres within the 49-acre area of disturbance. The remaining 271 acres of the proposed development have been proposed as open space (available for dedication to a public and/or private entity) surrounding those enclaves of development. The slope density analysis for the Project is based on the existing topography. As recognized in Section III.A (Geotechnical Hazards - Grading), a canyon fill in the northwestern portion of the site is a former disposal and borrow area, the depth of which has increased and decreased over the past several decades. Research regarding the site's natural topography, including review of prior USGS maps, has been inconclusive due to the historical nature of the prior disposal and borrow area. The areas chosen for the development can be characterized, in part or in whole, as those portions of the property where the site has been previously disturbed, where slopes are less steep, and where development can occur with the least detriment to natural topography.

For this discussion, the proposed residential development is sited in three areas: one enclave is located west of Kanan Road; one enclave is between Kanan and Cornell Roads; and, one enclave is located east of Cornell Road.

Proposed residential enclaves to the west of Cornell Road are proposed to be developed in accord with Los Angeles County Subdivision Code requirements for developments where any lot area is less than 20,000 square feet. See the discussion of the Los Angeles County Subdivision Code above. On the west side of Kanan Road, proposed development is surrounded by approximately 98 acres of open space (approximately 79 percent of that portion of the site). Surrounding the proposed enclave in the central portion of the site, between Kanan and Cornell Roads, there are approximately 16 acres of flood hazard zone open space (approximately 65 percent of that portion of the site).

With the exception of the Cornell Road Ranchos, which are separated from the project site by a major ridgeline and tucked into a man-made valley, the overall density of the proposed project is consistent (if not lower) than the existing development which surrounds it or which it encompasses. Even with lot sizes designed to accommodate meaningful clustering, approximately 60 percent of the proposed lots are the same size or greater than the legal lots in the immediate vicinity of the site (east and west of Cornell).

Most of the existing residential development in the vicinity of the project site has been developed without sidewalks, curbs and gutters, or streetlights. In keeping with the semi-rural ambiance of some of the development to the south, the project enclave to the east of Cornell Road would be similarly developed without sidewalks, curbs and gutters, or street lights. Also, although not specifically intended for horse keeping, some homeowners with lots that backup to open space may choose to keep horses on their property.

As previously indicated, for the enclaves located to the west of Cornell Road, the project applicant is seeking a waiver from the standard Los Angeles County Subdivision Ordinance requirements to provide

sidewalks, curbs and gutters, since they are not in keeping with the existing neighborhood pattern. Standard street lighting is also required in these areas in accordance with Section 21.32.140 of the Los Angeles County Subdivision Code for developments with lots with a net area of less than 40,000 square feet. However, a lighting mitigation plan is presented in Section III.H that would reduce the impact of standard street lighting. No horse keeping is intended for areas west of Cornell Road.

## LEVEL OF SIGNIFICANCE BEFORE MITIGATION

### Physical Division of an Established Community

The proposed project would not physically divide an established community. Currently, the project site consists of vacant land. To the north, commercial land uses are concentrated along the US 101 Freeway corridor. To the south are single family communities, similar to the proposed project. Open space borders the project site to the east and west. The proposed project would not place a barrier between existing land uses or prevent free movement along existing north-south corridors. Furthermore, the proposed project is similar in land use and density to the existing residences to the south of the project site and to the west of Cornell Road. Therefore, project impacts relative to the physical division of an established community would be less than significant.

### Conflict with any Applicable Land Use Plan, Policy or Regulation

The proposed project is consistent with the land use designations of the Los Angeles County General Plan and the Los Angeles County Zoning Code. The project is consistent with the Air Quality Management Plan (see Section III.C) and with the Congestion Management Plan (sees Section III.L). The project would be required to comply with the requirements of the County's Standard Urban Storm Water Mitigation Plan and the California State Water Resources Control Board's General Construction Activity Storm Water Permit (see Section III.E). The project is not entirely consistent with some of the goals and policies of the Santa Monica Mountains North Area Plan; nor is it compatible with SEA Compatibility Criteria 1, 2, 4 and 6, as discussed in Section III.F-1. Therefore, project impacts relative to conflicts with applicable land use plans, policies, and regulations would be significant.

### Conflict with any Applicable Habitat Conservation Plan or Natural Community Conservation Plan

There are no habitat conservation plans or natural community conservation plans applicable to the proposed project site. However, the project does fall under the purview of the US Fish and Wildlife Service's *Recovery Plan for Six Plants from the Mountains Surrounding the Los Angeles Basin* which includes Lyon's pentachaeta and Santa Monica Mountains dudleya. Project impacts relative to management efforts to preserve these species may be significant.

## MITIGATION MEASURES

With respect to the proposed project's potential to divide an established community and its compatibility with nearby land uses, project impacts are less than significant and no mitigation is required.

With respect to the proposed project's conflicts with applicable land use plans, policies and regulations, land use consistency analysis will be present to the Regional Planning Commission in consideration of the project. No mitigation measures are required.

With respect to the project's potential conflict with any applicable habitat conservation Plan or natural community conservation plan, mitigation measures for impacts to Lyon's pentachaeta and Santa Monica Mountains dudleya are presented under Section III.F, Biological Resources.

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

Project impacts relative to the physical division of an established community would be less than significant. Project impacts relative to land use compatibility issues would be less than significant. Furthermore, implementation of the requested waiver of standard street light and sidewalk requirements would partially ensure the project's compatibility with the existing residences in the area. Project impacts relative to management efforts to preserve Lyon's pentachaeta and Santa Monica Mountains dudleya is significant (see Section III.F).

## CUMULATIVE IMPACTS

Cumulative land use impacts could occur if other related projects in the vicinity of the project site would result in land use impacts in conjunction with the proposed project. Twenty six proposed or approved projects were identified that could potentially contribute to the cumulative effects of the proposed project (see Figure II-13 in Section II.C, Related Projects). Development of the proposed project in conjunction with the related projects would result in an intensification of existing prevailing land uses in the project vicinity.

In particular, related projects No.6, Creekside – Retail Center; and No. 10, Ted Moore Agoura Village are located directly north of the project site, within the City of Agoura Hills. Creekside is a retail commercial center consisting of approximately 93,000 square feet of space; the Ted Moore Agoura Village is a mixed use development consisting of 20,000 square feet of office space, 21,000 square feet of retail space, 14,000 square feet of restaurant space, 10,000 square feet of daycare, and 95 apartment units. Because they are commercial uses that provide local services and facilities, both Creekside – Retail Center and the Ted Moore Agoura Village are considered to be compatible with the proposed project and the existing residential uses south of the project site.

Related project Nos. 1 through 23 (including the Creekside - Retail Center and the Ted Moore Agoura Village) are all located within the City of Agoura Hills and include a variety of residential, commercial, and institutional uses. These related projects have been or would be subject to City of Agoura Hills environmental review and regulations, a process comparable to that which the proposed project is subject. Related project Nos. 24 through 26, are located within unincorporated Los Angeles County and would be subject to the County's development standards and environmental review. Furthermore, these 26 related projects do or would have to conform to the zoning and land use designations for each site. With the exception of related project No. 26 (5 single family lots), all of the related projects are located in urbanizing areas along the US 101 Freeway corridor and could be considered "infill" development. Similar to the proposed project, the Creekside - Retail Center, the Ted Moore Agoura Village, and the 5-lot related project No. 26 are currently undeveloped and do not contain any community services or roadways that the nearby residential communities use. Therefore, the development of the related projects would not physically divide an established community or conflict with any applicable land use plan, policy, regulation, habitat conservation plan or natural community conservation plan.

As previously discussed, the proposed project would not physically divide an established community or conflict with any applicable land use plan, policy, regulation, habitat conservation plan or natural community conservation plan. Therefore, the related projects, in combination with the proposed project, would not result in any cumulatively significant land use impacts.

# III. ENVIRONMENTAL IMPACT ANALYSIS
# L. TRAFFIC AND ACCESS

The following traffic report is summarized below and incorporated by reference. A copy of this report is included in Appendix D of this DEIR. A copy of this report is also available for public review in the offices of the Impact Analysis Section of the Los Angeles County Department of Regional Planning, located at 320 West Temple Street, Room 1348, Los Angeles, California 90012.

- Kimley-Horn and Associates, Inc., Traffic Impact Study for Triangle Ranch, September, 2003[1]

**Study Methodology**

The following traffic assessment examines three roadway segments and seven intersections. One of the roadway segments and all seven of the intersections are located within the City of Agoura Hills. Two of the roadway segments are in the County of Los Angeles. Table III.L-1, Intersection/Roadway Segment Summary, summarizes the roadway segments and intersections assessed in this discussion. The analysis follows Los Angeles County standards for the roadway segments in the County, and City of Agoura Hills standards for the seven intersections and one roadway segment in the City. The format of the traffic study follows County of Los Angeles and Congestion Management Program (CMP) guidelines.

The study area for this project was identified in concert with the County of Los Angeles Department of Public Works staff, and is consistent with the Los Angeles County Congestion Management Program (CMP) policy. At a minimum, the Los Angeles CMP requires that intersections within a one-mile radius of the project be analyzed. The list of study intersections was expanded, however, to include intersections along Kanan Road (in the City of Agoura Hills) up to Canwood Street, north of the US-101 Freeway.

The following traffic conditions have been analyzed in accordance with the County of Los Angeles traffic study guidelines:

- Existing traffic. Traffic volumes used in the study were counted in May 2003.

---

[1] *This report provides the background traffic information for the proposed project, and was prepared in coordination with the Los Angeles County Department of Public Works. The report describes existing traffic conditions and future traffic conditions based on ambient growth, traffic generation from the proposed project, and from related projects. The conclusions of the Traffic Impact Study form the authority for the conclusions drawn by this EIR.*

- Existing Plus Ambient Growth projected to the year the project will be completed. Per the County of Los Angeles Traffic and Lighting Division, ambient growth in the area is 1.1 percent per year. The project is projected to be built out in three years; therefore, ambient growth has been calculated to be 1.1 percent per year for three years.

- Existing Plus Ambient Growth Plus Project. This section determines the project's direct impacts by adding project traffic to the Existing Plus Ambient Growth traffic volumes.

- Cumulative Conditions (Existing Plus Ambient Growth Plus Proposed Project Plus Related Projects) in the vicinity. This section determines cumulative impacts.

**Table III.L-1**
**Intersection/Roadway Segment Summary**

| | Intersection | Roadway Segment |
|---|---|---|
| County of Los Angeles | | • Kanan Road south of Cornell Way<br>• Cornell Road south of Kanan Road |
| City of Agoura Hills | • Kanan Road at Canwood Street (signalized)<br>• Kanan Road at US-101 Westbound Ramps (Signalized)<br>• Kanan Road at US-101 Eastbound Ramps (signalized)<br>• Kanan Road at Roadside Drive (two-way stop controlled eastbound/westbound)<br>• Kanan Road at Agoura Road (signalized)<br>• Kanan Road at Cornell Way (one-way stop controlled westbound)<br>• Agoura Road at Cornell Road (four-way stop controlled) | • Kanan Road north of Cornell Way |

This methodology employs standard technologies of trip generation, trip distribution, trip assignment, and roadway and intersection capacity analysis.

Technical analysis of the intersection operating conditions provide a qualitative assessment of the operating conditions of that intersection. Operating conditions are expressed in terms of "Level of Service" which is also known by its acronym, LOS. Level of Service designations range from LOS "A" to "F," with LOS "A" representing comfortable, free-flowing traffic conditions with minimal delays, and LOS "F" representing congested conditions, with long delays. A qualitative description of each Level of Service is provided in Technical Appendix D.

***Two-lane Roadway Analysis Methodology***

Analysis of two-lane roadways has been conducted according to the Two-Way Roadway Analysis requirements of the County of Los Angeles Traffic Impact Analysis Report Guidelines. The hourly capacity of the two-lane roadway was determined primarily by the peak hour volume of traffic, and the degree of directional split. A roadway with a 50/50 split in directional traffic has a higher hourly capacity than a roadway with an 80/20 directional split. The hourly traffic volume is compared to the hourly capacity for the roadway, a volume-to-capacity ratio (v/c ratio) is calculated, and the level of service is identified for each peak hour.

***Signalized Intersection Analysis Methodology***

Analysis of signalized intersections has been conducted utilizing the Intersection Capacity Utilization (ICU) analysis method. The ICU technique is used for signalized intersections and compares the volumes of traffic on each movement to the capacity for each movement, and calculates the sum of individual volume-to-capacity (V/C) ratios for key conflicting movements. The ICU numerical value represents the percent of signal green time, or capacity, required by existing or future traffic. The County ICU methodology is used for signalized intersections, including an hourly capacity of 1,600 vehicles per lane, and a 10 percent clearance.

Because of the close spacing, the existing US-101 eastbound and westbound ramps at Kanan Road were analyzed using the "Tight Diamond" interchange analysis methodology. The "Tight Diamond" interchange analysis methodology was developed by Caltrans, and is designed to analyze two adjacent signalized interchange intersections as one intersection. This methodology applies when the two interchange intersections are in the diamond formation, and are in such close proximity to each other, that there is little or no room for vehicles to stack between the intersections, and the traffic movements through one closely affect the movements through the other, such as is the case with the existing Kanan/US-101 northbound and southbound interchanges configurations. Future intersection conditions were analyzed assuming proposed interchange improvements (see below).

***Unsignalized Intersection Analysis Methodology***

The unsignalized intersections were analyzed using the 2000 Highway Capacity Manual methodology for unsignalized intersections. The procedure for stop-control analysis determines the average total delay, expressed in seconds of delay per vehicle, for all turning movements from the major street and from the stop-controlled minor street traffic stream. Delay values are calculated based on the relationship between traffic on the major street and the availability of acceptable "gaps" in this stream through which conflicting traffic movements can be made. Level of Service conditions for each intersection are defined based on the weighted average of the delay estimates for each individual movement.

## ENVIRONMENTAL SETTING

Existing traffic conditions on the area road and street system are described and analyzed in this section. The physical characteristics of the roadway system serving the project site are shown on Figure III.L-1, Existing Lane Configurations.

### Existing Roadway System

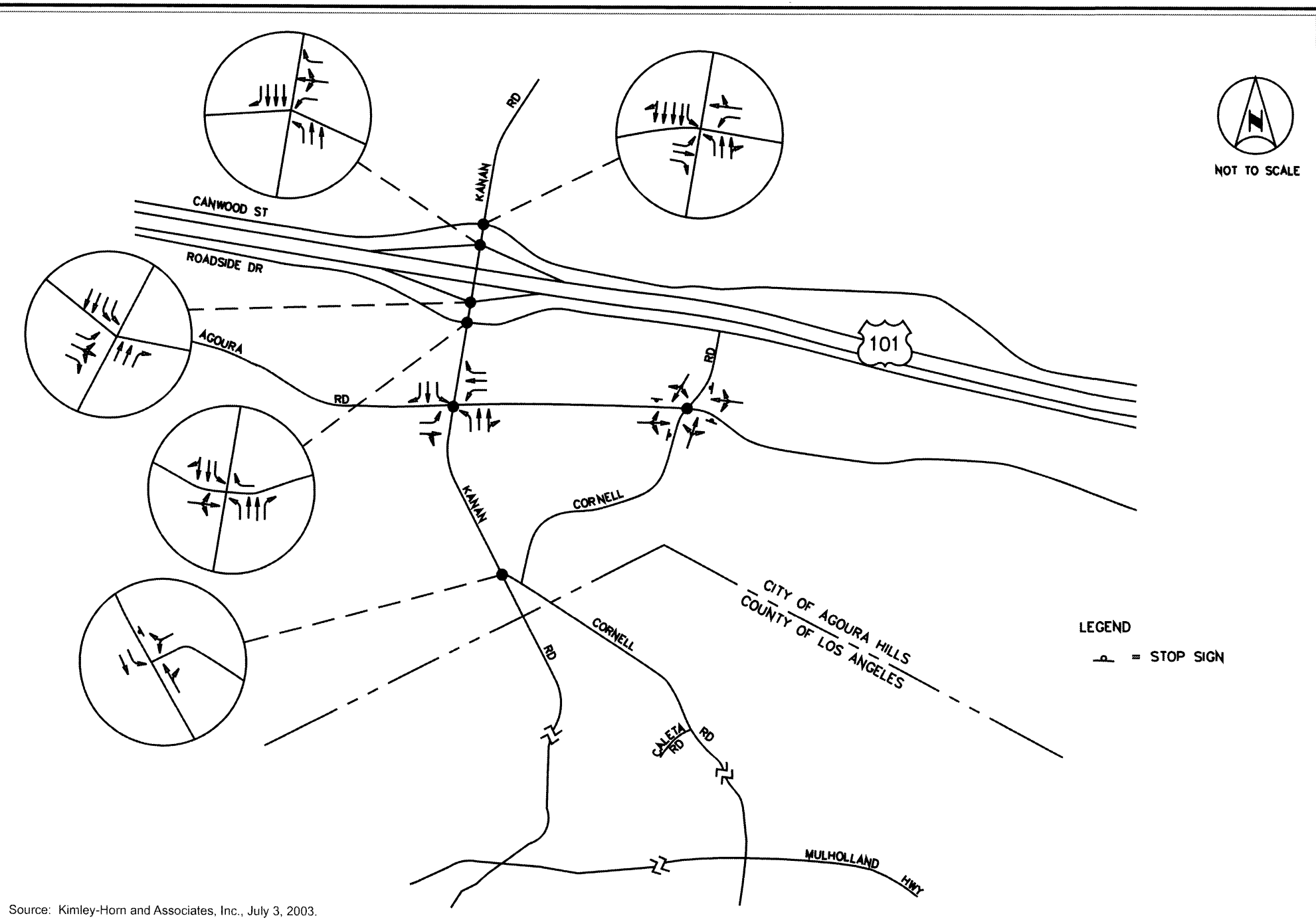
Regional access to the project site is provided by the Ventura Freeway (US-101), which travels in an east-west direction through the project area and connects to the project site via the Kanan Road interchange.

Local access to the project is provided by several roads:

***Kanan Road*** - The County of Los Angeles Highway Plan Policy designates Kanan Road as a Major Highway (100-foot right-of-way) between Agoura Road and Mulholland Highway. The Circulation Element of the City of Agoura Hills classifies Kanan Road as a Secondary Arterial (4 lanes undivided) south of Agoura Road, a Major Arterial (6 lanes divided) between Agoura Road and Thousand Oaks Boulevard and an Augmented Primary Arterial (6 lanes divided) north of Thousand Oaks Boulevard.

North of Agoura Road, two travel lanes are provided in each direction with left-turn storage at intersections. At the approaches to the US-101 interchange, three lanes are provided in each direction. South of Agoura Road, there is one southbound lane and two northbound through lanes with a left-turn lane. The roadway transitions to one lane in each direction south of Cornell Way, with a southbound left-turn lane at the Cornell Way intersection. The speed limit is 35 miles per hour north of Agoura Road and 45 miles per hour south of Agoura Road.

***Cornell Road*** - Cornell Road is a north/south roadway, designated on the County of Los Angeles Highway Plan Policy as a Secondary Highway (80-foot right-of-way). There are two through travel lanes in each direction. The roadway connects to Roadside Drive on the north and through the southern residential portions of Agoura Hills to the Santa Monica Mountains National Recreation area on the south. Cornell Road connects to Kanan Road south of Agoura Road via a short east/west roadway segment called Cornell Way, which is a two-lane undivided road. Parking is prohibited on both sides of Cornell Road. Cornell Road is currently 30 feet wide with 60 feet of right-of-way.




Source: Kimley-Horn and Associates, Inc., July 3, 2003.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.L-1
Existing Lane Configurations

***Agoura Road*** is an east-west Secondary Arterial that runs parallel to US-101. The road is designated as a future Primary Arterial in the study area, to be upgraded to 84 feet of roadway width. Existing right-of-way varies from 80 to 100 feet in the vicinity of the project. Agoura Road presently provides one travel lane in each direction in the project vicinity. The road is 30 feet wide west of the Kanan Road intersection to Reyes Adobe Road. The roadway widens to 56 feet on the east side of the Kanan Road intersection to provide an exclusive westbound right-turn lane. Parking is generally prohibited along Agoura Road, except for the section between Lewis Road and Palo Comado Canyon. The speed limit is 40 miles per hour west of Kanan Road and 45 miles per hour east of Reyes Adobe Road.

***Roadside Drive*** is an east-west local street that serves as a frontage road on the south side of US-101. One travel lane is provided in each direction. It provides access to businesses located along its length. West of Kanan Road, the street width varies from 30 feet to 44 feet; east of Kanan Road the street varies from 30 feet to 45 feet in width. At the intersection of roadside Drive at Kanan Road, the westbound leg of Roadside Drive is restricted to right turns only.

***Canwood Street*** is an east-west local street which serves as a frontage road on the north side of US-101 Freeway. Canwood Street is designated on the circulation element as a Local Arterial (2 lanes undivided) between Reyes Adobe Road and Kanan Road, a Secondary Arterial between Kanan Road and the future ramp terminal, and a Local Arterial east of the ramp terminal. It serves local businesses east of Kanan Road and residential neighborhoods west of Kanan Road. One travel lane is provided in each direction. The street varies in width from 30 feet to 40 feet. Curb and sidewalk are provided along the north side of the street for approximately 300 feet from the Kanan Road intersection. Canwood Street originates at Lake Crest Drive, at the west City limits, and extends to Chesebro/ Driver/ Palo Comado Canyon Road on the east.

### *Two-Lane Roadways*

The following three roadway segments have been evaluated throughout the course of the traffic study, following the County of Los Angeles guidelines, discussed previously:

- Kanan Road north of Cornell Way
- Kanan Road south of Cornell Way
- Cornell Road south of Kanan Road

### *Intersections*

Seven intersections have been evaluated throughout the course of the study, as indicated below.

- Kanan Road at Canwood Street (Signalized)
- Kanan Road at US-101 Westbound Ramps (Signalized)
- Kanan Road at US-101 Eastbound Ramps (Signalized)

- Kanan Road at Roadside Drive (Unsignalized)
- Kanan Road at Agoura Road (Signalized)
- Kanan Road at Cornell Way (Unsignalized)
- Agoura Road at Cornell Road (Four-way stop controlled)

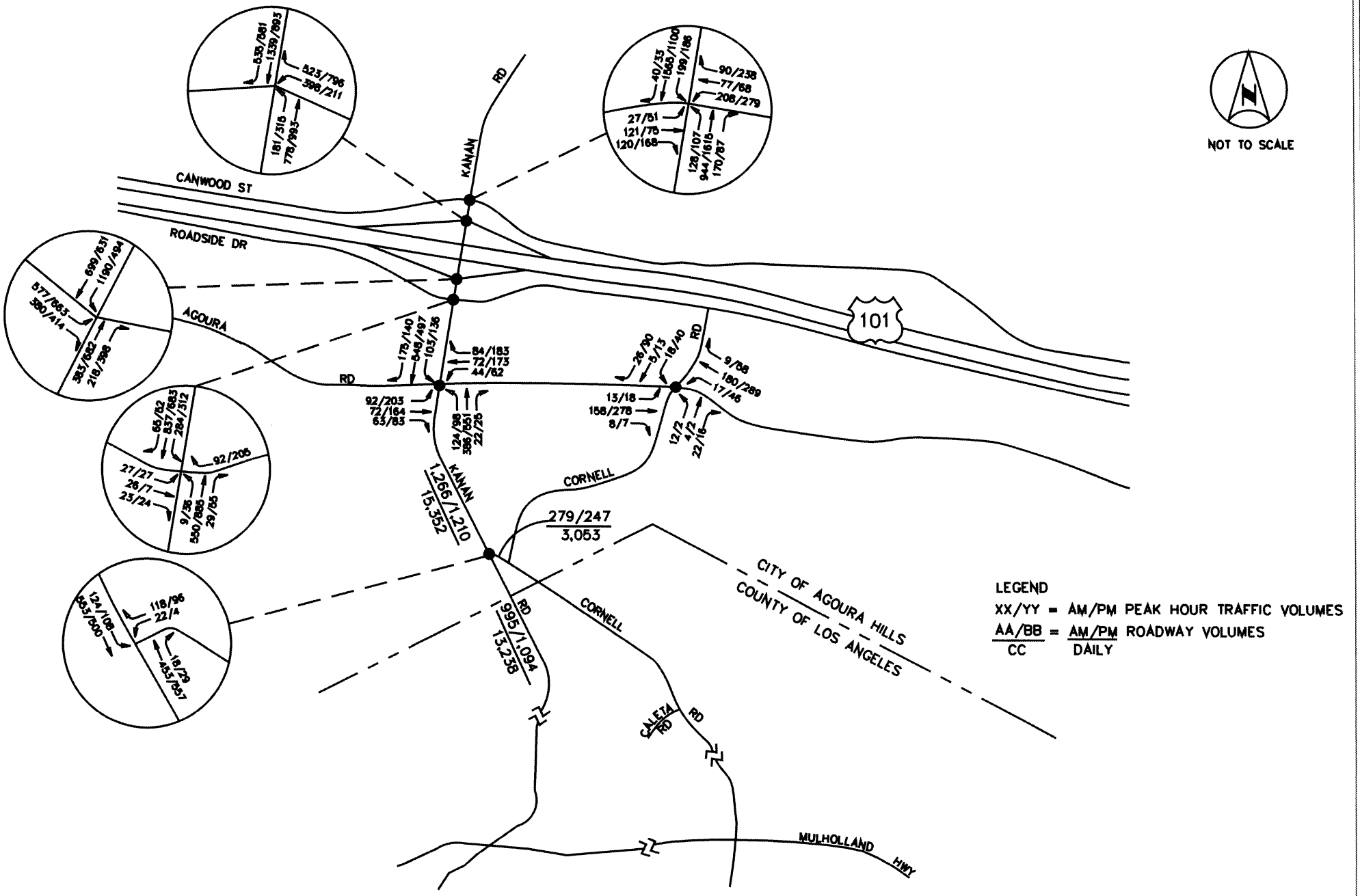
***Summary of Two-lane Roadway Analysis – Existing Conditions***

Existing 24-hour counts were conducted in May 2003 on Kanan Road north of Cornell Way, on Kanan Road south of Cornell Way and on Cornell Road south of Kanan Road. The daily and peak hour volumes on these roadway segments are presented on Figure III.L-2, Existing Daily and Peak Hour Traffic volumes. Copies of the traffic data collection worksheets are provided in Technical Appendix D.

The existing conditions analysis for the two-lane roadways was conducted using the County Traffic Impact Report Analysis Guidelines, and the results are summarized on Table III.L-2, Summary of Two Lane Roadway Operations – Existing Conditions. The analysis indicates that the three roadway segments are currently operating at LOS A in both peak hours.

***Signalized Intersection Analysis – Existing Conditions***

Existing morning and evening peak hour traffic counts were conducted at the seven study intersections, and are presented on Figure III.L-2. Copies of traffic data collection worksheets are provided in Technical Appendix D. The results of the existing conditions analysis for the study intersections are summarized on Table III.L-3, Summary of Intersection Operations – Existing Conditions. The signalized intersection of Kanan Road and Canwood Street is currently operating at an unacceptable level of service (LOS E) during the evening peak hour, and the signalized intersections of the US-101 Ramps at Kanan Road (analyzed as a "Tight Diamond" interchange) are currently operating at an unacceptable level of service (LOS D) during the morning peak hour. At the intersection of Kanan Road and Roadside Drive, the eastbound approach experiences LOS "F" delays in both the morning and evening peak hours. The remaining study intersections are operating at acceptable levels of service (LOS A, B or C) in both peak hours. Intersection analysis worksheets for all intersections are provided in Technical Appendix D.




Source: Kimley-Horn and Associates, Inc., July 3, 2003.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.L-2
Existing Daily and Peak Hour Traffic Volumes

**Table III.L-2**
**Summary of Two Lane Roadway Operations**

| Segment | Hour | Split | Cap. | Vol. | V/C | LOS | Project. Vol. | Percentage | Significance? |
|---|---|---|---|---|---|---|---|---|---|
| **Kanan Road north of Cornell Way** | | | | | | | | | |
| Existing Conditions | AM | 50/50 | 2,800 | 1,266 | 0.46 | A | | | |
| | PM | 60/40 | 2,650 | 1,210 | 0.46 | A | | | |
| Existing Plus Growth | AM | 50/50 | 2,800 | 1,308 | 0.47 | A | | | |
| | PM | 60/40 | 2,650 | 1,250 | 0.48 | A | | | |
| Existing plus Growth Plus Project | AM | 50/50 | 2,800 | 1,351 | 0.49 | A | 48 | 3% | No |
| | PM | 60/40 | 2,650 | 1,301 | 0.49 | A | 63 | 4% | No |
| Cumulative Conditions | AM | 50/50 | 2,800 | 1,473 | 0.53 | A | | | |
| | PM | 60/40 | 2,650 | 1,419 | 0.54 | A | | | |
| **Kanan Road south of Cornell Way** | | | | | | | | | |
| Existing Conditions | AM | 60/40 | 2,650 | 995 | 0.38 | A | | | |
| | PM | 50/50 | 2,800 | 1,094 | 0.39 | A | | | |
| Existing Plus Growth | AM | 60/40 | 2,650 | 1,028 | 0.39 | A | | | |
| | PM | 50/50 | 2,800 | 1,131 | 0.41 | A | | | |
| Existing plus Growth Plus Project | AM | 60/40 | 2,650 | 1,061 | 0.40 | A | 37 | 3% | No |
| | PM | 50/50 | 2,800 | 1,174 | 0.42 | A | 49 | 4% | No |
| Cumulative Conditions | AM | 60/40 | 2,650 | 1,184 | 0.45 | A | | | |
| | PM | 50/50 | 2,800 | 1,310 | 0.47 | A | | | |
| **Cornell Road south of Kanan Road** | | | | | | | | | |
| Existing Conditions | AM | 60/40 | 2,650 | 279 | 0.11 | A | | | |
| | PM | 60/40 | 2,650 | 247 | 0.10 | A | | | |
| Existing Plus Growth | AM | 60/40 | 2,650 | 289 | 0.11 | A | | | |
| | PM | 60/40 | 2,650 | 256 | 0.10 | A | | | |
| Existing plus Growth Plus Project | AM | 60/40 | 2,650 | 300 | 0.12 | A | 11 | 4% | No |
| | PM | 60/40 | 2,650 | 267 | 0.10 | A | 14 | 4% | No |
| Cumulative Conditions | AM | 60/40 | 2,650 | 312 | 0.12 | A | | | |
| | PM | 60/40 | 2,650 | 278 | 0.11 | A | | | |

*Source: Los Angeles County Traffic Impact Analysis Report Guidelines - Significant Impact Threshold*

**Table III.L-3**
**Summary of Intersection Operations**

| Signalized Intersection | Existing Conditions | | | | Existing plus Growth Conditions | | | | Existing plus Growth plus Project Conditions | | | | Cumulative Conditions | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AM | | PM | | AM | | PM | | AM | | PM | | AM | | PM | |
| | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS |
| **Kanan Road at:** | | | | | | | | | | | | | | | | |
| Canwood Street[1] | 0.778 | C | 0.971 | E | 0.801 | C | 1.000 | E | 0.803 | C | 1.001 | E | 0.87 | D | 1.003 | E |
| US-101 Interchange[1] | 0.871 | D | 0.786 | C | 0.896 | D | 0.809 | D | 0.901 | D | 0.813 | D | | | | |
| Kanan/US-101 WB[1] | | | | | | | | | | | | | 0.837 | D | 0.953 | E |
| Kanan/US-101 EB[1] | | | | | | | | | | | | | 0.647 | B | 0.941 | E |
| Agoura Road | 0.632 | B | 0.707 | C | 0.649 | B | 0.727 | C | 0.663 | B | 0.746 | C | 0.800 | C | 1.103 | F |
| **Kanan Road at:** | | | | | | | | | | | | | | | | |
| Roadside Drive – WB[1] | 10.7 | B | 14.8 | B | 10.8 | B | 15.4 | C | 10.9 | B | 15.6 | C | | | | |
| Roadside Drive – EB[1] | 290.2 | F | 441.6 | F | 334 | F | 610.3 | F | 393.7 | F | 653.0 | F | | | | |
| Cornell Way – WB | 17.4 | C | 14.4 | B | 18.5 | C | 14.8 | B | 19.5 | C | 15.4 | C | 24.1 | C | 20.0 | C |
| **Agoura Road at:** | | | | | | | | | | | | | | | | |
| Cornell Way – All-way | 8.45 | A | 11.41 | B | 8.52 | A | 11.79 | B | 8.59 | A | 12.1 | B | 10.96 | B | 52.35 | F |

[1] *Existing intersection configurations used for Existing, Existing plus Growth, and Existing Plus Growth Plus Project Conditions*
*For future Cumulative Conditions evaluation, the proposed interchange improvement program is assumed. Roadside Drive will no longer be a stand-alone intersection.*

**Accident Analysis**

Accident data was obtained from the County of Los Angeles Department of Public Works for Kanan Road and Cornell Road between Canwood Street (north of the US-101 Freeway) and Mulholland Highway for the five-year period from February 1, 1998 to January 31, 2003.

The data for the five-year time period revealed that an average of 9.4 accidents per year occurred on Kanan Road between Canwood Street and Mulholland Highway, and an average of 5.2 accidents per year occurred on Cornell Road between Kanan Road and Mulholland Highway. This equates to an accident rate of .229 accidents per million-vehicle-miles on Kanan Road, and 1.31 accidents per million-vehicle-miles on Cornell Road. The County average for accidents on rural mountain roads ranges from 1.82 to 3.79 accidents per million-vehicle-miles, depending on the design speed of the roadway.

A summary of the accidents on Kanan Road and Cornell Road within one mile of the project is provided on Table III.L-4, Summary of Highway Accident History. On Kanan Road, within a mile of the project site, there were six accidents over the course of the five-year period. One accident was a fatality accident - all others were property damage only. On Cornell Road, within one mile of the site, there were 10 accidents over the five-year period. All were property-damage-only accidents. On the segment of Cornell Way that connects Kanan Road to Cornell Road, there were two accidents in 1999, and two in 2000. All were property-damage-only accidents.

**Speed Study**

In addition to observations made from the County of Los Angeles Accident Data, travel speed on Kanan Road and Cornell Road have been observed to be in excess of the posted speed limits, which are 50 mph on Kanan Road and 35 mph on Cornell Road.

Speed data was collected on Kanan Road and Cornell Road in the vicinity of the project. The results of speed data are typically reported in terms of average speed, and the 85$^{th}$ percentile speed, which identifies the speed under which 85 percent of the drivers are driving, and over which the remaining 15 percent of the drivers are driving. For example, if the 85$^{th}$ percentile speed is 40 miles per hour, that means that 85 percent of the drivers are driving at 40 mph or slower, and the remaining 15 percent of the drivers are driving faster than 40 mph.

## Table III.L-4
## Summary of Highway Accident History
## Within One Mile of Project Site

| Year | Date / Time | Location | No. of Vehicles | Vehicle Direction | Cause / Violation | Driver Condition | Weather | Injuries | Fatalities |
|---|---|---|---|---|---|---|---|---|---|
| **Kanan Road** | | | | | | | | | |
| 1998 | Oct. 11 / 2:00 PM | Kanan at Canwood | 2 | NB | Speeding | Normal | Clear | 0 | 0 |
| 1999 | Jan. 14 / 8:00 AM | 1,056' s/o Castle View | 2 | NB/SB | Following too close | Normal | Clear | 0 | 0 |
| | Nov. 20 / 8:00 PM | 200' n/o Silver Creek Rd. | 1 | SB | Speeding | Normal | Clear | 0 | 0 |
| 2000 | Nov. 15 / 10 PM | 227' n/o Silver Creek Rd. | 2 | NB | DUI | Under Influence | Clear | 0 | 2 |
| 2001 | Jun. 16 / 2:00 AM | 0.7 mi. s/o Castle View | 1 | SB | DUI | Under Influence | Clear | 0 | 0 |
| | Aug. 13 / 5:00 PM | 0.8 mi. s/o Castle View | 1 | SB | DUI | Under Influence | Clear | 0 | 0 |
| **Cornell Road** | | | | | | | | | |
| 1998 | May 24 / 3:00 PM | 0.2 mi. s/o Wagon Road | 1 | SB | Speeding | Normal | Clear | 0 | 0 |
| | Dec. 11 / 5:00 AM | 145' n/o Caleta Road | 2 | NB/SB | DUI | Drunk/Normal | Clear | 0 | 0 |
| 1999 | May 21 / 12 Noon | Cornell at Silver Creek | 2 | WB/EB | Stop sign violation | Normal | Clear | 0 | 0 |
| | June 2 / 6:00 PM | 0.7 mi. s/o Wagon Rd | 1 | NB | Speeding | Normal | Clear | 0 | 0 |
| | Aug. 9 / 7:00 PM | 0.7 mi. s/o Wagon Rd | 1 | SB | Speeding | Normal | Clear | 0 | 0 |
| 2000 | Jun. 10 / 8:00 PM | 0.7 mi. s/o Wagon Rd | 1 | NB | No violation | Normal | Clear | 0 | 0 |
| | Nov. 10 / 7:00 PM | 0.5 mi. s/o Wagon Rd | 2 | SB | Unsafe turn | Normal | Clear | 0 | 0 |
| 2001 | Mar. 27 / 6:00 PM | 15' s/o Wagon Rd | 1 | SB | Unsafe turn | Normal | Clear | 0 | 0 |
| | Mar. 31 / 6:00 AM | 104' n/o Countryside Dr | 1 | SB | DUI | Drunk | Cloudy | 0 | 0 |
| | Aug. 5 / 1:00 PM | 0.2 mi. s/o Wagon Rd. | 1 | NB | Speeding | Normal | Clear | 0 | 0 |
| **Cornell Way** | | | | | | | | | |
| 1999 | Feb. 7 / 11:00 PM | 0.1 mi. e/o Kanan Rd | 1 | WB | Speeding | Normal | Cloudy | 0 | 0 |
| | Dec. 21 / 1:00 AM | 0.2 mi. e/o Kanan Rd | 1 | WB | Speeding | Normal | Clear | 0 | 0 |
| 2000 | Jan. 25 / 5:00 PM | 0.2 mi. e/o Kanan Rd | 1 | EB | No violation | Normal | Raining | 0 | 0 |
| | Dec. 22 / 5:00 PM | 0.25 mi. e/o Kanan Rd | 1 | WB | Unsafe turn | Normal | Clear | 0 | 0 |

The speed data indicates that the 85th percentile speed of area residents and through travelers driving on Kanan Road is 53 to 54 mph just south of Agoura road, and increases to 57-59 mph south of Silvercreek. On Cornell Road, the 85th percentile speed is 49 to 52 mph. A summary of the speed data is provided on Table III.L-5, Summary of Speed Data. From this data, it is apparent that many drivers currently travel at speeds that exceed the posted speed limit on the roadways from which the proposed project will take access.

**Table III.L-5**
**Summary of Speed Data**

| Roadway Segment | Average Speed | 85th Percentile | Range of Speed | Posted Speed Limit |
|---|---|---|---|---|
| **Kanan Road btwn Agoura and Cornell Way** | | | | |
| Northbound | 46 | 53 | 36 to 56 | 50 |
| Southbound | 50 | 54 | 38 to 60 | |
| **Kanan Road south of Silvercreek** | | | | |
| Northbound | 54 | 57 | 42 to 62 | 50 |
| Southbound | 55 | 59 | 44 to 60 | |
| **Cornell Road south of Silvercreek** | | | | |
| Northbound | 47 | 52 | 35 to 54 | 35 |
| Southbound | 44 | 49 | 34 to 52 | |

## ENVIRONMENTAL IMPACTS

### Thresholds of Significance

County of Los Angeles guidelines stipulate that the project traffic impact would be considered significant on two-lane roadways if the project causes an increase in traffic volumes in the peak hour of four percent for roadways operating at LOS C, two percent for roadways operating at LOS D, or one percent for roadways operating at LOS E or F. These standards are applicable to the three analyzed roadways (i.e., Kanan Road north of Cornell Way, Kanan Road south of Cornell Way, and Cornell Road south of Kanan Road).

The City of Agoura Hills' intersection Level of Service (LOS) standard is LOS C, or 80% or less of the intersection capacity. City standards stipulate that the project traffic impact at study intersections would be considered to be significant if the project causes any intersection to worsen from acceptable (LOS C) to unacceptable (LOS D, E, F) conditions, or if the project causes an unacceptable ICU to increase by 0.02 or more. All seven of the study area intersections are located in the City of Agoura Hills.

**Project Impacts**

The proposed project is comprised of 81 single-family homes on 320.3 acres. Fifty-four lots will take access from Kanan Road, and 27 lots will take access from Cornell Road. On Kanan Road, access to lots on both sides of the street will be provided by a four-way, full-access intersection, about 550 feet south of Cornell Way. Left-turn pockets and right-turn acceleration and deceleration lanes will be provided on Kanan Road. On Cornell Road, a full-movement, gated entrance will provide access to 27 lots on the east side of the road, 3,300 feet south of Cornell Way.

*Trip Generation*

The traffic to be generated by the proposed project was calculated using trip generation rates from the Institute of Transportation Engineers (ITE) publication Trip Generation, Sixth Edition. Daily, morning and evening peak hour trip generation rates and project-related trips are presented on Table III.L-6, Summary of Project Trip Generation.

The proposed project will consist of 81 single-family homes and will generate 854 trips on a daily basis with 67 trips in the morning peak hour and 89 trips in the evening peak hour.

**Table III.L-6**
**Summary of Project Trip Generation**

| | | Trip Generation Rates | | | | | Project Trip Generation | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AM Peak | | PM Peak | | | AM Peak | | PM Peak | |
| Land Use | Units | Daily | In | Out | In | Out | Daily | In | Out | In | Out |
| Single Family Homes | 81 DU | 10.54 | 0.20 | 0.61 | 0.70 | 0.40 | 854 | 17 | 50 | 57 | 32 |

*Source: Institute of Transportation Engineer Trip Generation report, 6th Edition.*
*Land Use Category: 210 – Single-Family Detached Housing*
*Trip Generation Formulas: Trip Generation rates are based on the following formulas, where T = # of trips, and X = # of dwelling units.*

*Trip Generation Formulas:*

| | |
|---|---|
| *Daily* | $Ln(T) = 0.920\ Ln(X) + 2.707$ |
| *AM Peak Hour:* | $T = 0.700(X) + 9.477$, 25% entering, 75% exiting |
| *PM Peak Hour:* | $Ln(T) = 0.901\ Ln(X) + 0.527$, 64% entering, 36% exiting |

***Trip Distribution and Assignment***

The project-generated trips were distributed to likely origin-destination locations, using the County of Los Angeles Congestion Management Program (CMP) Trip Distribution Percentages (Appendix D of the CMP). The trip distribution assumptions reflect the nature of the project land use, land uses likely to interact with the project, and the roadway system available for tripmaking. With the basic trip distributions established, the project trips were assigned to the available road system.

The trip assignment takes into consideration the distance and roadway geometrics of each path which would most likely serve the project. Figure III.L-3, Proposed Project Trip Distribution, presents the trip distribution assumptions for the proposed project. The trip distribution percentage factors were applied to the project trip generation, and the results are shown on Figure III.L-4, Proposed Project Traffic Volumes. These volumes represent the proposed project's contribution of traffic at the study intersections and study roadways.

**Ambient Growth**

The County of Los Angeles traffic study guidelines require an analysis of Existing Conditions with the addition of ambient growth to the year the project is completed. In accordance with the County of Los Angeles CMP, the growth rate in the area is 1.1 percent per year. Triangle Ranch is projected to be completed in approximately three years. Therefore, existing traffic volumes were increased by 1.1 percent for three years, and the resulting existing plus growth peak hour traffic volumes are shown on Figure III.L-5, Existing Plus Growth Traffic Volumes.

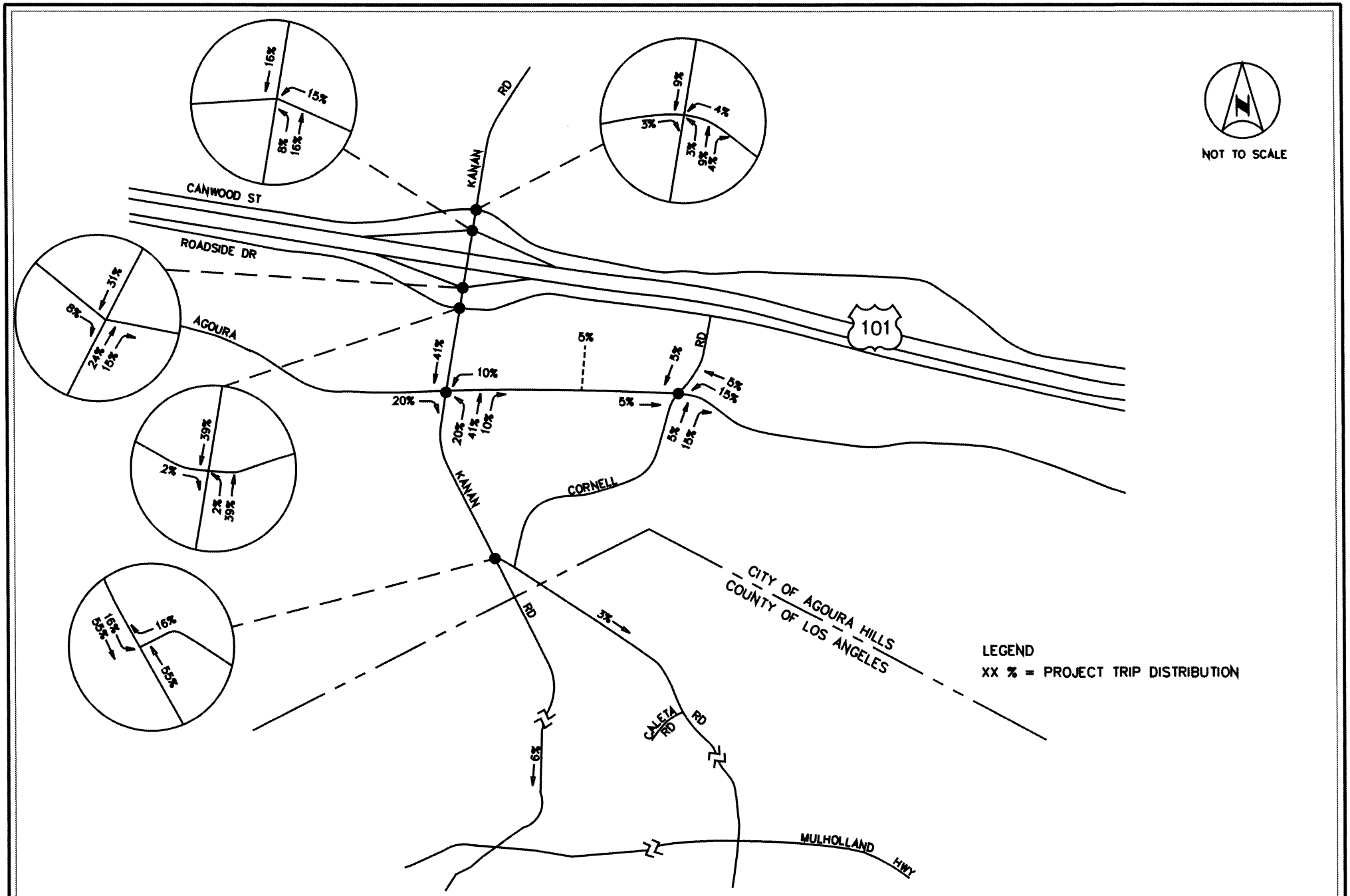
***Summary of Two-lane Roadway Analysis – Ambient Growth***

The results of the Existing plus Growth roadway analysis are summarized in Table III.L-2. The analysis indicates that the three roadway segments will continue to operate at LOS A in both peak hours with the addition of ambient traffic growth.

***Summary of Intersection Analysis – Ambient Growth***

The results of the Existing plus Growth intersection analysis is shown on Table III.L-3. The following signalized intersections will continue to operate at an unacceptable level of service (LOS D or worse) in one or both peak hours with the addition of ambient traffic growth:

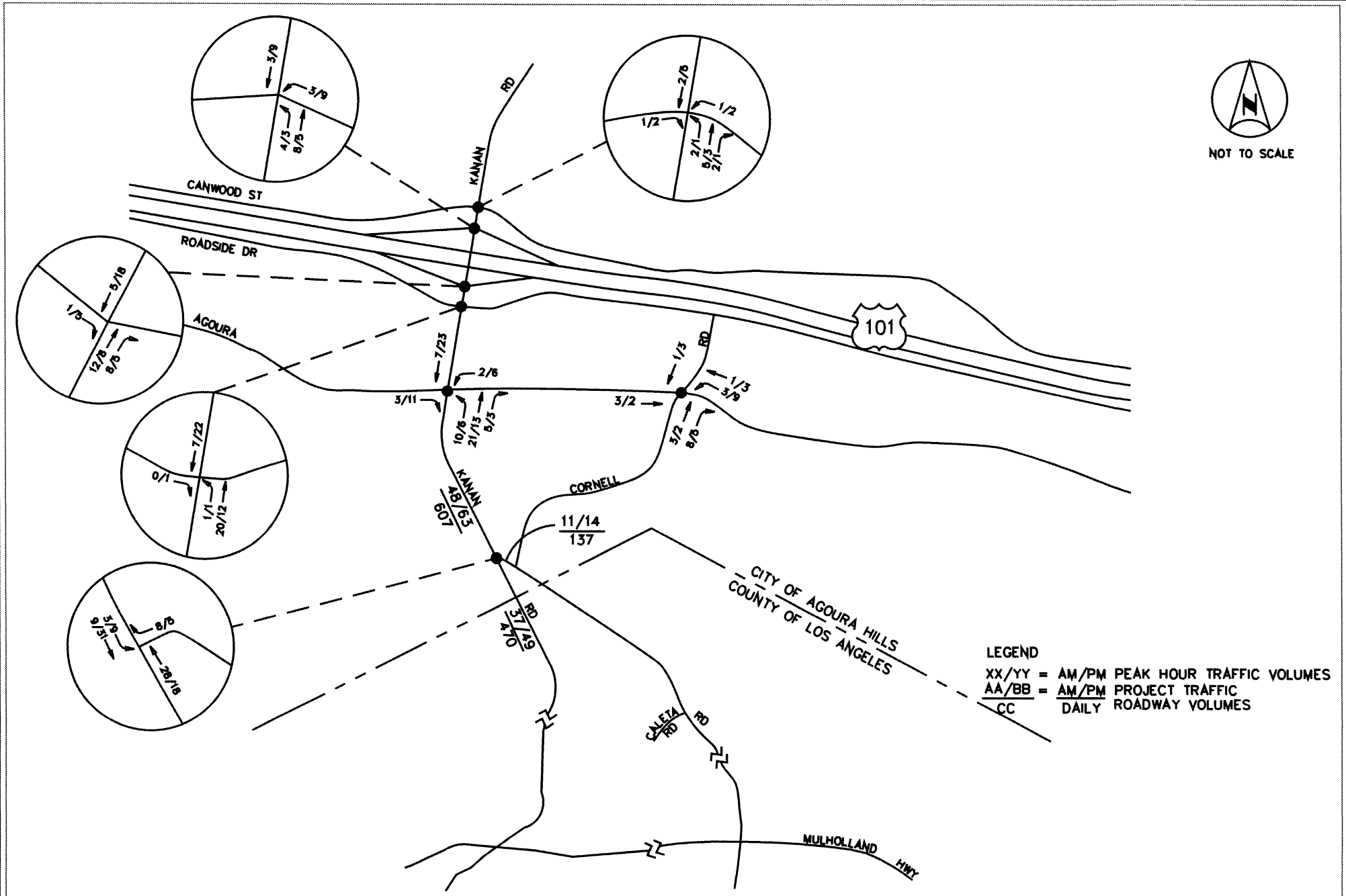
- Kanan Road at Canwood Street (PM continues at LOS E),
- Kanan Road at US 101 Interchange (AM continues at LOS D),
- Kanan Road at Roadside Drive (EB approach continues at LOS F in AM and PM)




Source: Kimley-Horn and Associates, Inc., July 3, 2003.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

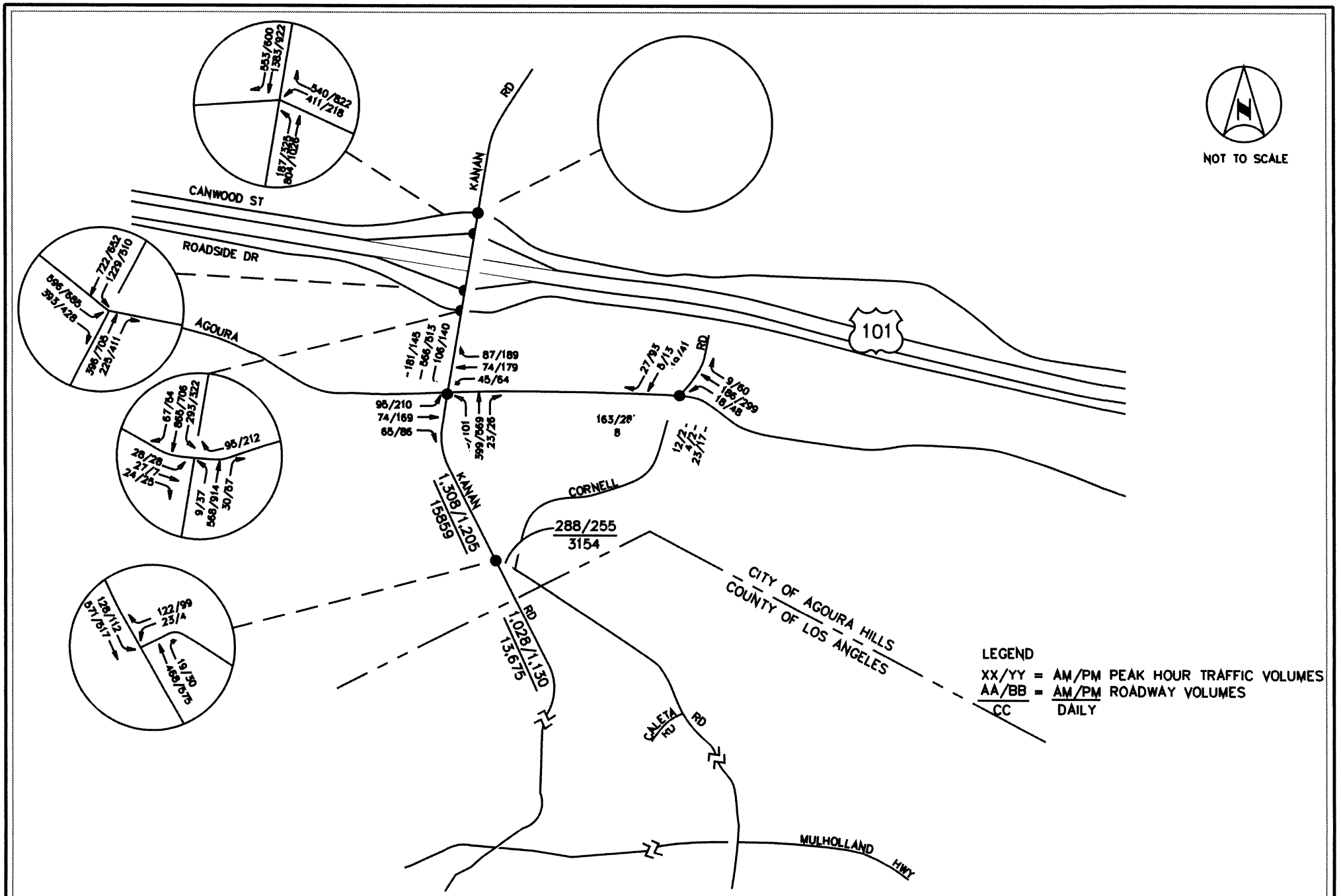
Figure III.L-3
Proposed Project Trip Distribution




Source: Kimley-Horn and Associates, Inc., July 3, 2003.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.L-4
Proposed Project Traffic Volumes




CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.L-5
Existing Plus Growth Traffic Volumes

The remaining signalized and unsignalized intersections will continue to operate at an acceptable level of service (LOS A, B or C) with ambient growth.

**Existing Plus Growth Plus Project Traffic**

Existing plus Growth plus Project peak hour volumes are shown on Figure III.L-6, Existing Plus Growth Plus Proposed Project Traffic Volumes.

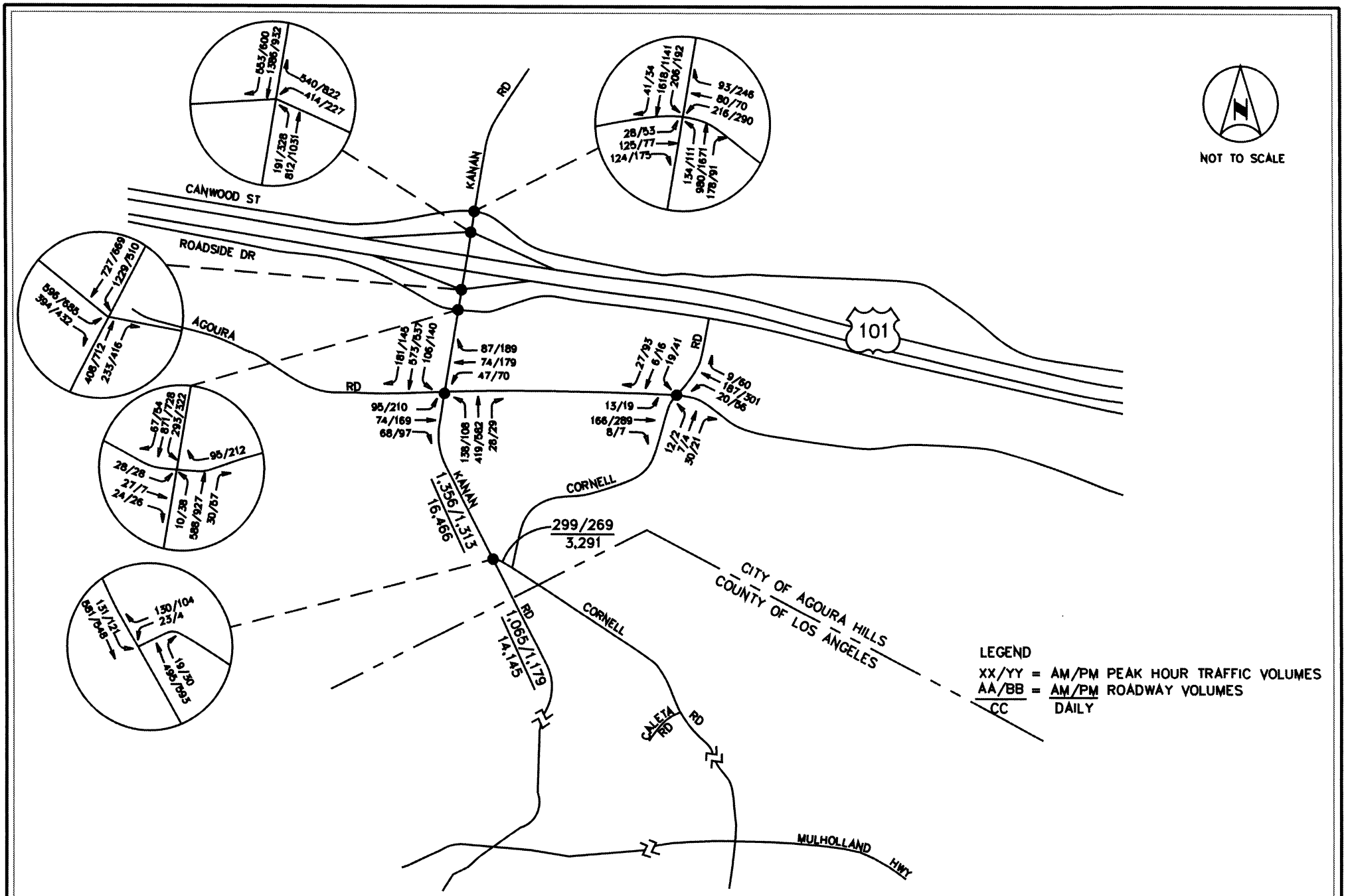
***Summary of Two-Lane Roadway Analysis***

The results of the Existing plus Growth plus Project roadway analysis are summarized in Table III.L-2. The analysis indicates that the three roadway segments will continue to operate at Level of Service A in both peak hours with the addition of project traffic. The project traffic added to these roadway segments would not represent a significant impact, based on the County of Los Angeles Traffic Analysis Guidelines.

***Summary of Intersection Analysis***

The study intersections were evaluated for Existing plus Growth plus Project traffic conditions, to determine if there are any direct project impacts. The results of the analysis are presented on Table III.L-3.

With the addition of project traffic, none of the study intersections would worsen to LOS D or worse in either peak hour. The two signalized intersections found previously to be deficient (Kanan Road/Canwood Street and Kanan Road/US 101 Interchange) would continue to operate unacceptably, with the proposed project contributing to unacceptable conditions by an increase in V/C of less than 0.02. As previously mentioned, project impact at study intersections in the City of Agoura Hills would be considered significant if the project causes an unacceptable ICU to increase by 0.02 or more, or if the project causes any intersection to worsen from acceptable to unacceptable conditions. Based on these criteria, the project would not have a significant impact at any of the signalized study area intersections. The unsignalized intersection of Kanan Road and Roadside Drive will continue to experience LOS F delays on the eastbound approach. This intersection will be eliminated as a stand-alone intersection and integrated into the Kanan Road / US-101 interchange as part of the planned improvements currently under design by the City, as discussed below.




Source: Kimley-Horn and Associates, Inc., July 3, 2003.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.L-6
Existing Plus Growth Plus Proposed Project Traffic Volumes

The interchange is an approved project that has made it through the Project Study Report phase, and is in final review at Caltrans. Funding has been identified, with $10.5 million coming from the MTA and $13.5 million from City funds.[2] The interchange improvements will create greater separation between the ramps, and will provide loop ramps to eliminate left-turns to access the freeway. As shown in Figure III.L-7, the eastbound off-ramp will be moved south to the existing Roadside Drive alignment, and the westbound off-ramp will be moved north to the existing Canwood Street alignment. East of Kanan Road, Canwood Street will be moved several hundred feet to the north, to achieve greater distance from the ramps. Construction is anticipated to begin early in Winter 2004, with completion in Winter, 2005/2006.[3]

Peak hour traffic projections assuming the improved interchange configuration were obtained from the US-101 / Kanan Road Interchange Upgrade Traffic Study (Austin-Foust Associates, 2001). The forecasts include traffic from all Related Projects and ambient growth for 20 years to the Year 2020. Forecasts obtained from the US-101/Kanan Road Interchange Upgrade Traffic Study have been used for the intersections of Kanan Road at Canwood Street, and the two ramp intersections. The intersection of Kanan Road at Roadside Drive will be integrated into the US-101 eastbound ramps, and will no longer be a stand-alone intersection. Cumulative Conditions forecasts at the remaining study intersections have been developed using the standard process of identifying related projects and adding project traffic from each project to Existing Plus Growth Plus Project Traffic Volumes.

---

2 *Part of the City funding includes developer fees.*

3 *The current schedule posted on the City's website shows construction beginning February, 2004 and ending February, 2005.*

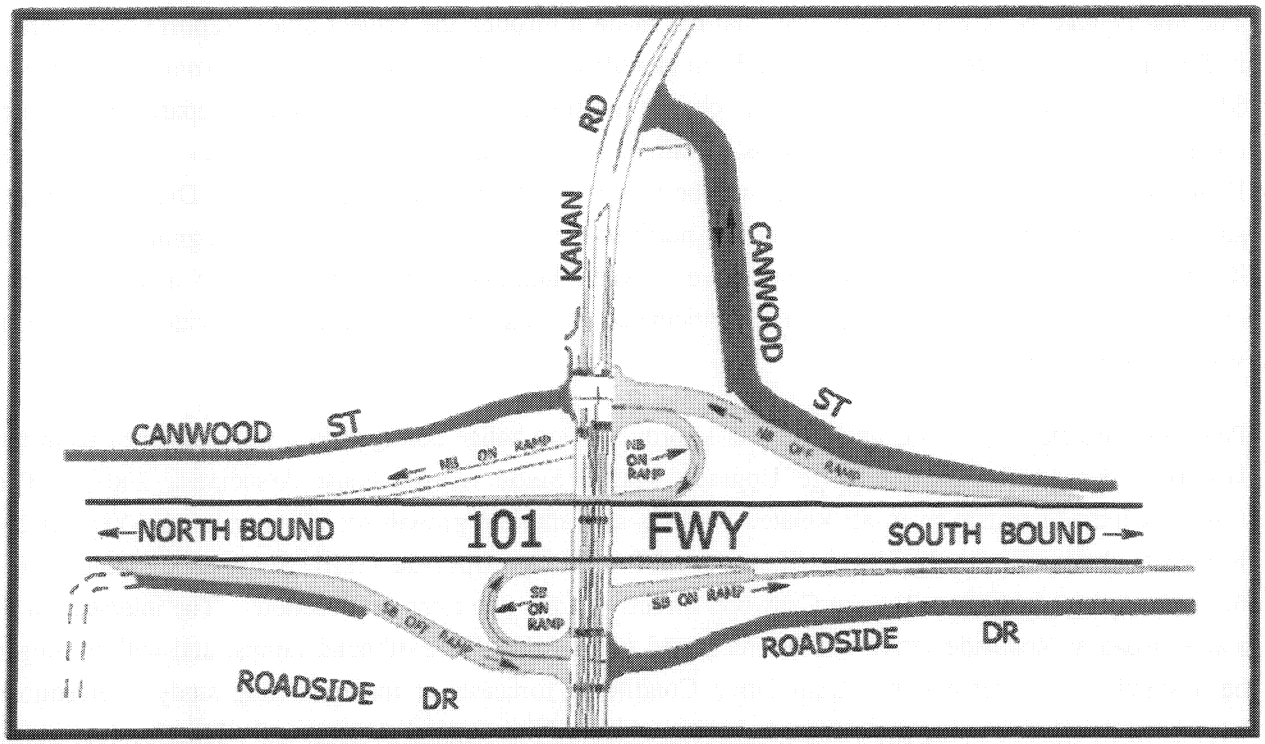



**Figure III.L-7 – Kanan Road Interchange Project**

**Related Projects – Cumulative Conditions**

In order to conduct an analysis of Cumulative Conditions, related projects in the project vicinity were considered. The County of Los Angeles Department of Regional Planning and the Planning Department at the City of Agoura Hills were contacted to obtain information about related projects. All projects within one and one-half miles of the study area, which have been approved or are pending approval by the County of Los Angeles were considered in this analysis. Approved and pending project data were obtained from the County of Los Angeles Department of Regional Planning. In addition, all approved and pending projects in the City of Agoura Hills Commercial and Residential Development Summary database were included in this analysis. A summary of Related Projects is provided on Table III.L-7. The location of Related Projects is shown on Figure III.L-8.

For the Cumulative Conditions analysis of the Kanan Road/US-101 interchange, future lane configurations of the interchange and Year 2020 forecasts was assumed.

**Table III.L-7**
**Related Projects List**

| No. | Project Description and Location | Project Size | Location |
|---|---|---|---|
| ***CITY OF AGOURA HILLS - RESIDENTIAL*** | | | |
| 1 | Riopharm 1 - single family residences | 14 DU | 27754 Agoura Road SE of Agoura and Montecillo |
| 2 | Riopharm 2 - single family residences | 14 DU | 26750 Agoura Road SE of Agoura and Ropharm |
| 3 | Stockton - 4-unit apartment building | 4 DU | 5310 Colodny Drive |
| 4 | Schneider - 4-unit condominium project | 4 DU | 5276 Colodny Drive |
| 5 | Minder - 19-unit condominium project | 19 DU | 5241 Colodny Drive |
| ***CITY OF AGOURA HILLS - COMMERCIAL*** | | | |
| 6 | Creekside - Retail Center | 93 KSF | SWC Kanan Road and Agoura Road |
| 7 | Burgandy Creek Bistro - New restaurant and reception hall | 11 KSF | Vacant lot west of 28818 Agoura Road |
| 8 | St. Paul's Lutheran Church | 91.04 KSF | 30125 Agoura Road |
| 9 | Alesco Development - Office buildings | 67 KSF | NEC Chesebro and Agoura Roads |
| 10 | Ted Moore - Agoura Village mixed use land development | Mixed: 10 Acres<br>Open: 8 Acres | SEC of Agoura Road and Kanan Road |
| 11 | Ball Properties (Centrepoint) - 2 office buildings | 8 KSF | Ladyface Circle |
| 12 | Riverwalk - residential, office buildings & restaurants | Res: 336 Apts.<br>Office: 93 KSF<br>Rest: 19 KSF | NEC Canwood and Kanan Road |
| 13 | Silagi "Canwood Plaza" - Office building | 22.896 KSF | NW corner of Canwood and Kanan Road |
| 14 | Semler (Alan Hartley) - 2 office buildings | 125 KSF | NEC Canwood and Derry |
| 15 | Levy, Moshe - office building w/underground parking | 20.830 KSF | Roadside Drive, west of Lewis Road |
| 16 | Wickman "Agoura Furniture Center" | 38.760 KSF | N/S Canwood Street and Chesebro Road |
| 17 | Reyes Adobe Partners - Mattress and Bedroom showroom | 14.5 KSF | Reyes Adobe Road, directly south of US 101 |
| 18 | Leaders Carpets | 14.080 KSF | 28350 Roadside Drive |
| 19 | So. Cal Food Services for Wendy's | 3.2 KSF | Lots 29 & 30 on Dorothy Drive |
| 20 | Silagi "Center Court" - Office building | 49 KSF | 29475 Canwood Street |
| 21 | Scheu (Corp. Point) - 2 new buildings | 81 KSF | S/S Agoura Road at Reyes Adobe Road |
| 22 | Development Partners - 2 story office building | 31.160 KSF | 30101 Agoura Court |

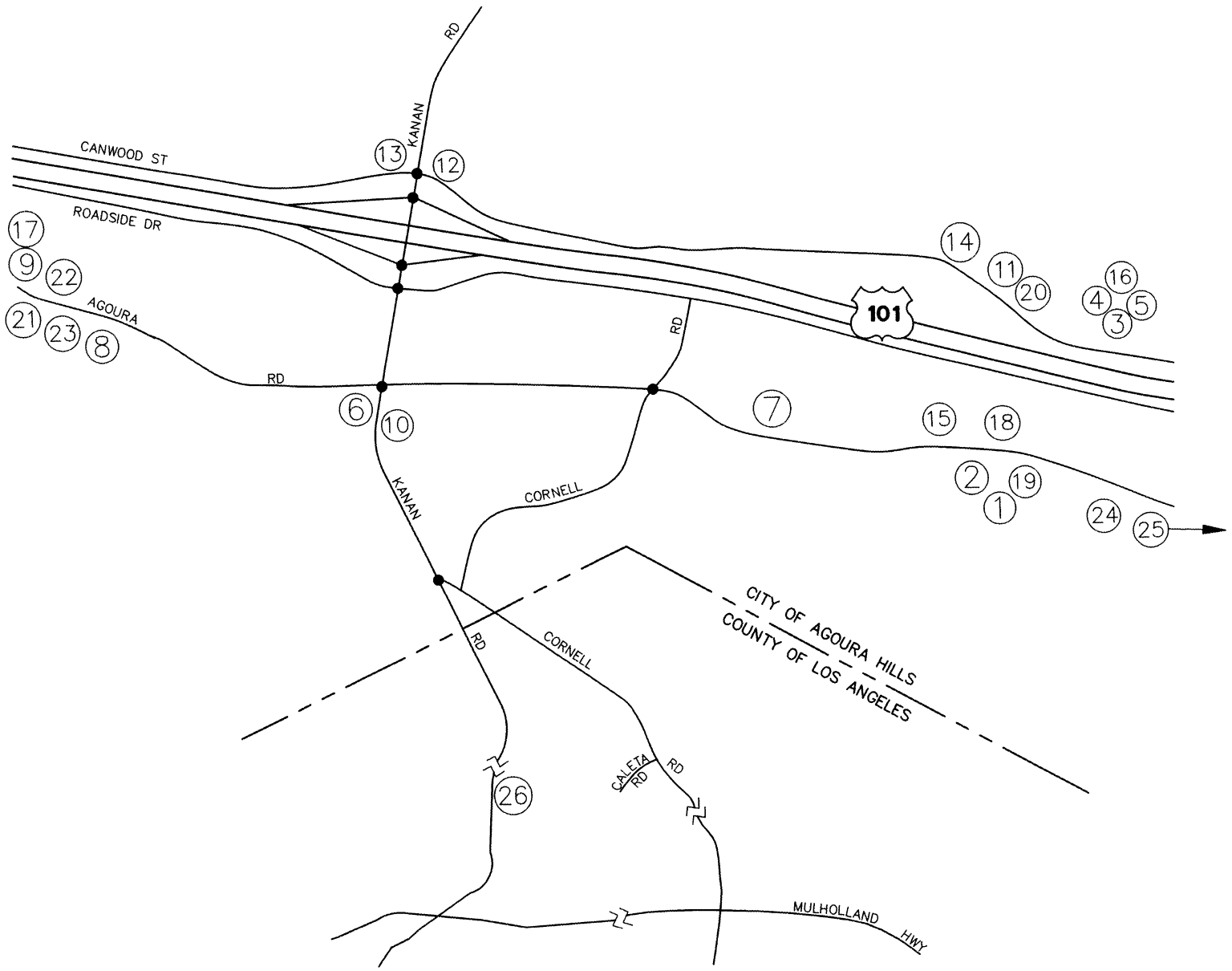
**TABLE III.L-7 Cont.**
**Related Projects List**

| No. | Project Description and Location | Project Size | Location |
|---|---|---|---|
| ***City of Agoura Hills – Commercial*** | | | |
| 23 | Realty Bancorp Equities – 2 story commercial building | 76.750 KSF | 29901 Agoura Road |
| ***COUNTY OF LOS ANGELES*** | | | |
| 24 | Private school, K-8 | 750 students | E of Palo Comado Cyn Rd and Chesebro |
| 25 | Six story office building w/parking structure | 140 Employess | 26585 Agoura Road, Calabasas |
| 26 | 5 SF Lots | 5 DU | 3155 Kanan Road |

A general description of each related project is provided in Technical Appendix D. It should be noted that the Related Projects include a number of significant future developments, including the Ted Moore Mixed-Use project on the southeast corner of the intersection of Kanan Road and Agoura Road, and the Creekside Retail project on the southwest corner of the intersection of Kanan Road and Agoura Road, and the mixed-use development proposed for the northeast quadrant of the Kanan / US-101 interchange. Although it is likely that intersection improvements will be required of these projects, this Cumulative Conditions analysis does not assume any mitigation improvements to be in place. The combined related project daily and peak hour traffic volumes from all Related Projects are illustrated on Figure III.L-9, Related Projects Traffic Volumes.

### *Summary of Two-lane Roadway Analysis – Cumulative Conditions*

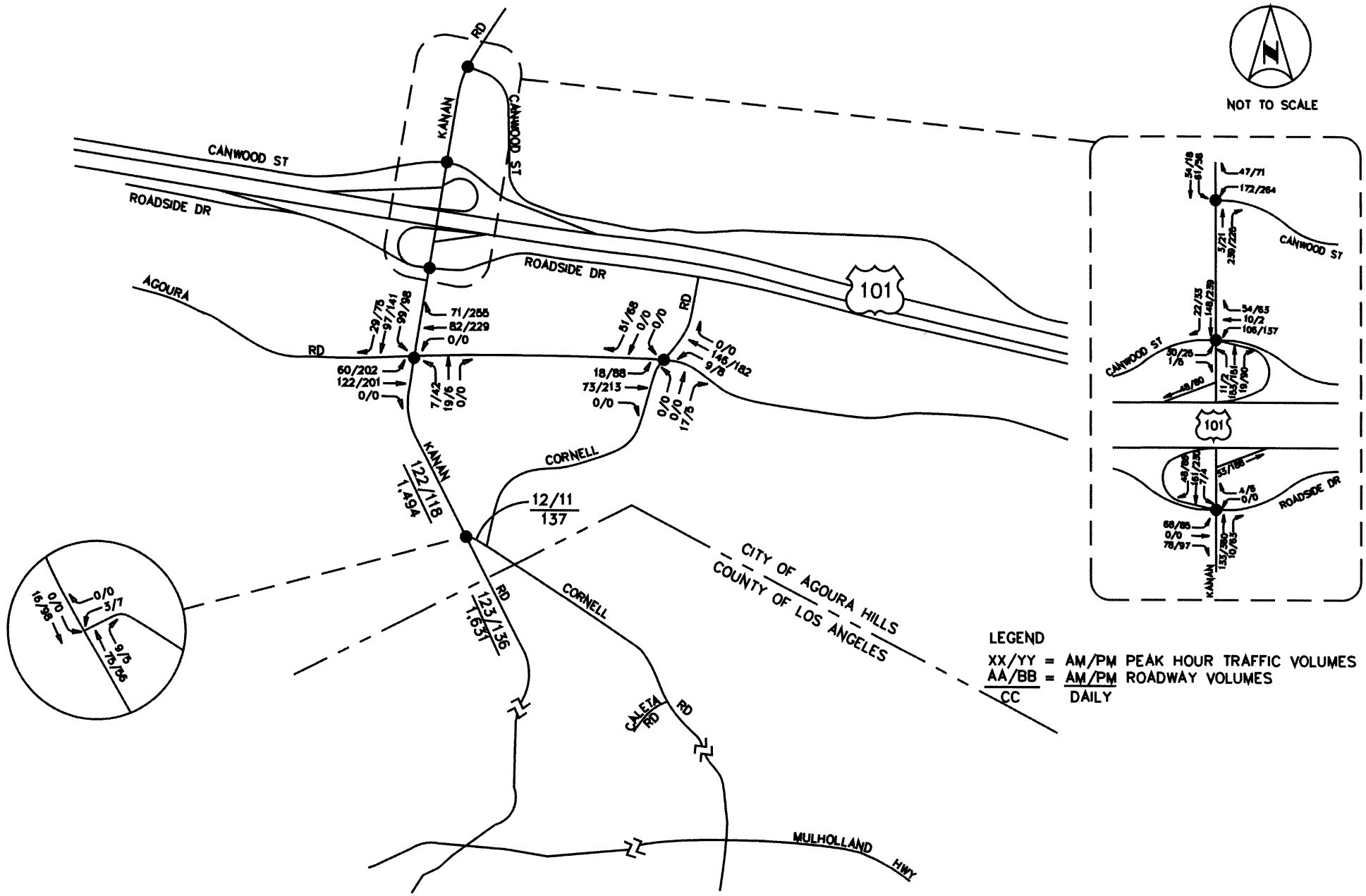
The results of the Cumulative Conditions roadway analysis are summarized in Table III.L-2. The analysis indicates that the three roadway segments will continue to operate at LOS A in both peak hours with the addition of related projects traffic.




Kimley-Horn & Associates, Inc., August 2003

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.L-8
Related Projects Location Map




Source: Kimley-Horn and Associates, Inc., July 3, 2003.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.L-9
Related Projects Traffic Volumes

***Summary of Intersection Analysis – Cumulative Conditions***

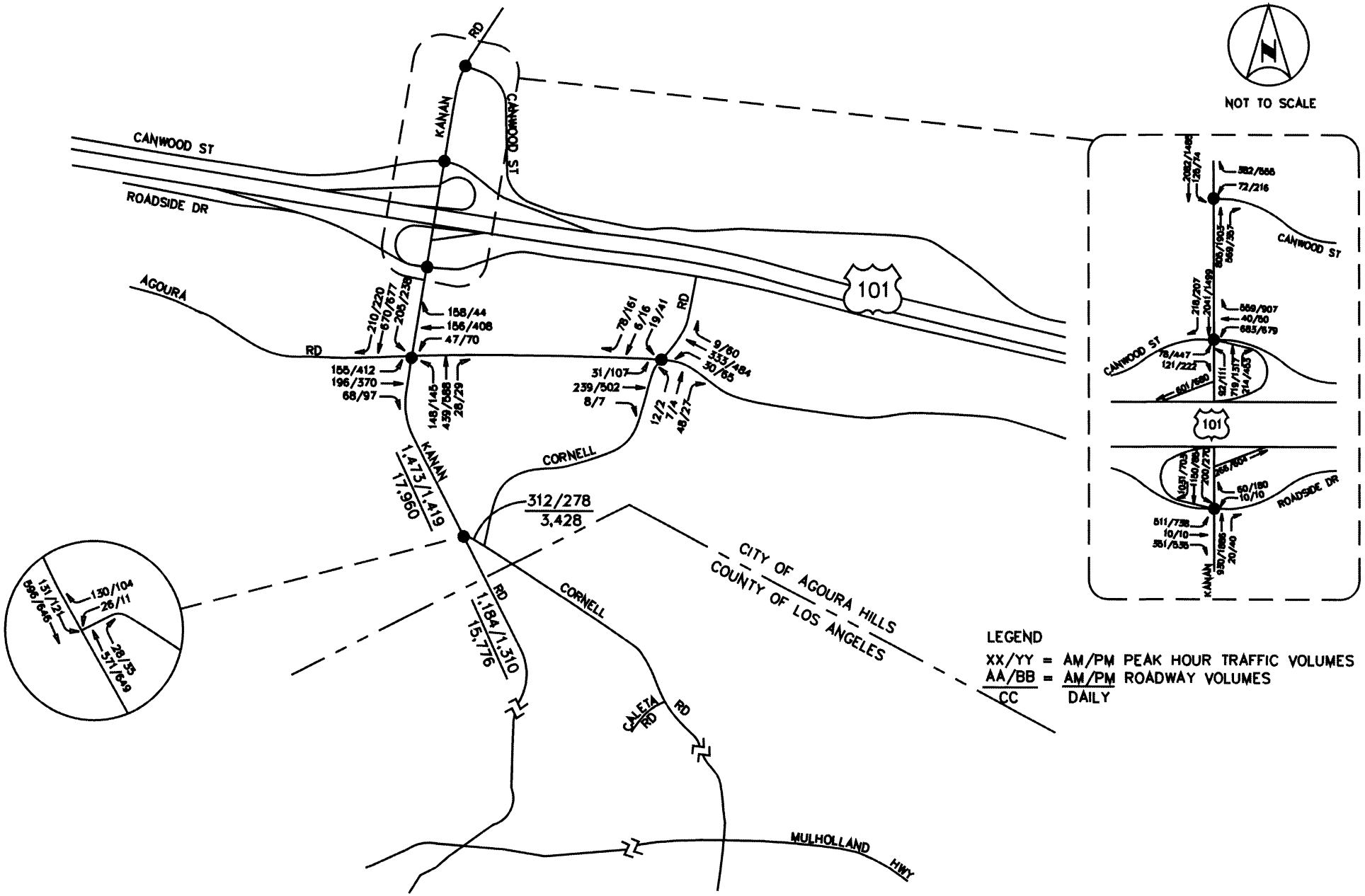
Cumulative Conditions peak hour traffic volumes are shown on Figure III.L-10, Cumulative Conditions. The intersections were re-evaluated, and the results of the analysis are shown on Table III.L-3. With the addition of related projects traffic, and the interchange improvements in place, the intersection of Kanan Road at Canwood Street will operate at LOS D in the morning peak hour and LOS E in the evening peak hour. The Kanan Road interchange eastbound and westbound ramps would operate at acceptable levels of service in the morning peak hour, and will operate at LOS D in the evening peak hour. The intersections of Kanan Road at Agoura Road and Agoura Road at Cornell Road are projected to operate at LOS E or F in the evening peak hour. It should be noted once again, that no mitigation improvements for the Related Projects are assumed in the Cumulative Conditions analysis, although it is expected that the major development projects will have substantial mitigation requirements. Based on County of Los Angeles criteria, the project would have a cumulative impact at the intersections of Kanan Road at Canwood Street, and Kanan Road at Agoura Road, and the project would be required to contribute on a fair-share basis to the improvements necessary to mitigate these conditions. Mitigation measures are provided below to address the impacts at these two intersections.

Since the future Cumulative Conditions analysis assumes a significant network improvement at the Kanan/US-101 interchange, an analysis was also conducted to show the proposed project's impact on the operation of the future interchange. A summary of Cumulative Conditions at the interchange, with and without the Triangle Ranch project, is provided in Table III.L-8.

**Table III.L-8**
**Summary of Cumulative Conditions at the Kanan – US-101 Interchange**
**Without and With Proposed Project**

| Intersection | Cumulative Conditions Without Project | | | | Cumulative Conditions With Project | | | |
|---|---|---|---|---|---|---|---|---|
| | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | |
| | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS |
| Kanan/US-101 WB | 0.786 | C | 0.901 | D | 0.787 | C | 0.903 | D |
| Kanan/US-101 EB | 0.595 | A | 0.889 | D | 0.597 | A | 0.891 | D |

Review of Table III.L-8 shows that the proposed project would not significantly impact the peak hour operation of the interchange under Cumulative Conditions. The ICU increase in both peak hours at both interchange intersections would be 0.002, and does not meet the 0.02 threshold of significance. The proposed project would participate in a Traffic Impact Fee program on a per-PM-trip basis through the City of Agoura Hills Benefit Assessment Fee.




Source: Kimley-Horn and Associates, Inc., July 3, 2003.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.L-10
Cumulative Conditions

**Accident/Speed Analysis**

Based on the accident/speed database provided by the County, most of the accidents on both Cornell Road or Kanan Road resulted in property damage only. The primary causes of accidents were speeding, improper turns or other moving violations, and driving under the influence.

To minimize the risk of additional accidents in the vicinity of the project site, and to facilitate the safe movement of vehicles into and out of the project, the project access points have been designed with left-turn lanes, deceleration lanes, and acceleration lanes, and will comply with County of Los Angeles sight distance criteria.

**Congestion Management Program Compliance**

The Los Angeles County Congestion Management Program (CMP) was developed in response to California Proposition 111, approved June 1990, and is intended to address regional congestion by linking land use, transportation, and air quality decisions.

Among the elements of the CMP is a land use analysis program which "requires local jurisdictions to analyze the impacts of land use decisions on the regional transportation system, for projects preparing and Environmental Impact Report (EIR)."

The CMP document identifies the County's CMP Highway System, and requires that Level of Service E or better be maintained on this network. The US-101 Freeway is the only CMP facility in the Agoura Hills area.

Analysis of project impact on a freeway segment would be required of any project that would add 150 trips or more in either direction during the AM or PM weekday peak hours. Triangle Ranch is projected to add 8 peak hour trips to US 101 east of Kanan Road in the eastbound direction during the morning peak hour and 5 peak hour trips during the evening peak hour. In the westbound direction, Triangle Ranch would add 4 morning peak hour trips and 9 evening peak hour trips to US 101 east of Kanan Road. Triangle Ranch is projected to add 4 peak hour trips to US 101 west of Kanan Road in the westbound direction during the morning peak hour and 3 peak hour trips during the evening peak hour. In the eastbound direction, Triangle Ranch would add 1 morning peak hour trips and 5 evening peak hour trips to US 101 west of Kanan Road. Therefore, further analysis of US 101 is not required for CMP purposes.

An analysis of CMP monitored intersections is required if a project contributes 50 or more peak hour trips to the CMP monitored intersections. No intersections in the study area have been identified in the CMP document as CMP monitored intersections.

## MITIGATION MEASURES

The following measures have been recommended by the Sheriff's Department to ensure adequate site access:

**L-1** Adequate line of sight distances, to the satisfaction of the Los Angeles County Department of Public Works, shall be provided for all ingress and egress points to the site.

**L-2** A turn-a-round radius in front of the gated portion of the site on the easterly side of Cornell Road shall be provided to accommodate a three-axle truck (e.g., moving van).

The following measures are required to address the impacts at the intersections of Kanan Road at Canwood Street and Kanan Road at Agoura Road:

**L-3** At the intersection of Kanan Road at Canwood Street, the addition of northbound and southbound through lanes shall be provided.

**L-4** At the intersection of Kanan Road at Agoura Road, the addition of a southbound left-turn lane, eastbound right and through lanes, and a westbound through lane shall be provided.

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

Implementation of Mitigation Measure L-3 above would improve the Kanan Road at Canwood Street intersection in the morning peak hour ICU to 0.722 (LOS "C") and the evening peak hour ICU to 0.805 (LOS "C"). The proposed project traffic represents approximately 2% of the additional peak hour traffic in the cumulative condition at this intersection.

At the intersection of Kanan Road at Agoura Road, implementation of Mitigation Measure L-4 above would improve the morning peak hour ICU to 0.508, LOS "A", and the evening peak hour ICU to 0.713, LOS "C". The proposed project traffic represents approximately 6% of the additional peak hour traffic in the cumulative condition at this intersection

A summary of intersection operation with mitigation is provided on Table III.L-9.

**Table III.L-9**
**Summary of Intersection Operations**
**Cumulative Conditions With and Without Mitigation**

| Signalized Intersection | Existing plus Growth Conditions | | | | Cumulative Conditions Without Mitigation | | | | Cumulative Conditions With Mitigation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AM | | PM | | AM | | PM | | AM | | PM | |
| | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS |
| **Kanan Road at:** | | | | | | | | | | | | |
| Canwood Street | 0.801 | C | 1.000 | E | 0.870 | D | 1.003 | E | 0.722 | C | 0.805 | D |
| Agoura Road | 0.649 | B | 0.727 | C | 0.800 | C | 1.103 | F | 0.508 | A | 0.713 | C |

As shown in Table III.L-9, impacts would be less than significant following the implementation of the mitigation measures above.

## CUMULATIVE IMPACTS

The growth in traffic due to the combined effects of continuing development, intensification of development, and related projects in conjunction with the proposed project is incorporated into the traffic impacts analysis above. The analysis indicates that the three roadway segments (i.e., Kanan Road south of Cornell Way, Cornell Road south of Kanan Road, and Kanan Road north of Cornell Way) will continue to operate at LOS A in both peak hours with the combined traffic from ambient growth, the proposed project and the related projects. Therefore, cumulative impacts to these three roadway segments would be less than significant.

As discussed above, with the combined traffic from ambient growth, the proposed project, and the related projects, the intersection of Kanan Road at Canwood Street would operate at LOS D in the morning peak hour and LOS E in the evening peak hour. The Kanan Road interchange eastbound and westbound ramps would operate at acceptable levels of service in the morning peak hour, and would operate at LOS D in the evening peak hour. The intersections of Kanan Road at Agoura Road and Agoura Road at Cornell Road are projected to operate at LOS E or F in the evening peak hour. This would constitute significant impacts at these two intersections. However, mitigation measures are provided above that would reduce these impacts to a less-than-significant level. Furthermore, since the proposed project's contribution to these significant cumulative impacts would be less than 0:01, the project's impact would be considered less than cumulatively considerable.

# III. ENVIRONMENTAL IMPACT ANALYSIS
# M. PUBLIC SERVICES
# 1. FIRE PROTECTION SERVICES

## ENVIRONMENTAL SETTING

The climate of Southern California is classified as a Mediterranean type in which hot summer droughts are followed by winter rainfall. The hot, dry summers subject vegetation to prolonged periods of moisture stress at times when wildfire is most likely. Seasonal weather changes introduce periods with distinctly different "fire weather" conditions. At the end of the summer, Santa Ana winds can exacerbate fire hazard levels in the project vicinity.

As described in Section IV.F, Biological Resources, a wide variety of natural vegetation covers the project site. Drought, a relatively frequent occurrence in Southern California, causes accumulation of dead plant material annually during their dormant stages, which contributes to a build-up, or fuel-loading, of volatile plant material. This build-up produces conditions that may exacerbate the intensity of wildfires and, thereby, increases the degree of the fire hazard over time.

Slope steepness and the ruggedness of terrain throughout the project site could influence the speed of a fire spreading, the accessibility of fire-fighting equipment, and response times. Up-slope fires move substantially faster than down-slope fires because of an up-slope "wind effect" which accelerates the spread of fire. As slope steepness increases, the ability to use fire trucks and bulldozers to directly fight fires is inhibited.

The portion of the Santa Monica Mountains in which the project site is located, is described by the Los Angeles County Forester and Fire Warden as a Very High Fire Hazard Severity Zone (formerly Fire Zone 4). This designation is due to the site's steep terrain, fire prone vegetation and proximity to large tracts of land similarly susceptible to wildfire.

### Fire Stations

The project site receives fire protection and paramedic service from the County of Los Angeles Fire Department. Fire Station No. 65, located at 4206 N. Cornell Road, Calabasas 91302 (adjacent to the project site) is the jurisdictional engine company for the project site. The closest fire stations and distances in travel minutes in the vicinity of the project are indicated below in Table III.M.1-1.

The project site is located within the Fire Department's "Area 1 - Malibu/Santa Monica Mountains" fire response area.[1] Fire stations throughout this area provide support to one another during emergency situations. Since overall fire protection services in Area 1 are considered to be deficient, all fire station facilities in Area 1 are also considered to be deficient - including Fire Station No. 65.[2]

**Table III.M.1-1**
**Fire Stations Serving Project Site**

| Station/Equipment[1] | Distance (Miles)[2] | Time (Minutes) | Personnel |
|---|---|---|---|
| LA County Station #65 | | | |
| Engine 65 | 0.4 | 0.7 | 3 |
| Engine 265 | 0.4 | 0.7 | 3 |
| Squad 65 | 0.4 | 0.7 | 2 |
| Westlake Village Station #144 | | | |
| Engine 144 | 4.1 | 7.0 | 4 |
| LA County Station #125 | | | |
| Truck 125 | 4.9 | 8.4 | 4 |

1 *Station No. 144 is located at 31981 Foxfield Drive, Westlake Village; Station No. 125 is located at 5215 N. Las Virgenes Road, Calabasas.*
2 *Average to intersections of Streets "C" and "D" and Streets "H" and "I".*

According to the Fire Department, there is a deficit of fire protection services in Area 1 and additional facilities are needed.[3] Future Fire Station No. 89 is planned to be located on Canwood Street between Kanan Road and Strawberry Hill Drive. However, the architect's plans for this facility have not been finalized and, as such, the Fire Department does not have an estimated completion date for this new facility. It will be the second closest station to the project site. Current staffing plans for Future Fire Station No. 89 are to relocate the second engine and paramedic squad in Station 65 to the new station. According to the Fire Department, this reconfiguration of the Department's resources is not expected to eliminate (although it will partially alleviate) the existing fire protection services deficit in Area 1.[4]

### Water Availability

The project site is located within the jurisdiction of the Las Virgenes Municipal Water District (LVMWD), which has adequate water service in the area. The District currently maintains a 14-inch

---

1 *Telephone communication with Debbie Aguirre, County of Los Angeles Fire Department, September 29, 2003.*
2 *Ibid.*
3 *Ibid.*
4 *Ibid.*

water service main under Cornell Road and an 8-inch water service main under Silver Creek Road. For additional water information, see Section III.N.1, Water. According to the LVMWD, existing water facilities are considered adequate to serve existing residents in the general area of the project site.

## ENVIRONMENTAL IMPACTS

### Thresholds of Significance

In accordance with Appendix G to the CEQA Guidelines, the proposed project would have a significant impact if it would result in substantial adverse physical impacts associated with the provision of new or physically altered Fire Department facilities, need for new or physically altered Fire Department facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives.

### Proposed Project

The proposed project has been sited to minimize fire hazards. For example, the residential enclaves would be concentrated on the site's gentler slopes and would avoid the steeper slopes, where wildfires will burn more rapidly and are more difficult to reach. For the most part, hillside and canyon areas with the highest fire hazard potential would not be developed, but rather would be retained in their existing condition. Also, the residential enclaves would be mostly sited in close proximity to public highways, which would facilitate emergency vehicle access and, if necessary, evacuation. Should it be necessary, evacuating residents would have the option to depart the site either to the north or to the south. Lastly, the project site is located adjacent to an existing fire station and the estimated emergency response time to the project site would be less than one minute.

The proposed project's water service improvements would also serve fire safety needs. Fire hydrants and fire flows would be provided as required by the Fire Department. Also, water main improvements would be provided as determined necessary by the Preliminary Water System Design Report to be prepared by the Las Virgenes Municipal Water District. Street widths and cul-de-sac radii would be sized, per Fire Department requirements, to accommodate fire-fighting equipment.

A fuel modification program to create a buffer between the proposed residences and the surrounding natural vegetation would be implemented in compliance with County Fire Department requirements. The fuel modification program is discussed in detail below. For further information regarding the fuel modification program, see Section III.F, Biological Resources. In conjunction with the fuel modification program, the project would also implement a Master Landscape Plan that would emphasize the use of fire-retardant planting materials and efficient irrigation systems on manufactured slopes as fire buffers. The Master Landscape Plan is discussed in further detail in Section I, Project Description (see Figure I-7) and Section III.M, Visual Qualities.

## Project Impacts

### *Short-Term Construction Impacts*

Construction of the proposed project would increase the potential for accidental wildfires from such sources as the operation of mechanical equipment in close proximity to fire-prone vegetation, use of flammable construction materials, and from carelessly discarded cigarettes. In most cases, the implementation of "good housekeeping" procedures by the construction contractors and the work crews would minimize these hazards. Good housekeeping procedures that would be implemented during construction of the proposed project include: the maintenance of mechanical equipment in good operating condition; careful storage of flammable materials in appropriate containers; and the immediate and complete cleanup of spills of flammable materials when they occur. Additionally, such procedures as watering newly graded areas to keep dust down and the cessation of grading during high winds would also help to reduce fire hazards during dry summer months.

Construction activities also have the potential to affect fire protection services, such as emergency vehicle response times, by adding construction traffic to the street network and by partial lane closures during street improvements and utility installations. These impacts, while potentially adverse, are considered to be less than significant for the following reasons:

(1) Construction impacts are temporary in nature and do not cause lasting effects;

(2) The project site is immediately adjacent to Fire Station No. 65. Thus, opportunities for conflicts between construction traffic and emergency vehicles on nearby surface streets would be minimal; and

(3) Partial lane closures would not greatly affect emergency vehicles, the drivers of which normally have a variety of options for dealing with traffic, such as using their sirens to clear a path of travel or driving in the lanes of opposing traffic. Additionally, if there are partial closures to streets surrounding the project site, flagmen would be used to facilitate the traffic flow until construction is complete.

While the proposed project's construction-related activities would increase the potential for starting a wildfire, construction is not considered to be a high-risk activity and the Fire Department is equipped and prepared to deal with such fires should they occur. Project construction would not be expected to tax fire fighting and emergency services to the extent that there would be a need for new or physically altered fire facilities. Therefore, construction-related impacts to fire protection and medical emergency services would be less than significant.

***Long-Term Operational Impacts***

The proposed project would introduce 81 new homes and an estimated 243 residents[5] into previously uninhabited hillside areas considered to be subject to very high fire hazards by the LAFD. This new resident population would increase the potential for wildfire starts in the area and, concomitantly, the need for fire protection and emergency services in the area. Although designed with fire safety as a concern, by itself, the project design would not be sufficient to eliminate the risk of exposure to wildfire hazards.

As discussed above, additional facilities are needed in Area 1 to provide adequate fire protection services. Although the proposed project by itself would not warrant the construction of a new or physically altered fire station, the proposed project would contribute to the existing need for a new or physically altered fire station.[6] As discussed above, the threshold for a significant impact is ultimately determined by whether the construction of a new or physically altered fire station (in order to maintain acceptable service ratios, response times or other performance objectives), would cause significant environmental impacts. However, since specific plans for such future facilities are not available, it is not possible to determine whether the associated construction impacts would cause significant impacts. In the absence of such information, this analysis assumes the worst-case scenario that such construction impacts would be potentially significant. Therefore, the project would have a potentially significant long-term impact on fire protection services.

The following discussion analyzes the major criteria for determining the proposed project's impacts to fire protection services with respect to fire flows, response distance, emergency access/evacuation, and fuel modification.

*Fire Flows*

As determined by the Los Angeles County Fire Department, single-family detached homes require a minimum fire flow of 1,250 gallons per minute at 20 pounds per square inch residual pressure for a two-hour duration. In order to provide the required fire flow (and water for domestic purposes), all residential lots would be served by 8-inch water mains, which would be provided within each of the project's proposed public and private roads and cul-de-sacs. Fire hydrants would be located along each road at intervals of 600 feet as specified by the Los Angeles County Fire Department. Water service would be looped from Cornell Road to Kanan Road and back again to Cornell Road. Also, looped water systems would be provided for the development areas west of Kanan Road and east of Cornell

---

[5] *Assumes 3.0 persons per single-family dwelling unit (Source: Las Virgenes Municipal Water District Population Growth, Residential Development and Employment Activity Report, LVMWD Report Number 2041, March 1996).*

[6] *Telephone communication with Debbie Aguirre, County of Los Angeles Fire Department, September 29, 2003.*

Road. See Figure III.N.1-1, Water Plan, for the proposed water system. All of these water lines would be designed according to LVMWD standards, which take into account Los Angeles County Fire Department fire flow and pressure requirements. For a discussion of the proposed project's provision of water service for fire flows and domestic purposes, including temporary construction impacts associated with the installation of water lines, refer to Section III.N.1, Utilities - Water.

*Response Distance and Access*

The Fire Department's response time criterion to respond to a fire is based on the nationwide standard of five minutes. Since the project site is located adjacent to Fire Station No. 65, it is anticipated that the Fire Department would be able to respond to an incident within five minutes of initial notification. Therefore, the response distance between the project site and the primary response fire station is considered to be adequate. In addition, the Fire Department has indicated that the distance between Fire Station 65 and the project site is adequate.[7]

*Emergency Access/Evacuation*

According to the Fire Department, the proposed project may necessitate multiple ingress/egress access for the circulation of traffic, and emergency response issues. As designed, each of the proposed residential enclaves has only one means of access. However, none of the proposed residential enclaves exceed the 75 dwelling unit limitation on a single access point (in accordance with the Subdivision Code).[8] The largest enclave, located on the west side of Kanan Road has a total of 44 residential lots; the smallest enclave, located between Kanan and Cornell Roads, consists of 10 residential lots; the enclave on the east side of Cornell Road consists of 27 lots.

*Fuel Modification Plan*[9]

The Los Angeles County Fire Department's Fuel Modification Plan Guidelines (adopted January 1998) require all subdivisions within areas designated as a Very High Fire Hazard Severity Zone to provide a fuel modification plan. The Plan must establish a 200-foot wide fuel modification area that is subdivided into three distinct zones. According to the Plan Guidelines, "a fuel modification zone is a strip of land where combustible native or ornamental vegetation has been modified and/or partially or totally replaced with drought tolerant, fire resistant plants" (page 1). Each fuel modification zone has specific improvement and maintenance requirements. Since the proposed project does not depict

---

7 *Ibid.*

8 *Telephone communication with Inspector J. Scott Greenelsh, County of Los Angeles Fire Department, September 24, 2003.*

9 *The fuel modification plan for the proposed project has been prepared following the County of Los Angeles Fire Department "Fuel Modification Plan Guidelines" and preliminary consultation with the County of Los Angeles Fire Department.*

specific locations for houses or other combustible structures, the Fuel Modification Plan locates the 200' wide fuel modification zone adjacent to the rear and/or side of each proposed residential building pad (see Figure III.M.1-1). Figure III.M.1-2 presents a representative cross-section of the fuel modification zones.

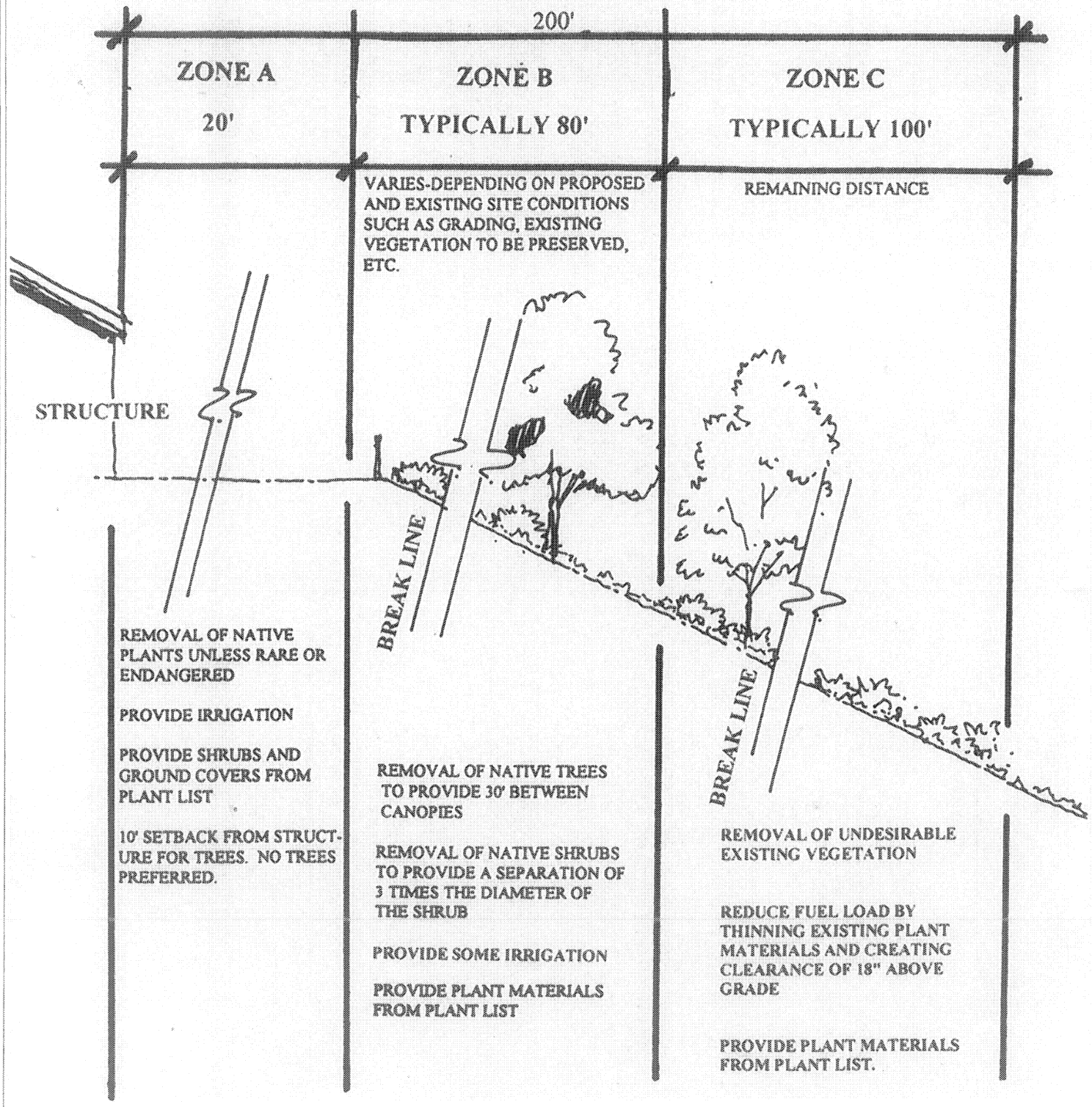
Zone A is a 20' wide "Setback Zone" located immediately adjacent to combustible structures (i.e., houses), attached accessory structures, appendages and projections. Most of the vegetation within this zone is limited to ground cover, lawns and a select number of ornamental plants (e.g., herbaceous perennials or low shrubs). Removal of native plants is required with some consideration given for rare and endangered species. Preliminary discussions with the County of Los Angeles Fire Department indicate that the rare and endangered species located within Zone A will not require removal because they are annuals. Zone A is an irrigated zone; however, irrigation in the vicinity of native Oak trees will be located beyond the dripline and directed away from the trees.

Zone B is an "Irrigation Zone" located adjacent to Zone A. Usually greater than 100 feet, the width of Zone B will be determined on a lot by lot basis and will vary depending on possible site conditions such as grading, vegetation to be preserved, etc. With the possible exception of specimen native vegetation that is approved for retention, "irrigated surface fuels" in this zone will be maintained at a height not to exceed 18 inches. Remaining native vegetation will be thinned out to provide a 30-foot distance between any tree canopies and a separation distance between shrubs which is a minimum of three times the diameter of the shrub. Special consideration will be given to the rare and endangered plant species located within Zone B. Preliminary conversations with the County of Los Angeles Fire Department indicate that such species in Zone B will not require removal; however, such species are not compatible with supplemental irrigation.

Source: Dizin Landscape Architects

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.M.1-1
Fuel Modification Plan




CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.M.1-2
Fuel Modification Zones Cross-Section

Zone C is a "thinning zone" located adjacent to Zone B. The width of Zone C will vary depending on the ultimate designated width of Zone B, but averages about 100 feet in width. However, the combined width of Zones A, B and C will not exceed 200 feet except under very unusual conditions. Fuel modification within Zone C entails removal of undesirable existing vegetation, thinning of natural vegetation and removal of lowest 18 inches of vegetation from the ground (excluding rare or endangered species), and some replacement planting if necessary to meet minimum slope coverage requirements.

For further information regarding the fuel modification program, see Section III.F, Biological Resources and III.I, Visual Qualities.

## LEVEL OF SIGNIFICANCE BEFORE MITIGATION

Implementation of the proposed project would contribute to the need for new or physically altered Fire Department facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives. Therefore, project impacts on fire protection services, before mitigation, would be potentially significant.

## MITIGATION MEASURES

The following mitigation measures would reduce significant impacts to a less than significant level:

**M.1-1** Access shall comply with Title 21 (County of Los Angeles Subdivision Code) and Section 902 of the Fire Code, which requires all weather access. All weather access may require paving.

**M.1-2** A fuel modification plan, landscape plan, and an irrigation plan shall be submitted to the Fire Department and approved prior to final map clearance.

**M.1-3** Prior to occupancy, the project applicant/developer shall provide Fire Department approved street signs and access numbers.

**M.1-4** Project shall comply with all applicable code and ordinance requirements for construction, access, water mains, fire flows, fire hydrants, brush clearance, and fuel modification.

**M.1-5** Fire sprinkler systems shall be installed in all residential structures.

The project applicant proposes to implement the following measure to reduce further the project's less-than-significant impacts associated with fire flows:

**M.1-6** The project shall provide water system improvements as required by the Preliminary Water System Design Report prepared by the Las Virgenes Municipal Water District.

Lastly, the proposed project would be subject to the Los Angeles County Developer Fee for Fire Stations Program (Developer Fee). Satisfying Developer Fee obligations in an amount proportionate to the demand created by the project is the mechanism for mitigating the project's impact on the Fire Department's equipment and facilities. The following measure is required:

**M.1-7** The project applicant/developer shall pay a Developer Fee on Construction (at the prevailing rate of $0.3716 per square foot of construction) for future capital improvements for the Los Angeles County Fire Department.

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

The implementation of the project design features, in combination with the mitigation measures above, would reduce potential impacts associated with fire protection to a less-than-significant level.

## CUMULATIVE IMPACTS

Development and occupancy of all the anticipated growth in the related projects study area, including the proposed project, would increase demands for Fire Department protection services. According to the Fire Department, additional facilities are needed to adequately serve Area 1. Based on the threshold criteria discussed above, a significant cumulative impact would occur if the combined demand for fire protection services generated by the proposed project and the related projects would result in the provision of new or physically altered Fire Department facilities, the construction of which could cause significant environmental impacts. Since future Fire Station No. 89 would relocate existing Fire Department resources, the cumulative demand for new facilities would not be entirely met by this new facility. Furthermore, the Fire Department has indicated that Fire Station No. 89 would not entirely eliminate the current deficit of fire protection services in Area 1.[10] Therefore, additional facilities in addition to future Fire Station No. 89 would still be needed to meet the cumulative demand. However, since specific plans for such future facilities are not available, it is not possible to determine whether the associated construction impacts would cause significant impacts. In the absence of such information, this analysis assumes the worst-case scenario that cumulative impacts would be significant.

According to CEQA Guidelines Section 15130(a)(3):

---

[10] *Telephone communication with Debbie Aguirre, County of Los Angeles Fire Department, September 29, 2003.*

> *An EIR may determine that a project's contribution to a significant cumulative impact will be rendered less than cumulatively considerable and thus is not significant. A project's contribution is less than cumulatively considerable if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact...*

This is the case with the proposed project, which would be required to pay developer's fees in the amount of $0.3716 per square foot of residential construction to offset its fair-share impact on Fire Department facilities. On this basis, the project's contribution to the potentially significant cumulative impact would be rendered less than cumulatively considerable and, as such, is not significant.

# III. ENVIRONMENTAL IMPACT ANALYSIS
# M. PUBLIC SERVICES
# 2. SHERIFF SERVICES

## ENVIRONMENTAL SETTING

The Los Angeles County Sheriff's Department, which serves all unincorporated areas of Los Angeles County as well as approximately forty contract cities, provides the law enforcement services to the project site area. The Sheriff's Department is also responsible for emergency evacuation of the project area, if needed. More specifically, the project site receives its primary services from Lost Hills/Malibu Sheriff's Station located at 27050 Agoura Road, in the City of Calabasas. The station is located approximately three miles east of the project site (via U.S. 101 -- Ventura Freeway at Lost Hills Road).

According to the Sheriff's Department, the Malibu/Lost Hills Station is fully equipped to handle any situation which might arise where the need for law enforcement service is concerned. For the fiscal year 2003/2004, the staffing level at the Malibu/Lost Hills Station included 137 sworn personnel and 40 civilian, which are considered adequate to service the five contract cities (i.e., Agoura Hills, Calabasas, Malibu, Hidden Hills, and Westlake Village) and the outlying unincorporated Los Angeles County area (north to Chatsworth Lake and the Ventura County line, south to the Pacific Ocean coastline, and west to the Ventura County line).[1] Further assistance can be provided by sworn officers from other areas of the County, as well as the City of Los Angeles, the County of Ventura, and the California Highway Patrol through the "mutual aid" program, if needed. The California Highway Patrol (CHP) is responsible for the enforcement of traffic related laws and regulations.

Equipment available to the Lost Hills/Malibu Sheriff's station includes: radio cars, four-wheel drive vehicles, mountain rescue vehicles, all terrain vehicles (ATVs), motorcycles, and a helicopter.

According to the Sheriff's Department, the violent crime rate for the project area is "very low" and most of the crimes reported in the area of the project site (the City of Agoura Hills, as determined by the Sheriff's Department) consist of "property crimes". Many of the crimes are thefts of valuable properties left in plain sight in vehicles (which are often unlocked). Additionally, according to the Sheriff's Department, the crime rate per 1,000 residents is well below that of most cities in Los

---

[1] *Correspondence from Thomas G. Martin, Captain, Malibu/Los Hills Station, to Helen Crofoot, Christopher A. Joseph and Associates, July 18, 2003.*

Angeles County and is probably among the lowest in the state.[2] Most traffic problems in the area consist of congestion and speeding on mountainous roads, including Kanan Road.

The crime statistics for the unincorporated Agoura area for the calendar year 2002 were 22 part one crimes (those involving violence, grand thefts of property and vehicles, and arson) and 358 for City of Agoura Hills. The officer to population ratio for both the unincorporated Agoura area and City of Agoura Hills is about one per 2,422 residents.[3]

The Sheriff's Department maintains response time goals of 20 minutes for routine calls, 15 minutes for priority calls and 7 minutes for emergency calls for service. Reported response times for the City of Agoura Hills and the unincorporated area of Agoura are summarized in Table III.M.2-1.

**Table III.M.2-1**
**Sheriff's Response Times (In Minutes)**

| | Emergency | Priority | Routine |
|---|---|---|---|
| City of Agoura Hills | 5 | 6.7 | 17.7 |
| Unincorporated Agoura | 8.3 | 11.2 | 21.2 |
| *Source: Correspondence from Captain Thomas G. Martin, Malibu/Lost Hills Station, July 18, 2003.* | | | |

## ENVIRONMENTAL IMPACTS

### Thresholds of Significance

In accordance with Appendix G to the CEQA Guidelines, impacts on Sheriff's protection services would be significant if the project would result in a substantial adverse physical impact associated with the provision of new or physically altered facilities, need for new or physically altered facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives.

### Project Impacts

In their review of the proposed project, the Sheriff's Department has noted that new development has the potential to increase demand for law enforcement services both onsite and related to its additional

---

2 *Personal communication between Sergeant Kevin B. Mauch, Lost Hills/Malibu Station and Wendy Brogin (March 16, 1999, and March 24, 1999).*

3 *Ibid, Martin.*

traffic generation. However, many of these potential demands can be reduced in the design and planning phase of the project. According to the Sheriff's Department, crime prevention through design is a proven means of reducing crime and demands on law enforcement. Lighting, visibility, methods of egress and ingress and security services all help if they are well planned.[4]

Consistent with the Sheriff's comments, the proposed project includes substantial crime prevention design features. For example, the residential enclave on the east side of Cornell road would be a private community with security gates that would minimize public access. All three residential enclaves would be clustered developments, a design approach that enhances opportunities for mutual surveillance while minimizing opportunities for the concealment of criminal activities. Also, the proposed project would provide low levels of night lighting, sufficient for security and identification purposes, throughout the residential enclaves. Furthermore, the site design takes advantage of the steep adjacent hillsides to further restrict public access to the residential enclaves. With these design features, the level of police protection required for the proposed project would be substantially reduced in comparison with a typical subdivision.

According to the Sheriff's Department, response times to the proposed project would be more in keeping with those of the City of Agoura Hills (see Table III.M.2-1), since the project site lies just outside the City and within close proximity to the Sheriff's station.

According to the Sheriff's Department, the Malibu/Lost Hills Station is fully capable of providing adequate services to the proposed project without adversely affecting current levels of service to the community and without the necessity of hiring additional officers or staff and without having to purchase additional equipment.[5] Since the proposed project would not result in a substantial adverse physical impact associated with the provision of new or physically altered Sheriff's station or other facilities, the proposed project's impact on Sheriff's protective services would be less than significant.

In addition to those crime prevention design features discussed above, mitigation measures are recommended below in order to maintain acceptable service ratios, response times and other performance objectives of the Sheriff's Department. These mitigation measures are not required under CEQA because, as discussed above, the proposed project would not create the need for new or physically altered Sheriff's facilities. However, they are recommended to reduce further the demands of the proposed project on police protection services.

In their previous review (2000), the Sheriff's Department recommended that access points to the site be adequate to allow for the turning radius of a three-axle truck (e.g., moving van), including a turn-

---

4 *Ibid, Martin.*

5 *Ibid, Martin.*

around area on the Cornell Road side of the gate proposed for the portion of the project located to the east of that road. (For further discussions of access issues, see Section III.L, Traffic and Access).

There has been some concern raised by the surrounding community regarding emergency access to and evacuation of the portion of the site located east of Cornell Road during an areawide emergency episode. However, the proposed development does not exceed the seventy-five dwelling unit limitation on a single route of access to a highway and the Sheriff's Department has reviewed the proposed project and has indicated that emergency evacuation is not a concern at this location.[6] Furthermore, the Sheriff's Department has indicated that a secondary means of access for the eastern portion of the project would not be necessary.[7]

## MITIGATION MEASURES

Project impacts on Sheriff's protection services would be less than significant and, under CEQA, mitigation measures are not required. Nevertheless, the following mitigation measures are recommended to reduce further the project's reliance on the Sheriff's Department assistance by making the project site less vulnerable to criminal activity:

**M.2-1** The Sheriff's Department shall be given access codes and/or keys to lock boxes to gated portions of the project site.

**M.2-2** Signs shall be posted on the project site allowing for the enforcement of the California Vehicle Code on the project's interior streets.

**M.2-3** The applicant/project developer shall consult with the Sheriff's Department's for security design assistance.

**M.2-4** Upon completion of the project, the project applicant/developer/builder shall provide the Malibu/Lost Hills Station commanding officer with a diagram of the project. The diagram shall include access routes, addresses, and any other information that might facilitate the Sheriff's response.

Site access mitigation measures are discussed in Section III.L, Traffic and Access. To minimize the risk of accidents due to excessive speeds on Kanan Road, and to facilitate the safe movement of vehicles into and out of the project site, the four-way "A" Street/"E" Street/Kanan Road intersection in the northern portion of the project site will provide north and southbound left-turn lanes, plus right-turn acceleration/deceleration lanes.

---

6 *Sheriff's Department, telephone conversation with Lt. Van Herpe, September 24, 2003.*

7 *Ibid.*

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

Impacts to Sheriff's protective services would be less than significant. With the implementation of the recommended mitigation measures these less-than-significant impacts would be reduced even further. Provision of the proposed project design features (such as left turn lanes, acceleration/deceleration lanes, etc.) plus compliance with Los Angeles County Department of Public Works line-of-sight requirements, would reduce potential access-related impacts to a less-than-significant level.

## CUMULATIVE IMPACTS

Development of the 26 related projects (see Table II-1 in Section II.C) in conjunction with the proposed project would increase the demand for Sheriff's protection services. Of the 26 related projects, six are residential, two are mixed-use (including residential), and 18 consist of commercial/institutional uses. The related projects would generate approximately 2,807 employees[8] and approximately 1,473 residents. The related projects in combination with the proposed project would generate approximately 1,716 residents. Based on the current officer to population ratio of one officer per 2,422 residents, less than one officer (0.7) would be needed to maintain current police protection service levels. The addition of less than one officer would not likely require new or physically altered facilities, the construction of which could cause significant environmental impacts.

Notwithstanding the above, it is conceivable that the cumulative demands of the proposed project and the related projects could necessitate the construction of a new or physically altered Sheriff's station or other facilities. Based upon the threshold criteria, construction of a new or expanded Sheriff's station could result in significant cumulative impacts if that construction caused significant environmental impacts. However, this is not expected to occur for several reasons. First, the Sheriff's Department has not indicated any necessity for or plans to construct new or expanded facilities. Second, the Sheriff's Department periodically reviews the adequacy of its services and facilities and proposes appropriate service enhancements, through the yearly budgetary process, to ensure adequate ongoing protection for the area. Third, each related project would be reviewed by the local decision-makers for consistency with its applicable land use plan and would be required to mitigate its individual impacts on Sheriff's services.

As discussed above, the proposed project's incremental impact on Sheriff's protection services is considered to be less than significant because:

- the proposed single-family homes would include substantial crime prevention design features that would reduce reliance of the Sheriff's Department;

---

[8] *See Table II-1.*

- the proposed project would provide adequate emergency access to and evacuation of the project site; and

- the proposed project is relatively small (i.e., 81 single-family homes) and would not require Sheriff's protection services of a substantial magnitude that would require new or physically altered Sheriff's facilities (i.e., less than one officer).

For these reasons, it is concluded that the proposed project's incremental impact on Sheriff's protective services would not be cumulatively considerable. Hence, there would be no cumulatively significant impact on police protection services.[9]

[9] *It should also be noted that since there are no plans for new or expanded Sheriff's facilities available to review, it is impossible to determine at this time whether such construction might cause significant environmental impacts.*

# III. ENVIRONMENTAL IMPACT ANALYSIS
# M. PUBLIC SERVICES
# 3. SCHOOLS

## ENVIRONMENTAL SETTING

The project site is located within the jurisdictional boundaries of the Las Virgenes Unified School District. Schools currently serving the project site, their addresses, and approximate distance from the project site are:

- Sumac Elementary School, 6050 Calmfield Avenue, Agoura Hills -- 1.6 miles, north
- Lindero Canyon Middle School, 5844 Larboard Lane, Agoura Hills -- 3 miles, northwest
- Agoura High School, 28545 W. Driver Avenue, Agoura Hills -- 1.1 mile, north

The school capacity and enrollment data for these schools is shown in Table III.M.3-1. As shown in Table III.M.3-1, all of the public schools in the area currently exceed their enrollment capacities. The project site is undeveloped and, therefore, does not currently contribute to the existing school enrollment.

**Table III.M.3-1**
**Current School Enrollments/Capacities**

| School | 1995/96 Design Capacity | Total Capacity With Relocatables | Capacity After 20% Class Size Reduction[a] | Current Enrollment[b] | Under/Over Capacity |
|---|---|---|---|---|---|
| Sumac Elementary | 548 | 698 | 558 | 617 | 59 Over |
| Lindero Canyon Middle School | 1,080 | 1,230 | 1,230[c] | 1,331 | 101 Over |
| Agoura High School | 1,954 | 1,984 | 1,587 | 2,122 | 535 Over |

[a] *See Footnote No. 1, above.*
[b] *Las Virgenes Unified School District Enrollment Summary - As of November 20, 1998*
[c] *Classroom reduction not required at middle school level.*

*Source: Las Virgenes Unified School District, July 2003.*

### School Facilities Fee Plan

The Leroy F. Greene School Facilities Act of 1998 (SB 50) sets a maximum level of fees a developer may be required to pay to mitigate a project's impacts on school facilities. The maximum fees authorized under SB 50 apply to zone changes, general plan amendments, zoning permits and subdivisions. SB 50 also prohibits a local agency from denying a development project, by either legislative or adjudicative action, on the basis that school facilities are inadequate to serve the project.

In enacting SB 50, the Legislature stated its intent to occupy the field of school facilities impact mitigation and to preempt local regulation in that area. SB 50 expressly overrides both CEQA and local laws in providing the exclusive method of considering and mitigating impacts on school facilities that may result from a legislative or adjudicative act. Furthermore, the provisions of SB 50 are deemed to provide full and complete mitigation of school facilities impacts, notwithstanding any contrary provisions in CEQA or other State or local laws (Government Code Section 65996). In other words, payment of developer fees constitutes full and complete mitigation of school impacts.

Pursuant to Section 65995.5-7 of the California Government Code, the Las Virgenes Unified School District has established a residential developer fee at a rate of $2.14 per square foot on new residential construction within the boundaries of the District.[1]

## ENVIRONMENTAL IMPACTS

### Thresholds of Significance

In accordance with Appendix G to the CEQA Guidelines, impacts on schools would be significant if the project would result in a substantial adverse physical impact associated with the provision of or need for new or physically altered schools in order to maintain acceptable service ratios or other performance objectives.

### Project Impacts

The introduction of approximately 243 permanent residents onto the project site and the generation of school age children would increase demand for student enrollments into the Las Virgenes Unified School District. Based upon student generation rates provided by the District, the proposed project

---

*1 Petrash, Kathy, Las Virgenes Unified School District, telephone correspondence, August 26, 2003.*

would generate approximately 32 elementary school students, 17 middle school students, and 32 high school students (see Table III.M.3-2).

**Table III.M.3-2**
**Project Student Generation**

| School | Generation Rate[a] | Dwelling Units | Students Generated |
|---|---|---|---|
| Sumac Elementary | 0.40 Students/DU | 81 | 32.4 |
| Lindero Middle School | 0.21 Students/DU | 81 | 17.0 |
| Agoura High School | 0.40 Students/DU | 81 | 32.4 |
| | | ***Total Students*** | 81.8 |

[a] *Source: Las Virgenes Unified School District, July 16, 2003.*

It is possible that some of the future residents in the proposed project already reside within the service boundaries of the District, with their school-aged children currently enrolled in the District schools near the project site. However, to provide for a worst-case scenario, it is assumed that none of the students generated by the proposed project would be currently enrolled in District schools, but would enroll in the District upon moving into the proposed project. Because each of the schools serving the project site is operating over its total capacity (with the inclusion of relocatable classrooms), the proposed project's additional new students will further contribute to the over-enrollment within the District (see Table III.M.3-3).

**Table III.M.3-3**
**School Capacities With Project**

| School | Total Capacity With Relocatables & 20% Reduction | Current Enrollment | Project Students | Future Enrollment (Existing + Project) | Over/Under Capacity |
|---|---|---|---|---|---|
| Sumac Elementary | 558 | 617 | 32.4 | 649 | 91 Over |
| Lindero Middle School | 1,230 | 1,331 | 17.0 | 1,348 | 118 Over |
| Agoura High School | 1,587 | 2,122 | 32.4 | 2,144 | 557 Over |

In *Goleta Union School District v. The Regents of the University of California,* the California Appellate Court found that classroom overcrowding, per se, does not constitute a significant effect on the

environment under CEQA.[2] Rather, the threshold for such a finding is whether the project would result in a substantial adverse physical impact associated with the provision of or need for new or physically altered schools in order to maintain acceptable service ratios or other performance objectives. While the addition of approximately 33 elementary school and 33 high school students would contribute to the existing need for relocatable classrooms at Sumac Elementary and Agoura High, the project's incremental impact would not be sufficient to require an additional classroom. However, even if the project were to require a relocatable classroom on each of the affected campuses, it is unlikely that the addition of a prefabricated structure on an existing campus would result in a substantial adverse physical impact. Therefore, the project's impacts on Sumac Elementary and Agoura High would be less than significant. With respect to Lindero Middle School, the project's contribution of 17 new students would not result in a substantial adverse physical impact associated with the provision of or need for new or physically altered schools.[3] Therefore, the project's impact on Lindero Middle School would also be less than significant.

As previously discussed, the project developer would be required to pay a fee of $2.14 per square foot of residential development. Based on an average of 5,000 square feet, the project developer would pay approximately $866,700 to the Las Virgenes Unified School District to offset the proposed project's impacts on schools.

## SIGNIFICANCE OF IMPACTS BEFORE MITIGATION

The proposed project would not result in a substantial adverse physical impact associated with the provision of or need for new or physically altered schools in order to maintain acceptable service ratios or other performance objectives. Therefore, project impacts on public schools would be less than significant.

## MITIGATION MEASURES

The proposed project would contribute additional students to public schools that are currently operating with over-enrollments. However, as discussed in the Environmental Setting section, the project

---

2 *Goleta Union School District v. The Regents of the University of California, 37 Cal. App. 4th 1025 (1995).*

3 *LVUSD is currently constructing the new Alice C. Stelle Middle School at 22450 Mulholland Hwy, Calabasas. The new school is scheduled to open in November or December, 2003. However, the provision of this new school is anticipated to relieve middle school over-crowding at A.E. Wright Middle School only. It will not affect over-enrollment at Lindero Canyon Middle School.*

applicant would be required to pay a school fee of $2.14 per square foot of new residential development to the Las Virgenes Unified School District in compliance with SB 50. This fee provides full and complete mitigation of any potential school impacts.

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

Impacts on schools from implementation of the proposed project would be less than significant. With payment of fees in compliance with SB 50, impacts would be further reduced.

## CUMULATIVE IMPACTS

As previously indicated by the Las Virgenes Unified School District, the elementary, middle, and high schools that serve the project site are currently operating above their capacities. Other schools in the District are also currently operating at or above their capacities. Development of the proposed project in combination with the 26 related projects would further increase the demand for public schools. While the School District has not indicated a specific need for new schools, it is likely that the cumulative demand generated by the proposed project, the related projects, and unknown future projects, would ultimately result in the provision of or need for new or physically altered schools in order to maintain acceptable service ratios or other performance objectives. However, since future school sites have not been identified and no architectural plans are available to review, it is not feasible to determine whether the provision of or need for new or physically altered schools would result in a substantial adverse physical impact.[4] In the absence of such information this analysis concludes that the cumulative impact may be potentially significant.

Notwithstanding the above, it should also be noted that the proposed project and each of the related residential projects would be required to pay developer's fees which the State of California has determined are sufficient to fully mitigate impact on schools. Therefore, with the payment of school fees, the proposed project and the residential related projects would mitigate the cumulative impact to the extent permitted by State law.

---

4 *CEQA Guidelines Section 15145 provides that if, after thorough investigation, a lead agency finds that a particular impact is too speculative for evaluation, the agency should note its conclusion and terminate discussion of the impact.*

Lastly, according to CEQA Guidelines Section 15130(a)(3):

> *An EIR may determine that a project's contribution to a significant cumulative impact will be rendered less than cumulatively considerable and thus is not significant. A project's contribution is less than cumulatively considerable if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact...*

This is the case with the proposed project, which would be required to pay developer's fees in the amount of $2.14 per square foot of residential construction to off-set its fair-share impact on school facilities. On this basis, the project's contribution to the potentially significant cumulative impact would be rendered less than cumulatively considerable, and this is not significant.

# III. ENVIRONMENTAL IMPACT ANALYSIS
# M. PUBLIC SERVICES
# 4. LIBRARIES

## ENVIRONMENTAL SETTING

The County of Los Angeles Public Library (CLAPL) system currently serves 51 of the 88 cities and most unincorporated areas of Los Angeles County. There are 84 regional and community libraries, four bookmobiles, and seven special reference/resource centers serving a population of over three million people over 3,000 square miles. The CLAPL has a book collection of 8.2 million volumes in addition to magazines, newspapers, and other media. Each community library has a catalog that gives patrons access to the total collection. The CLAPL is financed by a dedicated share of property tax from the service area in addition to a general fund contribution, parcel tax, grants, and fees.

The Agoura Hills Library and the Westlake Village Library are the two libraries in the vicinity of the project site (see Table III.M.4-1). According to the CLAPL, the project site is within Las Virgenes Bookmobile service area and thus the proposed project would be served by the bookmobile rather than either the Agoura Hills Library or the Westlake Village Library. The bookmobile has a collection of 13,030 items, of which it can transport 1,500 volumes at a time. The bookmobile makes stops throughout the area on Monday through Wednesday and Fridays.

**Table III.M.4-1**
**Libraries Serving the Proposed Project**

| Name | Location | Hours of Operation | Size (sf ) | Library Material Items |
|---|---|---|---|---|
| Agoura Hills Library | 29901 Ladyface Court Agoura Hills | *Mon-Wed*: 10am to 8pm<br>*Thurs*: 11am to 5pm<br>*Fri & Sat*: 10am to 5pm | 17,722 | 131,571 |
| Westlake Village Library[a] | 31220 Oak Crest Drive Westlake Village | *Thurs & Fri*: 11am-6pm | 11,500 | 62,407 |
| Las Virgenes Bookmobile | Varies. | *Mon.-Wed. & Fri.:*<br>10 am-12pm<br>1:30pm-3:30pm | N/A | 14,543 |

*[a] Westlake Village operates under a joint agreement between the City of Westlake Village and the County of Los Angeles Public Library.*

*Source: County of Los Angeles Public Library, www.colapublib.org; Los Angeles County Public Library, Michele Mathieu, Administrative Assistant, written correspondence, July 21, 2003.*

On October 27, 1998, the Los Angeles County Board of Supervisors approved Section 22.72, Library Facilities Mitigation Fee, of the Los Angeles County Code. The purpose of this section is to mitigate increased demand by new residential development within the County upon public library facilities. The amount of fees required by applicants of residential projects in the County depends upon the library planning area in which the development is located, as depicted in the "Report on Proposed Developer Fee Program for Library Facilities - Prepared by the County of Los Angeles Public Library, October 1998". The project site falls within the Library Planning Area Seven, Santa Monica Mountains. Pursuant to Section 22.72.030 of the Los Angeles County Code, the current library facilities mitigation fee (as of July 1, 2004) for Planning Area Seven is $680 per dwelling unit. The County Library Developer Fee is subject to an annual CPI adjustment, and the actual amount of the fee will be that in effect at the time the building permits for the proposed project are issued.

The CLAPL uses the standard of 2.75 library material items per person and 0.5 gross square feet (sf) per person to determine a library's service adequacy to its community.[1] According to the CLAPL, the Agoura Hills Library serves a population of approximately 23,518 people; the Westlake Village serves approximately 9,537 people. Based on LACPL's standard described above, both the Agoura Hills Library and Westlake Village Library have an adequate supply of library material items and facilities to serve the population.

The Las Virgenes Bookmobile serves approximately 15,220 people within its service area.[2] Based on the LACPL's standards, the bookmobile does not have sufficient materials or space to serve the existing population.

## ENVIRONMENTAL IMPACTS

### Thresholds of Significance

In accordance with Appendix G to the CEQA Guidelines, impacts on library services would be significant if the proposed project would result in a substantial adverse physical impact associated with the provision of or need for new or physically altered libraries, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios or other performance objectives.

---

1 *Los Angeles County Public Library, Michele Mathieu, Administrative Assistant, written correspondence, July 21, 2003; and Malou Rubio, Head, Staff Services, written correspondence, March 8, 2005.*

2 *Ibid.*

**Project Impacts**

Implementation of the proposed project would increase demand for library services at the Agoura Hills Library, Westlake Village Library, and Las Virgenes Bookmobile by increasing the permanent residential population in Library Planning Area Seven, which these library facilities serve. The Public Library uses an average persons per household (APPH) of 3.09. Using an APPH of 3.09, the development of 81 residential units would result in an estimated increase of 250 persons. This would result in the need for 125 square feet of library space and 688 books and other materials. Although the Agoura Hills Library and the Westlake Village Library would have an adequate supply of library material items and space to meet this increase in demand, the Las Virgenes Bookmobile would not have adequate supplies or space to meet this increase in demand. However, if the project generated demand for 125 square feet of additional space were translated into new construction of permanent space (rather than mobile space) this would be the approximate equivalent of an 11 by 11 foot room, the construction of which would not be expected to result in significant environmental impacts.

Furthermore, the project applicant would be required to pay a fee to the CLAPL. As set forth in Section 22.72.030 of the Los Angeles County Code (i.e., $680 per dwelling unit), the CLAPL may require the project developer to pay $55,080. According to the CLAPL, payment of this fee would reduce the project's impacts on library services to a less-than-significant level.[3] Therefore, the proposed project would not result in a substantial adverse physical impact associated with the provision of or need for new or physically altered libraries in order to maintain acceptable service ratios or other performance objectives. Impacts on libraries would be less than significant.

## MITIGATION MEASURES

Impacts on libraries would be less than significant. Therefore, no mitigation measures are recommended.

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

The proposed project's impacts on libraries would be less than significant.

---

3 *Ibid.*

## CUMULATIVE IMPACTS

Implementation of the proposed project in combination with the 26 related projects listed in Table II-1 would further increase demand for the library services at the Agoura Hills Library, Westlake Village Library, and Las Virgenes Bookmobile by increasing the number of employees, customers, and residents in the vicinity of the project site. Of the 26 related projects, six are residential, two are mixed-use (including residential), and 18 consist of commercial/institutional uses. The related projects would generate approximately 2,807 employees[4] and approximately 1,473 residents. If all of the employees generated by the related projects were to become new residents in the CLAPL's Planning Area Seven, those employees and the new residents would generate a need for approximately 2,140 square feet of additional library space. Overall, the proposed project and related projects would therefore generate a need for 2,261.5 square feet of additional library space. This is about 1/5 the amount of space in the Westlake Village Library. Due to its relatively small size, it is unlikely that either a 2,261.5 square foot addition to an existing library or the construction of a new 2,261.5 square foot library would result in any significant environmental impacts. Therefore, cumulative impacts to libraries would not be expected to be significant.

It should also be noted that according to CEQA Guidelines Section 15130(a)(3):

> *An EIR may determine that a project's contribution to a significant cumulative impact will be rendered less than cumulatively considerable and thus is not significant. A project's contribution is less than cumulatively considerable if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact...*

This is the case with the proposed project, which would be required to pay the Library Facilities Mitigation Fee in the amount of $680.00 per dwelling unit to off-set its fair-share impact on library facilities. On this basis, the project's contribution to the cumulative impact would be rendered less than cumulatively considerable and, as such, is not significant. Each of the related residential projects would also be would be required to pay the Library Facilities Mitigation Fee. However, the non-residential related projects are not subject to this requirement.

---

4 *See Table II-1.*

# III. ENVIRONMENTAL IMPACT ANALYSIS
# M. PUBLIC SERVICES
# 5. PARKS AND RECREATION

## ENVIRONMENTAL SETTING

### Los Angeles County

The Los Angeles County Department of Parks and Recreation (LACDPR) manages approximately 68,000 acres of parkland throughout the County including golf courses, regional and community parks, natural areas, and botanical gardens. However, LACDPR does not maintain any parks or recreational facilities in the vicinity of the project site.

### City of Agoura Hills

The closest parks and recreational facilities to the project site are located in the City of Agoura Hills. Therefore, it is likely that future residents of the proposed project would use parks and recreational facilities located in the City. Table III.M.5-1 lists the parks and recreation facilities maintained by the City.

Based on a standard of three acres of parkland per 1,000 residents, the City of Agoura Hills General Plan Parks and Recreation Element identifies a 24-acre shortfall of parkland in the City. Since the adoption of the Parks and Recreation Element in 1992, the City has developed an additional seven acres of parkland. However, the resident population in the City has concomitantly grown since that time. Therefore, despite the additional seven acres of parkland, the City estimates its current parkland shortfall has only decreased to 22 acres.[1]

### City of Calabasas

In the City of Calabasas, the 30,000-square foot Agoura Hills/Calabasas Community Center offers such programs and activities as basketball, gymnastics, senior activities, sports leagues, and theater/music productions to residents. The cities of Agoura Hills and Calabasas manage the Community Center through a joint powers authority.

In addition, the following public parks and recreational facilities are available in the City of Calabasas:

---

1 *City of Agoura Hills, Mike Kamino, Director, Planning and Community Development, written correspondence, July 14, 2003.*

- Calabasas Tennis and Swim Center
- Gates Canyon Park at Thousand Oaks Boulevard
- Grape Arbor Park at Parkville Road and Calamine Drive
- Juan Bautista de Anza Park at Lost Hills Road and Las Virgenes Road

**Table III.M.5-1**
**Parks and Recreation Facilities**
**In The City of Agoura Hills**

| Name | Location | Distance to Project Site | Amenities |
|---|---|---|---|
| Agoura Hills Recreation Center | 30610 Thousand Oaks Boulevard | 2.1 Miles | • Multi-purpose room<br>• Softball fields<br>• Volleyball facilities and equipment |
| Chumash Park | 5550 Medea Valley Drive | 1.3 Miles | • Children's play area<br>• Multi-purpose ballfield |
| Forest Cove Park | 5451 Forest Cove Lane | 1.3 Miles | • Children's play area<br>• Multi-purpose ballfield<br>• Outdoor basketball court<br>• Picnic area with BBQs |
| Morrison Park | Thousand Oaks Boulevard and Forest Cove Lane | 1.6 Miles | • Children's play area<br>• Picnic area |
| Old Agoura Park | 5301 Chesebro Road | 1.4 Miles | • Baseball field<br>• Children's play area<br>• Equestrian warm-up arena<br>• Picnic area with BBQs<br>• Western Style Equestrian Arena |
| Reyes Adobe Park | 31400 Rainbow Crest Drive | 1.3 Miles | • Children's play area<br>• Picnic area with BBQs |
| Sumac Park | 6000 Calmfield Avenue | 1.5 Miles | • Children's play area<br>• Picnic area with BBQs |

*Source: City of Agoura Hills, 2003.*

**Other Parks and Recreational Facilities**

***Rancho Simi Recreation (Ventura County)***

- Chapparal Park at 2177 N. Medea Creek Lane
- Eagle View Park at 1240 Hidden Springs Avenue
- Indian View Park at 4800 Rockfield Street
- Mae Boyer Park at 130 Kanan Road

- Oak Canyon Community Park at Kanan Road and Holly Tree Drive
- Valley View Neighborhood Park at Kanan Road and Los Arcos

***Santa Monica Mountains National Recreation Area***

- Cheseboro Canyon Park at Chesebro Road
- Paramount Ranch on Cornell Road
- Rocky Oaks Park off of Kanan Road and Mulholland Highway
- Peter Strauss Ranch at Mulholland Highway
- Diamond X Ranch at Mulholland Highway and Las Virgenes Road

***California State Parks***

- Malibu Creek State Park at Las Virgenes Road
- Tapia State Park at Las Virgenes Road
- Topanga State Park on Topanga Road
- Leo Carrillo Beach State Park on Pacific Coast Highway

**Public Open Space Fees**

To alleviate the demand on public parks and recreational facilities, residential developers are required to pay a public open space fee, as permitted under the Quimby Act. The Quimby Act allows California counties and municipalities to require developers of new residential subdivisions to dedicate parkland or to pay fees in lieu of parkland dedication. Pursuant to Section 21.24.340 and 21.28.140 of the Los Angeles County Code, a project developer may dedicate parkland and/or pay a fee in lieu of the provisions of such parkland.

## ENVIRONMENTAL IMPACTS

**Thresholds of Significance**

In accordance with Appendix G to the CEQA Guidelines, impacts on parks and recreational facilities would be significant if the proposed project:

- Results in the need for new or physically altered facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios or other performance objectives; or

- Increases the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

**Project Impacts**

Implementation of the proposed project would increase the demand for parks and recreation services in the vicinity of the project site. Residential developments typically have the greatest potential to result in impacts to parks and recreational facilities since they generate a permanent increase in the residential population. The proposed 81 single-family units would generate approximately 243 permanent residents on the project site.[2] Although approximately 271.7 acres (85 percent) of the project site would be retained as open space and a 20-foot wide easement would be dedicated for riding and hiking (i.e., Zuma Ridge Trail), the proposed project does not include active parks or recreational facilities. Furthermore, the LACDPR does not maintain any active parks or recreational facilities (e.g., ballfields, tennis courts, golf courses) in the vicinity of the project site. Therefore, residents from the proposed project would likely use parks and recreational facilities in the surrounding communities, including the City of Agoura Hills.

Based on a parkland per population ratio of three acres per 1,000 residents, the project applicant would be obligated to either dedicate 0.73 acres of parkland or pay an in lieu Quimby fee of $166,212[3] to Los Angeles County to offset any increased demand on parks and recreational facilities created by the proposed project in the County.[4] Because there are no available flat areas on the project site that would permit the development of a park with a wide range of active recreational facilities, the project applicant would pay Quimby fees to the County of Los Angeles to offset the proposed project's demand for parks and recreational facilities.

However, as stated above, it is likely that residents from the project site would utilize parks and recreational facilities in the City of Agoura Hills. Based on the City's parkland per population ratio of three acres per 1,000 residents, the proposed project would generate a demand for 0.73 acres of parkland. As previously discussed, the City of Agoura Hills is deficient in parks and recreational facilities, and any additional demand could adversely affect existing parks and recreational facilities. However, the project applicant would not be required to pay fees or dedicate parkland to offset impacts

---

2 *Assumes 3.0 persons per single-family dwelling unit (Source: Las Virgenes Municipal Water District Population Growth, Residential Development and Employment Activity Report, LVMWD Report Number 2041, March 1996).*

3 *Based on Section 21.28.140 of the Los Angeles County Code, which states that $228,000 per acre is a fair market value for the Agoura/Calabasas Park Planning Area (No. 33B). Confirmed by Los Angeles County Department of Parks and Recreation, Patrocenia Sobrepena, August 26, 2003.*

4 *Los Angeles County Department of Parks and Recreation, Lucy Younger, telephone conversation, April 9, 1999.*

on parks and recreational facilities in the City of Agoura Hills because the project site in located outside of the City. Unless Los Angeles County agrees to share the project applicant's Quimby fee payment with the City of Agoura Hills, it is expected that the proposed project would increase the use of existing parks within the City such that physical deterioration of those parks or recreational facility could occur or be accelerated. Therefore, the proposed project's impacts on parks and recreational facilities in the City would be significant.

Although additional parks and recreational opportunities are provided by other parks (e.g., Agoura Hills/Calabasas Community Center, Santa Monica Mountains National Recreation Area, Rancho Simi Recreation parks), it is expected that there would be less demand for those facilities, such that the project would not generate the need for new or physically altered facilities in those areas.

## MITIGATION MEASURES

With the required payment of Quimby fees to the LACDPR, impacts on parks and recreational facilities in the County of Los Angeles would be less than significant. As discussed above, the Subdivision Map Act, Government Code Section 66477(a)(3), requires the County of Los Angeles to use the Quimby fees to develop new neighborhood or community parks or recreational facilities to serve the subdivision. With the provision of these new County facilities, the proposed project's impacts on City of Agoura Hills parks and recreation facilities would be temporary and less than significant.

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

With the payment of the required Quimby fees, impacts on County of Los Angeles parks and recreational facilities would be less than significant.

## CUMULATIVE IMPACTS

Implementation of the proposed project in combination with the 26 related projects listed in Table II-1 would increase the demand for parks and recreation services by increasing the number of employees, customers, and residents in the vicinity of the project site. Of the 26 related projects, six are residential, two are mixed-use (including residential), and 18 consist of commercial/institutional uses. Employees generated by the commercial components of the related projects would not be expected to use local park or recreational facilities to any great extent since they would not typically have long periods of time during the workday to visit parks and recreational facilities. However, the increase in the residential population by the related projects in the vicinity would potentially contribute to the existing parkland deficiency in the project site vicinity. In particular, the related projects include a total of 486 single family homes and multi-family dwelling units within the City of Agoura Hills. The additional demand for recreational facilities in the City of Agoura Hills generated by these units would

increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities could occur or be accelerated. Therefore, cumulative impacts to recreational facilities in the City of Agoura Hills would be significant.

However, in accordance with CEQA Guidelines Section 13130(a)(3), the proposed project's contribution to the cumulative impacts on parks and recreational facilities would not be cumulatively considerable, and thus is not be significant, because the project developer would satisfy fully the project developer's Quimby Act obligations through the payment of Quimby fees to the LACDPR. The satisfaction of the Quimby Act requirements would constitute the project's fair share of mitigation designed to alleviate the cumulative impact on parks and recreational facilities.[5]

---

[5] *CEQA Guidelines Section 13130(a)(3) states: "An EIR may determine that a project's contribution to a significant cumulative impact will be rendered less than cumulatively considerable and thus is not significant. A project's contribution is less than cumulatively considerable if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact...."*

# III. ENVIRONMENTAL IMPACT ANALYSIS
# N. PUBLIC UTILITIES
# 1. WATER

The following report is summarized below and incorporated by reference. A copy of this report is included in Appendix H of this DEIR.

- Las Virgenes Municipal Water District, Preliminary Water System Design Report for Tentative Tract No. 52419, Triangle Ranch, March 2004[1]

## ENVIRONMENTAL SETTING

### Potable Water

The project site is located within the service area of the Las Virgenes Municipal Water District (LVMWD), and would receive water service from the District. The project site is currently vacant and consumes neither potable water nor reclaimed water from the District. However, water lines are available to serve the site. LVMWD maintains a 14-inch potable waterline in Cornell Road, which connects to a 24-inch pipe at the intersection of Agoura Road and Cornell Road (just west of the Cornell Pump Station). An 8-inch potable water line is located in Silver Creek Road. There is no potable water line in Kanan Road between Agoura Road and Silver Creek Road (see Figure III.N.1-1, Water Plan, for the locations of the existing water lines available to serve the project site).

LVMWD obtains all of its potable water from the Metropolitan Water District (MWD), which in turn, obtains its water from the State Water Project in Northern California. The LVMWD's current allocation of MWD water is considered adequate to meet the Master Plan's water demand projections.[2] However, the total quantity of water LVMWD may obtain from the MWD is fixed and additional supplies are not available. Consequently, conservation has become the major source of new water supplies.

---

1 *This report assesses the existing potable water, recycled water, and sewer system facilities available to serve the proposed project. The report identifies the project's estimated demand for water and sewage generation, and assesses the Las Virgenes Municipal Water District's capacity to service the proposed project and recommends necessary improvements.*

2 *Personal communication from Eugene Talmadge, Planning Administrator, Las Virgenes Municipal Water District, April 1, 1998.*

3 *The City of Agoura Hills' Ladyface Specific Plan limits development within the Plan area to below the 1,100-foot elevation to accommodate fluctuations in the LVMWD's 1,235-foot hydraulic gradient system.*

The project site is located within the LVMWD's 1,235-foot hydraulic gradient system, which includes the 8-million gallon (MG) Calabasas Tank, the 4.2 MG Equestrian Trails Tank, and the 3 MG Morrison Tank. Pump stations are located at Whizen's Corners (Cornell Pump Station) and at Semiole Hot Springs.[3] The 10,000-acre-foot Las Virgenes Reservoir provides seasonal storage for the District. Las Virgenes Reservoir supplies the 1235-foot system via Westlake Pump Station. The 1235-foot system is also supplied through the MWD "turnouts" on the east side of the district. Water transmitted through the 1235-foot system supplies over 90 percent of the District's current customers, either directly or by supplying the water that is distributed to most of the subsystems.

According to the LVMWD, the hydraulic gradient in the vicinity of the project site is heavily influenced by the operation of Cornell Pump Station. When the pump station is pumping from east to west, the gradient near the project site can be as high as 1260 feet. At times when the pump station is not operating, or when it pumps from west to east, the gradient may drop to around 1100 feet. The project site will be supplied from the discharge side of Cornell Pump Station when it is pumping westward.

The District's Potable Water Master Plan[4] outlined needed improvements to the potable water system, including several which will improve pressures near Cornell Pump Station during periods of high demand. Improvements were recently constructed that increase the capacity of the 'backbone' transmission lines along the 101-Freeway. These improvements have increased the suction pressure at Cornell Pump Station as much as 16 psi during peak-hour demand. Discharge pressures also have increased. Nevertheless, the district anticipates that additional improvements to the backbone system will be needed, within a few years, to meet growing demands.

One of the backbone improvements recommended in the Potable Water Master Plan is the Cornell Tank (3.0 million gallons). By providing storage in the center of the system, this tank would help maintain pressures in the area during periods of high demand. Moreover, the tank would mitigate a growing storage deficit in the 1235-foot zone. The District has identified a possible site for this tank near the north end of the project site, east of Cornell Road.

**Recycled Water**

LVMWD also maintains an active program for use of reclaimed water and has established a distribution system in the general area. Reclaimed water is produced at the LVMWD's Tapia Water Reclamation

---

[4] *Boyle Engineering Corporation, Potable Water system Master Plan for the Las Virgenes Municipal Water District, December 1999.*

Facility located on the west side of Las Virgenes Road, approximately two miles south of Mulholland Highway. The project site is located within the service area of the District's Western Recycled Water System. The Western Recycled Water Distribution System, constructed by Las Virgenes Municipal Water District/Triunfo Sanitation District Joint Venture, serves recycled water to users generally along the Ventura Freeway corridor from Las Virgenes Road to the Ventura County line. Recycled water enters the system via Headquarters West Pump Station, which is located east of the LVMWD District Headquarters on Las Virgenes Road. The 2.5 million gallon Indian Hill Tank, situated on the ridge just east of the project site boundary, provides regulatory storage for the Western Recycled Water System. The nearest source of reclaimed water to the project site is located on Agoura Road, approximately 3,000 feet west of Kanan Road.

## ENVIRONMENTAL IMPACTS

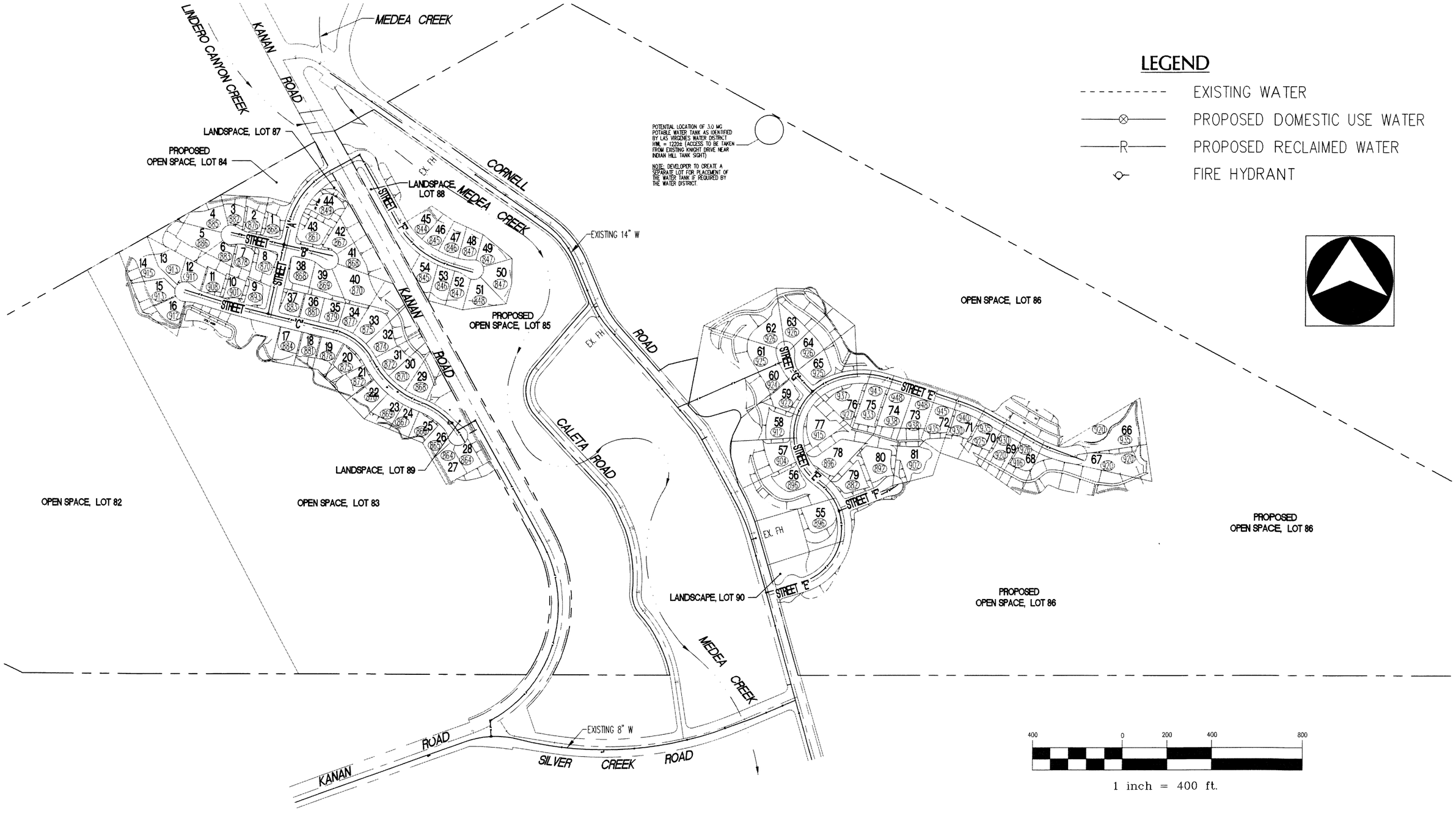
### Thresholds of Significance

In accordance with Appendix G to the CEQA Guidelines, the proposed project would have a significant impact on the environment if it would:

- Require or result in the construction of new water facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.
- Result in insufficient water supplies available to serve the project from existing entitlements and resources.

### Proposed Project

The proposed water system would deliver water to the proposed project from multiple connections to the existing 14-inch main in Cornell Road, as well as through a connection to the 8-inch pipe at the intersection of Kanan and Silver Creek Roads. All proposed residential lots would be served by 8-inch water mains, which would be provided within each of the project's proposed public and private roads and cul-de-sacs. Fire hydrants would be located along each road at intervals specified by the Los Angeles County Fire Department. Potable water service would be looped from Cornell Road to Kanan Road and back again to Cornell Road. Also, looped water systems would be provided for the development areas west of Kanan Road and east of Cornell Road. See Figure III.N.1-1, Water Plan, for the proposed water system.




Source: Wagner Halladay, Inc., June 2004

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.N.1-1
Water Plan

According to the Preliminary Water System Design Report, all units and hydrants in the proposed project will receive water at pressures which meet district standards. All units within the proposed project would have service connections below an elevation of 1076 feet and may experience maximum pressures greater than 80 psi. All of the units would require individual pressure reducing valves ahead of the building plumbing to limit pressures to not more than 80 psi, as required by the Uniform Plumbing Code. All of the proposed units with service connections below an elevation of 914 feet, including most of the Kanan side of the project site and some lots on the Cornell side, may experience maximum pressures greater than 150 psi. These units will required individual pressure reducing valves on the District's side of the service meter in addition to valves ahead of the building plumbing.

If required by the LVMWD, a reclaimed water line may be extended to the project site from the Indian Hills Reservoir. The LVMWD, through collection of development fees, will fund the future construction of a mainline distribution system for reclaimed water in Kanan and Cornell Roads. The LVMWD, however, has no estimated time schedule for the construction. Within the project boundaries, reclaimed water service would be looped from Cornell Road to the area west of Kanan Road and back to Cornell Road. Service would also be extended from Cornell Road to selected landscaped open space areas to the east. Lines required to serve landscaped open space lots would be placed within the residential streets and extended into the open space areas by way of easements.[5]

The project would provide all water distribution system improvements to the satisfaction of the Las Virgenes Municipal Water District and the Los Angeles County Fire Department.

A key component of the proposed project is the provision of a master landscape plan for the entire project area, including common landscaped areas, undeveloped building pads, and the private grounds of occupied residences. The master landscape plan would serve several water conservation functions, including minimizing water irrigation needs through the use of drought-tolerant, fire retardant, native plant species and efficient irrigation systems. Irrigation systems that minimize runoff, evaporation, and overspray, and maximize the water that reaches plant roots (e.g., timed drip/trickle/micro irrigation techniques) are proposed. The plan also emphasizes the extensive use of mulch to increase the water holding capacity of the soil, and the use of non-living groundcover, such as wood mulch in planting areas, to reduce irrigation needs.

---

[3] *A reclaimed water system will be required if the cost of extending the system to the project site is less than $5,000 times the number of acres being irrigated with the water. Reclaimed water is required for use on manufactured slopes and in common areas requiring irrigation.*

**Water Tank Site**

As discussed in Section I – Project Description, the proposed site plan indicates a potential water tank site in the northeastern portion of the project site. The potential water tank is not a part of the proposed project. Rather, such a water tank site has been requested by the LVMWD as an improvement to the "backbone" system that would provide additional storage and help maintain pressures in the area during periods of high demand. The ultimate location of the tank has not been determined, but will be subject to a future a Tank Siting Study to be prepared by the LVWMD. LVMWD would conduct all tank site-related grading and would build, own and maintain the tank.

**Short-Term Construction Impacts**

The proposed project would generate short-term construction-related demand for reclaimed water for use in such activities as dust suppression, soil compaction, and the washing of construction vehicles. Since reclaimed water is not available at the project site, it would be necessary to haul water by truck to the construction area. The haul distance is approximately 3,000 feet from the closest source to the project site. A typical water truck can carry between 2,000 and 3,000 gallons. During the peak of grading, only one water truck would be necessary, although it would refill its tank several times during a typical day. While it cannot be predicted with certainty how many times a truck may need to refill its tank, for the purposes of estimating the magnitude of construction-related water consumption, it is estimated that the truck could go through three to four tanks during a peak work day. Consequently, it is estimated that peak construction-related reclaimed water consumption would be approximately 9,000 to 12,000 gallons per day. During later phases of construction (such as during home construction) the demand for construction-related reclaimed water can be expected to taper off substantially. No adverse impact to the District's supplies of reclaimed water is anticipated since the District has an abundance of reclaimed water and encourages its use for this purpose.

Should an extension of a reclaimed water line be required between the Indian Hill Reservoir and the project site, the associated impacts would largely depend upon the ultimate alignment of that line. If constructed within public street rights-of-way, short-term traffic and access impacts could occur. Such impacts could consist of temporary partial or complete lane closures as trenches are excavated, the pipes installed, and the trenches subsequently refilled and covered over. The extension of the reclaimed water line (approximately one-half to one mile in length) is expected to take approximately one week to complete. During this time, possible disruptions to the flow of traffic could be a temporary nuisance. However, the construction would not require complete roadway closures and no detours are anticipated. Nevertheless, flagpersons would be used to facilitate traffic flow if the construction required temporary lane closures. No significant construction-related impacts are expected.

Existing potable water infrastructure is available in Cornell Road and Silver Creek Road adjacent to the project site, and no extension of potable water lines to the project site would be required. However, some minor construction in Kanan Road (approximately 900 feet) would be required to connect the development areas along Kanan Road to the existing potable water line in Silver Creek Road. This minor construction could also result in short-term traffic and access impacts along Kanan Road. As discussed above, such impacts could consist of temporary partial or complete lane closures as trenches are excavated, the pipes installed, and the trenches subsequently refilled and covered over. During this time, possible disruptions to the flow of traffic could be a temporary nuisance. However, the construction would not require complete roadway closures and no detours are anticipated. Also, flagpersons would be used to facilitate traffic flow if the construction required temporary lane closures. No significant construction-related impacts are expected.

The siting and construction of the future Cornell Tank will be conducted by the LVMWD and is not a part of the proposed project. While approval of the proposed project may be conditioned to require the Developer to dedicate a site for the tank and easements, no water tank construction-related impacts would occur as a result of the proposed project.

**Long-Term Operational Impacts**

Total daily water consumption for the completed project is estimated to be approximately 87.250 gallons per day. Of this total, 81,000 gallons would be consumed for domestic purposes; the remaining 6,250 gallons would be consumed by the irrigation demands of the four commonly held landscape lots. Calculation of the project's estimated water demand is presented in Table III.N.1-1. Additionally, the Fire Department has reviewed the proposed project and has indicated that fire flows of 1,250 gallons per minute for two hours from one hydrant will be required.

The LVMWD Master Plan projects future buildout water demand for properties within the District's service area based on the land use densities permitted by the governing land use plan for each property. In turn, planning for the District's water supplies and delivery facilities is based upon the Master Plan's water demand estimates. Projects consistent with their governing land use designations are generally consistent with the District's Master Plan and, hence, would not require or result in the construction of new water facilities or expansion of existing facilities. For the subject property, the District's buildout projection was based on the Malibu/Santa Monica Mountains Interim Area Plan (MSMMAP), which was in effect at the time the District prepared the Master Plan. As discussed in Section III.K, Land Use Compatibility, the MSMMAP has been replaced by the more restrictive Santa Monica Mountains North Area Plan (SMMNAP). Since the proposed project is consistent with the densities permitted by the SMMNAP, the proposed project is consistent with the District's Master Plan. Therefore, the proposed project would not require or result in the construction of new water facilities or expansion of existing

facilities, the construction of which could cause significant environmental effects; consequently, project impacts would be less than significant.

**Table III.N.1-1**
**Project Water Consumption (Daily)**
**(Gallons/Day)**

| Proposed Land Use | Size | Consumption Factor | Total Water Consumption |
|---|---|---|---|
| Proposed Project | | | |
| Single Family Residences | 81 units | 1,000 gallons/day[1] | 81,000 gpd |
| Landscaping Common Slopes | 2 acres | 3,125 gallons/day[2] | 6,250 |
| *Subtotal* | | | 87,250 gpd |

*1 Las Virgenes Municipal Water District, Preliminary Water System Design Report for Tentative Tract No. 52419, Triangle Ranch, March 2004*
*2 Las Virgenes Municipal Water District Master Plan (1991); and, personal communication from Eugene Talmadge, Planning Administrator, Las Virgenes Municipal Water District, March 2, 1999.*

According to the LVMWWD, water supplies appear to be adequate to meet the District's water demand (including the project's incremental demand).[6] Therefore, the proposed project would not result in insufficient water supplies available to serve the project from existing entitlements and resources; consequently, project impacts to water supplies would be less than significant. Notwithstanding the above, while there is no current regional water supply shortage, drought conditions have been persistent throughout California over the last several years. Should drought conditions return, there is the potential that District wide water shortages could occur. Therefore, the District advocates strict conservation measures for the proposed project. These conservation measures are included in the following mitigation measures.

## SIGNIFICANCE OF IMPACTS BEFORE MITIGATION

The proposed project would not require or result in the construction of new water facilities or expansion of existing facilities, the construction of which could cause significant environmental effects; consequently, project impacts would be less than significant.

---

*7 Personal communication from Eugene Talmadge, Planning Administrator, Las Virgenes Municipal Water District, April 1, 1998.*

The proposed project would not result in insufficient water supplies available to serve the project from existing entitlements and resources; consequently, project impacts to water supplies would be less than significant.

## MITIGATION MEASURES

The project's impact on water availability is less than significant and mitigation measures are not required under CEQA. Nevertheless, the project proposes a comprehensive landscape plan that would be effective in minimizing water demand for landscaping purposes. Also, the project would be required to pay water connection fees to the Las Virgenes Municipal Water District. Such fees are typically used for maintenance and construction of new potable and reclaimed water facilities. Lastly, the District has recommended that strict water conservation measures be included as conditions of project approval. Therefore, the following water conservation measures are suggested:

N.1-1 Installation of Point-of-use water heaters, recirculating hot water systems and hot water pipe insulation. Use of these systems reduces the waiting time for hot water, thereby minimizing water waste. These practices also save energy needed to heat the water.

N.1-2 Installation of low-flush toilets and low-flow showerheads and faucets.

N.1-3 The following water conservation measures for ongoing residential uses are recommended for inclusion in the project's CC&Rs:

1) Use of swimming pool/spa covers for all such facilities;
2) Use of recirculating water systems for all decorative water features;
3) Use of xeriscape landscaping; and
4) Use of rain switches which turn-off automatic sprinkler systems when soil moisture sensors indicate there is adequate soil moisture.

N.1-4 If available, reclaimed water should be used during the site preparation phase to reduce fugitive dust emissions.

N.1-5 Water pressure greater than 50 psi should be reduced to 50 psi or less by means of a pressure-reducing valve.

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

The project's impact on water supplies and distribution facilities would be less than significant. Implementation of the recommended water conservation measures would further reduce the already less than significant impact.

## CUMULATIVE IMPACTS

The Los Angeles County Development Monitoring System (DMS) serves as a tracking system for all pending, approved, and recorded projects in the County. As part of the Initial Study conducted for this project, a DMS review of cumulative water demand on the Las Virgenes Municipal Water District was prepared. Table III.N.1-2 presents the results of the DMS cumulative water supply analysis.

Based on the DMS analysis, the District has adequate potable water supplies to serve all of the existing, recorded, approved, and pending projects (including the proposed project) within the Las Virgenes Municipal Water District's service area. Therefore, the cumulative impact on water supplies will not be significant.

**Table III.N.1-2**
**Development Monitoring System**
**Cumulative LVMWD Water Supply Analysis**
**(Acre-Feet/Year)**

| Existing Demand | Recorded | Approved | Pending | Project | Total | Supply |
|---|---|---|---|---|---|---|
| 18,075 | 297.47 | 0.00 | 793.80 | 79.18 | 19,245.45 | 20,800.00 |

*Source: Initial Study for Los Angeles County Project No. 97178, May 14, 2003.*

According to the DMS analysis, future water availability will be as follows:

| Year | Total Available (AF/YR) | Significant Impact |
|---|---|---|
| 2004 | 21,216 | No |
| 2005 | 21,640 | No |
| 2006 | 22,073 | No |
| 2007 | 22,514 | No |

# III. ENVIRONMENTAL IMPACT ANALYSIS
# N. PUBLIC UTILITIES
# 2. SEWERAGE

## ENVIRONMENTAL SETTING

The project site is located within the service area of the Las Virgenes Municipal Water District (LVMWD), which provides sewage treatment for the project site vicinity and the surrounding area. Currently, the project site is vacant and does not generate any sewage to the District's facilities.

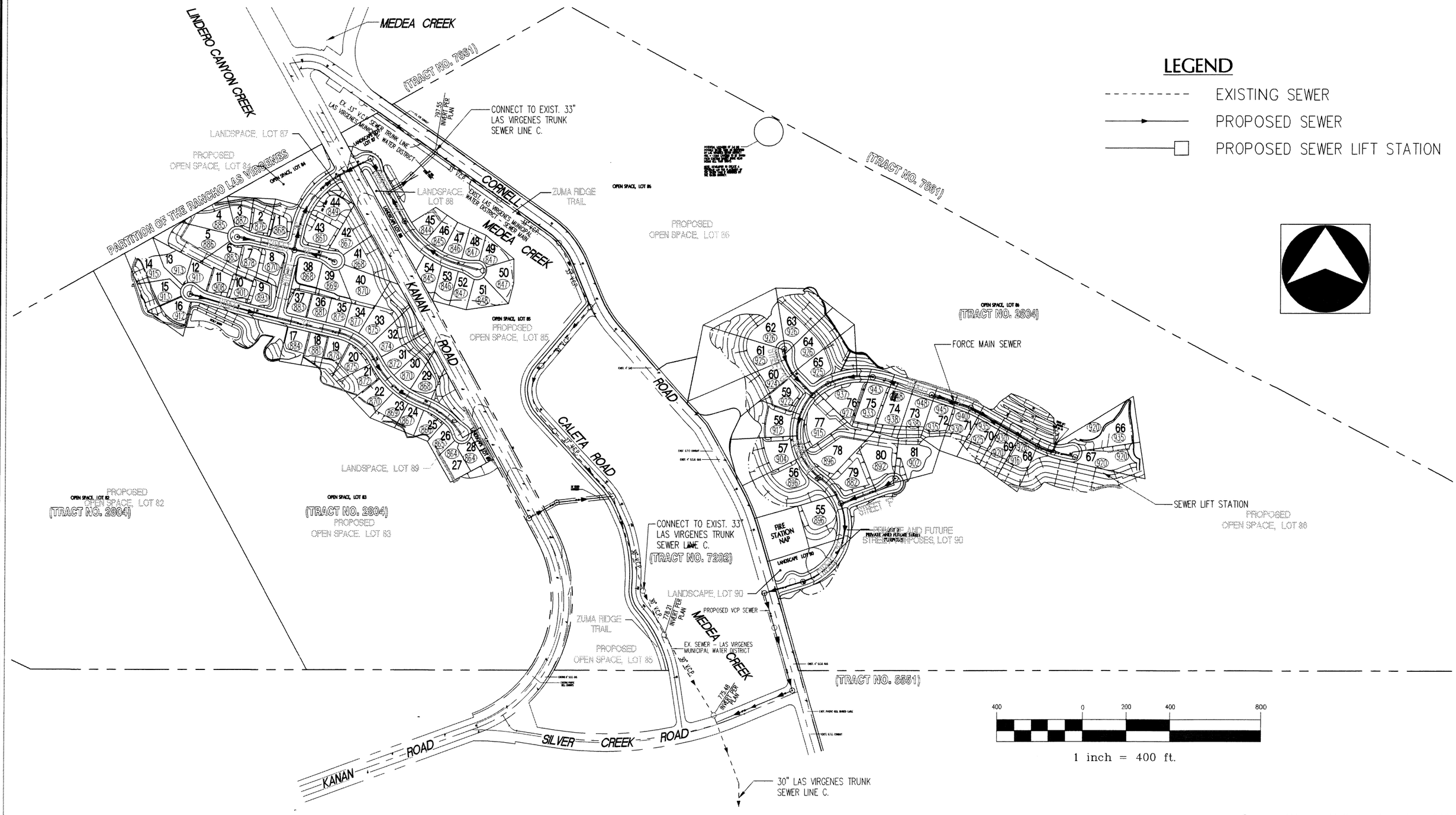
The LVMWD maintains a 33-inch gravity flow trunk sewer in Cornell Road, north of Caleta Road, which is available to serve the proposed project. At Caleta Road the trunk sewer connects to a 27-inch trunk line which follows Caleta Road south in an alignment adjacent to Medea Creek. Figure III.N.2-1, Sewer Plan, indicates the location of existing sewer line serving the project site. The LVMWD's sewer systems have been designed and sized to accommodate the maximum development potential in each area contributing to a particular sewer system (as permitted by the applicable County and City General Plan land use plans). According to the LVMWD, there are no inadequacies in the existing trunk sewer system serving the project area.

Sewage from this trunk sewer is received and treated at the LVMWD's Tapia Water Reclamation Facility (Tapia Plant). The Tapia Plant is located adjacent to Malibu Creek near the intersection of Piuma Road and Malibu Canyon Road, approximately 2 miles south of the Mulholland Highway. The plant provides tertiary treatment to effluent and has a current capacity of 16 MGD. The Tapia Plant is operated by the LVMWD and its service area includes unincorporated areas of western Los Angeles County along the Ventura Freeway Corridor, the Calabasas area, the cities of Agoura Hills, Westlake Village, and the eastern portions of Thousand Oaks and Ventura County (the latter areas collected and treated under a Joint Venture Agreement with Triunfo County Sanitation District).

Expansion of the Tapia Plant capacity to 16.1 MGD was completed and in service by the end of 1993. The Tapia Plant currently treats 8.0 to 8.5 MGD, on average. This increased capacity is considered adequate to serve the ultimate growth projected by the various land use planning agencies under adopted General and Specific Plans and by the population forecasts from Southern California Association of Governments (SCAG).[1]

---

1 *Personal communication from Eugene Talmadge, Planning Administrator, Las Virgenes Municipal Water District, April 1, 1998.*




Source: Wagner Halladay, Inc., June 2004

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure III.N.2-1
Sewer Plan

## ENVIRONMENTAL IMPACTS

### Thresholds of Significance

In accordance with Appendix G to the CEQA Guidelines, the proposed project would have a significant impact on the environment if it would:

- Require or result in the construction of new wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

- Result in a determination by the wastewater treatment provider which serves the project that it does not have adequate capacity to serve the project's project demand in addition to the provider's existing commitments.

### Proposed Project

The proposed project would be served by public sewers, with sewage treatment conducted by the La Virgenes Municipal Water District at its Tapia Water Reclamation Facility. The system would be aligned in public and private roadways, as well as dedicated easements to LVMWD or the County of Los Angeles. A series of gravity sewer mains and laterals would collect effluent from each of the residential units and connect to the existing trunk line. For the proposed residences on the east and west sides of Kanan Road two lateral connections to the truck line are proposed: to the 33-inch line in Cornell Road in the northern portion of the site, and to the 27-inch line in Caleta Road in the southern end. The residential lots along the east side of Cornell Road would be connected to the trunk line in at Silver Creek Road by means of a series of new sewer mains and laterals. See Figure III.N.2-1, for the locations of existing and proposed sewers.

Collector sewers from any development in this area are the responsibility of the County of Los Angeles and connection to the Las Virgenes Municipal Water District's trunk sewers must be coordinated with that agency.

### Short-Term Construction Impacts

Since there is an existing sewer line adjacent to the project site with sufficient capacity to handle the flows from the proposed project, no off-site sewer line improvements are anticipated, other than the proposed project's connection. Some minor construction in Kanan and Cornell Roads would be required to connect the development areas to existing sewer lines (see Figure III.N.2-1). This minor construction could result in short-term traffic and access impacts along Kanan and Cornell Roads. As discussed above, such impacts could consist of temporary partial or complete lane closures as trenches

are excavated, the pipes installed, and the trenches subsequently refilled and covered over. During this time, possible disruptions to the flow of traffic could be a temporary nuisance. However, the construction would not require complete roadway closures and no detours are anticipated. Also, flagpersons would be used to facilitate traffic flow if the construction required temporary lane closures. No significant construction-related impacts are expected.

**Long-Term Operational Impacts**

Upon completion, the proposed project would generate approximately 28,350 gallons of sewage per day (see Table III.N.2-1, Project Sewage Generation). Because there is existing capacity at the Tapia Plan and, because the project is consistent with the land use density assumptions used to prepare the District's Master Plan, the 81 proposed residences can be served by the sewerage system and would not require or result in the construction of new wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. Therefore, project impacts on the Tapia Plant would be less than significant.

Based on a daily peak factor of 3.2, the estimated peak flow to be discharged into the existing LVMWD trunk sewer would be 63.0 gallons per minute, or 0.14 cubic feet per second. Since there is adequate capacity in the trunk sewer serving the project site and the trunk sewer is considered adequate to accommodate the District's Master Plan flow projections utilized to size the Tapia Water Reclamation Facility, it is concluded, that the project would not have a significant adverse impact on the District's trunk sewer.

Uniform alignment and grades of the residential lots in the area west of Cornell Road will allow for efficient collection of sewage in underground gravity sewer lines. However, variations in alignment and grade of roads servicing the area east of Cornell Road do not allow for such efficiency. As shown in Figure III.N.2-1, a sewer lift station is proposed to be located at the "E" Street cul-de-sac to pump effluent from areas that cannot take advantage of gravity sewer mains.

## SIGNIFICANCE OF IMPACTS BEFORE MITIGATION

The proposed project would not: (1) require or result in the construction of new wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects, nor (2) result in a determination by the wastewater treatment provider which serves the project that it does not have adequate capacity to serve the project's project demand in addition to the provider's existing commitments. Therefore, project impacts to the sewerage system would be less than significant.

**Table III.N.2-1**
**Project Sewage Generation (Daily)**
**(Gallons/Day)**

| Proposed Land Use | Size | Generation Factor | Total Sewage Generation |
|---|---|---|---|
| **Proposed Project** | | | |
| Single Family Residences | 81 Units | 350 gallons/day | 28,350 |

*Source: Las Virgenes Municipal Water District Master Plan (1991); and, personal communication from Eugene Talmadge, Planning Administrator, Las Virgenes Municipal Water District, March 2, 1999.*

## MITIGATION MEASURES

The project's impacts are less than significant and mitigation measures are not required. However, the water conservation measures recommended in Section III.N.1 will help to minimize the total volume of effluent entering the sewer system, thus further reducing the project's already less than significant impact. Also, the project will be required to pay sewer connection fees to the District. Such fees are typically applied toward the District's maintenance and construction of new facilities.

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

The project's impact on sewage treatment distribution facilities would be less than significant. Implementation of the recommended water conservation measures would further reduce the already less than significant impact.

## CUMULATIVE IMPACTS

The Los Angeles County Development Monitoring System (DMS) serves as a tracking system for all pending, approved, and recorded projects in the County. As part of the Initial Study conducted for this project, a DMS review of cumulative sewage demand on the Las Virgenes Municipal Water District was prepared. Table III.N.2-2, presents the results of the updated DMS cumulative sewer treatment capacity analysis:

**Table III.N.2-2**
**Development Monitoring System**
**LVMWD Sewage Treatment Capacity Analysis**
**(Million Gallons per Day)**

| Existing | Recorded | Approved | Pending | Project | Total | Supply |
|---|---|---|---|---|---|---|
| 10.80 | 0.25 | 0.15 | 0.32 | 0.038 | 11.56 | 16.10 |

*Source: Initial Study for Los Angeles County Project No. 97178*

Based on the above DMS analysis, there is adequate sewage treatment capacity at the Tapia Treatment Plant to accommodate all of the existing, recorded, approved, and pending projects (including the proposed project) within the Las Virgenes Municipal Water District's service area. Therefore, the cumulative impact would not be significant.

# III. ENVIRONMENTAL IMPACT ANALYSIS
# N. UTILITIES
# 3. SOLID WASTE DISPOSAL

## ENVIRONMENTAL SETTING

Solid waste management in Los Angeles County involves public and private refuse and recycling services, as well as public and private solid waste transfer, recovery, and disposal facilities. In the unincorporated area of the County, residential, commercial and industrial customers contract with private haulers for solid waste collection, processing, and disposal.

Solid waste is disposed at a number of landfills in Southern California. The closest landfill to the project site is the Calabasas Landfill, which is located at the terminus of Lost Hills Road north of the Ventura Freeway. This Los Angeles County owned facility is operated by County Sanitation District No. 2 of Los Angeles County under a Joint Powers Agreement. Calabasas Landfill began operating in 1961. It currently accepts only non-hazardous municipal solid waste. In the past this site also accepted limited quantities of liquid hazardous wastes; however, this practice was discontinued in July 1980. Effective February 1991, the Los Angeles County Code was amended to provide that the landfill could not accept refuse originating outside the Calabasas Landfill wasteshed (Ordinance No. 91-0003). Calabasas Landfill has a maximum permitted daily capacity of 3,500 tons. Between November 2003 and November 2004, the landfill received an average of 1,730 tons of material daily. The landfill has a remaining capacity of approximately 10.8 million tons, or 23.4 million cubic yards. Its remaining life expectancy is approximately year 2025 (21 years) based on an incoming tonnage rate of 1,500 tons per day.[1]

Although located considerably farther away than the Calabasas Landfill, the Sunshine Canyon Landfill in the northern portion of the San Fernando Valley, and the Bradley Landfill, located in Sun Valley, also have available capacity to receive solid waste from the project site. Located at 14747 San Fernando Road in Sylmar, Sunshine Canyon Landfill serves a large portion of the west Los Angeles basin, including wastes from southeastern Santa Clarita Valley. The Sunshine Canyon Landfill is operated by Browning-Ferris Industries of California, Inc. Los Angeles City's permits to dispose solid waste in its portion of the Sunshine Canyon Landfill expired in 1991. In 1996, the City contracted with a private waste hauler to dispose its solid waste in the County portion. In December 1999, the City of Los Angeles approved Ordinance 172,933, which amended the Los Angeles Municipal Code (LAMC) to allow the City to expand the Sunshine Canyon Landfill and combine the City and County portions of the landfill.[2] The plan approved in Ordinance 172,933 will allow the City to (1) work with the County to combine the City and County portions of the landfill,[3] (2) expand the landfill footprint to 194 acres in the City and 257 acres in

---

1 *Correspondence from County of Sanitation Districts of Los Angeles County, Monique Valenzuela, July 31, 2003.*

2 *City of Los Angeles Ordinance 172,933 (amending LAMC Section 12.04) and its [Q] Qualified Conditions of Approval, approved December 10, 1999.*

3 *Ibid.*

the County,[4] (3) increase capacity to 55 million tons in the City portion and increase the combined capacity of the City/County landfill to 90 million tons,[5] (4) permit a daily maximum intake of 6,600 tons per day in the County prior to the combining of the City and County portions of the landfill,[6] (5) permit a combined City/County daily maximum intake of 12,100 tons following combining the City and County portions of the landfill,[7] and (6) extend the estimated closure date to approximately 2029.[8]

The Bradley Landfill is currently permitted to intake 10,000 tons per day[9] and receives approximately 2,250 tons per day.[10] This indicates that the Bradley Landfill is currently permitted to receive an additional 7,750 tons per day of solid waste until estimated closure date of 2007.

Despite the possible expansion of Sunshine Canyon, the County of Los Angeles is facing a serious disposal crisis, both in terms of the daily and long term disposal capacities. According to the Los Angeles County Department of Public Works, a shortfall in permitted daily landfill disposal capacity will occur in the next few years. Of the seven operating landfills in Los Angeles County, three will run out of space within the next decade.[11]

*Household Hazardous Waste*

The Los Angeles County Department of Public Works operates a Household Hazardous Waste (HHW) Collection Program. The program provides an opportunity for private residents to safely dispose of household chemicals such as household cleaning products, paint substances, automotive products, pool chemicals, fertilizers, pesticides, batteries, and fluorescent light bulbs. County residents can bring their HHW to "Hazmobile" collection sites. These sites are mobile and are held at various locations throughout the County, each remaining in the same location for two to three days. These sites are staffed with employees trained in hazardous waste handling who safely unload residents' waste into trucks and trailers onsite. The County contracts with private disposal companies for this service, and the companies are responsible for the recycling and disposal of the collected materials. While there are no facilities for the disposal of hazardous waste in Los Angeles County, the nearest facilities being located in Santa Barbara and Kern Counties, there are several centers in Los Angeles County that recycle hazardous waste.

---

4 *Ibid.*
5 *Ibid.*
6 *Ibid*
7 *Ibid*
8 *City of Los Angeles, Draft Subsequent Environmental Impact Report Sunshine Canyon Landfill, SEIR 91-0377-ZC/GPA, State Clearinghouse No. 92041053, July 1997.*
9 *California Integrated Waste Management Board, "Solid Waste Information System", June 24, 2003.*
10 *California Integrated Waste Management Board, "2002 Landfill Summary Tonnage Report," www.ciwmb.ca.gov/Landfills/tonnage/2002/Landfill.htm, May 20, 2003.*
11 *Los Angeles Times, February 26, 1999.*

*Solid Waste Regulatory Background*

The California Integrated Solid Waste Management (ISWM) Act – frequently referred to as AB 939 - requires local jurisdictions to divert at least 50 percent of their waste stream. As required by the ISWM, Los Angeles County has prepared a Source Reduction and Recycling Element (SRRE) which describes the County's programs to reach this goal. The SRRE must be updated annually to account for changing market and infrastructure conditions. As projects and programs are implemented, the characteristics of the waste stream, the capacities of the current solid waste disposal facilities, and the operational status of those facilities are upgraded, as appropriate. California cities and counties are required to submit annual reports to the CIWMB to update it on their progress toward the AB 939 goals. For residential developments in unincorporated portions of Los Angeles County, curbside recycling has been the major program for waste reduction.

In the project site vicinity, private companies provide solid waste disposal services under an open-market system. Under this system, waste haulers with permits to operate in the unincorporated areas are free to solicit contracts for waste collection services from individuals and businesses. These private haulers are required to provide curbside collection and recycling of such items as newspapers, plastic, glass, aluminum and tin, and green wastes. Such private companies may utilize any appropriate landfill for the disposal of solid wastes; however, the distance of the landfill from the point of collection is a major factor in selecting a disposal site. Because of the proximity to the Calabasas landfill, this facility would likely be the disposal site for the project's solid waste.

## ENVIRONMENTAL IMPACTS

### Threshold of Significance

In accordance with Appendix G to the CEQA Guidelines, a significant impact to solid waste services would occur if the landfill serving the proposed project did not have sufficient permitted capacity to accommodate the project's solid waste disposal needs and/or if it would not comply with Federal, State and local statutes and regulations related to solid waste.

### Project Impacts

*Short-Term Construction Impacts*

Solid waste would be generated at the project site by both short-term construction activities and long-term residential activities. Construction activities generate a variety of scraps and wastes, with the majority of recyclables being wood waste, drywall, metal, paper, and cardboard. Based on a construction generation rate of 4.38 pounds of waste for every square foot of new residential construction[12], the construction of 81

[12] *USEPA Report No EPAA530-98-010, Characterization of Building Related Construction and Demolition Debris in the United States, July 1998, page A-1.*

new residences is projected to generate approximately 887 tons of waste.[13] Recycling of construction-related waste materials in compliance with ABA 939 would substantially reduce this waste stream that most likely would go to the Calabasas Landfill. With the Calabasas Landfill currently receiving a daily intake of approximately 1,730 tons per day, with a permitted intake of 3,500 tons per day, there is more than enough space to accommodate the construction waste produced by the proposed project. In addition, the construction phase of the proposed project would be spread out over several years, which would further reduce the impact to the Calabasas Landfill regarding construction waste.

Site grading can also be a source of construction waste directed to a landfill. However, the proposed project's grading operations are designed to balance onsite; therefore, no excavated soil would be exported to a landfill.

Because the total landfill capacity in Los Angeles County is limited, any addition to the overall waste stream flowing to the County's landfills will hasten the day the County eventually runs out of landfill capacity. Therefore, any additional solid waste from any source may be considered adverse. However, since the addition of the project's construction-related wastes to the Calabasas Landfill would not cause that landfill to exceed its permitted daily capacity, this impact is considered less than significant.

***Long-Term Operational Impacts***

Operation of the proposed project would result in ongoing generation of solid waste. Over the long-term, the project's 81 residences can be expected to generate approximately 810 pounds (0.41 tons) of solid waste per day, or 148 tons per year (see Table III.N.3-1). As discussed above, the AB 939 requirement to reduce the solid waste stream to landfills by 50 percent means that approximately 400 pounds of the project's total daily solid waste generation (or 7.5 tons per year) must be diverted elsewhere than to a landfill (e.g., recycled).

As mentioned previously, the Calabasas Landfill is permitted to receive 3,500 tons per day and currently receives 1,730 tons per day of solid waste. Therefore, the Calabasas Landfill can receive an additional 1,770 tons per day before it reaches its permitted capacity. Because the proposed project is anticipated to produce approximately 400 pounds per day of solid waste, the Calabasas Landfill has more than enough permitted capacity to accommodate this additional contribution.

---

[13] *Based upon 81 residences at 5,000 square feet per residence X 4.38 lbs ÷ 2,000 =887 tons.*

**Table III.N.3-1**
**PROJECT/CUMULATIVE SOLID WASTE GENERATION (DAILY)**
**(Pounds/Day)**

| Proposed Land Use | Size | Generation Factor | Total Solid Waste Generation |
|---|---|---|---|
| **Proposed Project** | | | |
| Single Family Residences | 81 Unit | 10 pounds/day | 810 |
| **Related Projects** | | | |
| Office | 424,886 Square Feet | 0.005 lbs./square foot | 2,124 |
| Retail/ Restaurant | 379,290 Square Feet | 0.01 lbs./square foot | 3,793 |
| Single Family D.U.s | 28 Units | 10.0 lbs./day | 280 |
| Multiple-Family D.U.s | 458 Unit | 5.0 lbs./day | 2,290 |
| | | *Subtotal* | *8,487 lbs./day or 4.2 tons* |
| | | **CUMULATIVE TOTAL** | **9,297 lbs./day Or 4.6 tons/day** |

*SOURCE: Citywide Recycling Division, Los Angeles City Bureau of Sanitation*

Although total landfill capacity in the County is limited and any addition to the overall waste stream would reduce the County's overall landfill capacity, the Calabasas Landfill has sufficient remaining capacity for its current solid waste intake and the proposed project's intake for the foreseeable future. As the proposed project's long-term generation of solid waste can be accommodated at the Calabasas Landfill without causing the landfill to exceed its permitted daily capacity in the foreseeable future, the proposed project's long-term impact on solid waste facilities is less than significant.

It should also be noted that although other landfills in Los Angeles County are near capacity, potential capacity may become available through expansion of the Bradley Landfill and/or Puente Hills Landfill, conversion of waste-to-energy and through the use of waste-by-rail to landfills outside of Los Angeles County (e.g., the proposed Eagle Mountain Landfill in Riverside County).

***Household Hazardous Waste***

According to the Environmental Programs Division of the Department of Public Works, the project may generate household hazardous waste which could adversely affect existing hazardous waste management facilities in this County, which are inadequate to handle the hazardous waste currently being generated.[14] These wastes may be disposed of by the residents at any of the hazardous materials pickup sites offered by the County. This is a regional problem and beyond the scope of any individual project to resolve.

## SIGNIFICANCE OF IMPACTS BEFORE MITIGATION

With a remaining capacity of approximately 1,770 tons per day, the Calabasas Landfill has more than adequate capacity to accommodate the proposed project's additional contribution of 400 pounds per day (0.2 tons per day). Therefore, the projected increase in solid waste as a result of the implementation of the proposed project would have a less than significant impact on regional solid waste disposal facilities.

## MITIGATION MEASURES

The project's short-term and long-term impacts on the County's solid waste disposal facilities are less than significant and, under CEQA, mitigation measures are not required. Nonetheless, the following measures are recommended to reduce further the project's already less than significant short-term construction-related solid waste impacts:

N.3-1 The construction contractor will contract for waste disposal services with a company that recycles construction-related wastes.

N.3-2 To facilitate the on-site separation and recycling of construction-related wastes, the construction contractor will provide temporary waste separation bins in front of each home during construction.

The following measures are recommended to further reduce the project's already less than significant long-term solid waste impacts:

N.3-3 The applicant/developer shall make information published by the County regarding the curbside recycling program, as well as on-site composting methods for yard waste, available to purchasers of dwelling units at the time of sale.

---

*14 Interdepartmental Review correspondence, September 19, 2000.*

## LEVEL OF SIGNIFICANCCE AFTER MITIGATION

The project's short-term and long-term impacts on the County's solid waste disposal facilities are less than significant.

## CUMULATIVE IMPACTS

As indicated in Table III.N.3-1, the project in combination with the related projects would generate a cumulative total of 4.6 tons per day on an on-going basis. Construction of the related projects would also contribute to cumulative solid waste impacts, although the flow of construction wastes only occurs during the relatively short construction period and ceases as construction is completed. As discussed above, the Calabasas Landfill is permitted to receive up to 3,500 tons of solid waste each day. It currently receives approximately 1,730 tons daily. Therefore, the Calabasas Landfill has a remaining daily capacity of 1,770 tons. Assuming that all of the cumulative solid waste is sent to the Calabasas Landfill with no waste stream diversion, the additional 4.6 tons per day would not cause the Calabasas Landfill to exceed its permitted daily capacity. Therefore, the proposed project, in combination with the related projects, would not cause a significant cumulative impact to the Calabasas Landfill. Furthermore, additional capacity to accommodate the cumulative disposal needs of the proposed project and related projects may become available as the County develops solutions to meet the future disposal needs at a regional level (e.g., expanding existing landfills, transporting waste to other landfills, converting waste to energy, recycling and waste reduction). Furthermore, similar to the proposed project, the related projects would be subject to the requirements of AB 939 (i.e., divert 50 percent of the solid waste generated through waste reduction, recycling and composting).

# III. ENVIRONMENTAL IMPACT ANALYSIS
# P. ENERGY CONSERVATION
# 1. ELECTRICITY

## ENVIRONMENTAL SETTING

Southern California Edison Company (SCE) provides electricity service to unincorporated portions of Los Angeles County, including the project site. SCE obtains power from numerous sources, including (1) the San Onfre Nuclear Generating Station (SONGS), (2) the Mohave Generating Station in Laughlin, Nevada, and (3) the Big Creek hydroelectric system.

The State of California produces 75 percent of the electricity it uses. The remaining electricity is purchased through suppliers from the Pacific Southwest and the Pacific Northwest. One-third of the State's electrical energy is generated by natural gas. Additional electricity is generated through other means, including hydro, nuclear energy, coal, oil, geothermal, waste, wind and solar sources.[1]

Energy consumption by new buildings in California is regulated by the State Building Energy Efficiency Standards, embodied in Title 24 of the California Code of Regulations (CCR). The efficiency standards apply to new construction of both residential and non-residential buildings, and regulate energy consumed for heating, cooling, ventilation, water heating and lighting. The building efficiency standards are enforced through the local building permit process. Local government agencies may adopt and enforce energy standards for new buildings, provided that these standards meet or exceed those provided in Title 24 guidelines. Currently, no electricity is consumed on the project site. There are existing 16kV power lines along Cornell Road adjacent to the project site, but no lines run directly onto the project site.[2]

## ENVIRONMENTAL IMPACTS

### Thresholds of Significance

In accordance with Appendix F to the CEQA Guidelines, CEQA "requires that EIRs include a discussion of the potential energy impacts of proposed projects, with particular emphasis on avoiding or reducing inefficient, wasteful and unnecessary consumption of energy." As no specific thresholds of significance for potential energy impacts are suggested in Appendix F or G to the CEQA Guidelines,

---

1 *California Home Page: www.energy.ca.gov/html/calif_energy_facts.html, July 15, 2003.*

2 *Correspondence from the Southern California Edison Company, Laura Frazier, Service Planner, July 10, 2003.*

the following thresholds of significance are derived from the Draft L.A. CEQA Thresholds Guide,[3] which states that the proposed project would result in a significant impact to electricity resources or systems if either of the following would result from project implementation:

- Create a need for new supply facilities, distribution infrastructure, or capacity enhancing alterations to existing facilities; or
- Conflict with adopted energy conservation plans.

**Project Impacts**

Upon full buildout, the proposed project is anticipated to consume approximately 1,249 kilowatt hours (kwH) per day (see Table III.P.1-1). In order to serve the proposed project's electricity needs, existing electrical lines in the project area would need to be extended. SCE has determined that one of their 16kV circuits can be used to connect to the project site. The existing aboveground 16kV power lines would need to be extended onto the project site for connection purposes. [5]

SCE would provide electricity to the project site in accordance with the rules and regulations set forth by the California Public Utilities Commission. If a shortage of energy and/or generating capacity would occur, SCE would apportion its available supply of electricity among its customers as set forth in Rule No. 14, Shortage of Supply and Delivery.[4] The project developer would be responsible for paying connection costs and possibly some or all of the expansion costs. SCE indicated that a short outage is normally required to extend the existing electrical lines to the project site. The expansion of the electricity distribution system would result in partial or full road lane closures while installing the lines, as the lines would be installed underground as recommended in the Santa Monica Mountains North Area Plan. The road lane closures would be temporary and would end as soon as utility installation is complete; typically such construction requires less than a week to complete. While electrical connection of the proposed project would entail the expansion of distribution infrastructure, this requirement is not expected to create a significant impact to the physical environment for the following reasons:

(1) Any disruption of service would be of a short-term nature, typically lasting a couple of hours;

(2) Extension of electrical lines would be within public rights-of-way; and

---

3 *City of Los Angeles, Draft L.A. CEQA Thresholds Guide, May 14, 1998.*

5 *Correspondence from the Southern California Edison Company, Laura Frazier, Service Planner, July 10, 2003.*

4 *Ibid.*

(3) The full cost of the proposed connections and the fair share cost of the expansion of the electrical distribution systems would be born by the project developer.

Title 24 of the California Code of Regulations establishes energy conservation standards for new construction, including single-family homes. The proposed project would comply with Title 24 energy conservation standards for insulation, glazing, lighting, shading, and water and space heating systems in new homes.

With modern energy efficient construction materials and compliance with Title 24 standards, the proposed project would be consistent with the County's energy conservation standards and therefore would not conflict with adopted energy conservation plans.

**Table III.P.1-1**
**Cumulative Daily Electricity Consumption**

| Land Use[1] | Size | Generation Rate (kwH/sf/yr)[a] | Total Daily Electricity Consumption |
|---|---|---|---|
| ***Proposed Project*** | | | |
| Single-Family Homes | 81 DU | 5,626.5 | 1,249 |
| ***Related Projects*** | | | |
| | | | |
| Office | 564,888 | 12.95 | 20,042 |
| Restaurant | 44,000 | 47.45 | 5,720 |
| | | | |
| Retail | 184,540 | 13.55 | 6,851 |
| Single-Family | 33 DU | 5,626.5 | 509 |
| Multi-Family | 458 DU | 5,626.5 | 7,060 |
| School/Daycare | 171,175 | 5.9 | 2,767 |
| Church | 9,104 | 5.9 | 147 |
| | | | |
| | | *Subtotal* | *43,096* |
| | | **Cumulative Total** | **44,344** |

[a] *Source: SCAQMD, CEQA Air Quality Handbook, Table A9-11-A, 1993.*

## MITIGATION MEASURES

Although the proposed project would not have a significant impact on electricity services, the following mitigation measures are recommended to reduce further the proposed project's impacts:

P.1-1 In the event of full or partial road closures, the project developer shall employ flagmen during the construction of the electrical distribution system to facilitate the flow of traffic.

**P.1-2** During the design process, the project developer shall consult with SCE regarding possible energy efficiency measures.

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

The proposed project's impacts on electricity services expansion and supply would be less than significant without mitigation. However, the implementation of the recommended mitigation measures would further reduce the proposed project's impacts.

## CUMULATIVE IMPACTS

Development of the proposed project in conjunction with the 26 related projects indicated in Figure II-13 in Section II.C (Related Projects) would increase the demand for electricity. As shown in Table III.P-1, the estimated electricity consumption by the related projects in combination with the proposed project would be approximately 44,344 kwH per day. However, cumulative impacts are not expected to be significant for the reasons discussed below.

According to SCE, significant adverse cumulative impacts related to electricity supply and service in the project area would not occur. Furthermore, all of the related projects would be required to comply with Title 24 of the California Code, which establishes energy conservation standards for new construction, reducing the demand for electricity from SCE.

If new electricity supply facilities, distribution infrastructure, or capacity enhancing alterations would be needed with implementation of the related projects, it is expected that the SCE would connect such new electricity loads with minimum interruption to existing customers. New electricity distribution lines would likely be installed underground, as recommended in the Santa Monica Mountains North Area Plan.

Therefore, the combined effects of the proposed project and the related projects are expected to result in a less-than-significant cumulative electricity impact.

# III. ENVIRONMENTAL IMPACT ANALYSIS
# P. ENERGY CONSERVATION
# 2. NATURAL GAS

## ENVIRONMENTAL SETTING

The Southern California Gas Company (SCG) provides natural gas to the project area through existing gas mains located under the streets and public right-of-ways. Natural gas service is provided in accordance with the SCG's policies and extension rules on file with the California Public Utilities Commission (PUC) at the time contractual agreements are made.

The State produces about 16 percent of the natural gas it uses. The remaining 84 percent is obtained from sources outside of the State, 46 percent from the Southwest, 28 percent from Canada, and 10 percent from the Rocky Mountain area. In the last 10 years, three new interstate gas pipelines were built to serve California, expanding the over one million miles of existing pipelines.[5] However, the availability of natural gas is based upon present conditions of gas supply and regulatory policies. As a public utility, SCG is under the jurisdiction of the PUC, but can be affected by actions of federal regulatory agencies. Should these agencies take any action, affecting natural gas supply or the conditions under which service is available, natural gas service would be provided in accordance with those revised conditions.

SCG states that, currently, there are no existing or anticipated service problems or deficiencies in the project area. SCG has designed the distribution pipeline system to meet the demand of total buildout in the project vicinity, including the project site.[6] Currently, the project site is undeveloped and does not consume any natural gas.

## ENVIRONMENTAL IMPACTS

### Thresholds of Significance

In accordance with Appendix F to the CEQA Guidelines, CEQA "requires that EIRs include a discussion of the potential energy impacts of proposed projects, with particular emphasis on avoiding or reducing inefficient, wasteful and unnecessary consumption of energy." As no specific thresholds of significance are suggested in Appendix F or G to the CEQA Guidelines, the applicable thresholds of

---

5 *California Home Page: www.energy.ca.gov/html/calif_energy_facts.html, April 3, 2003.*

6 *Correspondence from the Southern California Gas Company, Jim Hammel, Technical Services, Northern Region, July 15, 2003.*

significance are derived from the Draft L.A. CEQA Thresholds Guide,[7] which provides that the proposed project would result in a significant impact to natural gas resources or utility systems if either of the following would result from project implementation:

- Create a need for new supply facilities, distribution infrastructure, or capacity enhancing alterations to existing facilities; or
- Would conflict with adopted energy conservation plans.

**Project Impacts**

Development of the proposed 81 single-family homes would result in a demand for natural gas at the project site. Based on a rate of 6,665 cubic feet of natural gas per square foot per month, the estimated daily natural gas consumption for the proposed project would be approximately 17,996 cubic feet (see Table III.P.2-1).[8] SCG has stated that it can accommodate the natural gas needs of the proposed project from existing subterranean local distribution mains and demand projections.[9] Natural gas would be provided to the project site by providing service extensions from the six-inch medium pressure main in Kanan Road. The project developer would be responsible for paying connection costs and possibly some or all of the expansion costs. The SCG has indicated that gas mains and service extensions are generally installed in a joint trench (i.e., in a public right-of-way) with other dry utilities (e.g., electric, telephone, and cable TV). According to SCG, the natural gas service extensions to the project site would be connected to existing lines by "hot tap" methods, with no disruption to existing customers.[10] This installation could result in full or partial road lane closures. However, the road lane closures would be temporary and would end as soon as utility installation is complete, which typically requires less than a week. Since a six-inch medium pressure main is available in Kanan Road adjacent to the project site, no expansion of the existing distribution infrastructure would be necessary.

Title 24 of the California Code of Regulations establishes energy conservation standards for new construction, including single-family homes. These standards relate to increased energy conservation standards for insulation, glazing, lighting, shading, and water and space heating systems in new homes. The proposed project would comply with these standards in Title 24 as they relate to the conservation of natural gas. Furthermore, the proposed project would use modern energy-efficient construction

---

7 *City of Los Angeles, Draft L.A. CEQA Thresholds Guide, May 14, 1998.*

8 *Calculated using the South Coast Air Quality Management District CEQA Air Quality Handbook, Table A9-12-A (Natural Gas Usage Rate), 1993.*

9 *Correspondence from the Southern California Gas Company, Jim Hammel, Technical Services, Northern Region, July 15, 2003.*

10 *Ibid.*

materials and otherwise comply with the State's energy conservation standards. Therefore, the proposed project would not conflict with adopted energy conservation plans.

## MITIGATION MEASURES

Although the proposed project would not have a significant impact on natural gas services, the following mitigation measures are recommended to reduce further the proposed project's impacts:

**P.2-1** Prior to the start of construction, the proposed project's energy engineer shall consult with SCG for an energy analysis regarding efficiency and conservation measures.

**P.2-2** The project developer shall hire flagmen to facilitate traffic flow during installation of the natural gas main extensions.

## LEVEL OF SIGNIFICANCE AFTER MITIGATION

The proposed project's impacts on natural gas services would be less than significant without mitigation. However, the implementation of the recommended mitigation measures would further reduce the proposed project's impacts.

## CUMULATIVE IMPACTS

Implementation of the proposed project in conjunction with the 26 related projects indicated in Figure II-13 in Section II.C (Related Projects) would increase the demand for natural gas. The cumulative net increase of natural gas consumption is estimated to be 158,339 cubic feet per day (see Table III.P.2-1). SCG has stated that "demand projections by the Gas Company have allowed for additional load/demand of this project, as well as, the cumulative impact of future proposals in this area."[11] Because SCG has indicated that natural gas is available for the proposed project in combination with the related projects, cumulative impacts to natural gas services would be less than significant.

---

[11] *Ibid.*

**Table III.P.2-1**
**Cumulative Natural Gas Consumption**

| Land Use[1] | Size | Generation Rate (cubic feet/sf/month)[a] | Total Natural Gas Consumption (cubic feet/day) |
|---|---|---|---|
| **Proposed Project** | | | |
| Single-Family Homes | 81 DU | 6,665 | 17,996 |
| **Related Projects** | | | |
| Office | 564,888 sf | 2.0 | 37,659 |
| Restaurant | 44,000 sf | 2.9 | 4,253 |
| Retail | 184,540 sf | 2.9 | 17,839 |
| Single-Family | 33 DU | 6,665 | 7,332 |
| Multi-Family | 458 DU | 4,011.5 | 61,242 |
| School/Daycare | 171,175 sf | 2.0 | 11,412 |
| Church | 9,104 sf | 2.0 | 607 |
| | | | |
| | | *Subtotal* | *140,344* |
| | | **Cumulative Total** | **158,339** |

[a] *Source: SCAQMD, CEQA Air Quality Handbook, Table A9-11-A, 1993.*

# IV. GENERAL IMPACT CATEGORIES

## A. SUMMARY OF SIGNIFICANT UNAVOIDABLE IMPACTS

Section 15126.2(b) of the CEQA Guidelines requires that an EIR describe any significant impacts which cannot be avoided. Specifically, Section 15126.2(b) states:

> *Describe any significant impacts, including those which can be mitigated but not reduced to a level of insignificance. Where there are impacts that cannot be alleviated without imposing an alternative design, their implications and the reasons why the project is being proposed, notwithstanding their effect, should be described.*

Based on the analysis contained in Section IV (Environmental Impact Analysis) of this Draft EIR, the proposed project would result in significant unavoidable environmental impacts relative to air quality (short-term, construction-related vehicle emissions (NOx)); biological resources (Lyon's pentachaeta, Santa Monica Mountains dudleya, loss of habitat, encroachment into SEA); noise (short-term construction activities) and visual qualities (i.e., scenic vistas; scenic resources; and visual character).

Alternative designs to the proposed project and their implications are discussed in Section V (Alternatives to the Proposed Project). As indicated therein, none of the alternative designs would reduce all of the significant unavoidable impacts associated with the proposed project to a less-than-significant level (with the exception of the No Project Alternative).

## B. GROWTH INDUCING IMPACTS OF THE PROPOSED PROJECT

Section 15126.2(d) of the CEQA Guidelines requires a discussion of the ways in which a proposed project could induce growth. This includes ways in which a project would foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Section 12126.2(d) of the CEQA Guidelines states:

> *Discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth (a major expansion of a waste water treatment plant might, for example, allow for more construction in service areas). Increases in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects. Also discuss the characteristic of some projects which may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.*

The proposed project would introduce 81 single-family residences, with an estimated resident population of approximately 243 individuals[1], into 320.3 acres of currently undeveloped hillside property that is an "infill" location between existing development. Many of these residents are expected to be new to the area. As such, the project could foster economic growth in this portion of western Los Angeles County by generating demand for local goods and services. This additional demand on existing community services and facilities may tax their existing capacity and contribute to the need for future expansion of those facilities. However, the project is consistent with the range of densities permitted on the site by the Santa Monica Mountains North Area Plan and therefore its anticipated growth inducement has been anticipated in the Los Angeles County General Plan, and is assumed to be less-than-significant.

The project is not expected to contribute to future expansion of the Las Virgenes Municipal Water District's Tapia Water Reclamation Plant. In 1993, the Tapia Plant's sewage treatment capacity was expanded to 16.1 million gallons per day (mgd), but currently only treats 8.0 to 8.5 mgd, on average. There are no plans for future expansions. The project is consistent with the Las Virgenes Municipal Water District's Master Plan and, therefore, its projected sewage generation has already been accounted for in the previous Tapia Plant expansion. Furthermore, the existing sewer main, which serves the project site, has adequate capacity to accommodate the proposed project's estimated sewage flows. Therefore, the project would not contribute to or require the expansion of existing sewerage capacity.

The project would require the extension of a water main from its existing terminus near the intersection of Kanan and Silver Creek Roads into the project site. However, existing developments both to the north and south of the site already have adequate water service. On-site lands to the east and west of the proposed development enclaves are proposed as open space and are not expected to require water service in the future. Off-site lands to the east and west are separated from the project site by ridgelines and/or are at elevations that may or may not be serviceable by the Las Virgenes Municipal Water District without supplemental pumping equipment. Therefore, the project's extension of the water line would not provide a significant opportunity for other land owners to connect to the system.

The project would grade the right-of-way for possible future roadway improvements along Kanan and Cornell Roads, as required by the County of Los Angeles. However, no physical improvements to these streets are proposed as part of this project, other than the provision of left turn lanes and acceleration/deceleration lanes for project access. Furthermore, most of the undeveloped land south of the project site is publicly owned and will not develop in the future. Development of private land that does exist to the south is not currently constrained by the lack of roadway capacity. No internal project

---

[1] *Assumes approximately 3 persons per household (Source: Las Virgenes Municipal Water District Population Growth, Residential Development and Employment Activity Report, LVMWD Report Number 2041, March 1996).*

roadways will provide new access to future developable land. Therefore, the project would not remove any access obstacles to growth.

## C. IMPACTS FOUND TO BE LESS THAN SIGNIFICANT

Section 15128 of the CEQA Guidelines states: "An EIR shall contain a statement briefly indicating the reasons that various possible significant effects of a project were determined not to be significant and were therefore not discussed in detail in the EIR."

Section VII of this EIR includes the updated Initial Study for the proposed project, conducted by the Los Angeles County Department of Regional Planning (May 15, 2003) which identifies the various possible significant effects of the project that were determined not to be significant and were therefore not discussed in detail in this EIR. The Initial Study also provides the reasons why these various possible significant effects of a project were determined not to be significant. These various possible significant effects include: mineral resources, agriculture resources, environmental safety and general environmental concerns.

# V. ALTERNATIVES TO THE PROPOSED PROJECT

Section 15126.6(a) of the state CEQA Guidelines requires the identification and evaluation of a range of reasonable alternatives which would feasibly attain most of the basic project objectives but would avoid or substantially lessen its significant effects. The intent of the alternatives analysis is to ensure that other possible approaches to avoid or reduce environmental impacts were considered. The merits of the alternatives and how they compare to the project offer valuable information to the decision makers. Because an EIR must identify ways to mitigate or avoid the significant effects that a project may have on the environment, CEQA restricts the range of potential alternatives to those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more significant effects.

**Selection of a Range of Reasonable Alternatives**

The range of alternatives is governed by a "rule of reason" that requires only those alternatives necessary to permit a reasoned choice. The discussion of alternatives need not be exhaustive, only reasonable. The range of feasible alternatives must be discussed in a manner which fosters meaningful public participation and informed decision making. Among the factors that may be used to eliminate alternatives from detailed consideration in an EIR are: (i) failure to meet most of the basic project objectives, (ii) economical or other infeasibilities or (iii) inability to avoid significant environmental impacts. An EIR need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative.

Pursuant to Section 15126.6(e) of the CEQA Guidelines, the discussion of the alternatives should also identify the environmentally superior alternative.

**Evaluation of Alternatives**

The EIR must include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project. If an alternative would cause one or more significant effects in addition to those that would be caused by the project as proposed, the significant effects of the alternative must be discussed, but in less detail than the significant effects of the project as proposed.

**Number of Alternatives to be Evaluated**

Neither the CEQA statutes the CEQA Guidelines, nor recent court cases specify a precise number of alternatives required to be discussed in an EIR. The CEQA Guidelines do, however, state that an alternative defined as the "No Project" alternative must be included and, when appropriate, development of the project at an alternate site should also be discussed.

**Project Intent and Objectives**

The primary objective of the County of Los Angeles is to implement the North Area Plan (Plan). The Plan provides a more focused policy for the regulation of development within the unincorporated areas of the Santa Monica Mountains north of the coastal zone. Overall, the emphasis of this policy is

> *"...to maximize preservation of the area's natural environment, recognize the opportunities and constraints that the land imposes, accommodate new uses that minimize impacts on the natural environment, and ensure that new development is compatible with and enhances the quality of existing communities, and provide for a wide range of public and private recreational opportunities."*

Specific objectives of the North Area Plan are

- To maintain the continuation of existing settlement patterns, especially the more remote rural enclaves, embracing the area's rural and semi-rural character.

- To protect natural environments especially sensitive flora and fauna biological habitats. A major contributing factor to this is surface and underground water quality which may be affected by alterations to watersheds (in particular Malibu Creek and other key watersheds).

- To protect areas of scenic beauty and natural open space.

- To preserve undisturbed terrain in its natural state, not only to preserve natural environmental features, but also to protect resident's health and safety within developed lands. This is to be achieved through consciously choosing to protect the natural terrain in its natural state over allowing development projects to proceed simply because impacts can be mitigated.

The County of Los Angeles has identified the following "design concepts" as its specific objectives for the proposed project:

- To create a semi-rural residential community by minimizing or avoiding street lighting and construction of sidewalks, curbs, and gutters.

- To concentrate development along the existing Kanan and Cornell Roads and to be in proximity to existing infrastructure and services.

- To design lots and roadways to avoid ridgelines.

- To locate the majority of the development on the gentler slopes.

The project applicant's primary objective is to achieve a profitable economic return on its property investment. To achieve this objective the applicant intends on subdividing the currently vacant 320.3-acre site and to create a "high-end" residential development that is marketable, aesthetically attractive, environmentally sensitive, and financially feasible. More specifically, it is the applicant's objective to develop 81 single-family residences within a development envelope of approximately 54 acres. It is the applicant's intent to retain the remaining portion of the project site as permanently preserved open space.

To achieve this broad development objective, the applicant has identified the following specific objectives:

- To create a semi-rural "clustered" residential community (that avoids the appearance of a "tract" development);
- To minimize grading disturbance and human and domestic animal intrusions into the majority of the project site;
- To preserve to the greatest extent possible the natural character of the site and the surrounding environment. To this end the project seeks:
  - To preserve approximately 271.7 acres of permanent open space, or 85 percent of the project site.
  - To concentrate development on less environmentally sensitive portions of the property, while preserving in perpetuity more sensitive resources.
  - To preserve the area's semi-rural ambiance by maintaining development setbacks from public roadways, minimizing or avoiding street lighting, and avoiding construction of sidewalks, curbs, and gutters;
  - To preserve most of the coast live oaks and other sensitive plant species, such as the Lyon's pentachaeta;
  - To landscape the development area primarily with native vegetation and local building materials.
- To site and design the proposed development to protect significant scenic vistas and features. In particular the plan seeks to preserve views of Ladyface Mountain and major ridgelines by:
  - Siting lots and roadways to avoid breaking ridgeline views; and
  - Siting development partially in previously disturbed areas;
- To minimize grading by concentrating development on the gentler slopes;
- To provide high-quality housing for local and area residents to meet existing and future needs of those desiring to live in the Santa Monica Mountains and to help alleviate the severe housing shortage in the greater Los Angeles region.

- To locate the residential development in proximity to existing infrastructure and services; and,
- To develop the site in conformance with the goals and policies of the Los Angeles County General Plan, the Santa Monica Mountains North Area Plan, and to the extent possible, the General Plan of the City of Agoura Hills.

**Overview of Selected Alternatives**

This EIR evaluates the following alternatives, selected in accordance with their ability to meet the aforementioned CEQA criteria:

Alternative 1 - No Project is provided pursuant to CEQA Guidelines Section 15126.6.

Alternative 2 – Large Lot Alternative, evaluates an alternative design that combines comments made by area homeowners: 1) that the site should be developed with large, ranchette-type lots, and 2) that the number of residences should be limited to the densities proposed for the project site by an early version of the Draft Ventura Freeway Corridor Areawide Plan. Although the Santa Monica Mountains North Area Plan (SMMNAP), and not the Draft Ventura Freeway Corridor Areawide Plan, determines the permitted land use density for the project site, an alternative consistent with the Draft Ventura Freeway Corridor Areawide Plan is included because members of the public have requested it. Alternative 2 also addresses comments made by community residents that the project site should be developed with large lot estates.[1]

Alternative 3- Alternate Site Plan, evaluates an alternative design that eliminates residential development in the portion of the project site that lies between Kanan and Cornell Roads. Similar to the proposed project, this alternative would provide a total of 81 single-family residences. However, in this alternative, 54 single-family residences would be developed on the west side of Kanan Road, and 27 single-family residences would be developed on the east side of Cornell Road. With the exception of the elimination of development between Kanan and Cornell Roads, Alternative 3 would utilize the same basic grading plan as the proposed project.

Alternative 4 – SEA/Reduced Lot Plan is designed in response to SEATAC and DRP staff comments to reduce project impacts to SEA No. 6 and biological resources in general, by: (1) reducing the number of residences on the east side of Cornell Road from 27 to 12 homes; (2) reducing the size of building pads to avoid impacts to the tributary drainage "M"; (3) eliminating the eastern most cul-de-sac and lots; (4) reducing the number of homes between Kanan and Cornell Roads in the northern portion from 10 to six homes; (5) reducing the number of homes on the west side of Kanan Road from 44 to 26 homes; and (6) preserving the central secondary ridge on the west side on Kanan Road, and eliminating all housing south of that ridge. In total, Alternative 4 would provide 44 new homes.

---

[1] *Comments made at a public meeting held by the project applicant on December 8, 1998.*

Alternative 5 - Sensitive Plant Species Avoidance, evaluates an alternative that reduces impacts to sensitive plant throughout the project site. The avoidance of sensitive plant species populations would be achieved by retaining populations within proposed open space lots. The total number of units provided on the project site would be reduced to 76 residences.

**Alternatives Rejected as Being Infeasible**

Section 15126.6(c) of the CEQA Guidelines requires EIRs to identify any alternatives that were considered by the lead agency but were rejected as infeasible during the scoping process, and briefly explain the reasons underlying the lead agency's determination.

Since the environmental review process for Tentative Tract 52419 was initiated in 1998, land use authority for the project site has transitioned from the Malibu/Santa Monica Mountains Interim Area Plan to the Draft Ventura Freeway Corridor Areawide Plan to the North Area Plan. The move toward more restrictive land use controls has been reflected in a series of progressively smaller site plans. While each of the following may have been consistent with the applicable zoning and land use designations at the time they were proposed, each has since been rendered infeasible as the land use controls have become more protective of natural resources by subsequent area plans. These designs include:

- A 143-lot project design. This alternative was developed early in the design process. It was rejected because its density exceeded the maximum permitted by the Malibu/Santa Monica Mountains Interim Area Plan. Additionally, this alternative would have significantly greater impacts on biological resources than the proposed project.

- A 132-lot project design. This alternative was rejected because its lot design was considered too "tract-like" in its layout and, like the proposed project, it failed to adequately mitigate significant impacts to scenic qualities and biological resources.

- A 123-lot project design. This design was suggested by the City of Agoura Hills in response to the Notice of Preparation for an earlier 123-lot design. Eighteen (18) lots be eliminated or relocated from the 123-lot design, resulting in a project for 105 lots. This alternative was ultimately rejected when the Santa Monica Mountains North Area Plan was adopted and the project was downsized to 81 lots, which rendered the City's recommendation infeasible.

The following alternatives were considered but rejected as infeasible during the scoping process:

- Ladyface Mountain Avoidance. Under this concept no development would be permitted on the west side of Kanan Road at the base of Ladyface Mountain. The purpose of such an alternative would be the maximum preservation of Ladyface Mountain's aesthetic and cultural qualities. This alternative was rejected because it would shift all of the development into the SEA on the east side

of Cornell Road and into the project area surrounding Medea Creek, resulting in significant and unacceptable impacts to biological resources in that area.

- Santa Monica Mountains Conservancy Alternative. On January 19, 1999 the Santa Monica Mountains Conservancy recommended, as part of its response to the Notice of Preparation released in 1998, an alternative design that would limit the project to 58 residences. This number was derived from a combination of the maximum number of units permitted by the Santa Monica Mountains Comprehensive Plan, which does not have jurisdiction over the project site, as well as concerns for wildlife, visual impacts, and other issues. The recommended alternative was rejected by the project applicant because it failed to achieve some of the project objectives, as set out in Section I of this EIR.

Lastly, an Alternate Site Alternative was rejected on the basis that the project applicant does not own or control another property in Los Angeles County that could accommodate the proposed project.

**Assumptions and Methodology**

The following alternatives analysis discusses each alternative's impacts relative to each environmental issue, consistent with those addressed in the project analysis. Although the assessment is more general, similar methodologies and assumptions for alternatives analysis were employed. Each alternative is evaluated more schematically than the proposed project, and the potential development assumptions for the alternatives are hypothetical. However, specific conclusions can be drawn for comparative purposes from the detailed analyses of the proposed project.

**Alternative 1 - No Project**

Under a No Project alternative, the proposed Project would not be developed, and the site would remain in its current condition. Existing temporary uses on the project site would most likely continue their operations: firewood cutting and storage adjacent to the north side of Los Angeles County Fire Station No. 65 and the former grading equipment storage and fill material stockpiling on the lower slopes of Ladyface Mountain. None of the problems associated with these uses would be eliminated by the No Project Alternative. For example, dust would continue to blow from the soil stockpiles and firewood cutting areas. Surface water quality would continue to be compromised by sediment transport from the soil stockpile and firewood cutting areas. Also, scenic quality of the Kanan and Cornell Road corridors would continue to be affected by views of the soil stockpile and firewood-cutting areas.

Under this alternative, the proposed on-site excavation of approximately 498,400 cubic yards would not occur and there would be no additional landform alterations (i.e., construction of roadways, building pads, and cut and fill slopes) and no changes in existing drainage patterns. Under the No Project Alternative, this benefit would not be realized. There would be no new sources of water quality impacts to Medea Creek; however, there would also be no cleanup of existing sources, such as the former soil stockpiling at the base of Ladyface Mountain. There would be no loss of native habitat and no loss of sensitive plant species, such as coast live oaks, Lyon's pentachaeta, Santa Monica Mountains dudleya, etc. Nor would there be any elimination of wildlife, encroachments on wildlife movement corridors, nor fragmentation of the SEA. There would be no increase in ambient noise levels and there would be no increase in site illumination at night. There would be no additional traffic on Kanan or Cornell Roads. There would also be no increased demand on public services (e.g., sheriff/fire emergency services, schools), or utilities (e.g., domestic water supplies and sewage treatment). Also, there would be no alterations to existing views of the site from surrounding areas, including Kanan Road. However, there would be no dedication of open space to a public resources agency, and there would be no dedication of the on-site portion of the Zuma Ridge hiking/equestrian trail.

**Relationship to Project Objectives**

With respect to the North Area Plan, the "no Project" Alternative would:

- Maintain the continuation of existing settlement patterns, especially the more remote rural enclaves, embracing the area's rural and semi-rural character.
- Protect natural environments especially sensitive flora and fauna biological habitats. A major contributing factor to this is surface and underground water quality which may be affected by alterations to watersheds (in particular Malibu Creek and other key watersheds).
- Protect areas of scenic beauty and natural open space.

- Preserve undisturbed terrain in its natural state, not only to preserve natural environmental features, but also to protect resident's health and safety within developed lands. This is to be achieved through consciously choosing to protect the natural terrain in its natural state over allowing development projects to proceed simply because impacts can be mitigated.

By retaining the existing site conditions this alternative would not accomplish the following applicant's objectives:

- Preserve approximately 271.7 acres of permanent open space, or 84.6 percent of the project site.
- Provide high-quality housing for local and area residents to meet existing and future needs of those desiring to live in the Santa Monica Mountains and to help alleviate the severe housing shortage in the greater Los Angeles region.

The "No Project" alternative is environmentally superior to the proposed project because the majority of the environmental impacts associated with the proposed project would not occur under this alternative.

This alternative is seen as a means of deferring a development decision concerning the project site, and not as an alternative with long-term implications. In the long run, it would be expected that a development proposal for the site would ultimately be implemented. Because this 320.3-acre site represents a privately owned development opportunity (not within the Santa Monica Mountains National Recreation Area and not proposed for public acquisition), it is likely that it would ultimately be developed.

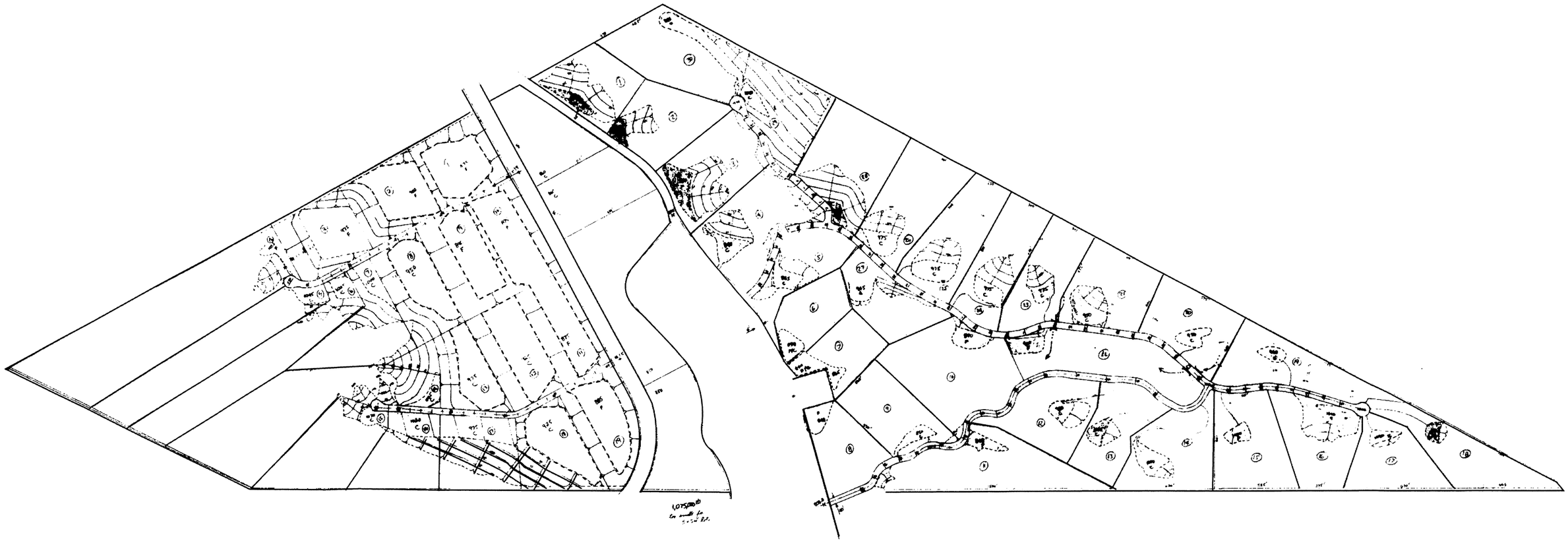
**Alternative 2 - Large Lot Alternative**

This alternative combines the design implications of two complementary concepts raised by public comments. The first is that the project site should be developed with large-lot ranchette type development, similar to existing large-lot developments located on the Wagon Road, just south of the project site. The second concept is that the project site should be developed with a density not to exceed that permitted by an early version of the Draft Ventura Freeway Corridor Areawide Plan. The early version of the Draft Ventura Freeway Corridor Areawide Plan referred to by the local homeowners that suggested this alternative proposed a density of one unit per 5 (five) acres over the entire site. Using that density as a guideline, Alternative 2, provides for the development of 53 estate/ranchettes on lots that average approximately 6.0 acres in size (see Figure V-1).

Because of the large lot design, this alternative has been designed as an exclusive, horse-oriented community. Large pad areas that maximize the useable portions of each lot would be provided west of Cornell Road. The average pad size in this area would be approximately 74,000 square feet (or 1.7 acres). A total of 19 units would be developed west of Kanan Road, while four (4) units would be developed between Kanan and Cornell Roads. On the east side of Cornell Road, natural topographic features and sensitive biological areas limit the feasibility of large pad areas. In this area, the grading pattern for roadways and building pads follows the contours and slope of the natural terrain. Grading east of Cornell road has been designed to avoid the largest sensitive plant populations and Drainage "B." These restrictions combine to limit the maximum number of lots to 30, east of Cornell Road.

While a total area of 223.7 acres would be left undisturbed by the necessary grading for this alternative, the large lot design precludes the opportunity for preservation of open space, either as a public dedication or as private open space maintained by a homeowners' association. Instead, all of the undeveloped hillsides would be included in the individual lot ownerships. In specific areas where sensitive plants occur, some form of deed restrictions would be required to protect the resources. However, for the most part, no restrictions on the homeowners' rights to use their entire property are envisioned as part of this alternative.

While the project site's Residential Plan Development (RPD) zoning would permit the stabling of up to eight (8) horses per acre, the following analysis assumes an average of two horses per residence, or a total of 106 horses on the site.



CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure V-1
Alternative 2 - Large Lot Alternative

***Grading***

Under Alternative 2, approximately 96.6 acres of landform alternation requiring the earth movement of 2,193,000 cubic yards would occur. This is 48 acres more land disturbance and 1,694,600 cubic yards more grading than would be required for the proposed project. This works out to an average of approximately 41,400 cubic yards of grading per residence under Alternative 2, compared to an average of approximately 6,153 cubic yards per residence for the proposed project. The majority of this grading would occur west of Kanan Road, where a total area of 68.1 acres (or 54.9 percent of the project site west of Kanan Road) would be subject to mass grading. In comparison, the proposed project would grade an area of 21.54 acres west of Kanan Road. Alternative 2 would disturb approximately 25.4 acres east of Cornell Road, compared to approximately 22.9 acres disturbed by the proposed project.

Alternative 2 and the proposed project would occupy the same 320.3-acre project site and would be exposed to the same general geotechnical conditions. Similar to the proposed project, it is anticipated that this alternative could result in significant impacts due to the potential for boulder roll and debris flow. In addition, since Alternative 2 would include the development of land that would otherwise be preserved as open space under the proposed project, it is conceivable that the development of Alternative 2 could involve unforeseen geotechnical conditions. However, if adverse geotechnical conditions are encountered, the layout of the large lots proposed under Alternative 2 could be refined to accommodate and/or rectify these conditions.

Similar to the proposed project, implementation of the recommended mitigation measures (see Section III.A (Geotechnical Hazards - Grading) would reduce potentially significant impacts to earth resources to less-than-significant levels. Therefore, such impacts under Alternative 2 would be similar to the proposed project. However, because of its reduced density, fewer people and structures would be exposed to geotechnical hazards under Alternative 2 than under the proposed project.

***Seismicity***

Alternative 2 would be subject to the same strong ground shaking during an earthquake as the proposed project. The only difference being that fewer people and structures on the property would be subject to the ground shaking. Seismic hazards for both alternatives would be comparable and less than significant.

***Air Quality***

Short-term, construction-related air quality impacts depend primarily on the area of soil disturbance and the duration of construction activities. This analysis assumes that the same amount of land surface would be disturbed, on a daily basis, under both Alternative 2 and the proposed project. Therefore, on a daily basis, short-term air quality impacts would be the same for both projects. However, because Alternative 2 would involve approximately 4.4 times more earth movement than the proposed project, its grading

operation would also be expected to last approximately 4.4 times as long. Under both Alternative 2 and the proposed project, NOx emissions from construction equipment would exceed the SCAQMD's threshold criteria. Therefore, both Alternative 2 and the proposed project would create significant short-term air quality impacts.

Because operational air quality impacts derive almost entirely from vehicle emissions and, because Alternative 2 would only generate approximately two-thirds the number of vehicle trips of the proposed project, Alternative 2 would be expected to generate approximately two-thirds the vehicle emissions as the proposed project and would serve to reduce further impacts that are already considered less than significant under the proposed project design.

***Hydrology/Flood Hazard***

Alternative 2 would employ a stormwater drainage concept similar to that of the proposed project. Storm drainage improvements would include on-site storm drains increased in size to convey "bulked" storm runoff flows through the development area for discharge into Medea Creek. Also, one or more debris basins would be "sized" to release a controlled flow of storm water. Therefore, peak runoff during a 50-year storm from both projects would be expected to be comparable. While fewer proposed residences under Alternative 2 would create less impermeable surface area than the proposed project, the longer roads would counter that effect with an increase in impermeable surface area. Consequently, total impermeable surface area for Alternative 2 would be roughly comparable to that under the proposed project. Downstream debris export from Alternative 2 would be less due to the larger area of native vegetation clearance, though siltation may be expected to potentially increase for the same reason. The project mitigates its runoff-related impacts to a less than significant level. Following implementation of the same level of mitigation, the impacts from Alternative 2 would similarly be reduced to a less than significant level.

***Water Quality***

Alternative 2 would utilize the same strategies (i.e., BMPs) for preventing short-term construction-related water quality impacts as the proposed project. These strategies would reduce short-term construction-related water quality impacts for both the proposed project and Alternative 2 to less than significant levels.

Concerning long-term operational water quality impacts, both Alternative 2 and the proposed project would be required to comply with the Los Angeles County Urban Storm Water Runoff Mitigation Plan, where "first flush" cleansing of storm water runoff would be achieved. There would be fewer cars on the project site under Alternative 2, which would proportionally reduce the amount of hydrocarbon pollutants leaked onto paved surfaces. However, the use of exterior chemical applications such as fertilizers and pesticides would probably not be reduced proportionally to the fewer residences under Alternative 2. Alternative 2

features large building pads with the possibility of large landscaped areas. Consequently, the total area subject to such chemical applications could be somewhat greater under Alternative 2. Also, the stabling and riding of approximately 106 horses on the project site (assuming two horses per residence) would introduce large quantities of manure and urine onto the site that could wash into Medea Creek during winter storms. Horse keeping is not part of the proposed project, although some horse keeping could occur east of Cornell Road. Therefore, Alternative 2 would have greater water quality impacts than the proposed project.

***Biological Resources***

Alternative 2 would eliminate 48.0 acres of native habitat more than the proposed project. The majority of this impact would occur west of Kanan Road, where all of the habitat on the lower slopes of Ladyface Mountain (within the project site) would be eliminated. As with the proposed project, this pattern of development would preclude on-site east/west wildlife connection between SEA No. 6 and the undisturbed portions of Ladyface Mountain. While the grading plan would avoid direct impacts to the most of the Lyon's pentachaeta habitat on the eastern portion of the site, the sensitive habitat would be divided between a number of individual owners. This would make on-going preservation of the sensitive species far more problematic. Additionally, the dispersed nature of development within the SEA would result in more, and larger, fuel-modification areas to protect individual residences, would cause more fragmentation problems than the proposed project, and would be more disruptive to wildlife movement. Independent SEATAC review would be required for this alternative. In summary, this alternative would potentially impact the entire site and is inconsistent with any biological resources thereon. Alternative 2 would have greater impacts to biological resources than the proposed project.

***Cultural Resources***

Phase II test excavations and surface collections conducted at the project site have served to completely and adequately mitigate all adverse impacts that might accrue on seven of the eight sites as a result of development. The proposed project would not impact the eighth site (CA-LAN-2078). In contrast, grading for Alternative 2 would eliminate CA-LAN-2078. This would constitute a significant impact. To mitigate this impact, Alternative 2 would be required to conduct a Phase III data recovery (salvage excavations). While this is an acceptable means of reducing developmental impacts to cultural resources, avoidance and preservation is preferable. Therefore, the impact to cultural resources created by Alternative 2 would be greater than that caused by the proposed project, although the impact could be reduced to a less-than-significant level.

***Noise***

Construction noise levels in connection with Alternative 2 would be essentially the same as those associated with the proposed project. Both would result in significant short-term construction noise impacts. However, since Alternative 2 would require approximately 4.4 times the length of time to prepare the site,

the length of exposure to those noise levels would be comparably greater than with the proposed project.

Traffic generated by Alternative 2 would be approximately two thirds that generated by the proposed project. Consequently, Alternative 2 would also be expected to reduce traffic-related noise levels. It should be noted that traffic noise emissions from the proposed project would be less than significant; therefore, Alternative 2 would serve to reduce further noise impacts that are already considered less than significant.

***Visual Qualities***

Both Alternative 2 and the proposed project would have significant visual quality impacts, although those impacts would differ in nature. Alternative 2 would disperse a low level of residential development across the entire project site, whereas the proposed project would concentrate development closer to the highways. In addition to the proposed homes, Alternative 2 would create horse corals, fencing, vegetation removal, and a meandering internal circulation roadways on the east side of Cornell Road. The resulting aesthetic effect of Alternative 2 would be a sense of the loss of open space over the entire project site. Alternative 2 avoids the appearance of a suburban/semi rural development, but transforms a larger area into residential/ranchette-type uses. Also, no open space dedication would occur under Alternative 2. In contrast, the proposed project maximizes the amount of remaining open space, but creates denser development in enclaves. Consequently, Alternative 2 would have a greater impact on the area's scenic vistas than would the proposed project and would more substantially degrade the existing visual character and quality of the project site and its surroundings.

***Light and Glare***

Alternative 2 would create fewer sources of residential night lighting that the proposed project, although those sources would be spread out over the entire property. Additionally, low levels of street lighting would be provided on all internal circulation roadways for security and identification purposes. Because of the dispersed nature of this alternative and the more extensive internal roadway system, this alternative would generate low levels of night lighting throughout a major portion of the 320.3-acre project site. In comparison, the proposed project would concentrate lighting (hence creating a brighter source) within the 48.6 acres of residential enclaves. Because lighting under Alternative 2 would be more visible from Kanan and Cornell Roads, impacts from these highways would be considered more significant than under the proposed project. On the other hand, impacts to the existing residences along Cornell Road and south of Silver Creek Road would be reduced due to the lower density of development. Nevertheless, because major portions of the 320.3-acre project site would be subject to night lighting, night lighting impacts under Alternative 2 would be greater than for the proposed project.

***Land Use Community***

Similar to the proposed project, Alternative 2 would be consistent with the land use density permitted by the Los Angles County General Plan, the Santa Monica Mountains North Area Plan, and existing zoning. However, unlike the proposed project, Alternative 2 does not concentrate development, which is encouraged by the SMMNAP. Furthermore, Alternative 2 would increase impacts to SEA No. 6, which is not consistent with the intent of the SMMNAP. Neither the proposed project nor the Alternative 2 would physically divide an established community. Also, Alternative 2 is compatible in land use and density with the existing pattern of residential development adjacent to the project site (i.e., along Cornell and Silver Creek Roads), and further to the south. While the proposed project would create significant land use impacts due to its consistencies with some SMMNAP policies and some SEA compatibility criteria, Alternative 2 would further exacerbate these issues.

***Traffic and Access***

Alternative 2 would generate approximately 559 vehicle trips per day. This is 295 vehicle trips less than the 854 trips expected from the proposed project. Therefore, traffic impacts from Alternative 2 would be less than those created by the proposed project. However, the proposed project does not create significant traffic impacts at any of the study intersections or two-lane roadway segments. Alternative 2 would further reduce the project's less than significant traffic impacts. Based on County of Los Angeles criteria, the project would contribute to cumulative impacts at the intersections of Kanan Road at Canwood Street, and Kanan Road at Agoura Road. The proposed project would mitigate its cumulative impact by payment of a fair-share of the costs for the improvements necessary to mitigate these conditions. While the cumulative traffic impacts associated with Alternative 2 would be less than that of the proposed project, it would also be required to pay a fair share of the necessary improvements.

***Fire Protection Services***

Both Alternative 2 and the proposed project are subject to the same fire hazards and both would have the same level of fire protection. However, by reducing the number of homes on the project site by 35 percent, Alternative 2 would theoretically decrease demand for fire protection and emergency services provided by the Los Angeles County Fire Department by approximately the same proportion. However, fire hazards to homes and occupants in Alternative 2 would probably increase due to their greater isolation and distance from project site access points. Also, response times to some homes under Alternative 2 would be greater due to the dispersed nature of the subdivision. Evacuation from the east side of Cornell Road under Alternative 2 would be more difficult and time consuming for the same reasons, even though there would be fewer people trying to evacuate the project site. The proposed project would contribute to the need for new or physically altered Fire Department facilities; therefore, project impacts on fire protection services, before mitigation, would be potentially significant. These impacts under Alternative 2 would be further increased. However, both the

proposed project and Alternative 2 would mitigate their impacts to less than significant levels through the payment of a Developer Fee on Construction.

***Sheriff's Services***

With two-thirds the number of people that would reside on the project site, Alternative 2 can be expected to reduce the demand for Sheriff's protective services by approximately the same proportion. However, the proposed project would not result in a substantial adverse physical impact associated with the provision of new or physically altered Sheriff's station or other facilities; therefore, the proposed project's impact of Sheriff's protective services would be less than significant. Alternative 2 would further reduce that less than significant impact.

***Education***

With one-third fewer residences on the project site, Alternative 2 can be expected to reduce impacts to schools by approximately the same proportion. However, the proposed project would not result in a substantial adverse physical impact associated with the provision of or need for new or physically altered schools in order to maintain acceptable service ratios or other performance objectives. Therefore, project impacts on public schools would be less than significant. Furthermore, the proposed project would reduce its impact by paying the maximum development fees permitted to be exacted under State law. The project's less than significant impact would be further reduced by Alternative 2, which would also be required to pay development fees.

***Libraries***

Alternative 2 would generate approximately one-third less demand for library services and facilities than the proposed project. However, the project would mitigate its impact by payment of the Library Facilities Mitigation Fee; Alternative 2 would also be required to pay the Fee. Therefore, Library impacts from both the proposed project and Alternative 2 would be less than significant.

***Parks and Recreation***

Alternative 2 would generate approximately one-third less demand for parks and recreation facilities than the proposed project. However, the project would mitigate its impact to County facilities by payment of the Quimby Fees; Alternative 2 would also be required to pay the Fees Therefore, County parks and recreation impacts from both the proposed project and Alternative 2 would be less than significant. However, for both the proposed project and Alternative 2, impacts to City of Agoura Hills' parks and recreation facilities would only be mitigated if the County shares the Quimby Fees with the City.

***Utilities – Water***

Although Alternative 2 would develop one-third fewer residences than the proposed project, it is expected that its demand for water would be comparable to the proposed project because of its greater demand for landscape irrigation and water for horse keeping. However, the proposed project would not require or result in the construction of new water facilities or expansion of existing facilities, the construction of which could cause significant environmental effects; consequently, project impacts would be less than significant. Furthermore, the proposed project would not result in insufficient water supplies available to serve the project from existing entitlements and resources; consequently, project impacts to water supplies would be less than significant. Impacts associated with Alternative 2 would also be less than significant, and essentially comparable to those of the proposed project.

***Utilities – Sewage***

Alternative 2 would generate approximately one-third less sewage than the proposed project. However, the proposed project would not require or result in the construction of new wastewater treatment facilities or expansion of existing facilities, nor result in a determination that there is not adequate capacity to serve the project's project demand in addition to the provider's existing commitments. Therefore, proposed project impacts to the sewerage system would be less than significant. Alternative 2 would further reduce the proposed project's less-than-significant impact.

***Utilities – Solid Waste***

Alternative 2 would generate approximately one-third less household solid waste than the proposed

project. However, the solid waste generated by the proposed project would not exceed daily capacity of the Calabasas Landfill, and its impacts would be less than significant. Therefore, Alternative 2 would further reduce the proposed project's less-than-significant solid waste disposal impacts.

Alternative 2 would also generate approximately 2,120 pounds of horse manure per day (i.e., 20 pounds of manure per horse per day x 2 horses per residence). Horse manure cannot be disposed at the Calabasas Landfill, consequently, there would be no additional impact to the landfill from the horses. Instead, the manure would mostly likely be collected from individual residences and delivered to an offsite facility for composting. The proposed project is not intended for horse keeping and the few horses that might be kept on the project site would generate substantially less manure associated with Alternative 2.

***Electricity***

Alternative 2 would consume approximately one-third less electricity than the proposed project. However, the proposed project can be served by Southern California Edison and, with the use of modern energy efficient construction materials and compliance with Title 24 standards, the proposed project would be consistent with the County's energy conservation standards and therefore would not conflict with adopted energy conservation plans. Therefore, proposed project impacts to the electrical system would be less than significant. Alternative 2 would further reduce the proposed project's less-than-significant impact.

***Natural Gas***

Alternative 2 would consume approximately one-third less natural gas than the proposed project. However, SCG has stated that it can accommodate the natural gas needs of the proposed project. Furthermore, the proposed project would comply with the standards in Title 24 as they relate to the conservation of natural gas. Also, the proposed project would use modern energy-efficient construction materials and otherwise comply with the State's energy conservation standards. Therefore, the proposed project would not conflict with adopted energy conservation plans. Alternative 2 would be subject to the same requirements and, consequently, would further reduce the proposed project's less-than-significant impact.

**Relationship to Project Objectives**

Alternative 2 would not satisfy all of the project objectives because it would result in the development of substantially fewer homes and no preservation of open space. Specifically, with regard to the North Area Plan, Alternative 2 would not:

- Protect natural environments especially sensitive flora and fauna biological habitats. A major contributing factor to this is surface and underground water quality which may be affected by alterations to watersheds (in particular Malibu Creek and other key watersheds).

- Protect areas of scenic beauty and natural open space.

- Preserve undisturbed terrain in its natural state, not only to preserve natural environmental features, but also to protect resident's health and safety within developed lands. This is to be achieved through consciously choosing to protect the natural terrain in its natural state over allowing development projects to proceed simply because impacts can be mitigated.

However, Alternative 2 would satisfy the following North Area Plan Objective:

- To maintain the continuation of existing settlement patterns, especially the more remote rural enclaves, embracing the area's rural and semi-rural character.

With regard to the design concepts recommended by the County of Los Angeles, this alternative would not:

- Concentrate development along the existing Kanan and Cornell Roads and to be in proximity to existing infrastructure and services.

- To locate the majority of the development on the gentler slopes.

However, the project would be consistent with the following County of Los Angeles recommended design concepts:

- To create a semi-rural residential community by minimizing or avoiding street lighting and construction of sidewalks, curbs, and gutters.

- To design lots and roadways to avoid ridgelines.

With regard to the project applicant's objectives, Alternative 2 would not:

- Minimize grading disturbance and human and domestic animal intrusions into the majority of the project site;

- Preserve to the greatest extent possible the natural character of the site and the surrounding environment.

- Preserve approximately 271.7 acres of permanent open space.

- Concentrate development on the least environmentally sensitive portions of the property, while preserving in perpetuity the more sensitive resources.

- Site and design the proposed development to protect significant scenic vistas and features.

- Concentrate development on the gentler slopes.

Alternative 2 would involve the development of 53 new homes, which is a substantially smaller number of homes than would be developed under the proposed project. Therefore, Alternative 2 would satisfy the following project applicant's objectives, although to a lesser extent than the proposed project:

- To provide high-quality housing for local and area residents to meet existing and future needs of those desiring to live in the Santa Monica Mountains and to help alleviate the severe housing shortage in the greater Los Angeles region.

- To develop the site in conformance with the goals and policies of the Los Angeles County General Plan, the Santa Monica Mountains North Area Plan, and to the extent possible, the General Plan of the City of Agoura Hills.

**Reduction of Significant Project Impacts**

The proposed project would result in significant environmental impacts following implementation of mitigation measures relative to short-term, construction-related vehicle emissions (NOx); biological resources (Lyon's pentachaeta, Santa Monica Mountains dudleya, loss of habitat, encroachment into SEA); construction noise; and visual qualities (i.e., scenic vistas; scenic resources; and visual character). Alternative 2 would not reduce any of the significant environmental impacts associated with the proposed project to a less-than-significant level.

**Alternative 3 – Alternate Site Plan**

Under Alternative 3, 81 residences would be developed on the project site, the same number of residences that would be provided by the proposed project. However, only two residential enclaves would be developed by Alternative 3 in contrast to the three enclaves planned by the proposed project. One enclave would be located on the west side of Kanan Road, while the second would be located on the east side of Cornell Road. There would be no residential development between Kanan and Cornell Roads. Under the proposed project, 11 residences would be developed in the northern portion of the project site between Kanan and Cornell Roads. Under Alternative 3, these 11 residences would be relocated to the enclave on the west side of Kanan Road. Consequently, Alternative 3 would provide 11 more residences on the west side of Kanan Road (or a total of 54 residences) than the proposed project, which would provide 43 residences in the same area. The design of the residential enclave on the east side of Cornell Road (i.e., 27 residences) would be the same under the proposed project and Alternative 3 (see Figure V-2).

The average lot size within the western enclave would be slightly smaller under Alternative 3 than under the proposed project. Nevertheless, the street layout would be the same for both designs.

Rather than provide 11 residences in the area in the northern portion of the project site between Kanan and Cornell Roads, Alternative 3 would retain this area (approximately 4.3 acres) in its current vacant condition and designate it as an open space lot.

Unlike the proposed project, Alternative 3 would provide a second means of access for the residential enclave on the west side of Kanan Road. Consequently, Alternative 3 would also be required to preserve the line-of-sight for 65 miles per hour speeds on Kanan Road in the southerly portion of the property. This would be accomplished by "laying" back the secondary ridge on the west side of Kanan Road at the southern property line at a 2:1 slope. As shown on Figure V-2, most of this required cut slope (i.e. 2.08 acres) is located offsite. Since the project applicant does not control this property, actual construction would most likely be conducted by LA County. However, since the County does not control the off-site property, it may have to condemn the property through eminent domain before commencing the grading.

Source: Wagner Halladay, June 2004

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure V-2
Alternative 3 - Alternate Site Plan

***Grading***

As indicated above, Alternative 3 would utilize a similar grading footprint as the proposed project, with three exceptions: (1) grading on the west side of Kanan Road would be extended southerly approximately 600 feet; (2) grading would include an offsite cut slope of 2.08 acres; and (3) there would be no grading between Kanan and Cornell Roads in the northern portion of the project site. Therefore, Alternative 3 would increase total project site (and offsite) area disturbed by grading by 2.98 acres, compared to the proposed project. However, the extent of grading on the west side of Kanan Road in the northern portion of the project site (21.5 acres) and on the east side of Cornell Road (22.9 acres) would be same for the proposed project and Alternative 3.

As discussed above, Alternative 3 would also be required to preserve the line-of-sight for 65 miles per hour speeds on Kanan Road in the southerly portion of the property. This would be accomplished by "laying" back the secondary ridge on the west side of Kanan Road at the southern property line at a 2:1 slope. The cut slope would cover an area of approximately 2.08 acres, and would involve the export of approximately 131,500 cubic yards of excavated hillside. Since the project applicant does not control this property, actual construction of this cut slope would most likely be conducted by LA County. As discussed above, since the County does not control the off-site property, it may have to condemn the property through eminent domain before commencing the grading. While Alternative 3 would decrease grading impacts between Kanan and Cornell Roads, it would increase grading impacts in the southern portion of the project site and offsite.

Alternative 3 would be exposed to the same general geotechnical conditions as identified for the proposed project. Similar to the proposed project, it is anticipated that this alternative could result in significant impacts due to the potential for boulder roll and debris flow. However, similar to the proposed project, implementation of the recommended mitigation measures (see Section III.A (Geotechnical Hazards - Grading) would reduce potentially significant impacts from earth resources to less-than-significant levels. Therefore, geotechnical hazard-related impacts would be similar to the proposed project.

***Seismicity***

Alternative 3 would be subject to the same strong ground shaking during an earthquake as the proposed project. Seismic hazards for both the proposed project and Alternative 3 would be comparable and less than significant.

***Air Quality***

On a daily basis, approximately the same amount of land surface would be graded under both Alternative 3 and the proposed project. Therefore, on a daily basis, short-term construction vehicle emission impacts would be the approximately the same for both projects. PM-10 emissions for both the proposed project and Alternative 3 would be less than significant. Potentially significant ROG emissions for both the proposed project and Alternative 3 could be mitigated to less than significant levels. Under both Alternative 3 and the proposed project, NOx emissions from construction equipment would exceed the SCAQMD's threshold criteria. Therefore, both Alternative 3 and the proposed project would create significant short-term air quality impacts. However, due to the slightly larger area of landform disturbance (2.98 acres), Alternative 3 would extend the length of the grading phase (by approximately 6 percent) resulting in greater total construction vehicle emissions.

Because operational air quality impacts derive almost entirely from vehicle emissions and, because Alternative 3 would generate the same number of vehicle trips as the proposed project, Alternative 3 would be expected to generate the same quantity of vehicle emissions as the proposed project. However, the long-term vehicle emissions from the proposed project would be less than significant; vehicle emissions associated with Alternative 3 would also be less than significant.

***Hydrology/Flood Hazard***

Alternative 3 would employ the same stormwater drainage concept as the proposed project. Storm drainage improvements would include on-site storm drains increased in size to convey "bulked" storm runoff flows through the development area for discharge into Medea Creek. Also, a debris basin would be "sized" to release a controlled flow of storm water. Because very little rainfall absorbs into the soil on the project site, the relocation of the 11 residences to the west side of Kanan Road would have a negligible effect on total runoff generated by the project site. Therefore, peak runoff during a 50-year storm from the proposed project and Alternative 3 would be expected to be essentially the same. However, debris generation from Alternative 3 would be slightly reduced, compared to the proposed project, due to slightly more area of native vegetation clearance (approximately 2.98 acres). The project mitigates its runoff-related impacts to a less than significant level. Following implementation of the same level of mitigation, the hydrology/flood hazard impacts from Alternative 3 would similarly be reduced to a less than significant level.

***Water Quality***

Alternative 3 would utilize the same strategies (i.e., BMPs) for preventing short-term construction-related water quality impacts as the proposed project. These strategies would reduce short-term

construction-related water quality impacts for both the proposed project and Alternative 3 to less than significant levels.

Concerning long-term operational water quality impacts, because both Alternative 3 and the proposed project would develop 81 residences on the project site, the type and quantities of "urban pollutants" generated by Alternative 3 and the proposed project would be essentially the same. Alternative 3 would be expected to generate approximately the same number of cars on the project site, and Alternative 3 would be expected to use approximately the same amounts of exterior chemical applications such as fertilizers and pesticides as the proposed project. Neither Alternative 3 nor the proposed project include horse keeping as major development feature. Both Alternative 3 and the proposed project would be required to comply with the Los Angeles County Urban Storm Water Runoff Mitigation Plan, where "first flush" cleansing of storm water runoff would be achieved. With the implementation of required water quality control programs (discussed in Section III.E), long-term operational water quality impacts for both Alternative 3 and the proposed project would be less than significant.

***Biological Resources***

Because Alternative 3 would use the same basic grading plan as the proposed project, its impacts to native vegetation communities on the west side of Kanan Road and the east side of Cornell Road would be the same as those associated with the proposed project. However, since no grading would be conducted in the northern portion of the project site between Kanan and Cornell Roads, there would be no impacts to vegetation communities in this area (i.e., 4.3 acres). As with the proposed project, this pattern of development would preclude on-site east/west wildlife connection between SEA No. 6 and the undisturbed portions of Ladyface Mountain. Impacts to the SEA would be the same for both Alternative 3 and the proposed project. In particular, both Alternative 3 and the proposed project would have significant impacts on biological resources due to the loss of Lyon's pentachaeta and Santa Monica Dudleya, and impacts to Drainage "B" south of the fire station. Therefore, Alternative 3 is inconsistent with SEATAC requirements. Additionally, both Alternative 3 and the propose project would have significant impacts to sensitive wildlife species due to habitat removal.

***Cultural Resources***

The Phase II test excavations and surface collections have served to completely and adequately mitigate all adverse impacts that might accrue to seven of the eight archaeological sites on the project site. The remaining site, CA-LAN-2078 would be preserved in an open space lot under both Alternative 3 and the proposed project. Therefore, both the proposed project and Alternative 3 would have less-than-significant impacts on cultural resources.

***Noise***

Construction noise levels generated west of Kanan Road and east of Cornell Road would be essentially the same for Alternative 3 and the proposed project. While Alternative 3 would not require any grading between Kanan and Cornell Roads, it would extent grading on the west side of Kanan 600 feet farther south than the proposed project. It would also require 2.08 acres of offsite grading. Therefore, Alternative 3 would increase noise impacts to residences on Silver Creek Road and, to a lesser extent, to residences farther to the south. Therefore, while Alternative 3 would reduce construction-noise impacts for those existing residences in the vicinity of the northern portion of Caleta Road, it would increase noise impacts to existing residences to the south of the project site. Additionally, Alternative 3 would have significant short-term construction noise impacts on existing residences along Cornell Road similar to the proposed project. In conclusion, both Alternative 3 and the proposed project would cause significant short-term construction-related noise impact; however, Alternative 3 would most likely impact more sensitive receptors than the proposed project.

Traffic generated by Alternative 3 would be essentially the same as that generated by the proposed project. Consequently, Alternative 3 would be expected to produce comparable traffic-related noise levels. Traffic noise emissions from the proposed project and Alternative 3 would be less than significant.

***Visual Qualities***

Both Alternative 3 and the proposed project would significantly impact the visual quality of those portions of the project site on the west side of Kanan Road and on the east side of Cornell Road. In these two development areas, the similarity of development would result in comparable impacts to views from Kanan and Cornell Roads, from the existing residences along Cornell and Silver Creek Roads, and from existing residences located to the south of Silver Creek Road. However, Alternative 3 would extend visual quality impacts approximately 600 feet farther south along the west side of Kanan Road than the proposed project. Also, Alternative 3 would involve approximately 2.08 acres of offsite grading of a ridgeline prominently visible from Kanan Road. On the other hand, Alternative 3 would eliminate all residential construction in the northern portion of the project site between Kanan and Cornell Roads (i.e., 4.3 acres). While each would have unique visual quality impacts, the overall visual quality affect of Alternative 3 and the proposed project would be significant and most likely comparable.

***Light and Glare***

Alternative 3 would create more sources of residential night lighting on the west side of Kanan Road than the proposed project. On the east side of Cornell Road, Alternative 3 and the proposed project would generate comparable levels of night lighting. However, Alternative 3 would eliminate all

sources of night lighting in the northern portion of the project site between Kanan and Cornell Roads. Both the proposed project and Alternative 3 would mitigate night lighting impacts to less-than-significant levels. While each would have unique light night lighting impacts, the overall night lighting affect of Alternative 3 and the proposed project would be most likely comparable.

***Land Use Compatibility***

Similar to the proposed project, Alternative 3 would be consistent with the land use density permitted by the Los Angles County General Plan, the Santa Monica Mountains North Area Plan, and existing zoning. Similar to the proposed project, Alternative 3 would also cluster development, which is encouraged by the SMMNAP. Furthermore, Alternative 3 would not increase impacts to SEA No. 6. Neither the proposed project nor the Alternative 3 would physically divide an established community. Also, Alternative 3 is compatible in land use and density with the existing pattern of residential development adjacent to the project site (i.e., along Cornell and Silver Creek Roads), and further to the south. Land use impacts under Alternative 3 would be similar to those associated with the proposed project, which have been determined to be significant due to consistencies with some SMMNAP policies and some SEA compatibility criteria.

***Traffic and Access***

Because it would contain the same number of single-family homes (i.e., 81), Alternative 3 would generate the same number of daily and peak hour vehicle trips as the proposed project. Alternative 3 would also have the same less-than-significant impacts at the study intersections and roadway segments. Similar to the proposed project, Alternative 3 would be required to pay a fair share of the roadway necessary improvements.

***Fire Protection Services***

Alternative 3 would be subject to the same fire hazards and would receive the same level of fire protection as the proposed project. Alternative 3 would have the same number of homes in similar locations and street patterns and its impacts on Fire Protection Services would be essentially the same as those associated with the proposed project. However, Alternative 3 would have a second means of access on the west side of Kanan Road, which would improve emergency access for that portion of the project site. Both Alternative 3 and the proposed project would contribute to the need for new or physically altered Fire Department facilities; therefore, both would have potentially significant impacts on fire protection services, before mitigation. However, both the proposed project and Alternative 3 would mitigate their impacts to less than significant levels through the payment of a Developer Fee on construction.

***Sheriff's Services***

With the same number of residences and residents, Alternative 3 would generate a comparable level of demand for Sheriff's protective services as the proposed project. Neither Alternative 3 nor the proposed project would result in a substantial adverse physical impact associated with the provision of new or physically altered Sheriff's station or other facilities; therefore, the impact on Sheriff's protective services under both Alternative 3 and the proposed project would be less than significant.

***Education***

With the same number of residences and residents, Alternative 3 would generate essentially the same number of students as the proposed project. The proposed project would not result in a substantial adverse physical impact associated with the provision of or need for new or physically altered schools in order to maintain acceptable service ratios or other performance objectives. Therefore, impacts from Alternative 3 on public schools would be comparable to the proposed project and also less than significant. Furthermore, both the proposed project and Alternative 3 would mitigate school impacts by paying the development fees permitted to be exacted under State law.

***Libraries***

With the same number of residences and residents, Alternative 3 would generate essentially the same demand for library services and facilities as the proposed project. The proposed project would mitigate its impact by payment of the Library Facilities Mitigation Fee and Alternative 3 would also be required to pay the Fee. However, the project would mitigate its impact by payment of the Library Facilities Mitigation Fee; Alternative 3 would also be required to pay the Fee. Therefore, Library impacts from both the proposed project and Alternative 3 would be less than significant.

***Parks and Recreation***

Alternative 3 would generate essentially the same demand for parks and recreation facilities as the proposed project. The project would mitigate its impact to County facilities by payment of the Quimby Fees; Alternative 3 would also be required to pay the Fees. Therefore, impacts to County parks and recreation facilities from both the proposed project and Alternative 3 would be less than significant. However, for both the proposed project and Alternative 3, impacts to City of Agoura Hills' parks and recreation facilities would only be mitigated if the County shares the Quimby Fees with the City.

***Utilities – Water***

Alternative 3 would have the same number of residences as the proposed project, and its demand for water would be comparable to that associated with the proposed project. The proposed project would not require or result in the construction of new water facilities or expansion of existing facilities, the construction of which could cause significant environmental effects; consequently, project impacts would be less than significant. Furthermore, the proposed project would not result in insufficient water supplies available to serve the project from existing entitlements and resources; consequently, project impacts to water supplies would be less than significant. Impacts associated with Alternative 3 would also be less than significant, and essentially the same as those of the proposed project.

***Utilities – Sewage***

Alternative 3 would generate approximately the same quantity of sewage as the proposed project. However, the proposed project would not require or result in the construction of new wastewater treatment facilities or expansion of existing facilities, nor result in a determination that there is not adequate capacity to serve the project's project demand in addition to the provider's existing commitments. Therefore, proposed project impacts to the sewerage system would be less than significant. Impacts associated with Alternative 3 would also be less than significant, and essentially the same as those of the proposed project.

***Utilities – Solid Waste***

Alternative 3 would generate approximately the same quantity of household solid waste as the proposed project. Solid waste generated by the proposed project would not exceed daily capacity of the Calabasas Landfill, and its impacts would be less than significant. Therefore, solid waste impacts under Alternative 3 would be comparable to the proposed project and also less than significant. Neither Alternative 3 nor the proposed project is intended for horse keeping.

***Electricity***

Alternative 3 would consume approximately the same amount of electricity as the proposed project. The proposed project can be served by Southern California Edison and, with the use of modern energy efficient construction materials and compliance with Title 24 standards, the proposed project would be consistent with the County's energy conservation standards and therefore would not conflict with adopted energy conservation plans. Therefore, proposed project impacts to the electrical system would be less than significant. Impacts under Alternative 3 would be similar to the proposed project and less than significant.

***Natural Gas***

Alternative 3 would consume approximately the same amount of natural gas as the proposed project. SCG has stated that it can accommodate the natural gas needs of the proposed project. Furthermore, the proposed project would comply with the standards in Title 24 as they relate to the conservation of natural gas. Also, the proposed project would use modern energy-efficient construction materials and otherwise comply with the State's energy conservation standards. Therefore, the proposed project would not conflict with adopted energy conservation plans. Impacts associated with Alternative 3 would be similar to the proposed project and subject to the same requirements and would also result in less-than-significant impacts

**Relationship to Project Objectives**

Alternative 3 would satisfy all of the project objectives because it would develop the same number of residences and would increase the total amount of open space preservation. Specifically, with respect to the North Area Plan, Alternative 3 would:

- Maintain the continuation of existing settlement patterns, especially the more remote rural enclaves, embracing the area's rural and semi-rural character.

- Protect natural environments especially sensitive flora and fauna biological habitats. A major contributing factor to this is surface and underground water quality which may be affected by alterations to watersheds (in particular Malibu Creek and other key watersheds).

- Protect areas of scenic beauty and natural open space.

- Preserve undisturbed terrain in its natural state, not only to preserve natural environmental features, but also to protect resident's health and safety within developed lands. This is to be achieved through consciously choosing to protect the natural terrain in its natural state over allowing development projects to proceed simply because impacts can be mitigated.

With respect to the design objectives of Los Angeles County, Alternative 3 would:

- Create a semi-rural residential community by minimizing or avoiding street lighting and construction of sidewalks, curbs, and gutters.

- Concentrate development along the existing Kanan and Cornell Roads and to be in proximity to existing infrastructure and services.

- Design lots and roadways to avoid ridgelines.

- Locate the majority of the development on the gentler slopes.

With respect to the project applicant's objectives, Alternative 3 would:

- Minimize grading disturbance and human and domestic animal intrusions into the majority of the project site;

- Preserve to the greatest extent possible the natural character of the site and the surrounding environment.

- Preserve approximately 271.7 acres of permanent open space.

- Concentrate development on the least environmentally sensitive portions of the property, while preserving in perpetuity the more sensitive resources.

- Site and design the proposed development to protect significant scenic vistas and features.

- Concentrate development on the gentler slopes.

- To provide high-quality housing for local and area residents to meet existing and future needs of those desiring to live in the Santa Monica Mountains and to help alleviate the severe housing shortage in the greater Los Angeles region.

- To develop the site in conformance with the goals and policies of the Los Angeles County General Plan, the Santa Monica Mountains North Area Plan, and to the extent possible, the General Plan of the City of Agoura Hills.

- To locate the residential development in proximity to existing infrastructure and services.

- Locate the residential development in proximity to existing infrastructure and services.

**Reduction of Significant Project Impacts**

The proposed project would result in significant environmental impacts following implementation of mitigation measures relative to short-term, construction-related vehicle emissions ((NOx); biological resources (Lyon's pentachaeta, Santa Monica Mountains dudleya, loss of habitat, encroachment into SEA); construction noise; and visual qualities (i.e., scenic vistas; scenic resources; and visual character). Alternative 3 would reduce aesthetic impacts to the portion of the project site located between Kanan and Cornell Roads. In exchange, Alternative 3 resulted in increased aesthetic impacts along the west side of Kanan Road. Alternative 3 would not reduce any of the significant environmental impact associated with the proposed project to a less-than-significant level.

**Alternative 4 – SEA/Reduced Lot Plan**

Alternative 4 reduces proposed project impacts to SEA No. 6 by reducing the number of residences on the east side of Cornell Road from 27 to 12 homes; by reducing the size of building pads to avoid impacts to the tributary drainage "M"; and by eliminating the eastern extension of the Street "E" cul-de-sac and the eastern most lots. Alternative 4 reduces proposed project impacts to the area between Kanan and Cornell Roads by reducing the number of homes from 10 to six homes, and by single-loading the homes on the southwest side of the access road. This design would use the roadway to buffer Medea Creek from residential uses. Alternative 4 reduces impacts to the west side of Kanan Road by reducing the number of homes from 44 to 26 homes; by preserving the central secondary ridge on the west side on Kanan and by eliminating all homes on the south side of that ridge. In total, Alternative 4 would provide 44 new homes. Figure V-4 presents the site plan for Alternative 4.

Under Alternative 4, the total area of grading disturbance within SEA No. 6 would be 11.65 acres. Consequently, Alternative 4 would decrease the area of grading within SEA No. 6 by approximately 11.23 acres, compared to the proposed project. Concomitantly, Alternative 4 would also reduce the quantity of earthwork within SEA No. 6. There would be a total of approximately 172,900 cubic yards of excavation within SEA No. 6 under Alternative 4, which would be approximately 71,043 cubic yards less than graded by the proposed project.

With respect to the entire project site, the proposed project would require 498,421 cubic yards of excavation, all of which would balance onsite. In comparison, Alternative 4 would require a total of 384,900 cubic yards of cut (113,521 cubic yards less than the proposed project), but only 155,660 cubic yards of fill. The 229,240 cubic yards of excess fill material (not including compensation for a 5 – 10 percent shrinkage factor) would need to be exported from the site.

In total, Alternative 4 would require 18.67 fewer acres of landform alteration than required for the proposed project: Alternative 4 would require approximately 29.93 acres of total landform alternation on the project site; the proposed project would require 48.6 acres of landform alteration. Table V-1 provides a comparative summary of the landform alteration requirements of Alternative 4 and the proposed project.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure V-3
Alternative 4 - SEA/Reduced Lot Plan Alternative

**Table V-1**
**Alternative 4 – Comparative Landform/Grading**

| Project | SEA No. 6 | West Side of Kanan Rd. | Between Kanan and Cornell Roads | Total |
|---|---|---|---|---|
| **Alternative 4** | | | | |
| Area of Landform Alternation | 11.65 acres | 14.39 acres | 3.9 acres | 29.93 acres |
| Cubic Yardage of Earthwork | 172,900 cubic yards of cut | 143,300 cubic yards of cut | 68,700 cubic yards of cut | 384,900 cubic yards of cut |
| **Proposed Project** | | | | |
| Area of Landform Alternation | 22.88 acres | 21.54 acres | 4.18 acres | 48.6 acres |
| Cubic Yardage of Earthwork | 243,943 cubic yards of cut | 187,041 cubic yards of cut | 67,437 cubic yards of cut | 498,421 cubic yards of cut |

Access under Alternative 4 would be somewhat different than the site access provided by the proposed project. Alternative 4 would include a three-way intersection on the north side of Fire Station No. 64 as access to the residential enclave within the SEA. Under the proposed project, access to this enclave would be a three-way intersection located on the south side of the fire station. Both designs would include a four-way intersection on Kanan Road in the northern portion of the project site.

***Geotechnical Hazards - Grading***

Residences developed under Alternative 4 would be exposed to the same general geotechnical conditions as identified for the proposed project. Similar to the proposed project, it is anticipated that this alternative could result in significant impacts due to the potential for boulder roll and debris flow. However, implementation of the recommended mitigation measures (see Section III.A, Geotechnical Hazards – Grading) would reduce the proposed project's potentially significant impacts from geotechnical hazards to a less-than-significant level. Geotechnical hazard impacts to proposed residences under Alternative 4 would also be mitigated to a less-than significant level.

With respect to the entire project site, Alternative 4 would involve 18.67 acres less onsite landform alteration than the proposed project (see Table V-I). Approximately 11.23 acres of this reduction would occur within SEA No. 6. Notwithstanding the reduction in total area of disturbance within the SEA, Alternative 4 results in a series of tall, west facing, cut and fill slopes that would not occur under the

proposed project because the access road enters the SEA from the north side of the fire station. Moreover, the earthwork required under Alternative 4 would result in the need to export approximately 229,240 cubic yards from the project site via haul trucks.

With respect to the area on the west side of Cornell Road, in the northern portion of the project site, Alternative 4 would impact slightly less area than the proposed project. Also, under Alternative 4 there would be 14.39 acres less landform alteration on the west side of Kanan Road, compared to the proposed project (see Table V-1).

***Seismicity***

Residences developed under Alternative 4 would be subject to the same strong ground shaking during an earthquake as the proposed project. Seismic hazards for both the proposed project and Alternative 4 would be comparable and less than significant. However, under Alternative 4 fewer residences would be subject to seismic effects.

***Air Quality***

In order to prevent significant dust impacts during grading, only up to 4 acres of the project site can be graded on any given day. This is the case for the proposed project and any alternative on the project site. For this reason, on a daily basis, approximately the same amount of land surface would be graded under both Alternative 4 and the proposed project. Therefore, on a daily basis, short-term construction vehicle emission impacts would be approximately the same for both projects. PM-10 emissions for both the proposed project and Alternative 4 would be less than significant, due to restrictions on the area of daily grading. Potentially significant ROG emissions for both the proposed project and Alternative 4 could be mitigated to less than significant levels. NOx emissions under both Alternative 4 and the proposed project would exceed the SCAQMD's threshold criteria. However, under Alternative 4, approximately 229,240 cubic yards of excess cut material would be exported from the site, which would result in additional NOx emissions.

On the other hand, over all Alternative 4 would require 18.67 acres less grading and would involve 113,521 cubic yards of earth movement less than the proposed project. Consequently, the length of the grading phase under Alternative 4 would be less (approximately 38 percent) than under the proposed project. Therefore, while daily construction emissions under Alternative 4 would be either equal to or more (in the case of NOx) than under the proposed project, Alternative 4 would actually reduce total emissions produced during a shortened construction phase.

Because operational air quality impacts derive almost entirely from vehicle emissions and, because

Alternative 4 would generate fewer vehicle trips (i.e., 464) than the proposed project (i.e., 854), Alternative 4 would be expected to generate approximately 46 percent less residential vehicle emissions than the proposed project. While the long-term vehicle emissions from the proposed project would be less-than-significant, Alternative 4 further reduce that less-than-significant impact.

Lastly, because Alternative 4 would involve less grading on the east side of Cornell Road, Alternative 4 would generate less dust within SEA No. 6 than the proposed project. Nevertheless, based on the SCAQMD thresholds, dust impacts for both Alternative 4 and the proposed project would be less than significant.

***Hydrology/Flood Hazard***

Alternative 4 would employ a comparable stormwater drainage concept as the proposed project. Storm drainage improvements would include on-site storm drains increased in size to convey "bulked" storm runoff flows through the development area for discharge into Medea Creek. Also, both the proposed project and Alternative 4 would provide a comparably sized debris basin in the northwestern portion of the project site. Post-development runoff from Alternative 4 would not be substantially different from the proposed project since practically all rainfall runs off the site and there is very little onsite percolation. Therefore, peak runoff during a 50-year storm from the proposed project and Alternative 4 would be comparable. Grading would remove the debris production potential from a smaller area (approximately 18.67 acres less) under Alternative 4; therefore, Alternative 4 would pass approximately 38 percent more debris into Medea Creek than the proposed project but less than at present. The proposed project design in combination with the mitigation measures is sufficient to reduce runoff-related proposed project impacts to a less than significant level. Following implementation of the same level of mitigation, the impacts from Alternative 4 would similarly be reduced to a less than significant level.

Alternative 4 would decrease impacts to natural hydrological conditions on the east side of Cornell Road; therefore, Alternative 4 would have less impact on the habitat within the SEA than the proposed project. However, Alternative 4 and the proposed project would have comparable and less-than significant impacts with respect to downstream conditions.

***Water Quality***

Alternative 4 would utilize essentially the same strategies (i.e., BMPs) for preventing short-term construction-related water quality impacts as the proposed project. These strategies would reduce short-term construction-related water quality impacts to less than significant levels for both the proposed project and Alternative 4.

There would be approximately 46 percent fewer cars and other vehicles on the project site under Alternative 4 compared to the proposed project; consequently, Alternative 4 would be expected to contribute approximately 46 percent less vehicle-related hydrocarbon pollutants onto paved surfaces. Also, Alternative 4 would be expected to use approximately 46 percent less exterior chemical applications such as fertilizers and pesticides as the proposed project. Neither Alternative 4 nor the proposed project include horse keeping as a major development feature.

Alternative 4 and the proposed project would use the same mechanical clarifier systems to comply with the Los Angeles County Urban Storm Water Runoff Mitigation Plan, where "first flush" cleansing of storm water runoff would be achieved. As discussed in Section IV.D, compliance with local, state and federal water quality control programs would reduce the proposed project's water quality impacts to a less than significant level. Similar compliance by Alternative 4 would further reduce those less-than-significant impacts.

Because Alternative 4 would involve less development on the east side of Cornell Road, it would decrease the potential for water quality impacts to SEA 6, compared to the proposed project. However, as discussed above, both the proposed project and Alternative 4 would reduce overall water quality impacts to less than significant levels.

***Biological Resources***

Alternative 4 would reduce grading impacts within the SEA No. 6 by 11.23 acres, from 22.8 acres of disturbance under the proposed project to 11.65 acres. The design of Alternative 4 does not conflict with the six established SEA compatibility criteria. As required by SEA compatibility criteria: Alternative 4 increases the amount of vegetative buffers used to protect critical resource areas than the proposed project, and eliminates the impacts to sensitive species by avoiding landform alteration nearly in all areas where Lyon's pentachaeta and the Santa Monica Mountains dudleya are found. Alternative 4 lessens fragmentation of habitat and impacts to biotic resources by reducing the amount of grading impact in the SEA area and by clustering dwelling units. Alternative 4 eliminates the impact to drainage "M", a tributary to Medea Creek; and, Alternative 4 maintains the existing wildlife movement pathways within the project site and reduces impact to wildlife movement within SEA No. 6. Alternative 4 utilizes fences or walls as a supplementary buffer between development and natural habitat; and, Alternative 4 reduces the conflict between project infrastructure and critical resources, by placing utilities underground and reducing the need for interior streets.

Impacts to sensitive species are essentially eliminated by the design of Alternative 4. Alternative 4 would not directly impact federally endangered Lyon's pentachaeta through landform alteration, and development of the 44 lots would avoid nearly all areas where Lyon's pentachaeta are found on-site,

both within SEA No. 6 and outside of it on the western portion of the site. Fuel-modification impacts to portions of Lyon's pentachaeta populations within 200 ft. of residences may potentially occur, and, barring Fire Department approval to avoid brush clearance in those areas, a 2081 Permit agreement with CDFG may be required. Impacts to the Santa Monica Mountains dudleya habitat are eliminated by the avoidance of disturbance to the secondary ridge on the west side of Kanan Road. Alternative 4 will not impact Linear-Leaved Golden Bush, Cloak Fern, Nevin's Brickellia, Redshank, or Coville's Lip Fern.

***Cultural Resources***

Alternative 4 would impact the same archaeological remains as the proposed project; therefore, its impacts to Cultural Resources would be the same as those associated with the proposed project. The Phase II test excavations and surface collections have served to completely and adequately mitigate all adverse impacts that might accrue to seven of the eight archaeological sites on the project site. The remaining site, CA-LAN-2078 would be preserved in an open space lot. Therefore, both the proposed project and Alternative 4 would have less-than-significant impacts on cultural resources.

***Noise***

Construction noise levels under Alternative 4 would be essentially the same as those associated with the proposed project. However, because it would require less grading and the construction of fewer residences east of Cornell Road, Alternative 4 would reduce the length of the construction period within SEA No. 6. Nevertheless, short-term construction impacts for the closest existing residences along Cornell Road would be significant for the proposed project and Alternative 4. Furthermore, Alternative 4 would include the export of approximately 229,240 cubic yards of excess cut material which would contribute further to the significant construction noise impacts. Also, by limiting the southern extension of housing on the west side of Kanan Road, Alternative 4 would reduce construction-related noise impacts on existing residences south of the project site.

Lastly, Alternative 4 would generate approximately 46 percent less residential traffic than the proposed project. Consequently, Alternative 4 would be expected to reduce even further the less-than-significant operational noise levels associated with the proposed project and Alternative 4.

***Visual Qualities***

Alternative 4 would decrease the number of residences on the west side of Kanan Road and would restrict the remaining development on that side of the highway to the northern portion of the project site. Thus, Alternative 4 would decrease visual impacts in the northwestern portion of the project site. Between Kanan

and Cornell Roads in the northern portion of the project site, there would be 3 fewer homes under Alternative 4. The remaining homes would be single-loaded on the west side of the access road which, in turn, would be shifted to the east. As a result, these homes would have larger yards and the potential for greater setbacks. The combination of fewer homes and larger setbacks would reduce aesthetic impacts from this enclave. Unlike the proposed project, Alternative 4 would not grade the secondary ridge on the west side of Kanan Road in the central portion of the project site. The retention of this ridge would preserve a major natural feature of the project site and would result in a smaller development area on the west side of Kanan Road.

On the east side of Cornell Road, Alternative 4 would provide 15 fewer residences, clustered closer to Cornell Road, than the proposed project. The reduction in the number of homes in the SEA would reduce visual quality impacts. However, the homes under Alternative 4 would be surrounded by large cut and fill slopes that would not occur under the proposed project.

***Light and Glare***

Alternative 4 would create less residential night lighting on the west side of Kanan Road. Alternative 4 would also generate less residential night lighting between Kanan and Cornell Roads. Alternative 4 would reduce night lighting in the southern portion of the project site. On the east side of Cornell Road, Alternative 4 would generate less night lighting than the proposed project, which would also reduce impacts with respect to sensitive wildlife within the SEA. Lastly, with implementation of comparable mitigation, both the proposed project and Alternative 4 would mitigate night lighting impacts to less-than-significant levels.

***Land Use Compatibility***

Similar to the proposed project, Alternative 4 would be consistent with the land use density permitted by the Los Angles County General Plan, the Santa Monica Mountains North Area Plan, and existing zoning. Neither the proposed project nor the Alternative 4 would physically divide an established community, and both the proposed project and Alternative 4 are compatible in land use density with the existing pattern of residential development adjacent to the project site (i.e., along Cornell and Silver Creek Roads), and further to the south. Alternative 4 would be consistent with more of the policies of the SMMNAP and with all the SEA compatibility criteria, compared to the proposed project; therefore, Alternative 4 would reduce the significant land use impacts under the proposed project to a less-than-significant level.

***Traffic and Access***

Because it would contain 37 fewer single-family homes (i.e., 44), Alternative 4 would generate

approximately 46 percent fewer daily and peak hour vehicle trips than the proposed project. Also, Alternative 4 would further reduce the proposed project's less-than-significant impacts at the study intersections and roadway segments. Similar to the proposed project, Alternative 4 would be required to pay a fair share of the necessary roadway improvements.

***Fire Protection Services***

Alternative 4 would be subject to the same fire hazards and would receive the same level of fire protection as the proposed project. However, Alternative 4 would have 37 fewer homes. Therefore, Alternative 4 would reduce impacts on Fire Protection Services. Both Alternative 4 and the proposed project would contribute to the need for new or physically altered Fire Department facilities; therefore, both would have potentially significant impacts on fire protection services, before mitigation. However, both the proposed project and Alternative 4 would mitigate their impacts to less than significant levels through the payment of a Developer Fee on construction.

***Sheriff's Services***

With 37 fewer homes, Alternative 4 would generate less demand for Sheriff's protective services than the proposed project. However, neither Alternative 4 nor the proposed project would result in a substantial adverse physical impact associated with the provision of new or physically altered Sheriff's station or other facilities; therefore, the impact on Sheriff's protective services under both Alternative 4 and the proposed project would be less than significant.

***Education***

With 37 fewer homes, Alternative 4 would generate approximately 46 percent fewer students compared to the proposed project. The proposed project would not result in a substantial adverse physical impact associated with the provision of or need for new or physically altered schools in order to maintain acceptable service ratios or other performance objectives. Therefore, Alternative 4 would further reduce the less-than-significant impacts compared to the proposed project. Furthermore, the proposed project and Alternative 4 would each mitigate school impacts by paying the maximum development fees permitted to be exacted under State law.

***Libraries***

With 37 fewer homes, Alternative 4 would generate approximately 46 percent less demand for library services and facilities compared to the proposed project. The proposed project would mitigate its impact by payment of the Library Facilities Mitigation Fee; Alternative 4 would also be required to pay the Fee.

Therefore, Library impacts from the proposed project and Alternative 4 would be less than significant.

***Parks and Recreation***

With 37 fewer homes, Alternative 4 would generate approximately 46 percent less demand for parks and recreation facilities compared to the proposed project. The proposed project would mitigate its impact to County facilities by payment of the Quimby Fees; Alternative 4 would also be required to pay the Fees. Therefore, impacts to County parks and recreation facilities from the proposed project and Alternative 4 would be less than significant.

***Utilities – Water***

Alternative 4 would provide 37 fewer homes than the proposed project; therefore, its demand for water would be approximately 46 percent less than that associated with the proposed project. The proposed project would not require or result in the construction of new water facilities or expansion of existing facilities, the construction of which could cause significant environmental effects; consequently, project impact's would be less than significant. Furthermore, the proposed project would not result in insufficient water supplies available to serve the project from existing entitlements and resources; consequently, project impacts to water supplies would be less than significant. Impacts associated with Alternative 4 would also be less than significant, but less than those of the proposed project.

***Utilities – Sewage***

Alternative 4 would generate approximately 46 percent less sewage than the proposed project. The proposed project would not require or result in the construction of new wastewater treatment facilities or expansion of existing facilities, nor result in a determination that there is not adequate capacity to serve the project's demand in addition to the provider's existing commitments. Therefore, proposed project impacts to the sewerage system would be less than significant. Impacts associated with Alternative 4 would further reduce those less-than-significant impacts,

***Utilities – Solid Waste***

Alternative 4 would generate approximately 46 percent less household solid waste than the proposed project. Solid waste generated by the proposed project would not exceed daily capacity of the Calabasas Landfill, and its impacts would be less than significant. Therefore, solid waste impacts under Alternative 4 would further reduce the less-than-significant impacts of the proposed project.

### *Electricity*

Alternative 4 would consume approximately 46 percent less electricity than the proposed project. The proposed project can be served by Southern California Edison and, with the use of modern energy efficient construction materials and compliance with Title 24 standards, the proposed project would be consistent with the County's energy conservation standards and therefore would not conflict with adopted energy conservation plans. Therefore, proposed project impacts to the electrical system would be less than significant. Impacts under Alternative 4 would further reduce those less-than-significant impacts.

### *Natural Gas*

Alternative 4 would consume approximately 46 percent less natural gas than the proposed project. SCG has stated that it can accommodate the natural gas needs of the proposed project. Furthermore, the proposed project would comply with the standards in Title 24 as they relate to the conservation of natural gas. Also, the proposed project would use modern energy-efficient construction materials and otherwise comply with the State's energy conservation standards. Therefore, the proposed project would not conflict with adopted energy conservation plans. Alternative 4 would be subject to the same requirements as the proposed project and would further reduce the proposed project's less-than-significant impacts.

## Relationship to Project Objectives

Alternative 4 would not satisfy all of the project objectives because it would not achieve the project applicant's basic goal of developing 81 homes.

With respect to the North Area Plan objectives, Alternative 4 would:

- Maintain the continuation of existing settlement patterns, especially the more remote rural enclaves, embracing the area's rural and semi-rural character.

- Protect natural environments especially sensitive flora and fauna biological habitats.

However, with respect to the North Area Plan objectives, Alternative 4, like the proposed project, would not:

- Protect areas of scenic beauty and natural open space.

- Preserve undisturbed terrain in its natural state, not only to preserve natural environmental features, but also to protect resident's health and safety within developed lands. This is to be achieved through consciously choosing to protect the natural terrain in its natural state over allowing development projects to proceed simply because impacts can be mitigated.

With respect to the "design concepts" recommended by Los Angeles County, Alternative 4 would:

- Create a semi-rural residential community by minimizing or avoiding street lighting and construction of sidewalks, curbs, and gutters.

- Concentrate development along the existing Kanan and Cornell Roads and to be in proximity to existing infrastructure and services.

- Design lots and roadways to avoid ridgelines.

- Locate the majority of the development on the gentler slopes.

With respect to the project applicant's objectives, Alternative 4 would:

- Minimize grading disturbance and human and domestic animal intrusions into the majority of the project site;

- Preserve to the greatest extent possible the natural character of the site and the surrounding environment.

- Preserve more than 280 acres of permanent open space.

- Concentrate development on the least environmentally sensitive portions of the property, while preserving in perpetuity the more sensitive resources.

- Concentrate development on the gentler slopes.

- Provide high-quality housing for local and area residents to meet existing and future needs of those desiring to live in the Santa Monica Mountains and to help alleviate the severe housing shortage in the greater Los Angeles region.

- Develop the site in conformance with the goals and policies of the Los Angeles County General Plan, the Santa Monica Mountains North Area Plan, and to the extent possible, the General

Plan of the City of Agoura Hills.

- Locate the residential development in proximity to existing infrastructure and services.

**Reduction of Significant Project Impacts**

The proposed project would result in significant environmental impacts following implementation of mitigation measures relative to short-term, construction-related air quality (NOx vehicle emissions) and noise impacts; impacts to biological resources (Lyons' pentachaeta, Santa Monica Mountains dudleya, loss of habitat, encroachment into SEA); and visual qualities impacts (i.e., scenic vistas; scenic resources; and visual character). Alternative 4 would not reduce short-term construction air quality and noise impacts to less-than-significant levels; however, Alternative 4 would reduce significant impacts to biological resources and use impacts compatibility to less-than-significant levels. Impacts to visual qualities would not be reduced to less than significant levels.

**Alternative 5 – Sensitive Plant Species Avoidance**

Alternative 5 has been designed to avoid all of the onsite populations of sensitive plant species, to the extent possible. Thus Alternative 5 is distinguished from Alternative 4, which is designed to reduce proposed project impacts to SEA No. 6. Figure V-4 indicates the proposed site plan for Alternative 5 juxtaposed against the locations of the sensitive plant populations. For the most part, the avoidance of sensitive plant species populations is achieved by retaining those populations within proposed open space lots.

Under Alternative 5, 76 residences would be developed on the project site, 6 less than the 81 residences provided by the proposed project. A total of 38 residences would be located in the northern portion of the project site: 28 would be on the west side of Kanan Road and 10 would be on the east side. A total of 19 residences would be located in the southern portion of the project site: 13 would be on the west side of Kanan Road and six (6) would be on the east side. In the eastern portion of the project site, a total of 19 residences would be located on the east side of Cornell Road,

Each of the five residential enclave proposed by Alternative 5 would be served by a single means of access. Under Alternative 5, no offsite grading (comparable to that required for Alternatives 3 and 4) would be required.

The total amount of landform alteration under Alternative 5 would be slightly more (i.e., 1.31 acres) more than required for the proposed project: Alternative 5 would require approximately 49.91 acres of landform alternation on the project site; the proposed project would require 48.6 acres of landform alteration. Table V-3 provides a comparative summary of the landform alteration requirements of Alternative 5 and the proposed project.

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure V-4
Alternative 5 - Sensitive Species Avoidance

**Table V-3**
**Alternative 5 – Comparative Landform/Grading**

| Project | East Side of Cornell Road | West Side of Kanan Rd. | Between Kanan and Cornell Roads | Total |
|---|---|---|---|---|
| **Alternative 5** | | | | |
| Area of Landform Alternation | 20.92 acres | 21.25 acres | 7.74 acres | 49.91 acres |
| Cubic Yardage of Earthwork | 218,230 cubic yards of cut | 162,294 cubic yards of cut | 117,919 cubic yards of cut | 498,443 cubic yards of cut |
| **Proposed Project** | | | | |
| Area of Landform Alternation | 22.88 acres | 21.54 | 4.18 | 48.6 |
| Cubic Yardage of Earthwork | 243,943 cubic yards of cut | 187,041 cubic yards of cut | 67,437 cubic yards of cut | 498,421 cubic yards of cut |

***Geotechnical Hazards - Grading***

Residences developed under Alternative 5 would be exposed to the same general geotechnical conditions as identified for the proposed project. Similar to the proposed project, it is anticipated that this alternative could result in significant impacts due to the potential for boulder roll and debris flow. However, implementation of the recommended mitigation measures (see Section III.A, Geotechnical Hazards – Grading) would reduce the proposed project's potentially significant impacts from geotechnical hazards to less-than-significant levels. Geotechnical hazard impacts under Alternative 5 would be comparable to those associated with the proposed project and would also be mitigated to a less-than-significant level.

Alternative 5 would require 1.31 acres more onsite landform alteration than the proposed project (see Table V-2). Also, similar to the propose project, Alternative 5 would not require any offsite grading. With respect to earthwork quantities, Alternative 5 would require essentially the same volume of excavation as the proposed project (see Table V-2). Since Alternative 5 would involve slightly more landform alteration, but the same volume of excavation, this alternative would have comparable geotechnical hazards/grading impacts as the proposed project. Implementation of the recommended mitigation measures would reduce impacts for both the proposed project and Alternative 5 to less than significant levels.

***Seismicity***

Residences developed under Alternative 5 would be subject to the same strong ground shaking during an earthquake as the proposed project. However, as Alternative 5 would construct 5 fewer residences on the project site than the proposed project, fewer people would be exposed to seismic hazards. Seismic hazards for both the proposed project and Alternative 5 would be mitigated to a less-than-significant level. Similar to the proposed project, Alternative 5 would have no seismic affect on sensitive plant species.

***Air Quality***

On a daily basis, approximately the same amount of land surface would be graded under both Alternative 5 and the proposed project. Therefore, on a daily basis, short-term construction vehicle emission impacts would be approximately the same for both projects. PM-10 emissions for both the proposed project and Alternative 5 would be less than significant. Potentially significant ROG emissions for both the proposed project and Alternative 5 could be mitigated to less than significant levels. Under both Alternative 5 and the proposed project, NOx emissions from construction equipment would exceed the SCAQMD's threshold criteria. Therefore, both Alternative 5 and the proposed project would create significant short-term air quality impacts. However, due to the slightly larger area of landform disturbance (approximately 1.31 acres of disturbance more than the proposed project), Alternative 5 would slightly increase the length of the grading phase, resulting in slightly more total construction vehicle emissions.

Because operational air quality impacts derive almost entirely from vehicle emissions and, because Alternative 5 would generate approximately 53 daily vehicle trips less than the proposed project, Alternative 5 would be expected to generate approximately six (6) percent less vehicle emissions than the proposed project. Thus, Alternative 5 would further reduce the less-than-significant air quality impacts from operational vehicle emissions associated with the proposed project.

***Hydrology/Flood Hazard***

Alternative 5 would employ a comparable storm water drainage concept as the proposed project. Storm drainage improvements would include on-site storm drains increased in size to convey "bulked" storm runoff flows through the development area for discharge into Medea Creek. Also, both the proposed project and Alternative 5 provide a comparably sized debris basin in the northwestern portion of the project site. Because there is very little storm water infiltration that occurs on the undeveloped site, the developed conditions for the proposed project do not result in a material increase in site runoff. This is also the case with Alternative 5, which would not materially increase site runoff rates. Therefore, peak runoff during a 50-year storm from the proposed project and Alternative 5 would be essentially the same and would not materially change the runoff rate compared to the "undeveloped site conditions.

Grading would remove the debris production potential from a slightly larger area (approximately 1.31 acres) under Alternative 5; therefore, Alternative 5 would generate approximately slightly less debris compared to the proposed project. The proposed project design in combination with the mitigation measures is sufficient to reduce runoff-related proposed project impacts to a less than significant level. Following implementation of the same level of mitigation, the storm water runoff/hydrology impacts from Alternative 5 would similarly be reduced to a less than significant level.

***Water Quality***

Alternative 5 would utilize essentially the same strategies for preventing short-term construction-related water quality impacts as the proposed project. These strategies would reduce short-term construction-related water quality impacts to less than significant levels for both the proposed project and Alternative 5.

With five (5) fewer residences provided on the project site, there would be approximately six percent fewer vehicles on the project site under Alternative 5 compared to the proposed project. Consequently, Alternative 5 vehicles would accidentally release approximately six percent less hydrocarbon pollutants onto paved surfaces within the project site. Also, Alternative 5 would use approximately six percent less exterior chemical applications such as fertilizers and pesticides as the proposed project. Neither Alternative 5 nor the proposed project include horse keeping as a major development feature. Therefore, Alternative 5 would reduce water quality impacts by approximately six percent, compared to the proposed project.

Alternative 5 and the proposed project would use the same mechanical clarifier systems to comply with the Los Angeles County Urban Storm Water Runoff Mitigation Plan, where "first flush" cleansing of storm water runoff would be achieved. As discussed in Section IV.D, compliance with local, state and federal water quality control programs would reduce the proposed project's water quality impacts to a less than significant level. Similar compliance by Alternative 5 would result in comparable less-than-significant impacts.

***Biological Resources***

Alternative 5 would reduce grading impacts within the SEA No. 6 by 1.96 acres, from 22.88 acres of disturbance under the proposed project to 20.92 acres. The design of the Alternative 5 adequately addresses the six established SEA compatibility criteria implemented by the County. As required by SEA compatibility criteria: Alternative 5 minimizes fragmentation of habitat and impacts to biotic resources by reducing the amount of grading impact in the SEA area, and by clustering dwelling units; it reduces the impact to watercourses and tributaries that supply Medea Creek; it preserves the existing movement pathways within the project site, especially within the SEA; it increases the amount of vegetative buffers

used to protect critical resource areas, and does not impact the endangered Lyon's pentachaeta or Santa Monica Mountains Dudleya; it utilizes fences or walls as a supplementary buffer between development and natural habitat; and Alternative 5 reduces the conflict between project infrastructure and critical resources, by placing utilities underground and reducing the need for interior streets.

Impact to sensitive species or endangered species is eliminated by the design of Alternative 5. Alternative 5 would not directly impact the federally endangered Lyon's pentachaeta or Santa Monica Mountains Dudleya, and will not impact any of the sensitive species on the project site.

There are no direct impacts to Medea Creek associated with proposed site plan or Alternative 5. This alternative would reduce impacts to drainages C, C-2, C-3 and M for a total reduction in jurisdictional impact of 0.02 acre of Corp jurisdiction and 0.11 acre CDFG jurisdiction. All watercourses would utilize a culvert in order to allow natural drainage into Medea Creek.

***Cultural Resources***

Alternative 5 would impact the same archaeological remains as the proposed project, therefore, its impacts to Cultural Resources would be the same as those associated with the proposed project. The Phase II test excavations and surface collections have served to completely and adequately mitigate all adverse impacts that might accrue to seven of the eight archaeological sites on the project site. The remaining site, CA-LAN-2078 would be preserved in an open space lot. Therefore, both the proposed project and Alternative 5 would have less-than-significant impacts on cultural resources.

***Noise***

Construction noise levels under Alternative 5 would be essentially the same as those associated with the proposed project. However, because it would move construction activities closer to existing residences along Cornell Road, Alternative 5 would increase the number of sensitive receptors exposed to significant short-term construction noise. Alternative 5 would also increase grading and construction of residences between Cornell and Kanan Roads in the southern portion of the project site. Therefore, in the Caleta Road area, the associated construction related noise impacts would be increased, compared to the proposed project. Since there are no sensitive receptors in the vicinity of the northern portion of the project site, construction noise impacts in that area would be less than significant.

Alternative 5 would generate slightly less (i.e., 53 daily trips) vehicular traffic than the proposed project. Consequently, Alternative 5 would be expected to reduce further the less-than-significant traffic noise produced by the proposed project.

***Visual Qualities***

Under Alternative 5, the distribution of residences over the project site would be more fragmented and interspersed with areas of open space which have been preserved to avoid areas of sensitive plant species. Alternative 5 would locate the 76 proposed residences closer to Kanan and Cornell Roads; therefore Alternative 5 would tend to heighten visual impacts, compared to the proposed project. Particularly along Cornell Road, Alternative 5 would increase the "immediacy" of development north of Fire Station No. 64. On the other hand, residences under Alternative 5 would not extend as far southeast as they would under the proposed project. Therefore, Alternative 5 would exchange visual impacts somewhat diffused by distance from Cornell Road (under the proposed project) for immediate impacts along Cornell Road. However, Cornell Road already has existing residences along the frontage in this area, which will attenuate, to some extent, the visual affect of adding more residences. On the other hand, the foreground views from the existing residences on Cornell Road will be more dramatically impacted by Alternative 5, compared to the proposed project.

Alternative 5 would also increase the immediacy of visual impacts along Kanan Road, as new homes would be provided on both the east and west side of the roadway, in both the northern and southern portions of the project site. However, the retention of secondary ridgeline in the central portion of the project site, on the west side of Kanan Road, would break up the "massing" of homes and would help to create the appearance of a smaller project.

Notwithstanding the above, it is unlikely that Alternative 5 would result in a material change in the view impact, which would be significant under the proposed project. Impacts to visual qualities would also be significant under Alternative 5.

***Light and Glare***

Alternative 5 would create slightly fewer sources of residential night lighting overall on the project site, since it would provide five fewer residences on the project site than the proposed project. However, new sources of lighting would be distributed over a wider area and closer to Kanan Road in the southern portion of the project site and closer to Cornell Road from the residential enclave on the east side of Cornell Road. Both the proposed project and Alternative 5 would mitigate night lighting impacts to less-than-significant levels. However, because residences would be closer to Kanan and Cornell Roads under Alternative 5, it would have a greater impact than the proposed project.

***Land Use Compatibility***

Similar to the proposed project, Alternative 5 would be consistent with the land use density permitted by the

Los Angles County General Plan, the Santa Monica Mountains North Area Plan, and existing zoning. Similar to the proposed project, Alternative 5 would also cluster development, into residential enclaves which is encouraged by the SMMNAP. Furthermore, Alternative 5 would not increase impacts to SEA No. 6, and Alternative 5 avoids all areas occupied by sensitive plant species. Neither the proposed project nor the Alternative 5 would physically divide an established community. Also, Alternative 5 is compatible in land use and density with the existing pattern of residential development adjacent to the project site (i.e., along Cornell and Silver Creek Roads), and further to the south. Land use impacts under Alternative 5 would be similar to those associated with the proposed project, which have been determined to be significant due to its inconsistencies with some SMMNAP policies and some SEA compatibility criteria.

***Traffic and Access***

Alternative 5 would contain five fewer residences that the proposed project. Therefore, Alternative 5 would reduce project site generated daily and peak hour vehicle trips by approximately 6.2 percent. Traffic impacts associated with the proposed project would be less than significant. Alternative 5 would further reduce those less-than-significant impacts by a 6.2 percent. Similar to the proposed project, Alternative 5 would also be required to pay a fair share of the roadway necessary improvements.

***Fire Protection Services***

Alternative 5 would be subject to the same fire hazards and would receive the same level of fire protection as the proposed project. Alternative 5 would provide five fewer residences on the project site, and therefore would slightly reduce demand for fire protection services. Nevertheless, both Alternative 5 and the proposed project would contribute to the need for new or physically altered Fire Department facilities; therefore, both would have potentially significant impacts on fire protection services, before mitigation. However, both the proposed project and Alternative 5 would mitigate their impacts to less than significant levels through the payment of a Developer Fee on construction.

***Sheriff's Services***

With five fewer residences on the project site, Alternative 5 would slightly reduce the demand for Sheriff's protective services, compared to the proposed project. Neither Alternative 5 nor the proposed project would result in a substantial adverse physical impact associated with the provision of new or physically altered Sheriff's station or other facilities; therefore, the impact on Sheriff's protective services under both Alternative 5 and the proposed project would be less than significant.

### *Education*

With five fewer residences on the project site, Alternative 5 would generate slightly fewer students, compared to the proposed project. The proposed project would not result in a substantial adverse physical impact associated with the provision of or need for new or physically altered schools in order to maintain acceptable service ratios or other performance objectives. Therefore, impacts from Alternative 5 on public schools, which would be less than those associated with the proposed project, would also be less than significant. Furthermore, both the proposed project and Alternative 5 would mitigate school impacts by paying the maximum development fees permitted to be exacted under State law.

### *Libraries*

With five fewer residences, Alternative 5 would slightly reduce the same demand for library services and facilities compared to the proposed project. The proposed project would mitigate its impact by payment of the Library Facilities Mitigation Fee and Alternative 5 would also be required to pay the Fee. Therefore, Library impacts from both the proposed project and Alternative 5 would be less than significant.

### *Parks and Recreation*

Alternative 5 slightly reduce demand for parks and recreation facilities compared to the proposed project. The proposed project would mitigate its impact to County facilities by payment of the Quimby Fee; Alternative 5 would also be required to pay the Fee. Therefore, impacts to County parks and recreation facilities from both the proposed project and Alternative 5 would be less than significant. However, for both the proposed project and Alternative 5, impacts to City of Agoura Hills' parks and recreation facilities would only be mitigated if the County shares the Quimby Fee with the City.

### *Utilities - Water*

Alternative 5 would provide five fewer residences on the project site compared to the proposed project. Therefore, its demand for water would be proportionately reduced (by approximately 6.2 percent). The proposed project would not require or result in the construction of new water facilities or expansion of existing facilities, the construction of which could cause significant environmental effects; consequently, proposed project impacts would be less than significant. Furthermore, the proposed project would not result in insufficient water supplies available to serve the project from existing entitlements and resources; consequently, proposed project impacts to water supplies would be less than significant. Impacts associated with Alternative 5 would be approximately 6.2 percent less than those associated with the proposed project and would also be less than significant.

***Utilities – Sewage***

Alternative 5 would generate approximately 6.2 percent less sewage than the proposed project. The proposed project would not require or result in the construction of new wastewater treatment facilities or expansion of existing facilities, nor result in a determination that there is not adequate capacity to serve the project's project demand in addition to the provider's existing commitments. Therefore, proposed project impacts to the sewerage system would be less than significant. Alternative 5 would further reduce the proposed project's less-than-significant sewage impacts.

***Utilities – Solid Waste***

Alternative 5 would generate approximately 6.2 percent less household solid waste than the proposed project. Solid waste generated by the proposed project would not exceed daily capacity of the Calabasas Landfill, and its impacts would be less than significant. Therefore, solid waste impacts under Alternative 4 would also be less than significant. Neither Alternative 5 nor the proposed project is intended for horse keeping.

***Electricity***

Alternative 5 would consume approximately 6.2 percent less electricity than the proposed project. The proposed project can be served by Southern California Edison and, with the use of modern energy efficient construction materials and compliance with Title 24 standards, the proposed project would be consistent with the County's energy conservation standards and therefore would not conflict with adopted energy conservation plans. Therefore, proposed project impacts to the electrical system would be less than significant. Impacts under Alternative 5 would be further reduced by approximately 6.2 percent, and would also be less than significant.

***Natural Gas***

Alternative 5 would consume approximately 6.2 percent less natural gas as the proposed project. SCG has stated that it can accommodate the natural gas needs of the proposed project. Furthermore, the proposed project would comply with the standards in Title 24 as they relate to the conservation of natural gas. Also, the proposed project would use modern energy-efficient construction materials and otherwise comply with the State's energy conservation standards. Therefore, the proposed project would not conflict with adopted energy conservation plans. Impacts associated with Alternative 5 would be approximately 6.2 percent less than those associated with the proposed project and thus, would also result in less-than-significant impacts

**Relationship to Project Objectives**

With respect to the North Area Plan, Alternative 5 would:

- To maintain the continuation of existing settlement patterns, especially the more remote rural enclaves, embracing the area's rural and semi-rural character.

- To protect natural environments especially sensitive flora and fauna biological habitats. A major contributing factor to this is surface and underground water quality which may be affected by alterations to watersheds (in particular Malibu Creek and other key watersheds).

Alternative 5 would not be fully consistent with the following North Area Plan objectives:

- To protect areas of scenic beauty and natural open space.

- To preserve undisturbed terrain in its natural state, not only to preserve natural environmental features, but also to protect resident's health and safety within developed lands. This is to be achieved through consciously choosing to protect the natural terrain in its natural state over allowing development projects to proceed simply because impacts can be mitigated.

Alternative 5 would be consistent with the design objectives of Los Angeles County:

- Create a semi-rural residential community by minimizing or avoiding street lighting and construction of sidewalks, curbs, and gutters.

- Concentrate development along the existing Kanan and Cornell Roads and to be in proximity to existing infrastructure and services.

- Design lots and roadways to avoid ridgelines.

- Locate the majority of the development on the gentler slopes.

With respect to the project applicant's objectives, Alternative 5 would:

- Preserve to the greatest extent possible the natural character of the site and the surrounding environment.

- Preserve approximately 270 acres of permanent open space.

- Concentrate development on the least environmentally sensitive portions of the property, while preserving in perpetuity the more sensitive resources.

- Site and design the proposed development to protect significant scenic vistas and features.

- Provide high-quality housing for local and area residents to meet existing and future needs of those desiring to live in the Santa Monica Mountains and to help alleviate the severe housing shortage in the greater Los Angeles region.

- Develop the site in conformance with the goals and policies of the Los Angeles County General Plan, the Santa Monica Mountains North Area Plan, and to the extent possible, the General Plan of the City of Agoura Hills.

- Locate the residential development in proximity to existing infrastructure and services.

- Locate the residential development in proximity to existing infrastructure and services.

**Reduction of Significant Project Impacts**

The proposed project would result in significant environmental impacts following implementation of mitigation measures relative to short-term, construction-related vehicle emissions ((NOx); biological resources (Lyon's pentachaeta, Santa Monica Mountains dudleya, loss of habitat, encroachment into SEA); construction noise; and visual qualities (i.e., scenic vistas; scenic resources; and visual character). Alternative 5 would reduce the significant environmental impacts to biological resources (Lyon's pentachaeta, Santa Monica Mountains dudleya and loss of habitat) associated with the proposed project to a less-than-significant level.

**Table V-3**
**Alternatives Comparison**

| Impact Area | Proposed Project Impact with Mitigation | Alternative 1: No Project | Alternative 2: Large Lot Alternative | Alternative 3: Alternate Site Plan | Alternative 4: SEA/Reduced Lot Plan | Alternative 5: Sensitive Plant Species Avoidance |
|---|---|---|---|---|---|---|
| **Geotechnical Hazards** | | | | | | |
| **- Grading:** | | | | | | |
| **Landform Alteration** | Less than Significant | LESS | GREATER | GREATER | LESS | SIMILAR |
| **Hazards** | Less than Significant | LESS | SIMILAR | SIMILAR | SIMILAR | SIMILAR |
| **Seismicity** | Less than Significant | LESS | SIMILAR | SIMILAR | SIMILAR | LESS |
| **Air Quality** | | | | | | |
| **Short-term** | Significant | LESS | SIMILAR | SIMILAR | LESS | GREATER |
| **Long-term** | Less than Significant | LESS | LESS | SIMILAR | LESS | LESS |
| **Surface Water** | | | | | | |
| **Runoff/Hydrology** | Less than Significant | LESS | SIMILAR | SIMILAR | SIMILAR | SIMILAR |
| **Water Quality** | | | | | | |
| **Short-term** | | LESS | SIMILAR | SIMILAR | LESS | SIMILAR |
| **Long-term** | Less than Significant | LESS | GREATER | SIMILAR | LESS | LESS |
| **Biological Resources** | Significant | LESS | GREATER | SIMILAR | LESS | SIMILAR |
| **Cultural Resources** | | | | | | |
| **Archaeological** | Less than Significant | LESS | GREATER | SIMILAR | SIMILAR | SIMILAR |
| **Noise** | | | | | | |
| **Short-term** | | LESS | GREATER | GREATER | LESS | GREATER |
| **Long-term** | Significant | LESS | LESS | SIMILAR | LESS | LESS |
| **Visual Qualities** | Significant | LESS | GREATER | SIMILAR | LESS | GREATER |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Light and Glare** | Less than Significant | LESS | GREATER | SIMILAR | LESS | GREATER |
| **Land Use** | Less than Significant | LESS | SIMILAR | SIMILAR | LESS | SIMILAR |
| **Traffic and Access**<br>**Traffic Generation**<br>**Hazards** | <br><br>Less than Significant | <br><br>LESS | <br>LESS<br>LESS | <br>SIMILAR<br>SIMILAR | <br>LESS<br>SIMILAR | <br>SIMILAR<br>SIMILAR |
| **Fire Protection Services** | Less than Significant | LESS | GREATER | LESS | LESS | LESS |
| **Sheriff's Protection Services** | Less than Significant | LESS | LESS | SIMILAR | LESS | LESS |
| **Schools** | Less than Significant | LESS | LESS | SIMILAR | LESS | LESS |
| **Libraries** | Less than Significant | LESS | LESS | SIMILAR | LESS | LESS |
| **Parks and Recreation**<br>**LA County**<br>**City of Agoura Hills** | <br>Less than Significant<br>Significant | <br><br>LESS | <br>LESS<br>LESS | <br>SIMILAR<br>SIMILAR | <br>LESS<br>LESS | <br>LESS<br>LESS |
| **Water** | Less than Significant | LESS | SIMILAR | SIMILAR | LESS | LESS |
| **Sewerage** | Less than Significant | LESS | LESS | SIMILAR | LESS | LESS |
| **Solid Waste** | Less than Significant | LESS | LESS | SIMILAR | LESS | LESS |
| **Electricity** | Less than Significant | LESS | LESS | SIMILAR | LESS | LESS |
| **Natural Gas** | Less than Significant | LESS | LESS | SIMILAR | LESS | LESS |
| * Does not reduce the significant operational air quality impact to less than significant levels. | | | | | | |

**Environmental Superior Alternative**

In addition to the discussion and comparison of impacts of a proposed project and the alternatives, Section 15126.6 of the CEQA Guidelines requires that an "environmentally superior" alternative be selected and the reasons for such a selection disclosed. In general, the environmentally superior alternative is the alternative that would be expected to generate the least amount of adverse impacts. In this case, the No Project Alternative would result in the least impacts on the existing environment. However, Section 15126.6(e)(2) of the CEQA Guidelines states if the No Project Alternative is the environmentally superior alternative, then the EIR shall also identify an environmentally superior alternative among the other alternatives. Based on the alternatives analysis provided above, the SEA Sensitive Site Plan (Alternative 4) is considered to be the environmentally superior alternative, since it would develop the fewest homes, preserve more open space, and would result in the fewest adverse impacts. Alternative 4 would require less landform alteration and earth movement, and fewer disturbances to native habitat than either the proposed project or any of the other alternatives. Also, Alternative 4 would reduce short-term construction-related air quality and noise impacts. Additionally, Alternative 4 would reduce visual quality impacts during the day and lighting impacts during the evening. Alternative 4 would also generate less traffic and would create less demand on public services and utilities than the proposed project or any of the other alternatives.

# VI. ORGANIZATIONS AND PERSONS CONSULTED/LEAD AGENCY

## A. AGENCIES, ORGANIZATIONS AND PRIVATE INDIVIDUALS CONSULTED

### COUNTY OF LOS ANGELES

Department of Regional Planning

Daryl Koutnik, Supervising Regional Planner
Impact Analysis Section
320 West Temple Street
Los Angeles, California 90012
(310) 974-6461

Department of Parks and Recreation

Larry Hensley
Chief, Planning Division
Lucy Younger
Jim McCarthy, Trails Co-ordinator
433 South Vermont Avenue
Los Angeles, California 90020-1975
(213) 738-2118

Department of Public Works

Tom Hoagland, Land Development Division
Mo Kajbaf, Drainage Division
Carlos Ruiz, Environmental Programs Division
Materials Engineering Division
Thomas V. Schriber, Hydraulic/Water Conservation Division
Scott Schales, Planning Division
K.E. Weary, Traffic and Lighting Division
Dean D. Efstathiou, Waterworks and Sewer Maintenance Division
900 South Fremont Avenue
Alhambra, California 91803

County of Los Angeles Sanitation Districts

Monique Valenzuela, Project Engineer
Solid Waste Management Department
1955 Workman Mill Road

Whittier, CA 90607

Fire Department

Inspector J. Scott Greenelsh
Debbie Aguirre
Lily Cusick
Forestry Division
LA County Fire Department
5823 Rickenbacker Road, Rm. 123
City of Commerce, California 90040-3027
(323) 890-4330

Sheriff's Department

Captain Thomas G. Martin
Sergeant Kevin B. Mauch
Sergeant Stephen R. Van Herpe
Lost Hills/Malibu Station
27050 Agoura Road
Calabasas, California 91301
(818) 880-1808

Public Library

Stephanie Hampton
Michele Mathieu, Administrative Assistant
Malou Rubio, Head, Staff Services
7400 East Imperial Highway
P.O. Box 7011
Downey, California 90241-7011
(562) 940-6992

Department of Health Services

Pete Oda, REHS IV
Solid Waste Management Program
5050 Commerce Drive
Baldwin Park, California 91706-1423

## LOCAL JURISDICTIONS

City of Agoura Hills

Michael Kamino, Senior Planner

Steve Craig, Environmental Coordinator
Planning and Community Development
Audry Brown
Parks and Recreation
30101 Agoura Court, Suite 102
Agoura Hills, California 91301
(818) 597-7321

City of Calabasas

Steve Craig, Environmental Coordinator
26135 Mureau Road
Calabasas, California 91302

City of Malibu

Planning Department
23555 Civic Center Way
Malibu, California 90265

County of Ventura

Nazir Lalani, Deputy Director
Transportation Department
800 South Victoria Avenue
Ventura, California 93009-1600

Christopher Stephens, County Planning Director
Resource Management Agency
800 South Victoria Avenue, L#1740
Ventura, California 93009

## SPECIAL DISTRICTS AND REGIONAL AGENCIES

California Regional Water Quality Control Board

Dennis A. Dickerson
Los Angeles Region
101 Center Plaza
Monterey Park, California 91754

Las Virgenes Municipal Water District

Eugene Talmadge, Planning Administrator

4232 Las Virgenes Road
Calabasas, California 91302-1994
(818) 880-4110

Las Virgenes Unified School Distict

Dr. Donald Zimring, Deputy Superintendent
Kathy Petrash
4111 La Virgenes Road
Calabasas, California 91302
(818) 880-4000

Resource Conservation District of the Santa Monica Mountains

Rosi Dagit
122 N. Topanga Canyon Boulevard
Topanga, California 90290

Southern California Edison

Laura Frazier, Service Planner
3589 Foothill Drive
Thousand Oaks, CA 91361

Southern California Gas Company

Jim Hammel, Technical Services
9400 Oakdale Avenue
Chatsworth, CA 91313-2300

STATE AGENCIES

Department of Conservation

Jason R. Marshall, Assistant Director
801 K Street, MS 24-02
Sacramento, California 95814

Department of Fish and Game

C.F. Raysbrook, Regional Manager
South Coast Region
4949 Viewridge Avenue
San Diego, California 92123

Santa Monica Mountains Conservancy

Paul Edleman
5750 Ramirez Canyon Road
Malibu, California 90265

Department of Parks and Recreation

Ron Schafer, District Superintendent
Angeles District
1925 Las Virgenes Road
Calabasas, California 91302

State Clearinghouse

1400 Tenth Street
Sacramento, California 95814

Native American Heritage Commission

Rob Wood, Environmental Specialist III
915 Capitol Mall, Room 364
Sacramento, California 95814

Department of Transportation

Stephen J. Buswell, IGR/CEQA Program Manager
Transportation Planning Office
District 7, 120 S. Spring Street
Los Angeles, California 90012-3606

Division of Occupational Safety and Health

Ann Harrington
455 Golden Gate Avenue, 10th Floor
San Francisco, CA 94102

FEDERAL AGENCIES

Army Corps of Engineers

Sherri Stevens
Los Angeles District
P.O. Box 2711, Reg. Branch
Los Angeles, California 90053

Fish and Wildlife Service

Diane K. Noda, Field Supervisor
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

National Park Service

Arthur E. Eck, Superintendent
Woody Smeck, Superintendent
Santa Monica Mountains National Recreation Area
401 West Hillcrest Drive
Thousand Oaks, California 91360-4207

## B. CONSULTANTS

EIR Project Management

Christopher A. Joseph & Associates
31255 Cedar Valley Drive, Suite 222
Westlake Village, CA 91362

Civil Engineers

Wagner Halladay
201 E. Yorba Linda Boulevard
Placentia, California 92870

Landscape Architects

Dizin
278 Alamitos Avenue, #3
Long Beach, CA 90802

Traffic Consultants

Kimley-Horn and Associates, Inc.
2100 W. Orangewood Avenue, Suite 140
Orange, California 92868

Biological Resources Consultants

Envicom Corporation
28238 Agoura Road

Agoura Hills, California 91301

PCR Services Corporation
One Venture, Suite 150
Irvine, California 92618

Impact Sciences
30343 Canwood Street, Suite 210
Agoura Hills, CA 91301

The Planning Associates
3151 Airway Avenue, Suite R-1
Costa Mesa, CA 92626

TW Biological Services
2415 29th Street
San Diego, CA 92104

Oak Tree Consultant

Tree Life Concern Inc.
8458 Eaton Avenue
Canoga Park, CA 91304

Geotechnical Engineers

Pacific Soils
10653 Progress way
Cypress, California 90653

Air Quality/Noise Consultant

Hans Giroux & Associates
3 Rushingwind
Irvine, California 92614

Archaeologist

W & S Consultants
2242 Stinson Street
Simi Valley, California 93015

Planning/Zoning/Governmental Affairs

Tom Tomlin
Tom Tomlin Associates

1888 Century Park East, Ste. 950
Los Angeles, CA 90067

Arnie Berghoff
arnie berghoff associates
1100 S. Flower Street, Ste. 2100
Los Angeles, CA 90015

Penny Boehm
Bohannon Mangagement Works!
1130 Capri
Oxnard, CA 92035

## C. LEAD AGENCY

Impact Analysis Section
Department of Regional Planning
County of Los Angeles
320 W. Temple Street
Los Angeles, California
(213) 974-6461

# SECTION VII. REFERENCES


General

Bass, Ronal E., Albert I Herson, and Kenneth M. Bogdan. *CEQA Deskbook, 1996 Edition,* Solano Press, California

City of Agoura Hills, 1996. Draft *Environmental Impact Report for the Creekside Center,* prepared by Fugro West, Inc.

City of Agoura Hills, March 24, 1992. *Final Environmental Impact Report -Agoura Hills General Plan Update,* prepared by Cotton/Beland/Associates, Inc.

City of Agoura Hills, September 1991. *Agoura Hills Final Ladyface Specific Plan*, prepared by P & D Technologies.

County of Los Angeles, Department of Regional Planning. 1981. *The Malibu/Santa Monica Mountains Interim Area Plan.*

County of Santa Barbara, Planning and Development Department. January 1995. *Environmental Thresholds and Guidelines Manual.*

Curtin, Daniel J. Jr., *Curtin's California Land Use and Planning Law, 1997 - 17th Edition,* Solano Press, California.

Remy, Michael H., Tina A. Thomas, James G. Moose and Whitman F. Manley, *Guide to the California Environmental Quality Act (CEQA), 1996 Edition*, Solano Press, California.

III.C Air Quality

San Joaquin Valley Fever:

"Epidemic of Valley Fever Ravaging Kern County". Los Angeles Times, January 1993.

"Epidemic of Coccidioidomycosis", Current Topics in Medical Mycology, 1988.

"Systemic Fungal Infections", Chapter 11, Infectious Diseases.

"Systemic Fungal Pathogens", Medical Microbiology, 2nd Edition (1990).

III. E Water Quality

2002 Clean Water Act Section 303(d) List of Water Quality Limited Segments, Los Angeles Regional Water Quality Control Board, Approved by U.S. EPA: July 2003.

2002-2003 Stormwater Monitoring Report, Los Angeles County Department of Public Works. website. http://ladpw.org/WMD/npdes/report_directory.cfm. Referenced October 11, 2004.

Collins, Rod. Los Angeles Regional Water Quality Control Board, telephone conversation, October 7, 2004 and October 17, 2004.

General Information on Nitrogen, U.S.G.S. Water Quality Monitoring, City of Boulder BASIN Project, website: http://bcn.boulder.co.us/basin/data/NUTRIENTS/info/NO3+NO2.html. Referenced October 11, 2004.

General Information on Solids, U.S.G.S. Water Quality Monitoring, City of Boulder BASIN Project, website: http://bcn.boulder.co.us/basin/data/COBWQ/info/TDS.html. Referenced October 11, 2004.

Ground Water and Drinking Water, List of Drinking Water Contaminants and MCLs, U.S. Environmental Protection Agency, website. http://www.epa.gov/safewater/mcl.html#mcls. Referenced October 11, 2004.

"Malibu Valley Groundwater Basin," State of California Department of Water Resources, California's Groundwater Bulletin # 118, website: http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/pdfs_desc/4-22.pdf. Referenced October 12, 2004.

"National Stormwater Quality Database (NSQD) Research Progress Report," University of Alabama, Department of Civil and Environmental Engineering and Center for Watershed Protection, January 200. website. http://www.cwp.org/NPDES_research_report.pdf. Referenced October 13, 2004.

"Preliminary Data Summary of Urban Storm Water Best Management Practices," Environmental Protection Agency, EPA-821-R-99-012, August 1999. website: http://www.epa.gov/OST/stormwater/#nsbd. Referenced October 11, 2004.

Smith, David. U.S. Environmental Protection Agency, Region 9. Telephone conversation, October 7, 2004.

Water Quality Control Plan Los Angeles Region, Adopted by California Regional Water Quality Control Board, Los Angeles Region, June 13, 1994. website: http://www.swrcb.ca.gov/rwqcb4/html/meetings/tmdl/Basin_plan/basin_plan_doc.html.

Water Quality Monitoring, South Brunswick Water and Sewer Authority, University of North Carolina at Wilmington, website: http://www.uncwil.edu/cmsr/waterq/WQuality.htm. Referenced October 11, 2004.

# SECTION VIII

# A. INITIAL STUDY

**STAFF USE ONLY**

PROJECT NUMBER: *97-178*

CASES: *TR 52419*

*OTP, CP, ZC*

****** INITIAL STUDY ******

**COUNTY OF LOS ANGELES**
**DEPARTMENT OF REGIONAL PLANNING**

GENERAL INFORMATION

I.A. Map Date: *March 14, 2003* Staff Member: *Hsiao-ching Chen*

Thomas Guide: *588 ABCD-1, 557 J-7, 558 ABCD-7* USGS Quad: *Calabasas, Thousand Oaks*

Location: *Southwesterly and southeasterly of Kanan and Cornell Roads, Agoura Hills*

Description of Project: *The project is a request for a tract map, oak tree permit, zone change (from CPD to RPD), and Conditional Use Permit (for development within SEA, density variation, and grading) to allow the development of 81 single family residences on three existing parcels. Project will also include off-site improvements associated with the subdivision including grading to create sufficient line-of-sight. The development area will be approximately 54 out of 320 acres.*

Gross Area: *320 acres*

Environmental Setting: *Project site is located in the central Santa Monica Mountains in an unincorporated Los Angeles County adjacent to and south of the City of Agoura Hills. Kanan and Cornell Roads run generally north/south through the center of the project site and divide the property into 3 parcels. Site is approximately 1/4 mile south of Ventura Freeway. The site is currently vacant and undeveloped and occupies mountainous terrain and alluvial floodplain on the east and west sides of Medea Creek. The eastern portion of the site is located within the Las Virgenes SEA (No. 6), which is described as supporting grassland, coastal sage scrub, chaparral, and coast live oak woodland. Archaeological sites have been reported on the property as well.*

Zoning: *RPD-1-27.5, CPD*

General Plan: *Non-urban (148 AC), Significant Ecological Area(172.3 AC)*

Community/Area Wide Plan: *Mountain Lands 5, Rural Residential (Santa Monica Mtns North Area Plan)*

**Major projects in area:**

| Project Number | Description & Status |
|---|---|
| *98-187/TR52805* | *5 SF on 107.8 AC (pending)* |
| *98-019/ PM 25062* | *4 SF lots on 40 AC (pending)* |
| *CUP 01-066* | *soild fill project (pending)* |
| | |

NOTE: For EIRs, above projects are not sufficient for cumulative analysis.

## REVIEWING AGENCIES

### Responsible Agencies

- ☐ None
- ☒ Regional Water Quality Control Board
  - ☒ Los Angeles Region
  - ☐ Lahontan Region
- ☐ Coastal Commission
- ☒ Army Corps of Engineers
- ☒ *Caltrans*

### Trustee Agencies

- ☐ None
- ☒ State Fish and Game
- ☒ State Parks
- ☒ *US Fish and Wildlife Service*
- ☐ _____

### Special Reviewing Agencies

- ☐ None
- ☒ Santa Monica Mountains Conservancy
- ☒ National Parks
- ☐ National Forest
- ☒ DOC Mines and Geology
- ☒ Resource Conservation District of the Santa Monica Mtns.
- ☒ *City of Agoura Hills*
- ☒ *Las Virgenes Municipal WD*
- ☒ *Las Virgenes Unified SD*
- ☒ *City of Calabasas*
- ☒ *AQMD*
- ☒ *City of Malibu*
- ☐ _____

### Regional Significance

- ☒ None
- ☐ SCAG Criteria
- ☐ Air Quality
- ☐ Water Resources

### County Reviewing Agencies

- ☒ Subdivision Committee
- ☒ DPW: *Watershed Mgt Program Development, Traffi & Lighting, Drainage & Grading, Geo & Materials Eng Transportation Planning*
- ☒ Fire Department
- ☒ *Parks & Recreation*
- ☒ *Sanitation Districts*
- ☒ *Sheriff*
- ☒ *Library*

## IMPACT ANALYSIS MATRIX

| CATEGORY | FACTOR | Pg | ANALYSIS SUMMARY (See individual pages for details) Less than Significant Impact/No Impact | Less than Significant Impact with Project Mitigation | Potentially Significant Impact | Potential Concern |
|---|---|---|---|---|---|---|
| HAZARDS | 1. Geotechnical | 5 | ☐ | ☐ | ☒ | *Grading, liquefection* |
| | 2. Flood | 6 | ☐ | ☐ | ☒ | *100 year flood area* |
| | 3. Fire | 7 | ☐ | ☐ | ☒ | *Fire Zone 4* |
| | 4. Noise | 8 | ☐ | ☐ | ☒ | *Noise from construction and operation* |
| RESOURCES | 1. Water Quality | 9 | ☐ | ☐ | ☒ | *Hillside development* |
| | 2. Air Quality | 10 | ☐ | ☐ | ☒ | *Construction* |
| | 3. Biota | 11 | ☐ | ☐ | ☒ | *Lyon's pentachaeta, dudleya, oak trees* |
| | 4. Cultural Resources | 12 | ☐ | ☐ | ☒ | *Known sites on property* |
| | 5. Mineral Resources | 13 | ☒ | ☐ | ☐ | |
| | 6. Agriculture Resources | 14 | ☒ | ☐ | ☐ | |
| | 7. Visual Qualities | 15 | ☐ | ☐ | ☒ | *Kanan Road is scenic* |
| SERVICES | 1. Traffic/Access | 16 | ☐ | ☐ | ☒ | *Exceed CMP threshold* |
| | 2. Sewage Disposal | 17 | ☒ | ☐ | ☐ | *(Concern of the public)* |
| | 3. Education | 18 | ☐ | ☐ | ☒ | *All schools are currently operating over capacity* |
| | 4. Fire/Sheriff | 19 | ☒ | ☐ | ☐ | *(Concern of the public)* |
| | 5. Utilities | 20 | ☒ | ☐ | ☐ | *(General concern of water in the area)* |
| OTHER | 1. General | 21 | ☒ | ☐ | ☐ | |
| | 2. Environmental Safety | 22 | ☒ | ☐ | ☐ | |
| | 3. Land Use | 23 | ☐ | ☐ | ☒ | *Zone change, SEA compatibility* |
| | 4. Pop./Hous./Emp./Rec. | 24 | ☐ | ☐ | ☒ | *Demand for park and recreation increases* |
| | Mandatory Findings | 25 | ☐ | ☐ | ☒ | |

**DEVELOPMENT MONITORING SYSTEM (DMS)** *

As required by the Los Angeles County General Plan, DMS shall be employed in the Initial Study phase of the environmental review procedure as prescribed by state law.

1. Development Policy Map Designation: *Non-urban hillsides, other non-urban & agricultural, SEA*
2. ☒ Yes ☐ No Is the project located in the Antelope Valley, East San Gabriel Valley, Malibu/Santa Monica Mountains or Santa Clarita Valley planning area?
3. ☒ Yes ☐ No Is the project at urban density and located within, or proposes a plan amendment to, an urban expansion designation?

**If both of the above questions are answered "yes", the project is subject to a County DMS analysis.**

☒ Check if DMS printout generated (attached)

Date of printout: *5/14/03*

☐ Check if DMS overview worksheet completed (attached)

*EIRs and/or staff reports shall utilize the most current DMS information available.

**Environmental Finding:**

FINAL DETERMINATION: On the basis of this Initial Study, the Department of Regional Planning finds that this project qualifies for the following environmental document:

☐ NEGATIVE DECLARATION, inasmuch as the proposed project will not have a significant effect on the environment.

An Initial Study was prepared on this project in compliance with the State CEQA Guidelines and the environmental reporting procedures of the County of Los Angeles. It was determined that this project will not exceed the established threshold criteria for any environmental/service factor and, as a result, will not have a significant effect on the physical environment.

☐ MITIGATED NEGATIVE DECLARATION, inasmuch as the changes required for the project will reduce impacts to insignificant levels (see attached discussion and/or conditions).

An Initial Study was prepared on this project in compliance with the State CEQA Guidelines and the environmental reporting procedures of the County of Los Angeles. It was originally determined that the proposed project may exceed established threshold criteria. The applicant has agreed to modification of the project so that it can now be determined that the project will not have a significant effect on the physical environment. The modification to mitigate this impact(s) is identified on the Project Changes/Conditions Form included as part of this Initial Study.

☒ ENVIRONMENTAL IMPACT REPORT*, inasmuch as there is substantial evidence that the project may have a significant impact due to factors listed above as "significant."

☐ At least one factor has been adequately analyzed in an earlier document pursuant to legal standards, and has been addressed by mitigation measures based on the earlier analysis as described on the attached sheets (see attached Form DRP/IA 101). The EIR is required to analyze only the factors not previously addressed.

Reviewed by: *Hsiao-ching Chen* Date: _____

Approved by: *Daryl Koutnik* Date: 15 MAY 2003

☐ Determination appealed--see attached sheet.

☐ This proposed project is exempt from Fish and Game CEQA filling fees. There is no substantial evidence that the proposed project will have potential for an adverse effect on wildlife or the habitat upon which the wildlife depends. (Fish & Game Code 753.5).

*NOTE: Findings for Environmental Impact Reports will be prepared as a separate document following the public hearing on the project.

## HAZARDS - 1. Geotechnical

**SETTING/IMPACTS**

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☒ | ☐ | ☐ | Is the project site located in an active or potentially active fault zone, Seismic Hazards Zone, or Alquist-Priolo Earthquake Fault Zone? *Earthquake-induced landslides (Per Seismic Hazards Map -Calabasas Quad)* |
| b. | ☒ | ☐ | ☐ | Is the project site located in an area containing a major landslide(s)? *Earthquake-induced landslides (Per Seismic Hazards Map -Calabasas Quad); Geotechnical Feasibility Study dated 11/26/97 by Pacific Soils Engineering, Inc.indicates that no significant landslides were mapped on the site but the other study done previously suggested possible on or new site landslides.* |
| c. | ☐ | ☒ | ☐ | Is the project site located in an area having high slope instability? *relatively stable (per Geotechnical Feasibility Study dated 11/26/97 by Pacific Soils Engineering, Inc.)* |
| d. | ☒ | ☐ | ☐ | Is the project site subject to high subsidence, high groundwater level, liquefaction, or hydrocompaction? *Liquefaction area exists within the property; groundwater encountered in northwestern portion of the property (per Geotechnical Feasibility Study dated 11/26/97 by Pacific Soils Engineering, Inc.)* |
| e. | ☒ | ☐ | ☐ | Is the proposed project considered a sensitive use (school, hospital, public assembly site) located in close proximity to a significant geotechnical hazard? *Project is residential and site contain seismic hazards* |
| f. | ☒ | ☐ | ☐ | Will the project entail substantial grading and/or alteration of topography including slopes of more than 25%? *Grading plan shows 563,000 c.y. of grading and additional grading of approximately 131,500 c.y. will be necessary to creat sufficient line of sight off-site. Grading will be balanced on site.* |
| g. | ☐ | ☒ | ☐ | Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property? _____ |
| h. | ☐ | ☐ | ☐ | Other factors? _____ |

**STANDARD CODE REQUIREMENTS**

☐ Building Ordinance No. 2225 C Sections 308B, 309, 310 and 311 and Chapters 29 and 70.

☒ **MITIGATION MEASURES** / ☐ **OTHER CONSIDERATIONS**

☐ Lot Size ☐ Project Design ☒ Approval of Geotechnical Report by DPW

*To be discussed in the DEIR.*

**CONCLUSION**

Considering the above information, could the project have a significant impact (individually or cumulatively) on, or be impacted by, **geotechnical** factors?

☒ Potentially significant ☐ Less than significant with project mitigation ☐ Less than significant/No impact

## HAZARDS - 2. Flood

### SETTING/IMPACTS

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☒ | ☐ | ☐ | Is a major drainage course, as identified on USGS quad sheets by a dashed line, located on the project site? *Medea Creek crosses the central portion of the property between Kanan and Cornell Rds.* |
| b. | ☒ | ☐ | ☐ | Is the project site located within or does it contain a floodway, floodplain, or designated flood hazard zone? *Within 100 year flood area and flood prone area* |
| c. | ☐ | ☒ | ☐ | Is the project site located in or subject to high mudflow conditions? |
| d. | ☒ | ☐ | ☐ | Could the project contribute or be subject to high erosion and debris deposition from run off? *Total debris potential from the slopes of Ladyface Mountain that could be carried easterly through the project site is approximately 6,100 cubic yards (per project's Hydrology Study).* |
| e. | ☒ | ☐ | ☐ | Would the project substantially alter the existing drainage pattern of the site or area? *Storm drain prepared for subdivision.* |
| f. | ☐ | ☐ | ☐ | Other factors (e.g., dam failure)? |

### STANDARD CODE REQUIREMENTS

☐ Building Ordinance No. 2225 C Section 308A ☐ Ordinance No. 12,114 (Floodways)
☒ Approval of Drainage Concept by DPW

### ☒ MITIGATION MEASURES / ☐ OTHER CONSIDERATIONS

☐ Lot Size ☒ To be discussed in the DEIR

### CONCLUSION

Considering the above information, could the project have a significant impact (individuallyor cumulatively) on, or be impacted by **flood (hydrological)** factors?

☒ Potentially significant ☐ Less than significant with project mitigation ☐ Less than significant/No impact

## HAZARDS - 3. Fire

**SETTING/IMPACTS**

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☒ | ☐ | ☐ | Is the project site located in a Very High Fire Hazard Severity Zone (Fire Zone 4)? |
| | | | | *Fire Zone 4 (per LA Co General Plan Safety Element Plate 7)* |
| b. | ☐ | ☒ | ☐ | Is the project site in a high fire hazard area and served by inadequate access due to lengths, widths, surface materials, turnarounds or grade? |
| c. | ☐ | ☒ | ☐ | Does the project site have more than 75 dwelling units on a single access in a high fire hazard area? *Project is proposing 81 units* |
| d. | ☐ | ☒ | ☐ | Is the project site located in an area having inadequate water and pressure to meet fire flow standards? |
| e. | ☐ | ☒ | ☐ | Is the project site located in close proximity to potential dangerous fire hazard conditions/uses (such as refineries, flammables, explosives manufacturing)? |
| f. | ☐ | ☒ | ☐ | Does the proposed use constitute a potentially dangerous fire hazard? |
| g. | ☐ | ☐ | ☐ | Other factors? |

**STANDARD CODE REQUIREMENTS**

☒ Water Ordinance No. 7834 ☒ Fire Ordinance No. 2947 ☒ Fire Regulation No. 8

☒ Fuel Modification/Landscape Plan

☒ **MITIGATION MEASURES** / ☐ **OTHER CONSIDERATIONS**

☐ Project Design ☐ Compatible Use

*To be discussed in the DEIR*

**CONCLUSION**

Considering the above information, could the project have a significant impact (individually or cumulatively) on, or be impacted by **fire hazard** factors?

☒ Potentially significant ☐ Less than significant with project mitigation ☐ Less than significant/No impact

## HAZARDS - 4. Noise

**SETTING/IMPACTS**

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☐ | ☒ | ☐ | Is the project site located near a high noise source (airports; railroads, freeways, industry)? |

*Site is approximately 1/4 mile south of Ventura Freeway.*

| | | | | |
|---|---|---|---|---|
| b. | ☐ | ☐ | ☒ | Is the proposed use considered sensitive (school, hospital, senior citizen facility) or are there other sensitive uses in close proximity? |

*Project is residential and adjacent to existing residential uses*

| | | | | |
|---|---|---|---|---|
| c. | ☐ | ☐ | ☒ | Could the project substantially increase ambient noise levels including those associated with special equipment (such as amplified sound systems) or parking areas associated with the project? |

*Site is currently undeveloped*

| | | | | |
|---|---|---|---|---|
| d. | ☐ | ☐ | ☒ | Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels without the project? |

*Construction activities*

| | | | | |
|---|---|---|---|---|
| e. | ☐ | ☐ | ☐ | Other factors? |

**STANDARD CODE REQUIREMENTS**

☒ Noise Ordinance No. 11,778 ☒ Building Ordinance No. 2225--Chapter 35

☒ **MITIGATION MEASURES** / ☐ **OTHER CONSIDERATIONS**

☐ Lot Size ☐ Project Design ☐ Compatible Use

*To be discussed in the DEIR*

**CONCLUSION**

Considering the above information, could the project have a significant impact (individually or cumulatively) on, or be adversely impacted by **noise**?

☒ Potentially significant ☐ Less than significant with project mitigation ☐ Less than significant/No impact

## RESOURCES - 1. Water Quality

**SETTING/IMPACTS**

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☐ | ☒ | ☐ | Is the project site located in an area having known water quality problems and proposing the use of individual water wells? |

*Greater Medea Creek watershed*

| | | | | |
|---|---|---|---|---|
| b. | ☐ | ☒ | ☐ | Will the proposed project require the use of a private sewage disposal system? |
| | ☐ | ☐ | ☐ | If the answer is yes, is the project site located in an area having known septic tank limitations due to high groundwater or other geotechnical limitations *or* is the project proposing on-site systems located in close proximity to a drainage course? |

*N/A*

| | | | | |
|---|---|---|---|---|
| c. | ☒ | ☐ | ☐ | Could the project's associated construction activities significantly impact the quality of groundwater and/or storm water runoff to the storm water conveyance system and/or receiving water bodies? |

*Construction adjacent to stream*

| | | | | |
|---|---|---|---|---|
| d. | ☒ | ☐ | ☐ | Could the project's post-development activities potentially degrade the quality of storm water runoff and/or could post-development non-storm water discharges contribute potential pollutants to the storm water conveyance system and/or receiving bodies? |

*Urban runoff*

| | | | | |
|---|---|---|---|---|
| e. | ☐ | ☐ | ☐ | Other factors? |

**STANDARD CODE REQUIREMENTS**

☐ Industrial Waste Permit ☐ Health Code Ordinance No. 7583, Chapter 5

☐ Plumbing Code Ordinance No. 2269 ☒ NPDES Permit Compliance (DPW)

☐ **MITIGATION MEASURES** / ☐ **OTHER CONSIDERATIONS**

☐ Lot Size ☐ Project Design

**CONCLUSION**

Considering the above information, could the project have a significant impact (individually or cumulatively) on, or be impacted by, **water quality** problems?

☒ Potentially significant ☐ Less than significant with project mitigation ☐ Less than significant/No impact

## RESOURCES - 2. Air Quality

**SETTING/IMPACTS**

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☐ | ☒ | ☐ | Will the proposed project exceed the State's criteria for regional significance (generally (a) 500 dwelling units for residential uses or (b) 40 gross acres, 650,000 square feet of floor area or 1,000 employees for nonresidential uses)? *Project is proposing 81 residential units* |
| b. | ☐ | ☒ | ☐ | Is the proposal considered a sensitive use (schools, hospitals, parks) and located near a freeway or heavy industrial use? |
| c. | ☐ | ☒ | ☐ | Will the project increase local emissions to a significant extent due to increased traffic congestion or use of a parking structure, or exceed AQMD thresholds of potential significance per Screening Tables of the CEQA Air Quality Handbook? *Threshold for single family residential development is 166 units.* |
| d. | ☒ | ☐ | ☐ | Will the project generate or is the site in close proximity to sources which create obnoxious odors, dust, and/or hazardous emissions? *Project grading and construction* |
| e. | ☐ | ☐ | ☒ | Would the project conflict with or obstruct implementation of the applicable air quality plan? *SCQMD is non-attainment area.* |
| f. | ☐ | ☒ | ☐ | Would the project violate any air quality standard or contribute substantially to an existing or projected air quality violation? |
| g. | ☐ | ☐ | ☒ | Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)? |
| h. | ☐ | ☐ | ☐ | Other factors: |

**STANDARD CODE REQUIREMENTS**

☐ Health and Safety Code Section 40506

☒ **MITIGATION MEASURES** / ☐ **OTHER CONSIDERATIONS**

☐ Project Design ☒ Air Quality Report

*To be discussed in the DEIR*

**CONCLUSION**

Considering the above information, could the project have a significant impact (individually or cumulatively) on, or be impacted by, **air quality**?

☒ Potentially significant ☐ Less than significant with project mitigation ☐ Less than significant/No impact

## RESOURCES - 3. Biota

**SETTING/IMPACTS**

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☒ | ☐ | ☐ | Is the project site located within a Significant Ecological Area (SEA), SEA Buffer, or coastal Sensitive Environmental Resource (ESHA, etc.), or is the site relatively undisturbed and natural? |

*SEA No. 6 - Las Virgenes*

| | | | | |
|---|---|---|---|---|
| b. | ☒ | ☐ | ☐ | Will grading, fire clearance, or flood related improvements remove substantial natural habitat areas? |

*64 out of 320 acres of the site will be within the development area.*

| | | | | |
|---|---|---|---|---|
| c. | ☒ | ☐ | ☐ | Is a major drainage course, as identified on USGS quad sheets by a blue, dashed line, located on the project site? |

*Medea Creek*

| | | | | |
|---|---|---|---|---|
| d. | ☒ | ☐ | ☐ | Does the project site contain a major riparian or other sensitive habitat (e.g., coastal sage scrub, oak woodland, sycamore riparian woodland, wetland, etc.)? |

*Coastal sage scrub, coast live oak woodland, willow riparian forest*

| | | | | |
|---|---|---|---|---|
| e. | ☒ | ☐ | ☐ | Does the project site contain oak or other unique native trees (specify kinds of trees)? |

*Oak trees, willows*

| | | | | |
|---|---|---|---|---|
| f. | ☒ | ☐ | ☐ | Is the project site habitat for any known sensitive species (federal or state listed endangered, etc.)? |

*Lyon's petachaeta, Dudleya, red-legged fron*

| | | | | |
|---|---|---|---|---|
| g. | ☒ | ☐ | ☐ | Other factors (e.g., wildlife corridor, adjacent open space linkage)? |

*Wildlife corridor*

**☒ MITIGATION MEASURES / ☐ OTHER CONSIDERATIONS**

☐ Lot Size ☐ Project Design ☒ Oak Tree Permit ☒ SEATAC Review

*To be discussed in the DEIR*

**CONCLUSION**

Considering the above information, could the project have a significant impact (individually or cumulatively) on **biotic resources**?

☒ Potentially significant ☐ Less than significant with project mitigation ☐ Less than significant/No impact

## RESOURCES - 4. Archaeological / Historical / Paleontological

### SETTING/IMPACTS

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☒ | ☐ | ☐ | Is the project site in or near an area containing known archaeological resources or containing features (drainage course, spring, knoll, rock outcroppings, or oak trees) which indicate potential archaeological sensitivity? *Oak trees, drainage course, undeveloped land* |
| b. | ☐ | ☒ | ☐ | Does the project site contain rock formations indicating potential paleontological resources? |
| c. | ☒ | ☐ | ☐ | Does the project site contain known historic structures or sites? *Nine prehistoric archaeological sites and one isolate located within the project area* |
| d. | ☒ | ☐ | ☐ | Would the project cause a substantial adverse change in the significance of a historical or archaeological resource as defined in 15064.5? *Site contains known archaeological sites and the proposed development may impact those sites.* |
| e. | ☐ | ☒ | ☐ | Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature? |
| f. | ☐ | ☐ | ☐ | Other factors? |

☐ **MITIGATION MEASURES** / ☐ **OTHER CONSIDERATIONS**

☐ Lot Size ☐ Project Design ☒ Phase I Archaeology Report

### CONCLUSION

Considering the above information, could the project leave a significant impact (individually or cumulatively) on **archaeological, historical**, or **paleontological** resources?

☒ Potentially significant ☐ Less than significant with project mitigation ☐ Less than significant/No impact

## RESOURCES - 5.Mineral Resources

**SETTING/IMPACTS**

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☐ | ☒ | ☐ | Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state? |
| b. | ☐ | ☒ | ☐ | Would the project result in the loss of availability of a locally important mineral resource discovery site delineated on a local general plan, specific plan or other land use plan? |
| c. | ☐ | ☐ | ☐ | Other factors? |

☐ **MITIGATION MEASURES** / ☐ **OTHER CONSIDERATIONS**

☐ Lot Size ☐ Project Design

**CONCLUSION**

Considering the above information, could the project leave a significant impact (individually or cumulatively) on **mineral** resources?

☐ Potentially significant ☐ Less than significant with project mitigation ☒ Less than significant/No impact

## RESOURCES - 6. Agriculture Resources

**SETTING/IMPACTS**

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☐ | ☒ | ☐ | Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use? |
| b. | ☐ | ☒ | ☐ | Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract? |
| c. | ☐ | ☒ | ☐ | Would the project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use? |
| d. | ☐ | ☐ | ☐ | Other factors? |

☐ **MITIGATION MEASURES** / ☐ **OTHER CONSIDERATIONS**

☐ Lot Size ☐ Project Design

**CONCLUSION**

Considering the above information, could the project leave a significant impact (individually or cumulatively) on **agriculture** resources?

☐ Potentially significant ☐ Less than significant with project mitigation ☒ Less than significant/No impact

## RESOURCES - 7. Visual Qualities

**SETTING/IMPACTS**

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☒ | ☐ | ☐ | Is the project site substantially visible from or will it obstruct views along a scenic highway (as shown on the Scenic Highway Element), or is it located within a scenic corridor or will it otherwise impact the viewshed? |

*Kanan Road is a scenic highway*

| | | | | |
|---|---|---|---|---|
| b. | ☒ | ☐ | ☐ | Is the project substantially visible from or will it obstruct views from a regional riding or hiking trail? |

*Zuma Ridge trail*

| | | | | |
|---|---|---|---|---|
| c. | ☒ | ☐ | ☐ | Is the project site located in an undeveloped or undisturbed area, which contains unique aesthetic features? *Site is currently undeveloped and at the base of Ladyface Mountain.* |
| d. | ☐ | ☒ | ☐ | Is the proposed use out-of-character in comparison to adjacent uses because of height, bulk, or other features? |

*Site is adjacent to residential uses.*

| | | | | |
|---|---|---|---|---|
| e. | ☐ | ☐ | ☒ | Is the project likely to create substantial sun shadow, light or glare problems? |

*Future street lighting in the project area*

| | | | | |
|---|---|---|---|---|
| f. | ☐ | ☐ | ☐ | Other factors (e.g., grading or land form alteration): |

**☒ MITIGATION MEASURES / ☒ OTHER CONSIDERATIONS**

☐ Lot Size ☐ Project Design ☒ Visual Report ☐ Compatible Use

*See DEIR.*

**CONCLUSION**

Considering the above information, could the project have a significant impact (individually or cumulatively) on **scenic** qualities?

☒ Potentially significant ☐ Less than significant with project mitigation ☐ Less than significant/No impac

## SERVICES - 1. Traffic/Access

**SETTING/IMPACTS**

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☒ | ☐ | ☐ | Does the project contain 25 dwelling units, or more and is it located in an area with known congestion problems (roadway or intersections)? |
| | | | | *81 units are proposed and U.S. 101 to the north is highly congested.* |
| b. | ☐ | ☒ | ☐ | Will the project result in any hazardous traffic conditions? |
| | | | | *Existing LOS on Kanan and Cornell Roads are Level A* |
| c. | ☐ | ☒ | ☐ | Will the project result in parking problems with a subsequent impact on traffic conditions? |
| d. | ☒ | ☐ | ☐ | Will inadequate access during an emergency (other than fire hazards) result in problems for emergency vehicles or residents/employees in the area? |
| | | | | *Cul-de-sac street exceeding 1000 feet in length* |
| e. | ☒ | ☐ | ☐ | Will the congestion management program (CMP) Transportation Impact Analysis thresholds of 50 peak hour vehicles added by project traffic to a CMP highway system intersection or 150 peak hour trips added by project traffic to a mainline freeway link be exceeded? |
| f. | ☐ | ☒ | ☐ | Would the project conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)? |
| g. | ☐ | ☐ | ☐ | Other factors? |

**☒ MITIGATION MEASURES / ☒ OTHER CONSIDERATIONS**

☐ Project Design ☒ Traffic Report ☒ Consultation with Traffic & Lighting Division

*See DEIR.*

**CONCLUSION**

Considering the above information, could the project have a significant impact (individually or cumulatively) on the physical environment due to **traffic/access** factors?

☒ Potentially significant ☐ Less than significant with project mitigation ☐ Less than significant/No impact

## SERVICES - 2. Sewage Disposal

**SETTING/IMPACTS**

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☐ | ☒ | ☐ | If served by a community sewage system, could the project create capacity problems at the treatment plant? |

*Tapia Water Reclamation Facility of Las Virgenes Municipal Water District*

| | | | | |
|---|---|---|---|---|
| b. | ☐ | ☒ | ☐ | Could the project create capacity problems in the sewer lines serving the project site? |

*Sewer line capacity is adequate.*

| | | | | |
|---|---|---|---|---|
| c. | ☐ | ☐ | ☐ | Other factors? |

**STANDARD CODE REQUIREMENTS**

☐ Sanitary Sewers and Industrial Waste Ordinance No. 6130

☐ Plumbing Code Ordinance No. 2269

☐ **MITIGATION MEASURES** / ☒ **OTHER CONSIDERATIONS**

*The subject is to be included in the EIR in response to public concern*

**CONCLUSION**

Considering the above information, could the project have a significant impact (individually or cumulatively) on the physical environment due to **sewage disposal** facilities?

☐ Potentially significant ☐ Less than significant with project mitigation ☒ Less than significant/No impact

## SERVICES - 3. Education

**SETTING/IMPACTS**

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☒ | ☐ | ☐ | Could the project create capacity problems at the district level? |
| b. | ☒ | ☐ | ☐ | Could the project create capacity problems at individual schools which will serve the project site? |
| c. | ☐ | ☒ | ☐ | Could the project create student transportation problems? |
| d. | ☒ | ☐ | ☐ | Could the project create substantial library impacts due to increased population and demand? |
| e. | ☐ | ☐ | ☐ | Other factors? |

☐ **MITIGATION MEASURES** / ☐ **OTHER CONSIDERATIONS**

☐ Site Dedication ☒ Government Code Section 65995 ☒ Library Facilities Mitigation Fee

**CONCLUSION**

Considering the above information, could the project have a significant impact (individually or cumulatively) relative to **educational** facilities/services?

☒ Potentially significant ☐ Less than significant with project mitigation ☐ Less than significant/No impact

## SERVICES - 4. Fire/Sheriff Services

**SETTING/IMPACTS**

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☐ | ☒ | ☐ | Could the project create staffing or response time problems at the fire station or sheriff's substation serving the project site? *LA Co Fire Station No. 65 is located on 4206 N. Cornell Rd and is adjacent to the site. Malibu/Lost Hills Sheriff Station is located at 27050 Agoura Road which is 3 miles from the project site.* |
| b. | ☐ | ☒ | ☐ | Are there any special fire or law enforcement problems associated with the project or the general area? |
| c. | ☐ | ☐ | ☐ | Other factors? |

☐ **MITIGATION MEASURES** / ☐ **OTHER CONSIDERATIONS**

☐ Fire Mitigation Fees

*The subject is to be included in the EIR in response to public concern.*

**CONCLUSION**

Considering the above information, could the project have a significant impact (individually or cumulatively) relative to **fire/sheriff** services?

☐ Potentially significant ☐ Less than significant with project mitigation ☒ Less than significant/No impact

## SERVICES - 5. Utilities/Other Services

**SETTING/IMPACTS**

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☐ | ☒ | ☐ | Is the project site in an area known to have an inadequate public water supply to meet domestic needs or to have an inadequate ground water supply and proposes water wells? |
| b. | ☐ | ☒ | ☐ | Is the project site in an area known to have an inadequate water supply and/or pressure to meet fire fighting needs? *Las Virgenes Water District* |
| c. | ☐ | ☒ | ☐ | Could the project create problems with providing utility services, such as electricity, gas, or propane? |
| d. | ☐ | ☐ | ☒ | Are there any other known service problem areas (e.g., solid waste)? *Soild waste generated from site will be transferred to Calabasas and Sunshine Canyon Landfills* |
| e. | ☐ | ☒ | ☐ | Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services or facilities (e.g., fire protection, police protection, schools, parks, roads)? |
| f. | ☐ | ☐ | ☐ | Other factors? |

**STANDARD CODE REQUIREMENTS**

☐ Plumbing Code Ordinance No. 2269 ☐ Water Code Ordinance No. 7834

☐ **MITIGATION MEASURES** / ☐ **OTHER CONSIDERATIONS**

☐ Lot Size ☐ Project Design

*Water issues to be analyzed due to general concern on water in the area.*

**CONCLUSION**

Considering the above information, could the project have a significant impact (individually or cumulatively) relative to **utilities/services**?

☐ Potentially significant ☐ Less than significant with project mitigation ☒ Less than significant/No impact

## OTHER FACTORS - 1. General

**SETTING/IMPACTS**

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☐ | ☒ | ☐ | Will the project result in an inefficient use of energy resources? |
| b. | ☐ | ☒ | ☐ | Will the project result in a major change in the patterns, scale, or character of the general area or community? |
| c. | ☐ | ☒ | ☐ | Will the project result in a significant reduction in the amount of agricultural land? |
| d. | ☐ | ☐ | ☐ | Other factors? |

**STANDARD CODE REQUIREMENTS**

☐ State Administrative Code, Title 24, Part 5, T-20 (Energy Conservation)

☐ **MITIGATION MEASURES** / ☐ **OTHER CONSIDERATIONS**

☐ Lot size ☐ Project Design ☐ Compatible Use

**CONCLUSION**

Considering the above information, could the project have a significant impact (individually or cumulatively) on the physical environment due to any of the above factors?

☐ Potentially significant ☐ Less than significant with project mitigation ☒ Less than significant/No impact

## OTHER FACTORS - 2. Environmental Safety

**SETTING/IMPACTS**

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☐ | ☒ | ☐ | Are any hazardous materials used, transported, produced, handled, or stored on-site? |
| b. | ☐ | ☒ | ☐ | Are any pressurized tanks to be used or any hazardous wastes stored on-site? |
| c. | ☐ | ☒ | ☐ | Are any residential units, schools, or hospitals located within 500 feet and potentially adversely affected? |
| d. | ☐ | ☒ | ☐ | Have there been previous uses which indicate residual soil toxicity of the site? |
| e. | ☐ | ☒ | ☐ | Would the project create a significant hazard to the public or the environment involving the accidental release of hazardous materials into the environment? |
| f. | ☐ | ☒ | ☐ | Would the project emit hazardous emissions or handle hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school? |
| g. | ☐ | ☒ | ☐ | Would the project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or environment? |
| h. | ☐ | ☒ | ☐ | Would the project result in a safety hazard for people in a project area located within an airport land use plan, within two miles of a public or public use airport, or within the vicinity of a private airstrip? |
| i. | ☐ | ☒ | ☐ | Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan? |
| j. | ☐ | ☐ | ☐ | Other factors? _____ |

☐ **MITIGATION MEASURES** / ☐ **OTHER CONSIDERATIONS**

☐ Toxic Clean up Plan

**CONCLUSION**

Considering the above information, could the project have a significant impact relative to **public safety**?

☐ Potentially significant ☐ Less than significant with project mitigation ☒ Less than significant/No impact

## OTHER FACTORS - 3. Land Use

**SETTING/IMPACTS**

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☐ | ☒ | ☐ | Can the project be found to be inconsistent with the plan designation(s) of the subject property? |
| b. | ☐ | ☐ | ☒ | Can the project be found to be inconsistent with the zoning designation of the subject property? *Project includes a Zone Change request* |
| c. | | | | Can the project be found to be inconsistent with the following applicable land use criteria: |
| | ☐ | ☒ | ☐ | Hillside Management Criteria? |
| | ☒ | ☐ | ☐ | SEA Conformance Criteria? *Project includes a SEA CUP request and project's compatibility with SEA needs to be discussed.* |
| | ☐ | ☐ | ☐ | Other? |
| d. | ☐ | ☒ | ☐ | Would the project physically divide an established community? |
| e. | ☐ | ☐ | ☐ | Other factors? |

☐ **MITIGATION MEASURES** / ☐ **OTHER CONSIDERATIONS**

**CONCLUSION**

Considering the above information, could the project have a significant impact (individually or cumulatively) on the physical environment due to **land use** factors?

☒ Potentially significant ☐ Less than significant with project mitigation ☐ Less than significant/No impact

## OTHER FACTORS - 4. Population/Housing/Employment/Recreation

**SETTING/IMPACTS**

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☐ | ☒ | ☐ | Could the project cumulatively exceed official regional or local population projections? |
| b. | ☐ | ☒ | ☐ | Could the project induce substantial direct or indirect growth in an area (e.g., through projects in an undeveloped area or extension of major infrastructure)? |
| c. | ☐ | ☒ | ☐ | Could the project displace existing housing, especially affordable housing? |
| d. | ☐ | ☒ | ☐ | Could the project result in a substantial job/housing imbalance or substantial increase in Vehicle Miles Traveled (VMT)? |
| e. | ☐ | ☐ | ☒ | Could the project require new or expanded recreational facilities for future residents? |
| f. | ☐ | ☒ | ☐ | Would the project displace substantial numbers of people, necessitating the construction of replacement housing elsewhere? |
| g. | ☐ | ☐ | ☐ | Other factors? |

*Project will increase demand for park and recreation services*

☐ **MITIGATION MEASURES** / ☐ **OTHER CONSIDERATIONS**

*Demand for park and recreation services will be discussed in the DEIR.*

**CONCLUSION**

Considering the above information, could the project have a significant impact (individually or cumulatively) on the physical environment due to **population, housing, employment**, or **recreational** factors?

☒ Potentially significant ☐ Less than significant with project mitigation ☐ Less than significant/No impact

## MANDATORY FINDINGS OF SIGNIFICANCE

Based on this Initial Study, the following findings are made:

| | Yes | No | Maybe | |
|---|---|---|---|---|
| a. | ☒ | ☐ | ☐ | Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory? |
| | | | | *Biota* |
| b. | ☐ | ☒ | ☐ | Does the project have possible environmental effects which are individually limited but cumulatively considerable? "Cumulatively considerable" means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. |
| | | | | |
| c. | ☐ | ☐ | ☒ | Will the environmental effects of the project cause substantial adverse effects on human beings, either directly or indirectly? |
| | | | | *Water quality, air quality* |

**CONCLUSION**

Considering the above information, could the project have a significant impact (individually or cumulatively) on the environment?

☒ Potentially significant ☐ Less than significant with project mitigation ☐ Less than significant/No impact

# B. NOTICE OF PREPARATION AND RESPONSE

The following public agencies and private individuals provided comments on the Notice of Preparation circulated from May 28, 2004 through July 27, 2004.

- County of Los Angeles Fire Department (July 23, 2004)
- County of Los Angeles Department of Public Works (August 30, 2004)
- County of Los Angeles Sheriff's Department (June 25, 2004)
- County of Los Angeles Sheriff's Department (July 19, 2004)
- City of Agoura Hills (July 27, 2004)
- County of Ventura Resource Management Agency (June 29, 2004)
- County of Ventura Public Works Agency, Transportation Department (June 28, 2004)
- Resource Conservation District of the Santa Monica Mountains (June 29, 2004)
- Santa Monica Mountains Conservancy (July 27, 2994)
- California Regional Water Quality Control Board (June 24. 2004)
- State of California, Native American Heritage Commission (June 25, 2004)
- State of California, Department of Parks and Recreation (July 13, 2004)
- State of California, Department of Transportation (June 21, 2004)
- U.S Department of the Interior, National Parks Service, Santa Monica Mountains National Recreation Area (July 23, 2004)
- Tom Dodson & Associates (July 14, 2004)

Los Angeles County
Department of Regional Planning

*Planning for the Challenges Ahead*

James E. Hartl, AICP
Director of Planning

# NOTICE OF PREPARATION

**DATE:** June 11, 2004

**PROJECT TITLE:** Triangle Ranch, Project No. 97-178
Vesting Tentative Tract No. 52419
Conditional Use Permit No. 97-178
Oak Tree Permit No. 97-178

**SCH No.** 1998111091

**PROJECT APPLICANT(s):** Sage Community Group
3 Corporate Plaza, Suite 102
Newport Beach, California 92660
Contact: Diane Fradkin

**CEQA LEAD AGENCY:** County of Los Angeles
Department of Regional Planning
Impact Analysis Section
320 W. Temple Street
Los Angeles, California 90012

**PROJECT LOCATION AND EXISTING CONDITIONS:** The 320.3-acre project site is located in the central western Santa Monica Mountains in an unincorporated portion of Los Angeles County, adjacent to and south of the City of Agoura Hills. The project site is approximately one-quarter mile south of U.S. 101 (Ventura Freeway). It is bordered on the north by the City of Agoura Hills, and by vacant land to the east and the west. Land to the south is developed with single-family residential and estates concentrated along the Kanan Road and Cornell Road corridors. The project site is primarily vacant, undisturbed land, without permanent structures. Kanan and Cornell Roads run roughly north/south through the center of the site, dividing the ownership into three geographically distinct areas. The western portion of the site (i.e., west of Kanan Road) is located on the lower, generally east facing slopes of Ladyface Mountain. The central portion of the project site (bounded by Kanan Road on the west and Cornell Road on the east) is primarily the Medea Creek valley floor. Most of the eastern portion of the site (i.e., east of Cornell Road) consists of the southwest facing slopes of a prominent northwest-southeast trending ridge.

The project site occupies both hilly to mountainous terrain and the basically level valley floor of Medea Creek. From the lowest elevation on the property (the bed of Medea Creek) at approximately 800 feet, the parcel extends west up the slope of Ladyface Mountain to an elevation of approximately 1,900 feet. The prominent ridge in the eastern portion of the property attains heights of 1,100 to 1,200 feet. Slopes on the site range from near level (along the floodplains of Medea Creek) to gradients exceeding 50 percent (on the higher elevations of the ridgelines along the property's borders).

The eastern portion of the project site (east of Cornell Road) is located within Los Angeles County designated Las Virgenes Significant Ecological Area (SEA No. 6). Within this area, vegetation consists of grasslands, sparse scrub, riparian scrub and chaparral. The endangered species *Pentachaeta lyonii* is found on the project site.

**PROJECT DESCRIPTION:** The project consists of the subdivision of the 320.3-acre project site into 81 single-family residential lots, plus landscape and open space lots. Proposed development would occupy approximately 54 acres of the project site; the remaining 266-acre portion of the site would be retained as open space to be maintained by the homeowners' association and/or dedicated to a public agency acceptable to the County of Los Angeles.

Project housing would consist of two "product" lines, with Cornell Road as the boundary between them. The development to the east of Cornell Road (27 homes) would be a private community with large custom lots. In this area there is proposed to be no sidewalks, curbs, or gutters, and street lighting would be kept to the minimum required for safety purposes. Development west of Cornell Road (54 homes) would conform to standard subdivision requirements, including streetlights, sidewalks, curbs and gutters.

Site preparation would include the use of conventional cut and fill grading techniques, as well as the construction of crib-type retaining walls. For the most part, proposed residences would be developed on the flatter portions of the site bordering Kanan and Cornell Roads. In total, approximately 54 acres (17 percent of the project site) would be altered by the proposed grading plan. Grading would be balanced onsite; no off-site export or import of fill material is expected.

**ENTITLEMENT REQUIREMENTS AND DISCRETIONARY APPROVALS:** The proposed project is an application for: 1) Vesting Tentative Tract Map No. 52419; 2) a Conditional Use Permit to implement a development within an SEA; to grade in excess of 100,000 cubic yards of earth materials; and to allow for a Density Controlled Development which allows the concentration of dwelling units on a portion of the project site while retaining the remaining portions of the project site (with the exception of infrastructure) in permanent open space; and 3) an Oak Tree Permit No. 97-178, to remove and/or encroach upon the protection zone of onsite oak trees.

**ENVIRONMENTAL ISSUES TO BE ANALYZED IN EIR: The Department of Regional Planning has determined by way of** an Initial Study (see attached Initial Study) that an Environmental Impact Report (EIR) is necessary for the proposed project. The environmental issues to be addressed in the Triangle Ranch EIR will include at least the following:

- Geotechnical Hazards (Grading, liquefaction)
- Flood Hazards (100-year flood area)
- Fire Hazards (Fire Zone 4)
- Noise Hazards (Noise from construction and operation)
- Water Quality (Hillside development)
- Air Quality (Construction)
- Biota (Lyon's pentachaeta, dudleya, oak trees)
- Cultural Resources (Known sites on property)

- Biota (Lyon's pentachaeta, dudleya, oak trees)
- Cultural Resources (Known sites on property)
- Visual Qualities (Kanan Road is scenic, Ladyface Mountain)
- Traffic/Access (Exceed CMP threshold)
- Sewage Disposal (Service Capacity)
- Education (All schools are currently operating over capacity)
- Fire/Sheriff Services (Concern of the public)
- Utilities (General concern of water availability in the area)
- Land Use (SEA compatibility)
- Population/Housing/Employment/Recreation (Trail dedication)

In addition to evaluating the potential effects of the proposed project, the EIR will analyze a full range of project alternatives, possibly including, but not necessarily restricted to: a "no project" alternative, a large lot single family alternative, an alternative site plan, and an SEA accommodating alternative.

**REQUEST FOR COMMENTS:** The County of Los Angeles Department of Regional Planning is soliciting input based on your views and opinions concerning the scope of the EIR for the proposed project. To facilitate your review, the following materials are attached:

- Los Angeles County Initial Study
- Vicinity Map
- Site Plan
- 500-foot Radius Land Use Map

Due to the time limits mandated by State law, your response must be sent at the earliest possible date, and no later than **July 15, 2004**. Please direct all written comments to the following address:

Dr. Hsiaoching Chen, AICP
Impact Analysis Section
Los Angeles County Department of Regional Planning
320 W. Temple Street, Room 1348
Los Angeles, CA 90012
Tel (213) 974-6461
Fax (213) 626-0434

# COUNTY OF LOS ANGELES

**FIRE DEPARTMENT**

1320 NORTH EASTERN AVENUE
LOS ANGELES, CALIFORNIA 90063-3294
(323) 890-4330



RECEIVED
JUL 29 2004



P. MICHAEL FREEMAN
FIRE CHIEF
FORESTER & FIRE WARDEN


July 23, 2004

Dr. Hsiao-ching Chen, AICP
Impact Analysis Section
Los Angeles County Regional Planning
320 W. Temple Street
Los Angeles, CA 90012

Dear Dr. Chen:

**NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT AND INITIAL STUDY FOR THE "TRINAGLE RANCH PROJECT", TRACT MAP #52419/OTP #97-178 – SANTA MONICA MOUNTAINS (EIR #2030/2004)**

The Notice of Preparation of an Environmental Impact Report and Initial Study for the proposed aforementioned project have been reviewed by the Planning Division, Land Development Unit, and Forestry Division of the County of Los Angeles Fire Department. The following are their comments:

**PLANNING DIVISION:**
As stated in the Initial Study, Fire Station 65 is adjacent to the project site. The next closest fire station is Station 125, located at 5215 N. Las Virgenes Road, Calabasas. It is about 5 miles, or approximately 7.3 minutes away. This station has the closest truck (ladder company) to the project.

Although this development would be in proximity to an existing fire station, it would increase the demand on the existing fire protection resources in the general area. Additional fire protection facilities are needed in the area to serve both recent and prospective growth.

The applicant shall participate in an appropriate financing mechanism, such as a developer fee or an in-kind consideration in lieu of developer fees, to provide funds for fire protection facilities which are required by new commercial, industrial or residential development in an amount proportionate to the demand created by this project. Currently, the developer fee is a set amount per square foot of building space, adjusted annually, and is due and payable at the time a building permit is issued. In the event that the developer fee is no longer in effect at the time of building permit issuance, alternative mitigation measures shall be required.

The project description indicates that the 27 estate lots in the easterly portion of the property would constitute a private community. It should be noted that, based on Fire Department experience, installation of a gate with a lock box would increase emergency response times by about one and a half minutes.

**LAND DEVELOPMENT UNIT – GENERAL REQUIREMENTS:**
The Department may condition future development to provide additional means of access. The development of this

project must comply with all applicable code and ordinance requirements for construction, access, water mains, fire flows and hydrants.

This property is located within the area described by the Forester and Fire Warden as a Fire Zone 4, Very High Fire Hazard Severity Zone (VHFHSZ). All applicable fire code and ordinance requirements for construction, access, water mains, fire hydrants, fire flows, brush clearance and fuel modification plans, must be met. Specific fire and life safety requirements for the construction phase will be addressed at the building fire plan check. There may be additional fire and life safety requirements during this time.

Every building constructed shall be accessible to Fire Department apparatus by way of access roadways, with an all-weather surface of not less than the prescribed width. The roadway shall be extended to within 150 feet of all portions of the exterior walls when measured by an unobstructed route around the exterior of the building.

Access roads shall be maintained with a minimum of ten (10) feet of brush clearance on each side. Fire access roads shall have an unobstructed vertical clearance clear-to-sky with the exception of protected tree species. Protected tree species overhanging fire access roads shall be maintained to provide a vertical clearance of thirteen (13) feet, six (6) inches.

When a bridge is required to be used as part of a fire access road, it shall be constructed and maintained in accordance with nationally recognized standards and designed for a live load sufficient to carry a minimum of 75,000 pounds. All water-crossing designs are required to be approved by the Public Works Department prior to installation.

The maximum allowable grade shall not exceed 15% except where topography makes it impractical to keep within such grade; in such cases, an absolute maximum of 20% will be allowed for up to 150 feet in distance. The average maximum allowed grade including topographical difficulties shall be no more than 17%. Grade breaks shall not exceed 10% in ten (10) feet.

When involved with a subdivision in unincorporated areas within the County of Los Angeles Fire Department, requirements for access, fire flows and hydrants are addressed at the Los Angeles County Subdivision Committee meeting during the subdivision tentative map stage.

Fire sprinkler systems are required in some residential and most commercial occupancies. For those occupancies not requiring fire sprinkler systems, it is strongly suggested that fire sprinkler systems be installed. This will reduce potential fire and life losses. Systems are now technically and economically feasible for residential use.

**SINGLE-FAMILY/TWO-FAMILY DWELLING UNITS:**
Single-family detached homes shall require a minimum fire flow of 1,250 gallons per minute at 20 pounds per square inch residual pressure for a two-hour duration. Fire hydrant spacing shall be 600 feet and shall meet the following requirements:

1. No portion of lot frontage shall be more than 450 feet via vehicular access from a public fire hydrant.
2. No portion of a structure should be placed on a lot where it exceeds 750 feet via vehicular access from a properly spaced public fire hydrant.
3. When cul-de-sac depth exceeds 450 feet on a residential street, hydrants shall be required at the corner and mid-block.
4. Additional hydrants will be required if hydrant spacing exceeds specified distances.

Fire Department access shall be provided to within 150 feet of all portions of the exterior walls of the first story of any single-unit. If exceeding 150 feet, provide 20 feet minimum paved width "Private Driveway/Fire Lane" clear-to-sky to within 150 feet of all portions of the exterior walls of the unit. Fire Lanes serving three (3) or more units shall be increased to 26 feet. A Fire Department approved turning area shall be provided for all driveways exceeding 150 feet in length and at the end of all cul-de-sacs. Streets or driveways within the development shall be provided with the following:

1. Provide 36 feet in width on all streets where parking is allowed on both sides.
2. Provide 34 feet in width on cul-de-sacs up to 700 feet in length. This allows parking on both sides of the street.
3. Provide 36 feet in width on cul-de-sacs from 701 to 1,000 feet in length. This allows parking on both sides of the street.
4. For streets or driveways with parking restrictions: The entrance to the street/driveway and intermittent spacing distances of 150 feet shall be posted with Fire Department approved signs stating "NO PARKING – FIRE LANE" in three-inch high letters. Driveway labeling is necessary to ensure access for Fire Department use.
5. Turning radii shall not be less than 32 feet. This measurement shall be determined at the centerline of the road.

**LIMITED ACCESS DEVICES (GATES, ETC.):**
All access devices and gates shall meet the following requirements:

1. Any single-gated opening used for ingress and egress shall be a minimum of 26 feet in width, clear-to-sky.
2. Any divided gate opening (when each gate is used for a single direction of travel – i.e., ingress or egress) shall be a minimum width of 20 feet clear-to-sky.
3. Gates and/or control devices shall be positioned a minimum of 50 feet from a public right-of-way, and shall be provided with a turnaround having a minimum of 32 feet of turning radius. If an intercom system is used, the 50 feet shall be measured from the right-of-way to the intercom control device.
4. All limited access devices shall be of a type approved by the Fire Department.
5. Gate plans shall be submitted to the Fire Department prior to installation. These plans shall show all locations, widths and details of the proposed gates.

**TRAFFIC CALMING MEASURES:**
All proposals for traffic calming measures (speed humps/bumps/cushions, traffic circles, roundabouts, etc.) shall be submitted to the Fire Department for review prior to implementation. Should any questions arise regarding design and construction, and/or water and access, please contact Inspector Marvin Dorsey at (323) 890-4243.

**FORESTRY DIVISION:**
The statutory responsibilities of the County of Los Angeles Fire Department, Forestry Division include erosion control, watershed management, rare and endangered species, vegetation, fuel modification for Very High Fire Hazard Severity Zones or Fire Zone 4, archeological and cultural resources, and the County Oak Tree Ordinance.

Under the Los Angeles County Oak Tree Ordinance, a permit is required to cut, destroy, remove, relocate, inflict damage or encroach into the protected zone of any tree of the Oak genus which is 25 inches or more in circumference (eight (8) inches in diameter), as measured 4 1/2 feet above mean natural grade. The applicant should incorporate innovative design to reduce or eliminate the impact to the Oak resources. Our Environmental Review Unit is currently

in the process of reviewing a previously requested revision of the current Oak Tree Permit pertaining to this project. Our final review and recommendations will be forthcoming for your review.

A fuel management/modification and fire hazard reduction plan should be developed and implemented prior to construction. In order to limit the threat of wildfire, the use of native/low fuel volume plants should be mandatory in the landscape plan for this project. The proposed project contains an SEA (Significant Ecological Area). Creative environmental design to protect and preserve this sensitive area is recommended.

The flora and fauna analysis should address any rare, endangered and/or sensitive species that exist on the project site. The preservation, relocation and/or construction impacting any of these species should be fully explained in the EIR. An archaeological and historical records check and field survey should be conducted to determine potential impacts to these resources.

This property is located within the area described by the Forester and Fire Warden as a Very High Fire Hazard Severity Zone or Fire Zone 4. The development of this project must comply with all Very High Fire Hazard Severity Zone code and ordinance requirements for fuel modification.

As required by Section 1117.2.1 of the County of Los Angeles Fire Code, a fuel modification plan, a landscape plan, and an irrigation plan shall be submitted with any subdivision of land or prior to any new construction, remodeling, modification or reconstruction where such activities increase the square footage of the existing structure by at least 50% within a 12-month period and where said structure or subdivision is located within an area designated as a Very High Fire Hazard Severity Zone or within Fire Zone 4.

A fuel modification plan, a landscape plan, and an irrigation plan shall be developed and approved prior to construction. Said plans shall be reviewed and approved by the County of Los Angeles Fire Department, Forestry Division. Specific questions regarding fuel modification requirements should be directed to the Fuel Modification Office at (626) 969-5205.

This project will require an EIR fee deposit of $1,000 payable to the County of Los Angeles Fire Department at the time the DEIR is submitted for review (see enclosed letter).

If you have any additional questions, please contact this office at (323) 890-4330.

Very truly yours,

DAVID R. LEININGER, CHIEF, FORESTRY DIVISION
PREVENTION BUREAU

DRL:sc

Enclosure

# COUNTY OF LOS ANGELES

## DEPARTMENT OF PUBLIC WORKS

*"To Enrich Lives Through Effective and Caring Service"*

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
www.ladpw.org



RECEIVED
AUG 31 2004



ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460


August 30, 2004

IN REPLY PLEASE
REFER TO FILE: LD-0

TO: Daryl Koutnik
Department of Regional Planning

Attention Hsiao-Ching Chen

FROM: Tom Hoagland TWH
Land Development Division

**RESPONSE TO A NOTICE OF PREPARATION**
**TRIANGLE RANCH PROJECT**
**PROJECT NO. 97-178/TRACT NO. 52419**

As requested, we have reviewed the Notice of Preparation for the Draft Environmental Impact Report (DEIR) for the Triangle Ranch Project and offer the following comments for your consideration.

Geotechnical

The DEIR description of the project and the associated grading, i.e., existing and proposed grades, etc., must be shown on a topographic map. Also, all geotechnical hazards must be identified and any mitigation measures discussed in detail.

Portions of the project site are located within a mapped potentially liquefiable area, per the State of California Seismic Hazard Zone Map, Calabasas Quadrangle. However, liquefaction analysis is not warranted at this time. Detailed liquefaction analysis, conforming to the requirements of the State of California Division of Mines and Geology "Special Publication 117", must be conducted at the Tentative Map and/or Grading/Building Plan stages.

Hydrology

During the DEIR stage, a Drainage Concept/Standard Urban Stormwater Mitigation Plan (SUSMP) report will be required to assess and mitigate drainage and SUSMP impacts. The analysis should address increases in runoff, any change in drainage patterns, treatment method proposed for SUSMP regulations, and the capacity of storm drain facilities.

Public Sewage Disposal/ Water Supply

A sewer area study is required to determine the availability of capacity in the proposed and existing sewage system servicing this project. If the system is found to have insufficient capacity, upgrade of the proposed and existing sewerage system is required to the satisfaction of Public Works.

The applicant shall obtain the Statement of Water Service/Water Availability Letter from the water purveyor indicating that the water system has sufficient water supplies to serve the project area. This includes meeting minimum domestic flow requirements as well as fire flow/fire hydrants requirements.

Road/Traffic/Transportation

Kanan Road is a Major Highway and Cornell Road is a Secondary Highway on the Los Angeles County Highway Plan, full improvements including the necessary right of way could be required. The DEIR should analyze the environmental impacts on the Significant Ecological Areas adjacent to Kanan and Cornell Roads if full-width standard highway improvements are constructed. These impacts should be compared to those impacts resulting from the modified improvements recommended in the attached Tentative Tract Map conditions.

We believe that the proposed project has the potential to significantly impact the County and County/City roadways and intersections in the area. We have reviewed a copy of the Traffic Impact Analysis for this project, and a copy of our March 24, 2004, comments to the consultant is attached.

If you have any questions regarding the above comments or environmental review process of Public Works, please contact Clarice Nash at (626) 458-5910.

CRN:jmw
P:\CEQA\CLARICE\proj97178TR52419triangleranch.doc

Attach.

LEROY D. BACA, SHERIFF

County of Los Angeles
Sheriff's Department Headquarters
4700 Ramona Boulevard
Monterey Park, California 91754-2169
(818) 878-1808

RECEIVED
JUN 28 2004

June 25, 2004

Hsiaoching Chen, AICP
Department of Regional Planning
Impact Analysis Section
County of Los Angeles
320 West Temple Street, Room 1348
Los Angeles, CA 90012

Dear Dr. Chen:

Please accept my sincerest appreciation for the opportunity to comment on the Notice of Preparation (NOP) for the proposed Environmental Impact Report (EIR) County Project Number 97-178/Tract Map Number 52419, Triangle Ranch.

The project location, one quarter mile south of US 101 (Ventura Freeway), is located in the unincorporated area of Los Angeles County. The Los Angeles County Sheriff's Department, Malibu/Lost Hills Station, currently provides general law enforcement service to the area.

The preparation of the EIR for the subject property should include an analysis of all public safety-related issues including, but not limited to, the following:

- Does Malibu/Lost Hills Station have adequate equipment to serve the project? Will additional equipment be needed to appropriately serve the project?
- Does Malibu/Lost Hills Station have adequate staffing to meet an expected increase in population generated by this proposal? Will additional staffing be required to adequately serve the project?
- An analysis of crime statistics, traffic statistics, and current and projected population.
- What affect, if any, will the impacts of this project have on routine, priority, and emergent response times to calls for service?

- An analysis of all transportation-related issues including parking, access, ingress, egress, and sight distance.

- An analysis of the development, as proposed, to ensure sound, accepted crime prevention strategies are employed to the greatest extent possible.

Thank you for the opportunity to comment on the preparation of the EIR for this development proposal and the opportunity it afforded me in assessing the level of law enforcement service provided by the staff of Malibu/Lost Hills Station.

Sincerely,

LEROY D. BACA, SHERIFF

Thomas G. Martin, Captain
Malibu/Lost Hills Station

*County of Los Angeles*
**Sheriff's Department Headquarters**
*4700 Ramona Boulevard*
*Monterey Park, California 91754-2169*

*Leroy D. Baca, Sheriff*

July 19, 2004

Dr. Hsiao-ching Chen, AICP
Impact Analysis Section
County of Los Angeles
Department of Regional Planning
320 West Temple Street, Room 1348
Los Angeles, California 90012

Dear Dr. Chen:

**ENVIRONMENTAL DOCUMENT REVIEW**
**NOTICE OF PREPARATION TRIANGLE RANCH PROJECT**
**COUNTY PROJECT NO. 97-178/TRACT MAP NO. 52419**

This is in response to your letter dated June 7, 2004, for the above identified project. We have completed our review and assessment of the project description and plans. For our comments please see the attached letter from Thomas G. Martin, Captain of Malibu/Lost Hills Sheriff's Station.

Should you have any questions regarding this matter, please contact Mr. Mike Kameya, of my staff at (626) 300-3013.

Sincerely,

LEROY D. BACA, SHERIFF

Gary T. K. Tse, Director
Facilities Planning Bureau

*A Tradition of Service Since 1850*

7/22/04

GTKT:MK:mk/ij

Attachment

cc: Thomas G. Martin, Captain, Malibu/Lost Hills Sheriff's Station
Linda Becker, Lieutenant, Malibu/Lost Hills Sheriff's Station
Phillip Brooks, Sergeant, Malibu/Lost Hills Sheriff's Station
Victor Rampulla
Frank Williams
Henry Yee
Mike Kameya
Chrono
File
(TriangleRanchProjEnvDocRevNOP)

attach to Letter

# County of Los Angeles

Sheriff's Department Headquarters
4700 Ramona Boulevard
Monterey Park, California 91754-2169

LEROY D. BACA, SHERIFF

June 29, 2004

Mr. Gary T.K. Tse, Director
Facilities Planning Bureau
1000 South Fremont Avenue

EIR Triangle Ranch Project

This project will not have a significant impact on crime rates or increase service calls to the Malibu/Lost Hills Station. The number of units proposed will not require additional staffing.

Traffic on Kanan Road, the main access road to the project is already overburdened. Although this project will add to this congestion, the size and scope is less than significant. Cornell Road must remain open for residential and emergency access during the construction phase of this project.

It can be anticipated that noise and dust created by this project will be significant. The general contractor must ensure local ordinances are complied with and that dust does not obscure any of the surrounding roadways.

If you have any further concerns, please fell free to contact Sergeant Philip Brooks in the traffic office at (818)878-1808, ext. 3062.

Sincerely,

LEROY D. BACA, SHERIFF

Thomas G. Martin, Captain
Malibu/Lost Hills Station

CITY OF

AGOURA HILLS

RECEIVED
JUL 28 2004

*"Gateway to the Santa Monica Mountains National Recreation Area"*

July 27, 2004

Dr. Hsiao-ching Chen
Impact Analysis Section
Department of Regional Planning
County of Los Angeles
320 West Temple Street
Los Angeles, CA 90012

Re: Comments on the Notice of Preparation for an EIR on the Triangle Ranch Project (County Project No. 97-178/Tract Map No. 52419)

Dear Dr. Chen:

The City of Agoura Hills appreciates the opportunity to comment on the Notice of Preparation for the Triangle Ranch Project (Tract Map No. 52419) Environmental Impact Report (EIR). This project abuts the City and is the City's southern gateway. Given its proximity many of the future residents will be relying on services and roadways in the City of Agoura Hills. Moreover, the site is located in a sensitive environmental area with oaks trees, hillsides and Medea Creek. Therefore, it is imperative that the EIR for this project serves as a full environmental disclosure document so that impacts of the development are clear and appropriate mitigation measures are developed.

The City received the Notice of Preparation on June 28, 2004. We are providing comments on the issues that are of concern to the City and residential neighborhoods adjacent to this project within 30 days from receipt of the Notice of Preparation, pursuant to Section 15082 of the CEQA Guidelines. The City respectfully requests that these concerns be addressed in the Draft EIR for this proposal. Our comments below reflect the most recent submittal from the County (plans dated May 18, 2004).

Revised Project Description and Project Alternatives

It is our understanding that the applicant has reduced the number of proposed residential lots. The current version of the Project Description involves the development of 81 dwelling units. The EIR should define the effective carrying capacity of the land and define a suitable density based on environmental issues. Also, as part of the project

*30001 Ladyface Court, Agoura Hills, CA 91301 • Telephone (818) 597-7300 • Fax (818) 597-7352*
*e-mail: ci.agoura-hills.ca.us*

description, the EIR should clearly define the various applicable land use densities for the property. The subject property is seriously constrained by the SEA designation, hillside topography, oak trees and the presence of resources ranging from rare and endangered plant species to significant archeological deposits. All existing natural features and existing topography must be identified in the project description.

A reduced project alternative that the City feels would be appropriate to include in the EIR would have the following attributes:

1) Habitat Preservation

This alternative should ensure preservation of more of the habitat supporting rare and endangered plants, oak woodlands, and riparian areas in the eastern neighborhood.

2) Reduced Grading

This alternative should limit the extent and grading of eastern neighborhood by deleting or relocating lots 59 to 70 to eliminate the need for proposed cut slopes of approximately 40 feet in height.

3) Compact Development

This alternative should have a more compact and smaller lot design in the western neighborhood that emphasizes clustering more of the proposed unit count in the portion of the overall property that has been disturbed. This alternative should emphasize a different product type and market strategy for the project that would focus on the creation of a clustered smaller lot subdivision in a rural neighborhood configuration. The intent of this alternative would be to preserve more open space through clustering on smaller lots instead of providing for larger lots or standard suburban lots throughout the development.

4) Riparian Corridor Preservation

This alternative should delete construction within the Medea Creek Riparian Corridor by assuming deletion of lots 45 to 54 along Medea Creek, and any other improvements affecting Medea Creek.

Conformance with the Santa Monica Mountains North Area Plan

The Land Use Policy Map of the Santa Monica Mountains North Area Plan shows this land to be designated N-2 and N-5. The EIR should include a density analysis to verify conformance to the maximum allowable density, including the completion of a slope density analysis.

The City also requests that the EIR include an analysis to verify conformance with each of the Elements of the North Area Plan, including conformance with the Goals and Policies, particularly regarding hillside management, biological resources, open space, transportation and scenic resources.

Traffic Circulation and Street Design

The City requests that the operation of intersections and street sections serving the project be analyzed using 1) cumulative volumes only and 2) cumulative volumes plus the project. The project will directly impact City streets and intersections, particularly the Kanan Road/Highway 101 Interchange and the Kanan/ Agoura Rd. intersection. These impacts can potentially exceed the planned capacity of improvements identified in the City's General Plan EIR (1992). The intersections east, west and north of the project through which project traffic will need to pass to access the development should all be included in the traffic analysis for this project. Additional cumulative mitigation planning will be required and the payment of the City's Traffic Improvement Fee should assist in offsetting at least some of the project's effects on the City's street system. The traffic impacts associated with this project may need to be mitigated with additional traffic control devices on Kanan Road. Appropriate mitigation measures, such as signalization, striping, road widening, etc., must be identified in the Draft EIR.

The City also requests that the EIR analyze the change in character of the area as a result of the proposed roadways within the subdivision, as wells as the proposed widening of Kanan Road. More specifically, the EIR should analyze: 1) the street dimensions within the subdivision, 2) streetscape planning proposed for the project under County standards and 3) any County proposal to straighten or widen Kanan Road. The Project Description and EIR analysis should evaluate the effects of full four-lane widening within the project boundary as well as potential realignment of Kanan Road along the approach towards Agoura Road. These changes will also result in direct environmental effects on habitat, riparian environments, and visual resources and must be analyzed in the Draft EIR. The City is concerned with retaining the rural streetscape in this corridor and with using land within the subdivision efficiently to reduce the total area of land modification. Excessively wide streets within the project will require the conversion of unnecessary

open space and encourage the enhancement of infrastructure that is likely to be growth inducing. This issue must also be addressed in the Draft EIR.

Biological Resources, Oak Trees and Integrity of the SEA

The biological resource considerations related to this project, including impacts to rare and endangered plants, are significant and need to be carefully considered through the preparation of a full biota report. A full oak tree report must also be prepared, identifying the location of all oak trees, assessing impacts of development on the oak trees, and identifying appropriate mitigation measures. Also, the project includes a wildlife corridor that is significant to the long-term goals of maintaining an integrated ecological unit for wildlife in the greater Santa Monica Mountains region. The EIR must analyze the wildlife movement issues related to this project.

Fuel Modification Zone Requirements as an EIR Study Boundary

For natural and cultural resource issues, the City requests that the EIR consider the fuel modification zone as the boundary of the impact area, rather than the property limits referenced on the Tentative Tract Map. Long-term changes to habitat values and incremental shifts in plant communities can result from fuel modification requirements, particularly in areas subject to convection burns (such as the proposed project). In settings such the proposed project, the dimensions of fuel modification zones by the California Department of Forestry can be relatively large and vegetation changes can be intensive. Therefore, it is important that the EIR address the limits of the fuel modification zone as the boundary of the affected environment.

The stewardship arrangements for the open space that will be created as a result of the development have not been resolved. The open space to be created as part of the project needs to be dedicated to an acceptable land management agency. The funding necessary to maintain this open space also needs to be specified in the mitigation measures for the project. The City also requests that a permanent conservation easement be required on the designated open space lands of this tract.

Impacts to Park and Recreation Facilities

The proposed project will generate demands for the use of local recreation facilities. The EIR should identify the location and type of neighborhood, community and regional park opportunities in the project vicinity. Given the proximity of the project to the City of Agoura Hills, it is likely that the residents of this project will undoubtedly rely heavily on the park and recreation facilities of our City. For this reason, we are requesting that the

EIR analyze the impacts of this project on City park and recreation facilities and that this development contribute Quimby fees to the City to at least partially offset at least some of the project's effects on the City's recreational resources. The proposed subdivision should also incorporate and comply with the Recreation and Trails Goals and Policies contained within the Santa Monica Mountains North Area Plan.

Grading and Geotechnical Remediation

The geotechnical remediation for this project appears rather extensive in several locations. Since the type of remediation that will be required significantly influences the scope of the visual impacts of the project and the limits of grading, the City requests that the grading plan be amended to reflect the requirements of slope remediation. The dimensions of the EIR study area should accurately reflect the anticipated cut and fill slope heights for the project. Without these geotechnical inputs, the dimensions of the project's impacts to landforms could be significantly underestimated.

Also, it is our understanding that the underlying landforms within a portion of the project may require blasting or some other form of pre-grading rock treatment. Please clarify in the EIR what portions of the project will need special pre-grading treatment. Furthermore, five residential lots and a private street are proposed on the west side of Kanan Road, which would abut the Agoura Hills City limits. Thus, the impacts of these lots to the City, including any required off-site grading, should be identified. The City also requests that the project be assessed per the proposed Los Angeles County Ridgeline and Grading Ordinance.

Hydrology, Water Quality and Riparian Impacts

The tract map submitted with the Notice of Preparation does not clearly illustrate detention and debris basins or stormwater collection and conveyance plans. The integration of the project with the existing drainage deficiencies in the immediate area is unclear. The City is requesting that a complete hydrologic analysis be conducted which addresses existing drainage deficiencies, the impacts of the project, changes to outfalls along Medea Creek, changes to stream gradients, and areas of hard channel improvement, if any, along existing drainage courses. The information available with the Notice of Preparation submittal is not sufficient to comment meaningfully on the scope of the issues that need to be addressed regarding hydrological impacts on upstream areas within the City. We are also requesting that the water quality impacts of the project be fully described.

Also, it is unclear what impacts this project may have on the Medea Creek riparian system. Will fuel modification zones be required for Lots 45 through 54, which are adjacent to Medea Creek? If so, what will be scope of this modification? What potential exists for erosion along the ox-bow in the Creek adjacent to these lots? If erosion occurs, what is the likelihood that the placement of the proposed residential uses of the lands immediately west of this ox-bow will require ultimate 'hard channel' improvements within the Medea Creek drainage? Are building and lot setbacks along the Medea Creek corridor sufficient? All of these issues need to be addressed in the EIR. In addition, the upstream impacts of the proposed bridge crossing with the extension of Silver Creek Road should be identified along with appropriate mitigation measures.

Fire Hazards and Emergency Response

This project is situated in a designated high fire hazard area. A fire history including lands within the project boundary and adjacent acreage should be prepared as part of the EIR to accurately predict the likely recurrence of fire over the life of the project. As mentioned above, the fuel modification requirements for this project need to be disclosed in the EIR and the impacts resulting from this modification effort should be described accurately.

Aesthetics and Visual Resources

The City has concerns about the potential aesthetic and visual resource consequences of the proposed project. The proposed project may have some potential to impact the southerly view corridor of some hillside homes in the City. The EIR should clarify, with an appropriate exhibit, how visible this project may be from vantage points in the City. We are requesting that a computer simulation of the appearance of the subdivision after construction be provided from view corridors in the northern portion of the City as well as from areas that are in closer proximity to the project. Such a simulation will assist in properly identifying the aesthetic impacts of the project and in developing appropriate mitigation measures.

Cultural Resources

The City has reviewed site inventory maps for this property and determined that a range of different types of archaeological deposits, including residential sites with the potential to contain human remains, are present either within or immediately adjacent to the development boundary. The City requests that properly and professionally executed Phase I and II studies be conducted of any archaeological deposits that will be impacted by the development.

In closing, the City of Agoura Hills appreciates the opportunity to provide initial comments on the Draft EIR scope of work for this project. We look forward to reviewing the Draft EIR and further comments will be provided on the Draft EIR as more information becomes available to the City.

Sincerely,

Mike Kamino
Director of Planning and Community Development

cc: Greg Ramirez, City Manager
Steve Craig, Environmental Analyst

RESOURCE MANAGEMENT AGENCY

county of ventura

Planning Division
Christopher Stephens
Director

June 29, 2004

| Post-it® Fax Note 7671 | Date 6/30/04 | # of pages ▶ 2 |
|---|---|---|
| To H. Chen | From C. Morehouse | |
| Co./Dept. | Co. | |
| Phone # | Phone # | |
| Fax # | Fax # | |

Hsiao-ching Chen
Impact Analysis Section
Department of Regional Planning
Los Angeles County
320 West Temple Street
Los Angeles, CA 90012

FAX #: (213) 626-0434

Subject: Triangle Ranch Project (Project No. 97-178) N. O. P.

Thank you for the opportunity to review and comment on the subject document. Attached are the comments that we have received resulting from intra-county review of the subject document.

Your proposed responses to these comments should be sent directly to the commentator, with a copy to Carl Morehouse, Ventura County Planning Division, L#1740, 800 S. Victoria Avenue, Ventura, CA 93009.

If you have any questions regarding any of the comments, please contact the appropriate respondent. Overall questions may be directed to Carl Morehouse at (805) 654-2476.

Sincerely,

Christopher Stephens
County Planning Director

*G:\WPC\WINWORD\1F35-7.04.doc*

Attachment

County RMA Reference Number 04-049

**PUBLIC WORKS AGENCY**
**TRANSPORTATION DEPARTMENT**
**Traffic, Advance Planning & Permits Division**
**MEMORANDUM**

JUN 29 2004

**DATE:** June 28, 2004

**TO:** Resource Management Agency, Planning Division
Attention: Carl Morehouse

**FROM:** Nazir Lalani, Deputy Director BON FOR NL

**SUBJECT:** Review of Document 04-049
Triangle Ranch Project, Tract Map #52419
Notice of Preparation of a DEIR for 81 single-family residential lots in the unincorporated area of Los Angeles County, adjacent to and south of the City of Agoura Hills.
Applicant: Sage Community Group

The Transportation Department has reviewed the Notice of Preparation of a DEIR for 81 single-family residential lots in the unincorporated area of Los Angeles County adjacent to and south of the City of Agoura Hills.

The project location is outside of Ventura County jurisdiction, however the traffic from this project may have an impact on Ventura County roads. The Environmental Study should be required to analyze and mitigate the traffic impacts if any, of this project to the roads in Ventura County. We would like to review the environmental study as it becomes available.

Our review is limited to the impacts this project may have on Ventura County's Regional Road Network.

Please call me at 654-2080 if you have questions.

NL-RH-BE-AB:sa
F:\transpor\LanDev\Non_County\04-049 Los Angeles.doc

RESOURCE CONSERVATION DISTRICT
OF THE
SANTA MONICA MOUNTAINS

122 NORTH TOPANGA CANYON BOULEVARD TOPANGA, CALIFORNIA 90290
(310) 455-1030 FAX (310) 455-1172

REBECCA M. BARKIN
District Manager

BOARD OF DIRECTORS
NANCY L. HELSLEY
President
GLENN BAILEY
Vice President
DENNIS WASHBURN
Treasurer
DAVID GOTTLIEB
WOODLAND HASTINGS

RECEIVED
JUN 30 2004

29 June 2004

Dr. Hsiaoching Chen
Impact Analysis Section
LA County Dept. of Regional Planning
320 W. Temple Street, Room 1348
Los Angeles, CA 90012

Re: Triangle Ranch Project (No. 97-178, Tract map 52419)

Dear Dr. Hsiaoching Chen,

In response to the request for input into the Notice of Preparation for the Environmental Impact Report associated with this report, we wish to add the following items for inclusion and analysis within the EIR.

1. Flood Hazards – Analysis should also show the change in Q values modeled on existing vegetation in addition to the 50 year bulk and burned Q required by the County. This will more clearly indicate the actual impact of increased run off into Medea Creek.

On-site retention of the first 3/4 inch storm event should be clearly demonstrated based on comparison to the existing site vegetation and condition, rather than to the 50 year bulk and burned Q.

2. Fire Hazard – Impacts of perpetual fuel modification on surrounding hillslopes should be analyzed in terms of expected increase in erosion and sedimentation, as well as amount of native plant community and associated habitat lost. Mitigations for these impacts need to be clearly demonstrated and monitoring for effectiveness clearly outlined. Clustering the proposed housing closer to existing roads is recommended.

3. Water Quality – Impacts to the hydrologic regime of Medea Creek need to be clearly identified and analyzed. This should address not only the quantity of run off, but also the quality in relation to known studies of changes in this reach of the upper Malibu Creek Watershed. Best Management Practices designed to retain and purify to meet current standards of at least the first 3/4 inch rainfall need to be clearly identified, along with associated mitigation and monitoring plans.

4. Biota – While we concur that a thorough discussion of sensitive plant species is required, this area also serves as an important wildlife corridor linkage. As such, the biota section needs also to clearly address the impacts to faunal species of concern, from amphibians through mammals.

5. Cultural Resources – Full analysis of the impacts of the proposed development on significant cultural resources should be identified, along with ways the development proposes to avoid and/or mitigate these impacts.

6. Visual Qualities – This property has high significance for local aesthetic views of Ladyface Mountain and the associated landscape. Minimizing the intrusion of the development into all viewshed, both from the local roads and trails is critical.

7. Land Use – This property lies within a Significant Ecological Area. As such, it has been identified as having both local and regional importance related to the long term health and ecological function of the Santa Monica Mountains. A project that demonstrates a clear understanding and **avoidance of impacts** is needed in order to comply with the existing land use regulations.

Thank you for the opportunity to comment on this important stage of the development process. We encourage both LA County and the developer to insist on the highest level of environmental constraint analysis to guide the project design process and Environmental Impact review.

Sincerely,

Rosi Dagit

Rosi Dagit
Sr. Conservation Biologist

National Park Service
U.S. Department of the Interior

Santa Monica Mountains
National Recreation Area

401 West Hillcrest Drive
Thousand Oaks, CA 91360

(805) 370-2300 phone
(805) 370-1850 fax

# Santa Monica Mountains National Recreation Area Fax

**To:** Hsiao-ching Chen, PhD, Impact Analysis Section, LA Co DRP

**Fax number:** (213)626-0434

**From:** Woody Smeck

**Date:** 6/23/04

**Pages to follow:** 5

**Comments:**

Original to follow in mail.

STATE OF CALIFORNIA–THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, *Governor*

SANTA MONICA MOUNTAINS CONSERVANCY
RAMIREZ CANYON PARK
5750 RAMIREZ CANYON ROAD
MALIBU, CALIFORNIA 90265
PHONE (310) 589-3200
FAX (310) 589-3207

July 27, 2004

Hsiao-ching Chen
Impact Analysis Section
Los Angeles County Department of Regional Planning
320 West Temple Street
Los Angeles, California 90012

**Notice of Preparation Comments Triangle Ranch Project,**
**Vesting Tentative Tract No. 52419**
**Project No. 97-178**

Dear Ms. Chen:

The Santa Monica Mountains Conservancy (Conservancy) offers the following comments on the Notice of Preparation (NOP)/Initial Study (IS) for the proposed Triangle Ranch project located on 320 acres at the eastern end of Lady Face Mountain in the Medea Creek watershed. The comments in this letter reiterate and expand upon the Conservancy's comments in a January 19, 1999 letter for the Live Oak Ranch project at the same location. Specifically, the Conservancy recommends that the project be redesigned to provide additional avoidance of visual and ecological resources, and that a thorough analysis of environmentally superior alternatives be provided in the Draft Environmental Impact Report (DEIR).

If the Santa Monica Mountains North Area Plan and the current zoning provide for any level of development units by right, the DEIR must elucidate how arbitrary unit counts are relative to total environmental impact. The spatial impact range of a unit (house and landscaping) can range from 7,500 square feet to 2.5 acres in nearby Santa Monica Mountains subdivisions. If there are extensive equestrian facilities, orchards, or vineyards, then the footprint impact can exceed 10 acres per unit. The DEIR must address the following question: If the County determines that the visual and ecological constraints of the site dictate that the development must go into several closely defined impact footprints, then what would be prohibitive of the County then telling the applicant that he or she must apportion the minimum allowable number of units by right within the closely defined impact footprints? The applicant would be getting his or her units or possibly more units in this case. To our knowledge the North Area Plan does not provide specific "flat pad sizes" by right per "unit."

PAGE 02

31058924 08 17:00 07/27/2004

Because of the numerous significant ecological and visual resources in the project area, the Conservancy emphasizes that ecological and visual constraints should determine the project footprint for this project. Market forces that dictate maximum profits for the applicant from the development of lots and pads of a certain size should not determine the project footprint.

The use of the benchmark of units allowed per acre according to planning documents is greatly flawed because it might be interpreted as determining the number of units by right. We reiterate that instead, a critical analysis of appropriate number of units, and the location of those units on the project site, must be based on maximum avoidance of adverse significant ecological and visual impacts.

**Regional significance of project site**

The Draft Environmental Impact Report (DEIR) description of the area should integrate the following important regional factors regarding the context of the site. The subject property is the dominant ownership within a major gateway to the Santa Monica Mountains National Recreation Area. Each portion of the project area on both sides of Kanan Road provides wildlife habitat that is integral to 1,000-plus-acre blocks of roadless (paved) habitat. In addition the project provides an important east-west habitat linkage network across Kanan Road to public open space lands. A review of an aerial photograph of the area clearly depicts this open space connection. As part of the Malibu Creek watershed, runoff from the site has a direct impact on water quality within the Malibu Creek aquatic communities, including the steelhead trout fishery. The site also contains the two easternmost known populations of the State and Federally-listed Lyon's pentachaeta wildflower.

The primary public policy objective to be pursued in this both ecologically and visually sensitive area should be to maximize the preservation of open space, key ecological resources, and primary viewsheds. To achieve this objective, any project approved on the property must be clustered to the maximum extent possible while simultaneously reflecting the physical constraints of the land.

**Inconsistencies with existing plans**

For all but the portion of the property between Cornell and Kanan Roads, the Santa Monica Mountains Comprehensive Plan (SMMCP) designates the appropriate development density as being one unit per 20-40 acres. The DEIR must discuss the consistencies/inconsistencies of the proposed project with the densities and policies in the SMMCP, the Santa Monica Mountains North Area Plan, the Los Angeles County General Plan, and the Santa Monica Mountains National Recreation Area General Management Plan. Also, the DEIR should address the project's inconsistency with the existing zoning for the site. The regionally significant wildlife

habitat, vegetation, and viewshed resources of the property alone provide a dearth of any public policy justification for exceeding the Low Density Threshold in a Non-Urban Hillside Management Area. The provision of a proportionately large open space dedication offsets a level of habitat impacts, but in no way automatically makes sense out a proposed project that is incompatible with a site's terrain and natural resources.

Specifically, the land use element of the Los Angeles County General Plan contains standards for development within Significant Ecological Areas (SEAs). Specifically the DEIR must address the project's consistency with the six SEA design compatibility criteria (Page LU-A13; enclosed).

Both the DEIR and the biological documents specifically prepared for review by the Significant Ecological Area Technical Advisory Committee (SEATAC) should address the compliance of the proposed project, and of each DEIR development alternative, with these important criteria. The portions of the project within SEA No. 6 should be analyzed with specific scrutiny.

In addition, the North Area Plan designates Kanan-Dume Road as a scenic route and Cornell Road as a route with scenic qualities. The DEIR must address the project's consistencies/inconsistencies with policies in the North Area Plan that intend to protect these routes.

**DEIR Alternatives**

Based on the Initial Study analysis, proposed project is not designed to work with the landform and ecological constraints on the property. The project therefore violates the intent of the California Environmental Quality Act (CEQA). In order to comply with CEQA, alternatives must be developed that better avoid and reduce direct ecological impacts.

Pursuant to Section 15126(d) of CEQA, an EIR must assess a reasonable range of alternatives to the project action. The range of DEIR project alternatives must include projects that fairly balance the applicant's objectives with the avoidance of significant adverse impacts. This CEQA section also states, "The EIR discussion must focus on opportunities for eliminating any significant adverse environmental effects, or reducing them to a level of less than significant even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly."

If the DEIR analysis rejects any environmentally superior alternatives as economically infeasible, that analysis must also specifically define the threshold that in turn would make each of these reduced projects feasible. If the environmentally superior alternative in the DEIR is not designed to be feasible by the applicant, the DEIR analysis should specifically state what changes would have to be made to that alternative to make it "feasible." Some threshold point

of economic feasibility must exist between the proposed project and the environmentally superior alternative. That threshold is arbitrary unless supported by a specific economic analysis.

To guide the design of the DEIR alternatives, our analysis dictates that specific lots shown on the revised tentative map should be totally eliminated from any inclusion because of their incongruity with the land and landscape under any development scenario. These lots and the justification for their removal is addressed below within three geographic zones. (This discussion below is limited to residential lots and does not include landscaping or street lots.)

**East of Cornell Road:** The lobe of the project located to the east of Cornell Road contains approximately 27 lots (lots 55-81). Lots 66-75 and 81 intrude too deeply into the surrounding habitat block and require extensive landform modification away from existing development areas. Lots 62-65 require a large cut slope in excess of a 100 feet (45 feet of vertical height). These 15 whole lots should be eliminated from all DEIR alternatives. The remaining 12 lots form a tight cluster appressed next to existing development and infrastructure. Visual, biological, and fire safety impacts are significantly reduced.

**Between Cornell Road and Kanan Road:** Any homes located between Cornell and Kanan Roads would be extremely visible from both road ways. Any homes in this defined area would also have a negative affect on the ability for wildlife to move freely from the Medea Creek riparian corridor to habitat on the west side of Kanan Road. In addition, any homes in this area would degrade the habitat value of the riparian corridor through the indirect impacts of pets, lights, and noise. Based on these three important considerations, our analysis shows that only four lots between Cornell and Kanan Roads would be appropriate.

Lots 45-54 (10 lots) are served by one street. The only pad areas off this street that would not result in unavoidable significant adverse ecological and visual impacts would be the interior halves of lots 47-54 and the bulb of the cul-de-sac combined with a direct-driveway-width road to Kanan Road adjacent to the northwest corner of lot 54. This would mean deleting lots 45 and 46, deleting the road, grading, and other disturbances to the northwest of lots 45 and 46, and locating just four lots in the concentric center of the area now shown for lots 47-54.

**West side of Kanan Road:** The largest lobe of the proposed project located to the west of Kanan Road contains 44 lots (lots 1-44). This proposed configuration places an uninterrupted block of streets and houses along approximately 1,600 feet of the 2,600-foot-long portion of the property that abuts the western edge of Kanan Road. From a scenic highway and cross-Kanan Road wildlife movement potential stand point, this long contiguous barrier is unacceptable. All of the development on this side of the road must be clustered to the north. Lots 21-31 require extensive landform modification and the total filling of two drainages. These 11 lots

should be eliminated from all DEIR alternatives. Lots 1-5 are too close to a principal drainage and must be removed to retain both the landform and ecological integrity of the drainage. This would result in the deletion of 16 lots, for a total of 28 remaining lots in this area.

The DEIR should also address impacts to the spring that is present in this area west of Kanan Road approximately near lots 17 and 18. The DEIR should include the County's permanent deed restriction of Caleta Road as part of the project, or a requirement for a conservation easement over this unbuilt road.

In summary, the approximate total number of lots that can built on without unavoidable significant adverse ecological and visual impacts is approximately 44 of the 81 proposed by the project. This analysis affords approximately 28 lots to the west of Kanan, Road, 12 lots to the east of Cornell Road, and approximately four in between.

Other important factors should be included in developing an adequate range of DEIR alternatives. One alternative should be equivalent to a "By Right Alternative" in which no significant discretionary action would be required to gain approval for the project. All but one of the DEIR development alternatives should totally avoid any impact to the two known Lyon's pentachaeta populations onsite including minimum 50-foot buffer zones from any proposed human-related disturbance or landscape element to the Lyon's pentachaeta plants.

All DEIR development alternatives must include provision of adequate easements to align the Zuma Ridge Trail through the property without the trail being directly next to the traffic along Kanan Road. All DEIR development alternatives that include more than 20 units should require the applicant to construct the trail.

Fee title dedication of open space to a public agency is the only means of guaranteeing permanent protection of property. It also ensures the highest level of ecological stewardship. All DEIR development alternatives with more than 20 units must also include the fee title dedication of all remaining open space outside of fuel modification zones to an appropriate public entity capable of managing open space for resource protection and recreational use. A conservation easement over the same area would be equitable if the 20 or less units were approved. All fuel modification zones should also have a conservation easement placed over them to prevent future encroachmentt. Such easements should be in the favor of both the County and the park agency holding title to the open space. The Conservancy emphasizes that retention of the open space by the homeowners' association (without this above-described conservation easement) provides absolutely no assurance the open will be protected and managed to preserve the resource values in perpetuity.



07/27/2004 17:00 3105892408

**Open Space Maintenance Funding**

The dedication of public open space by itself is insufficient mitigation for a project even of the lesser magnitude of the 44-unit project alternative recommended in this letter. In order to guarantee both the safety of the public visiting the open space dedication, and of the new adjoining homeowners, as well the ecological integrity of the open space, another critical mitigation measure that must be included in the DEIR is a permanent funding mechanism to maintain the property.

The edge effects of a large, new subdivision with a large public open space dedication at the suburban interface warrants ranger patrol and ecological stewardship by a public agency. An annual contribution of $10,000 (with an inflation adjustor) would be necessary to adequately maintain any proposed open space dedication on the subject property. Two mechanisms to provide this maintenance funding include a non-wasting endowment set up by the developer over a specific period of time or a property assessment. To our knowledge, a Community Facilities District (CFD) is the optimal method for such a funding source. The Conservancy's joint powers entity, the Mountains Recreation and Conservation Authority (MRCA), can be the entity that forms, administers, and benefits from the CFD.

This letter officially notifies the County that the Conservancy, or the MRCA would accept the open space dedication from a project approved on this property if it is accompanied by the above identified permanent maintenance funding.

Please direct any questions and future documentation to me at the address on this letterhead or by phone at (310) 589-3200 ext. 128 or to Judi Tamasi of our staff at the same address and phone number, ext. 121.

Sincerely,

PAUL EDELMAN
Deputy Director for
Natural Resources and Planning



07/27/2004 17:08 3105892408

Terry Tamminen
*Secretary for Environmental Protection*

# California Regional Water Quality Control Board

## Los Angeles Region

**Over 51 Years Serving Coastal Los Angeles and Ventura Counties**

**Recipient of the 2001 *Environmental Leadership Award* from Keep California Beautiful**

320 W. 4th Street, Suite 200, Los Angeles, California 90013
Phone (213) 576-6600 FAX (213) 576-6640 - Internet Address: http://www.swrcb.ca.gov/rwqcb4

**Arnold Schwarzenegge**
*Governor*

June 24, 2004

Rick Kuo
Los Angeles County Department of Regional Planning
320 west Temple Street
Los Angeles, CA 90012

Re: CEQA Documentation for Project in the Santa Clara Watershed

**Project No. CUP 04-033**

We appreciate the opportunity to comment on the CEQA documentation for the above-mentioned project. For your information a list of permitting requirements and Regional Board Contacts is provided in Attachment A hereto.

The project site lies in the Santa Clara watershed that was listed as being impaired pursuant to Section 303 (d) of the Clean Water Act. Impairments listed in reaches downstream from the proposed project include nutrients and their effects, salts, coliform bacteria, and historic pesticides. The Los Angeles Regional Water Quality Control Board will be developing Total Maximum Daily Loads (TMDLs) for the watershed, but the proposed project is expected to proceed before applicable TMDLs are adopted. In the interim, the Regional Board must carefully evaluate the potential impacts of new projects that may discharge to impaired waterbodies.

Our review of your documentation shows that it does not include information on how this project will change the loading of these pollutants into the watershed. Please provide the following additional information for both the construction and operational phases of the project.

- For each constituent listed above, please provide an estimate of the concentration (ppb) and load (lbs/day) from non-point and point source discharges.
- Estimates of the amount of additional runoff generated by the project during wet and dry seasons.
- Estimate of the amount of increased or decreased percolation due to the project.
- Estimates of the net change in cubic feet per second of groundwater and surface water contributions under historic drought conditions (as compiled by local water purveyors,

the Department of Water Resources, and others), and 10-year 50-year, and 100-year flood conditions.

If you have any questions please call me at (213) 576 6683.

Sincerely,

Elizabeth Erickson
Associate Geologist, TMDL Unit
Los Angeles Regional Water Quality Control Board

EE
Attachments (1)
cc:
File

**ATTACHMENT A**

✓ If the proposed project will result in a **discharge of dredge or fill into a surface water** (including a dry streambed), and is subject to a **federal license or permit**, the project may require a *Section 401 Water Quality Certification*, or waiver of Waste Discharge Requirements. For further information, please contact:

Valerie Carrillo, Nonpoint Source Unit at (213) 576-6759.

✓ If the project involves **inland disposal of nonhazardous contaminated soils and materials**, the proposed project may be subject to *Waste Discharge Requirements*. For further information, please contact:

Rodney Nelson, Landfills Unit, at (213) 576-6719.

*********

✓ If the overall project area is **larger than five acres**, the proposed project may be subject to the State *Board's General Construction Activity Storm Water Permit.* For further information, please contact:

Tracy Woods, Statewide General Construction Activity Storm Water Permits at (213) 576-6684.

✓ If the project involves a facility that is proposing to discharge storm water associated with **industrial activity** (e.g., manufacturing, recycling and transportation facilities, etc.), the facility may be subject to the State Board's *General Industrial Activities Storm Water Permit.* For further information, please contact:

Kristie Chung, Statewide General Industrial Storm Water Permits at (213) 576-6807.

✓ If the proposed project involves requirements for new development and construction pertaining to **municipal storm water programs**, please contact:

Xavier Swamikannu, Municipal Storm Water Permits, Los Angeles County at (213) 620-2094
Ejigu Solomon, Municipal Storm Water Permits, Ventura County at (213) 620-2237

✓ The proposed project also shall comply with the local regulations associated with the applicable **Regional Board stormwater permit**:

Los Angeles County and Co-permittees:
NPDES No. CAS004001
Waste Discharge Requirements Order No. 01-182.

Long Beach County and Co-permittees:
NPDES CAS004003
Waste Discharge Requirements Order No. 99-060.

Ventura County and Co-permittees:
NPDES No. CAS004002
Waste Discharge Requirements Order No. 00-108.

**********

✓ If the proposed project involves any construction and/or groundwater **dewatering to be discharged to surface waters**, the project may be subject to *NPDES/Waste Discharge Requirements*. For further information, please contact:

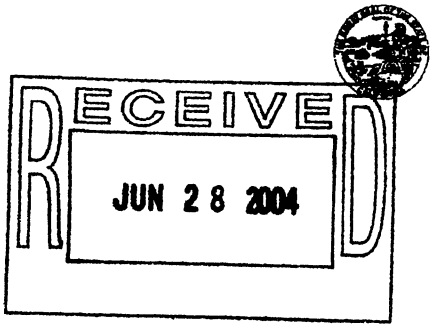
Augustine Anijielo, General Permitting and Special Projects Unit at (213) 576-6657 (All Region 4 Watersheds).

✓ If the proposed project involves any construction and/or groundwater **dewatering to be discharged to land or groundwater**, the project may be subject to *Waste Discharge Requirements*. For further information, please contact:

Kwang-il Lee, Non-Chapter 15 Unit, at (213) 576-6666 (All Region 4 Watersheds).

STATE OF CALIFORNIA — Arnold Schwarzenegger, Governor

**NATIVE AMERICAN HERITAGE COMMISSION**
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
(916) 657-5390 - Fax




June 25, 2004

Hsiao-ching Chen
Los Angeles County Department of Regional Planning
320 West Temple Street
Los Angeles, CA 90012

RE: SCH# 1998111091 – Triangle Ranch Project No. 97-178, Tract No. 52419, Los Angeles County

Dear Hsiao-ching Chen:

The Native American Heritage Commission has reviewed the Notice of Preparation (NOP) regarding the above project. To adequately assess and mitigate project-related impacts on archaeological resources, the Commission recommends the following actions be required:

- ✓ Contact the appropriate Information Center for a record search to determine:
  - If a part or all of the area of project effect (APE) has been previously surveyed for cultural resources.
  - If any known cultural resources have already been recorded on or adjacent to the APE.
  - If the probability is low, moderate, or high that cultural resources are located in the APE.
  - If a survey is required to determine whether previously unrecorded cultural resources are present.
- ✓ If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
  - The final report containing site forms, site significance, and mitigation measurers should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for pubic disclosure.
  - The final written report should be submitted within 3 months after work has been completed to the appropriate regional archaeological Information Center.
- ✓ Contact the Native American Heritage Commission for:
  - A Sacred Lands File Check. **Check Completed with negative results**
  - A list of appropriate Native American Contacts for consultation concerning the project site and to assist in the mitigation measures. **Native American Contacts List attached**
- ✓ Lack of surface evidence of archeological resources does not preclude their subsurface existence.
  - Lead agencies should include in their mitigation plan provisions for the identification and evaluation of accidentally discovered archeological resources, per California Environmental Quality Act (CEQA) §15064.5 (f). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American, with knowledge in cultural resources, should monitor all ground-disturbing activities.
  - Lead agencies should include in their mitigation plan provisions for the disposition of recovered artifacts, in consultation with culturally affiliated Native Americans.
  - Lead agencies should include provisions for discovery of Native American human remains in their mitigation plan. Health and Safety Code §7050.5, CEQA §15064.5 (e), and Public Resources Code §5097.98 mandates the process to be followed in the event of an accidental discovery of any human remains in a location other than a dedicated cemetery.

Sincerely,

Rob Wood
Environmental Specialist III
(916) 653-4040

CC: State Clearinghouse

State of California • The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
Arnold Schwarzenegger, Governor
Ruth Coleman, Director

California Department of Parks and Recreation
Angles District
1925 Las Virgenes Road
Calabasas, CA 91302

County of Los Angeles
Department of Regional Planning
Hsiao-ching Chen
320 West Temple Street
Los Angeles, CA 90012

**Project: Triangle Ranch, No 97-178, Tract No 52419**

Dear Ms. Chen,

The California Department of Parks and Recreation, Angeles District, has had the opportunity to review the Notice of Preparation for the Triangle Ranch Project. The area being proposed for the development of 81 houses is in a Significant Ecological Area (SEA), and we are concerned about the potential impacts of the project to the SEA and parklands in the area.

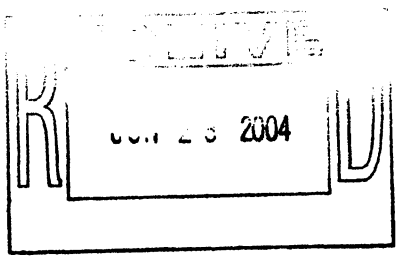
The Draft Environmental Impact Report (DEIR) should cover impacts to *Dudleya cymosa* ssp. *agourensis*, *Pentachaeta lyonii* and other rare or locally rare plants. The DEIR should also address impacts to wildlife movement and the integrity of the SEA. We also have concerns regarding impacts to native insects, reptiles, water quality and wildlife habitat from irrigation and brush clearance.

Thank you for the consideration of our comments,

Sincerely,

Ron Schafer
District Superintendent

**DEPARTMENT OF TRANSPORTATION**
DISTRICT 7, REGIONAL PLANNING
IGR/CEQA BRANCH
120 SO. SPRING ST.
LOS ANGELES, CA 90012
PHONE (213) 897-6536
FAX (213) 897-1337
E-Mail:NersesYerjanian@dot.ca.gov




*Flex your power!*
*Be energy efficient!*

Mr. Hsiao-Ching Chan
Dept. of Regional Planning
Impact Analysis Section
LosAngeles County
320 W. Temple St.
LosAngeles, CA. 90012

IGR/CEQA# 040619NY
NOP/Triangle Ranch Project #97-178
81 Single Family Residential Units
LA/101/35.04

June 21, 2004

Dear Mr. Boroski:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the 81 Single Family Residential Units in LA County.

Based on the information received, and to assist us in our efforts to completely evaluate and assess the impacts of this project on the State transportation system, a traffic study in advance of the DEIR should be prepared to analyze the following information:

Please reference the Department's **Traffic Impact Study Guideline** on the Internet at http://www.dot.ca.gov/hq/traffops/developserv/operationalsystems/reports/tisguide.pdf

1. Presentations of assumptions and methods used to develop trip generation, trip distribution, choice of travel mode, and assignments of trips to State Route 101.

2. Consistency of project travel modeling with other regional and local modeling forecasts and with travel data. The IGR/CEQA office may use indices to check results. Differences or inconsistencies must be thoroughly explained.

3. Analysis of ADT, AM, and PM peak-hour volumes for both existing and future conditions in the affected area. This should include freeways, interchanges, and intersections, and all HOV facilities. Interchange Level of Service should be

specified (HCM2000 method requested). Utilization of transit lines and vehicles, and of all facilities, should be realistically estimated. Future conditions would include build-out of all projects (see next item) and any plan-horizon years.

4. Inclusion of all appropriate traffic volumes. Analysis should include traffic from the project, cumulative traffic generated from all specific approved developments in the area, and traffic growth other than from the project and developments. That is, include: existing + project + other projects + other growth.

5. Discussion of mitigation measures appropriate to alleviate anticipated traffic impacts. These mitigation discussions should include, but not be limited to, the following:
   - description of transportation infrastructure improvements
   - financial costs, funding sources and financing
   - sequence and scheduling considerations
   - implementation responsibilities, controls and monitoring

   Any mitigation involving transit, HOV, or TDM must be rigorously justified and its effects conservatively estimated. Improvements involving dedication of land or physical construction may be favorably considered.

6. Specification of developer's percent share of the cost, as well as a plan of realistic mitigation measures under the control of the developer. The following ratio should be estimated: Additional traffic volume due to project implementation is divided by the total increase in the traffic volume (see Appendix "B" of the Guidelines). That ratio would be the project equitable share responsibility.

   We note for purposes of determining project share of costs, the number of trips from the project on each traveling segment or element is estimated in the context of forecasted traffic volumes which include build-out of all approved and not yet approved projects, and other sources of growth. Analytical methods such as select-zone travel forecast modeling might be used.

The Department as a commenting agency under CEQA has jurisdiction superceding that of MTA in identifying the freeway analysis needed for this project. Caltrans is responsible for obtaining measures that will off-set project vehicle trip generation that worsens Caltrans facilities and hence, it does not adhere to the CMP guide of 150 or more vehicle trips added before freeway analysis is needed. MTA's Congestion Management Program in acknowledging the Department's role, stipulates that Caltrans must be consulted to identify specific locations to be analyzed on the State Highway System. Therefore State Route(s) mentioned in item #1 and it's facilities must be analyzed per the Department's **Traffic Impact Study Guidelines.**

We look forward to reviewing the DEIR. We expect to receive a copy from the State Clearinghouse. However, to expedite the review process, you may send two copies in advance to the undersigned at the following address:

Cheryl J. Powell
IGR/CEQA Branch Chief
Caltrans District 07
Regional Transportation Planning Office
120 S. Spring St., Los Angeles, CA 90012

If you have any questions regarding this response, please call the Project Engineer/Coordinator Mr. Yerjanian at (213) 897-6536 and refer to IGR/CEQA # 040619NY.

Sincerely,

Cheryl J. Powell
IGR/CEQA Branch Chief
Regional Transportation Planning

United States Department of the Interior

NATIONAL PARK SERVICE
Santa Monica Mountains National Recreation Area
401 West Hillcrest Drive
Thousand Oaks, California 91360-4207

In reply refer to:
L76 (SAMO)/Triangle Ranch

July 23, 2004

Dr. Hsiao-ching Chen
Impact Analysis Section
Los Angeles County Department of Regional Planning
320 W. Temple St.
Los Angeles, CA 90012

Dear Dr. Chen:

The National Park Service has reviewed the Notice of Preparation (NOP) of an EIR for Triangle Ranch, Project No. 97-178/Tract Map No. 52419. The applicant proposes to subdivide 320.3 acres into 81 residential lots on 54 acres and retain 266 acres as open space.

The National Park Service provides comments on the effects of private and public land development in the Santa Monica Mountains at the invitation of state and local units of government with authority to prevent or minimize adverse uses (16 U.S.C. 460kk). We respect the rights of land owners to develop their properties consistent with federal, state, and local laws. In providing comments, we assume a neutral position and do not support or oppose land development. To this end, we offer the following comments on the proposed project Notice of Preparation. Overall, we concur with the NOP's list of environmental issues to be analyzed in the EIR and the range of alternatives. We recommend, however, the project be redesigned up-front to have the preferred alternative feature reduced grading, avoid impacts to cultural resource sites, sensitive species, and uphold the integrity of the Significant Ecological Area referenced in the Initial Study. The primary reason for suggesting a redesign is our concern that the currently proposed project is inconsistent with several long-range planning documents guiding development of the subject site.

The National Park Service has submitted comments on previous subdivision proposals for the project site. We have enclosed our comment letter on the NOP for the project when proposed as Live Oak Ranch in 1999. Our comments remain the same regarding potential resource impacts, although project density has changed, and now the Santa Monica Mountains North Area Plan has become the County's applicable specific plan. We request the County include our enclosed 1999 comments in the record for the current proposal.

In the 1999 comment letter, we listed the proposed project's inconsistencies with Los Angeles County General Plan. Please note the current project, while consistent with the maximum development units prescribed in the North Area Plan, has the potential to be inconsistent with a number of other goals and policies, including virtually all categories under the Conservation and Open Space element. These inconsistencies are signalled by the proposed grading and

location of the development footprint over the Lyon's pentachaeta populations and cultural resource sites. The proposed project, like former proposals, continues to impose suburban level development on an environmentally sensitive and scenic landscape. The 1999 Live Oak Ranch project proposed 132 residences on 64.6 acres, compared to the current 81-unit project on 54 acres. The footprint of disturbance has only been reduced by 10 acres—from 20% to 17% of the total project site—in spite of a 39% decrease in the number of units. The proposed grading of 694,500 cubic yards represents only a three percent (3%) reduction from the proposed grading (715,000 cubic yards) for the 132-unit former proposal. Moreover, the grading averages 8,574 cubic yards per residence, well above the County's average of 2,000-3,000 cubic yards for most single family residences in the Santa Monica Mountains.

Additionally, at the time the previous project was proposed, the Santa Monica Mountains National Recreation Area General Management Plan (GMP) revision was underway. The GMP was completed in 2002 and represents the local agencies' and general public's 20-year vision for the national recreation area. The GMP designates Triangle Ranch as "Land Recommended for Boundary Study" because it is contiguous with the national recreation area and is of similar scenic, natural, cultural, and recreational value. The project as proposed would be inconsistent with the GMP's prescription for the area to remain a scenic sensitive resource area that is perceived by the general public as a gateway to the national recreation area.

To completely assure protection of all scenic, natural and cultural resources of the property, acquisition of the entire site as public parkland would be ideal. Currently, because the site is located outside the boundary of the Santa Monica Mountains National Recreation Area, the National Park Service does not have the authority to acquire the property. Overall, whatever land use is ultimately approved for the site, we strongly recommend careful consideration of the site's value as a scenic sensitive resource and a gateway to the national recreation area.

Thank you for considering the National Park Service's input. If we can be of assistance, please call Ray Sauvajot, Chief of Planning, Science, and Resource Management, at (805) 370-2339.

Sincerely,

for Woody Smeck
Superintendent

cc: Joe Edmiston, Executive Director, Santa Monica Mountains Conservancy
Ron Schafer, Superintendent, Angeles District, State Department of Parks and Recreation

Enclosure: Letter dated January 4, 1999, from the National Park Service to Los Angeles County, addressing CUP, OTP, ZC #97178, TT #52419

# United States Department of the Interior

NATIONAL PARK SERVICE
Santa Monica Mountains National Recreation Area
401 West Hillcrest Drive
Thousand Oaks, California 91360-4207

IN REPLY REFER TO:

L76 (SAMO)

JAN 4 1999

Ms. Tabitha Lam, Planner
Los Angeles County Department of Regional Planning
320 W. Temple St.
Los Angeles, CA 90012

RE: CUP, OTP, ZC #97178, Tentative Tract #52419, Live Oak Ranch
Notice of Preparation of EIR

Dear Ms. Lam:

The National Park Service thanks the Regional Planning Department for a thorough initial study analysis of the above-referenced project. We concur with all the findings that warrant an Environmental Impact Report for the project and add emphasis to the following issues.

Resources - 3. Biota

The project site hosts at least two thriving populations of the federally listed endangered Lyon's pentachaeta (*Pentachaeta lyonii*). The development's footprint would obliterate both populations. The EIR should include an alternative that would leave the populations intact. It should also outline how the applicant intends to mitigate the loss of this endangered species.

Resources - 4. Archaeological

No less than eight archeological sites have been recorded within the property boundaries. The proposed project would require grading into the base of the mountain. The Native American community holds sacred the Ladyface Mountain region. The City of Agoura Hills has prepared a Specific Plan for this area. The proposed project should respect cultural resource protection requests of the Native American community and the city's policies in the specific plan. The EIR should include an alternative that would not involve grading of Ladyface Mountain.

Other Factors - 3. Land Use

We recommend before the EIR is prepared the project be redesigned to reduce density. Contrary to land use findings in the Initial Study, we believe the project will have a significant impact on the physical environmental owing to land use factors. This proposal

is a high density residential development in an area repeatedly characterized by County planning documents as rural with significant natural resource issues. At minimum, one alternative in the EIR should reduce the number of lots to a level that will neither impact the *Pentachaeta* sites nor require extensive grading and reconfiguration of drainages. The following planning document policies support our recommendation.

- Land Use Policy is rural, non-urban. "Areas not currently planned for urban use or scheduled to receive an urban level of service" (L.A. County General Plan, 1980). The proposed project required Development Monitoring System (DMS) analysis because of its urban-level presentation.

- General Development Policy is non-urban hillside and significant ecological area (SEA). "The intent is to permit uses which are compatible with, but do not alter the character of the hillsides, do not create a need for urban services, and do not cause significantly detrimental environmental impacts" (L.A. County General Plan, 1980). Each alternative in the EIR must address the General Plan's Hillside Management Performance Review Procedure for public safety, resource protection, suitability for development, and quality of design (Chapter III, page 42).

- Special Management Area Policy designates the site a Hillside Management Area and SEA. "[SEAs] are ecologically important or fragile land and water areas valuable as plant and animal communities requiring preservation and protection. The intent of the [Hillside Management Areas] is to protect the character and natural resource values of the hillsides and to manage new residential development so that the risks from fire and flood hazards, water pollution, soil erosion and land slippage will be avoided or mitigated" (L.A. County General Plan, 1980).

- Residential density policy in the Malibu/Santa Monica Mountains Interim Area Plan (1982) dictates an estimated 130 units might be permitted only if environmental impacts are found negligible or can be fully mitigated. One hundred thirty-two units packed into the developable part of the site represents a high density cluster that will inevitably destroy endangered species and cultural resources, require channeling and girding of adjacent drainages, impact viewsheds, cause reflective glare, and require an urban level of services. Such impacts would cause the project to fail the above-mentioned Performance Review Procedure in the public safety and resource protection categories. The Los Angeles *Times* recently found homeowners in high density residential developments file 2.4 times as many disaster relief claims as other residents in the Santa Monica Mountains (12/27/98). The EIR should carefully consider the environmental stability of such high density in this proposed development.

- The proposed Ventura Freeway Corridor Area Plan designates the property RR5: one dwelling unit per five acres for a maximum of 64 units. We believe this density represents a more environmentally realistic starting point for maximum density at the site.

The National Park Service is currently preparing the 20-year revision to the Santa Monica Mountains National Recreation Area General Management Plan that recognizes Kanan-Dume Road as a scenic highway and a gateway into the Santa Monica Mountains National Recreation Area. The EIR should incorporate the vision of a national park gateway when locating the development footprint.

Thank you for considering our input. If you have questions, please call Nancy Andrews, Chief of Planning, Science and Resource Management, or Melanie Beck, Outdoor Recreation Planner, at (805) 370-2301.

Sincerely,

Arthur E. Eck
Superintendent

cc: Honorable Zev Yaroslavsky, Los Angeles County Board of Supervisors
Joe Edmiston, Executive Director, Santa Monica Mountains Conservancy
Russ Guiney, Superintendent, Angeles District, State Department of Parks and Recreation
Kathleen Bullard, Executive Officer, Resource Conservation District of the Santa Monica Mountains
Rick Farris, U.S. Fish and Wildlife Service, Ventura Office

**TOM DODSON & ASSOCIATES**
2150 N. ARROWHEAD AVENUE
SAN BERNARDINO, CA 92405
TEL (909) 882-3612 • FAX (909) 882-7015
E-MAIL tda@tstonramp.com

July 14, 2004

Dr. Hsiaoching Chen, AICP
Impact Analysis Section
Los Angeles County
Department of Regional Planning
320 W. Temple Street, Room 1348
Los Angeles, CA 90012

Dear Dr. Chen:

The following comments are submitted on the Notice of Preparation (NOP) distributed by your agency for the Triangle Ranch, Project No. 97-178, Vesting Tentative Tract No. 52419, Conditional Use Permit No. 97-178 and Oak Tree Permit No. 97-178. I am submitting these comments on behalf of the Cornell Preservation Organization (CPO), a group of local residents that live adjacent to and in the vicinity of this proposed project. This proposed residential project has been under consideration for several years and local residents have consistently attempted to work with the applicant, currently Sage Community Group. CPO's objective has been to reduce the density of the proposed development so that it would be consistent with the surrounding land uses, which include a number of small horse ranch properties. The applicant has consistently attempted to cluster development at much higher densities than the surrounding residential development, which creates conflicts with surrounding land uses (discussed in more detail below) and with the adopted Area Plan that controls land use at the project site. This conflict with the community character is a major reason the CPO feels this project should be rejected.

As listed on pages 2 and 3, the Department has essentially required a comprehensive environmental impact report (EIR) for the project. The comments provided below are designed to provide the Department with additional detailed issues of focus in the EIR, beyond the specific topics. On behalf of CPO, we wish to receive copies of the Draft EIR when it is distributed (we will pay any reasonable fees). One hard copy and two electronic copies would be appreciated. This is a formal request in accordance with the California Environmental Quality Act (CEQA). The issues below are discussed in the order discussed in the Initial Study attached to the NOP.

Geotechnical: Concur with the scope of the geotechnical investigation. There are policies

in the Santa Monica North Area Plan regarding grading in areas with steep slopes. These policies should be examined as part of the geotechnical investigation, including the residual slopes.

Flood: Medea Creek is subject to significant flood hazards, including the inclusion of substantial sediment from erosion. This condition is, in effect, a high mudflow condition and the potential for damage from this potential hazard should be added to the list of issues to be addressed in the EIR. Relative to the development within the flood plain, one of the key concerns is the increase in runoff and the redirection of runoff downstream that will result from the proposed development. A detailed hydrological evaluation of the modified drainage is needed to ensure that downstream erosion and flooding will not result from the proposed project's implementation. As Medea Creek is already deemed to be polluted, the potential water quality degradation associated with construction, obviously including erosion and sedimentation, and after development need to be examined. A careful analysis of Total Maximum Daily Load (TMDL) and whether the Creek has any assimilative capacity must be prepared to adequate characterize the physical changes in the Creek as a result of this development.

Fire: The tract map indicates that development north of Kanan Road may have roads too steep and be difficult to serve. Adequacy of the water supply to meet fire flow requirements needs to be demonstrated. The area may have inadequate water storage to meet such requirements. An indirect effect of placing this project within the high fire hazard zone at the densities proposed is that a substantial fire buffer zone will have to be installed around the residences. This will result in converting substantial additional area to man-made landscape with two consequences: increased irrigated landscape and use of water and loss of native habitat. It is essential that a professionally prepared fire protection plan be prepared for those areas exposed to high fire hazards and significant vegetative fuel loads. Such a plan will define defensible space required to ensure that the structures are not placed at unreasonable risk, and it may lead to redesign of the project due to the significant exposure to fire hazards. This plan must be prepared as part of the CEQA process otherwise it could defer mitigation that could have additional significant impacts to the surrounding environment.

Noise: The finding that the project site is not located adjacent to a high noise source is inaccurate. Kanan Road has a high level of traffic; generates significant hourly and 24-hour noise levels; and has very high noise levels associated with vehicles racing up and down the road. Also, in contrast to most roadway noise sources, the greatest noise is generated on the weekends when substantial tourist traffic uses Kanan to access the local beaches. Several locations of the project require a noise study to examine actual exposure in comparison with County Plan significance thresholds. A forecast of future noise levels, cumulative with the project, also needs to be included in the EIR.

Water Quality: As stated above, the local creek does have water quality problems (Medea Creek) due to upstream development. This project will contribute to water quality problems, both during construction and after the project is occupied. It is essential that the proposed project be considered in the context of the Regional Board's Water Quality Control Plan and the assigned beneficial uses and water quality objectives for Medea Creek. Further, it will be necessary to define the specific best management practices (for both construction and long-term occupancy) that will be implemented so they can be evaluated for both adverse impacts as mitigation measures and to define the mechanism for maintaining the BMPs over the long-term to ensure their continued effective function. Failing to consider the BMPs would effective defer mitigation and analysis of mitigation measures which CEQA no longer permits. It is clear to CPO that a detailed antidegradation analysis of the project's water quality impact on Medea Creek needs to be considered within this EIR.

Air Quality: Concur with the scope of the air quality analysis. Two additional issues are of concern to CPO. The Kanan/Highway 101 Interchange and the adjacent intersections are significantly backed-up on the weekends during afternoon peak hour. As part of the project impact evaluation, the potential for existing CO Hotspot to occur should be examined. Since these is no monitoring station locally, monitoring for CO concentrations on weekends should be included to ensure that the impact forecast for the project is accurate. This project may require a zone change and as a result, consistency with SCAQMD's AQMP and the SCAG's RCPG should be considered in the EIR.

Biota: Concur with the scope of the biota evaluation. However, it should be noted that the biological resources on this property are very important to the species of special concern and these biota resources must be considered in the context of the remaining resources within the region.

Cultural Resources: Concur with the scope of the cultural resources evaluation. However, checklist item f. was checked as no impact when CPO believes that this project will have a substantial adverse effect on the value of Lady Face Mountain as a unique geologic feature. The damage that this project may cause to Lady Face must be included in the EIR.

Mineral Resources: Concur with the deletion of this issue.

Agricultural Resources: The portion of the property located adjacent to Cornell currently serves as pasture land and should be considered for its agricultural value. Use of this site will convert land being used for low-intensity agriculture to alternative uses. This loss of pastoral open space should be considered in the EIR.

Visual Qualities: Concur with inclusion of issues a. through c. We also feel that the clustering of development creates a visual setting that is out of character (item d.) with the

adjacent uses which are low density residential uses. This contrast is one of the primary concerns for CPO, i.e., creating a different neighborhood model compared to the existing visual setting. Such higher density clustering sets a precedent for our portion of the Cornell community and the visual impact of such a change needs to be evaluated and assessed for significance of impact. We are hearing about the possibility of very high retaining walls on Lady Face and such walls could create significant visual impacts on this major scenic corridor adjacent to Kanan Road.

Traffic/Access: Traffic impacts are a major concern, but the Initial Study dismisses one of the major concerns we have, traffic hazards. Project entrances onto Kanan and Cornell have very poor sight distance circumstances and the speed of traffic on both roads creates very significant hazards along these roadways. These hazards and potential design requirements or mitigation to control them are an critical issue to be addressed in the EIR. This topic must be added to the scope of the EIR. Similarly, parking for residences must be carefully examined. Parking along Cornell and Kanan creates significant hazards. This constrains future residential activities, such as birthday or other gatherings because there is insufficient parking for such events. Thus, one can envision circumstances in the future where the typical residential events will lead to significant traffic hazards along these roadways. This issue needs to be added to the scope of the EIR.

Sewage Disposal: Concur with inclusion of this issue in the evaluation.

Education: Concur with inclusion of this issue in the evaluation.

Fire/Sheriff: Concur with inclusion of this issue in the evaluation. A key issue of concern is adequacy of water storage for fire flow requirements. Another issue is availability of emergency access during weekend traffic jams on local roadways.

Utilities/Other Services: It appears that the public water supply question was checked in the wrong place. We have major concerns regarding overall water supply availability to the local water purveyor given the current State drought and are equally concerned regarding the adequacy of the local water storage and distribution facilities. A detailed evaluation of this project and cumulative demand on the available water and infrastructure is a key issue of concern. Under item e., please define all of the offsite utility infrastructure improvements that will be necessary to support this project so it can be determined what indirect effects may be caused by approval of the project.

General: We do not concur with the finding regarding "no impact" on the pattern, scale and character of the community. As described above, the cluster development will conflict with the existing development within the Cornell/Kanan corridor and this issue needs to fully examined as part of a policy review in the context of the adopted Area Plan.

Environmental Safety: Concur that this project does not raise significant environmental safety issues, with the exception of fire hazards and traffic hazard issues previously identified.

Land Use: This project may have substantial conflicts with the adopted Area Plan. As mentioned above, the primary concern is that the project cannot be developed as proposed without conflicts with various goals, objectives and policies of the plan. Several of these issues relate to Hillside Management Criteria and related hillside development issues adjacent to Lady Face Peak. Other issues relate to consistency of the proposed development with the surrounding development and the Area Plan policies. A full evaluation of these policies is essential to determine whether the project is consistent with the land use designations.

Population/Housing/Employment/Recreation: Concur with the findings under this section including the increased demand for recreation.

In addition to the above issues, a comprehensive evaluation of cumulative impacts should be provided in conjunction with this proposed project and an appropriate evaluation of alternatives should be included. CPO has many members with development and architectural backgrounds, and we are developing an alternative that will be submitted to the County for consideration in the EIR. We have approached this alternative with the objective of creating a feasible project that would be consistent with and integrated into the local community.

We look forward to reviewing the Draft EIR once it is distributed. Please note that we have requested three copies, with at least one hard copy for review by our membership. If you have any questions, please do not hesitate to give me a call.

Sincerely,

Tom Dodson

Tom Dodson
cc: Cornell Preservation Organization

# C. INTER-DEPARTMENTAL REVIEW COMMENTS

The following Los Angeles County agencies provided comments on the Inter-departmental Screen Check Draft Environmental Impact report circulated from November 8, 2004 through March 10, 2005.

- County of Los Angeles Sheriff's Department (November 30, 2004)
- County of Los Angeles Sheriff's Department (December 6, 2004)
- County of Los Angles Fire Department (February 18, 2005)
- County of Los Angeles Public Library (March 8, 2005)
- County of Health Services (December 28, 2004)
- Department of Parks and Recreation (December 2004)

County of Los Angeles
Sheriff's Department Headquarters
4700 Ramona Boulevard
Monterey Park, California 91754-2169

LEROY D. BACA, SHERIFF

November 30,2004

Mr. Gary T.K. Tse, Director
Facilities Planning Bureau
1000 South Fremont Avenue
Alhambra, CA 91803

Triangle Ranch Project Environmental Impact Report

The Triangle Ranch Project is project analysis is based on the stipulation of 81 residential dwellings constructed on existing vacant land adjacent to the City of Agoura Hills.

**IMPACT ON SHERIFF SERVICES**

Law enforcement services for the project area are provided exclusively by the Los Angeles County Sheriffs Department Lost Hills Station. The current ratio for police services in relation to population is 1.3 deputies/1000 residents. The addition of approximately 324 residents in the project area increases the demand for law enforcement by requiring the addition of 0.50 deputies. This share of law enforcement increase should be factored into the permits for the project.

The current Sheriff's station that services the area can accommodate additional staffing and no modifications to that facility would be required.

While the security of a gated community is desirable to some, it often creates delays in emergency services. The Fire department relies on a universal key system and has only one or two vehicles to enter the community. This system is not feasible for the Sheriff's Department due to the randomness of vehicles servicing the area. Thus, the Sheriff's Department commonly relies on using the current gate code.

While a gate code system in not inherently inadequate, changes in the gate code often are not relayed to the Sheriff's Department in a timely manner. Residents should be advised to provide this number anytime they contact the Sheriff's Department. Additionally, the Home Owners Association of similar community organizations should be required to update and verify these gate codes with the local Sheriff's Station on a regular basis.

**TRAFFIC IMPACT STUDY**

As related in the study, the current project will add to already overburdened streets and intersections in the area. Although the project will not significantly increase the congestion in the area, it should be required to contribute its fair share for future improvements to the Kanan Road and Agoura Road segments. This includes the freeway ramps on Kanan Road.

During the summer months, northbound traffic on Kanan Road south of Agoura Road backs up for up to one mile south of that intersection in the afternoon. Although the project will not significantly increase the traffic, it will contribute to a longer period of gridlock that is common in the summer months. Thus, as part of the fair share contribution, improvements to Kanan Road south of Agoura Road should include the widening of the roadway to two lanes in each direction.

In order to mitigate current and future traffic congestion, consideration should be given to signalization of the Kanan Road/Cornell Way intersection, and the Agoura Road/Cornell Road intersection. Also, some analysis should be mentioned regarding the re-alignment of Cornell Way at the intersection with Kanan Road in order to move it farther south, or eliminate it altogether, in order to reduce conflicts with the Kanan Road/Agoura Road intersection.

Finally, the intersection of Cornell Way/Cornell Road could be straightened or improved to eliminate the northbound right turn by making it a curved through roadway.

These modifications address the current needs of the area and in no way reflect major changes created by this project. Should any and all of these improvements be undertaken, the project should contribute its fair share to the completion of traffic calming enhancements.

If you have any further concerns, please feel free to contact Sergeant Philip Brooks at (818) 878-1808, extension 3062.

Sincerely,

LEROY D. BACA, SHERIFF

Thomas G. Martin, Captain
Malibu/Lost Hills Station

*County of Los Angeles*
**Sheriff's Department Headquarters**
*4700 Ramona Boulevard*
*Monterey Park, California 91754-2169*

*Leroy D. Baca, Sheriff*

December 6, 2004

Hsiao-ching Chen, Ph.D., AICP
Impact Analysis Section
County of Los Angeles
Department of Regional Planning
320 West Temple Street, Room 1348
Los Angeles, California 90012

Dear Ms. Chen:

**REVIEW OF SCREENCHECK DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE "TRIANGLE RANCH" PROJECT**

This is in response to your letter dated November 4, 2004, for the above identified project. We have completed our review and assessment of the project description and plans. For our comments please see the attached letter from Thomas G. Martin, Captain of Malibu/Lost Hills Sheriff's Station.

Should you have any questions regarding this matter, please contact Mr. Mike Kameya, of my staff at (626) 300-3013.

Sincerely,

LEROY D. BACA, SHERIFF

Gary T. K. Tse, Director
Facilities Planning Bureau

GTKT:MKmk/ij

cc: Thomas G. Martin, Captain, Malibu/Lost Hills Sheriff's Station
Philip Brooks, Sergeant, Malibu/Lost Hills Sheriff's Station
Victor Rampulla
Adrianne Ferree
Mike O'Shea
Mike Kameya
Chrono
File
(ScreencheckEIRforTriangleRanchProj)

# COUNTY OF LOS ANGELES

**FIRE DEPARTMENT**

1320 NORTH EASTERN AVENUE
LOS ANGELES, CALIFORNIA 90063-3294

(323) 890-4330



RECEIVED
FEB 28 2005



P. MICHAEL FREEMAN
FIRE CHIEF
FORESTER & FIRE WARDEN


February 18, 2005

Mr. Daryl Koutnik
Impact Analysis Section
Department of Regional Planning
320 West Temple Street
Los Angeles, CA 90012

Dear Mr. Koutnik:

**SCREENCHECK DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE TRIANGLE RANCH PROJECT, COUNTY PROJECT AND OTP #97-178/TRACT MAP #52419, STATE CLEARINGHOUSE #1998111091, "CITY OF AGOURA" (EIR #2175/2004)**

The Screencheck Draft Environmental Impact Report for the proposed aforementioned project has been reviewed by the Planning Division, Land Development Unit, and Forestry Division of the County of Los Angeles Fire Department. The following are their comments:

**PLANNING DIVISION:**

We would like to clarify one of the mitigation measures for project impact on fire protection service (pp. S-32, III.M.1-11). The developer fee is a set amount per square foot of building space, periodically adjusted. The amount cited in the report was current as of the time of writing. Since the fee is due and payable at the time of building permit issuance, the actual amount will differ, depending on the rate in effect at the time that each lot is ready for construction.

**LAND DEVELOPMENT UNIT:**

The Fire Prevention Division, Land Development Unit has no additional comments regarding this project. The conditions that were detailed in the letter dated July 23, 2004 (EIR #2030/2004) have not been changed at this time.

Should any questions arise regarding subdivision, water systems, or access please contact Inspector Marvin Dorsey at (323) 890-4243.

**FORESTRY DIVISION:**
The statutory responsibilities of the County of Los Angeles Fire Department, Forestry Division include erosion control, watershed management, rare and endangered species, vegetation, fuel modification for Very High Fire Hazard Severity Zones or Fire Zone 4, archeological and cultural resources, and the County Oak Tree Ordinance.

The areas germane to the statutory responsibilities of the County of Los Angeles Fire Department, Forestry Division have been addressed. However, our Environmental Review Unit is currently in the process of reviewing a previously requested revision of the current Oak Tree Permit pertaining to this project (see enclosed). Our final review and recommendations will be forthcoming for your review.

If you have any additional questions, please contact this office at (323) 890-4330.

Very truly yours,

David R. Leininger

DAVID R. LEININGER, CHIEF, FORESTRY DIVISION
PREVENTION BUREAU

DRL:lc

Enclosure

# LOS ANGELES COUNTY FIRE DEPARTMENT
# ENVIRONMENTAL REVIEW FEES & DEPOSITS

Effective September 11, 1991, whenever a review for impact on the fire prevention, natural resources, and/or fire resource allocation responsibilities of the Fire Department is required, as part of the environmental review process, the applicant shall pay a minimum deposit fee of $1,000 from which actual costs shall be billed and deducted. Additional deposits may have to be made if actual review costs exceed 80% of deposited funds. A larger deposit may be made for more complex projects to ensure prompt continuation of environmental review efforts. All unused funds shall be refunded to the applicant.

All Environmental Review Deposits should be made payable and sent to:

Los Angeles County Fire Department
P.O. Box 910901
Commerce, CA 90091-0901
Attn: Fiscal Services Division

If you have any questions regarding the Environmental Review Fee or Deposit amount, please call the Forestry Division at (323) 890-4330.

If you have any questions regarding your Environmental Review Deposit status, please contact the Fiscal Services Division at (323) 838-2345.

County of Los Angeles Public Library
7400 East Imperial Hwy., P.O. Box 7011, Downey, CA 90241-7011
(562) 940-8461, TELEFAX (562) 803-3032

Library

MARGARET DONNELLAN TODD
COUNTY LIBRARIAN

March 8, 2005

TO: Hsiao-ching Chen
Los Angeles County Department of Regional Planning

FROM: Malou Rubio
Head, Staff Services

SUBJECT: **TRIANGLE RANCH**
**PROJECT No. 97-178, TENTATIVE TRACT MAP No. 52419**

This is in response to your invitation to submit comments on the Draft EIR for the Triangle Ranch Project. Please update the Public Library section with the following information.

**Page III.M.4-1**

- The Public Library has a collection of *8.2* million volumes in addition to magazines, newspapers, and other media.

Table III.M.4-1:

- The Agoura Hills Library is *17,722 sq. ft.* and has a collection of *131,571* books and other materials.
- The Westlake Village Library has a collection of *62,407* books and other materials. The hours of operation for the Westlake Village Library are *11:00 am - 6:00 pm* on Thursdays and Fridays.
- The Las Virgenes Bookmobile has a collection of *14,543* books and other materials. The hours of operation for the Bookmobile are Monday, Tuesday, Wednesday and Friday from 10:00 am – 12:00 pm and 1:30 – 3:30 pm. The Bookmobile does not operate on Thursdays.

**Page III.M.4-2**

- The current library facilities mitigation fee (developer fee) for Planning Area 7, as of July 1, 2004, is $680 per dwelling unit. This would result in a total fee obligation of $55,080 (81 x $680). The County Library Developer Fee is subject to an annual CPI adjustment, and the actual amount of the fee will be that in effect at the time the building permits for the project are issued. Therefore, the total fee obligation for this project may be higher.
- The Agoura Hills Library serves a population of approximately *23,518.*
- The Westlake Village Library serves a population of *9,537.*

**Page III.M.4-3**

- The Public Library uses an average persons per household (APPH) of 3.09. Using an APPH of 3.09, the development of 81 residential units would result in an estimated increase of 250 persons. This would generate a need for an additional 125 square feet of library space and 688 books and other materials.

- The construction of permanent space, which would be required as a result of the estimated population increase, would not be expected to result in significant environmental impacts. However, there would be a significant impact on the library and library services.

- Payment of the Public Library fee would reduce impacts on library services to less than significant. Therefore, no *additional* mitigation measures are recommended.

**Page III.M.4-4**

- The construction of permanent space, which would be required as a result of the cumulative impact, would not be expected to result in significant environmental impacts. However, there would be a significant impact on the library and library services.

- The current library facilities mitigation fee (developer fee) for Planning Area 7 as of July 1, 2004, is $680 per dwelling unit. This would result in a total fee obligation of $55,080 (81 x $680). The County Library Developer Fee is subject to an annual CPI adjustment, and the actual amount of the fee will be that in effect at the time the building permits for the project are issued. Therefore, the total fee obligation for this project may be higher.

If you have any questions or require additional information regarding this matter, please contact Malaisha Hughes at (562) 940-8455.

MR:MH:mh
U:\STAFFSERVICES\DEVELOPER FEE\EIR\Triangle Ranch.doc

c: David Flint, Assistant Director, Finance & Planning, Public Library

COUNTY OF LOS ANGELES
DEPARTMENT OF HEALTH SERVICES
**Public Health**

THOMAS L. GARTHWAITE, M.D.
Director of Health Services and Chief Medical Officer

JONATHAN E. FIELDING, M.D., M.P.H.
Director of Public Health and Health Officer

**Environmental Health**
ARTURO AGUIRRE, R.E.H.S., M.A.
Director of Environmental Health

**Bureau of Environmental Protection**
**Solid Waste Management Program/L.A. County LEA**
5050 Commerce Drive Baldwin Park, California 91706-1423
TEL (626) 430-5540 • FAX (626) 813-3022
www.lapublichealth.org/eh

BOARD OF SUPERVISORS
Gloria Molina
First District
Yvonne Brathwaite Burke
Second District
Zev Yaroslavsky
Third District
Don Knabe
Fourth District
Michael D. Antonovich
Fifth District

December 28, 2004

Hsiao-ching Chen
Department of Regional Planning
Impact Analysis Section
320 West Temple Street
Los Angeles, CA 90012

**SUBJECT: SCREENCHECK DRAFT ENVIRONMENTAL REPORT**
**THE "TRIANGLE RANCH" PROJECT**
**COUNTY PROJECT NUMBER 97-178 / TRACT MAP NO. 52419**
**STATE CLEARINGHOUSE NO. 1998111091**

Dear Ms. Chen:

The staff of the Los Angeles County Department of Health Services, Solid Waste Management Program (SWMP), thank you for the opportunity to review and comment on the section of "Solid Waste Disposal" that was inadvertently omitted from the DEIR submitted on November 8, 2004.

**Environmental Setting (Page III.N.3-1)**

Second paragraph: the word landfill should be added to the Calabasas wasteshed to clarify that reference is not to the City of Calabasas. Same paragraph to avoid confusion only one unit should be used "tons".

The daily incoming tonnage needs to be updated throughout the document (Page III.N.3.1, N.3-4, and N.3.7). The current tonnage between November 03 to 04 has been 1730 tons per day.

Third paragraph: The Sunshine Canyon Landfill is not operated by the County or City of Los Angeles it is operated by Browning-Ferris Industries of California, Inc.-Allied.

**Household Hazardous Waste (Page III.N.3-2)**

Please expand on the last statement regarding the household hazardous waste. Describe where all the household hazardous waste will be taken and who will handle and process the household hazardous waste.

**Table III.N.3-1 Project/Cumulative Solid Waste Generation (Page III.N.3-5)**

Under Related Projects: Multiple Family D.U.s/Generation Factor it indicates .0 lbs/day this cannot be correct a number must be identified to reflect generation of solid waste. When you divide the total solid waste generation 2,290 by 458 units is 5 lbs/day.

**Household Hazardous Waste (Page III.N.3-6)**

In the first sentence it states "the project may generate household hazardous waste which could adversely affect existing hazardous waste management facilities in this County, which are inadequate to handle the hazardous waste currently generated". Please clarify the statement above and how it will have a significant or an adverse impact on the project.

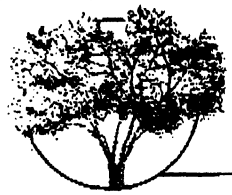
**Cumulative Impacts (Page III.N.3-7)**

The cumulative impacts of construction activities need to be mentioned.

We look forward to reviewing the EIR when it becomes available. If you have any questions, please call me at (626) 430-5540.

Very truly yours,

Pete Oda, REHS IV
Solid Waste Management Program



COUNTY OF LOS ANGELES
DEPARTMENT OF PARKS AND RECREATION
*"Creating Community Through People, Parks and Programs"*

December 4, 2004

TO: Ms. Hsiao-ching Chen
Department of Regional Planning
Impact Analysis Section

FROM: Larry Hensley
Chief, Planning Division

SUBJECT: **SCREENCHECK DRAFT ENVIRONMENTAL IMPACT REPORT THE "TRIANGLE RANCH" PROJECT COUNTY PROJECT NUMBER 97-178 / TRACT MAP NO. 52419**

The Department of Parks and Recreation has reviewed the Screencheck Draft Environmental Impact Report for the proposed Triangle Ranch project. We concur with the finding that the proposed project could require new or expanded recreational facilities for future residents. The applicant has chosen to fulfill the Quimby requirement by paying in-lieu fees resulting in no contribution of land or recreational amenities to the Department. The proposed project is within County unincorporated lands so in-lieu fees should be paid solely to the Department of Parks and Recreation and not split with the City of Agoura Hills (M.5-1). The Department accepts the alignment and easement for the Zuma Ridge Trail.

If you have any questions, please contact me at (213) 351-5098.

LH:bm(c:response-traingleranch)

c: Gil Lopez, Parks and Recreation
James Barber, Parks and Recreation
Joan Rupert, Parks and Recreation
Bryan Moscardini, Parks and Recreation
Tonda Lay, Parks and Recreation

# D. SEATAC MINUTES

Los Angeles County
Department of Regional Planning
Director of Planning James E. Hartl, AICP

# MINUTES OF THE SIGNIFICANT ECOLOGICAL AREA TECHNICAL ADVISORY COMMITTEE (SEATAC) MEETING OF JANUARY 5, 1998

(Approved as amended April 6, 1998)

**PERSONS IN ATTENDANCE:**

| SEATAC MEMBERS | REGIONAL PLANNING STAFF |
|---|---|
| Martin Cody, PhD | Kerwin Chih |
| Janet Fahey, PhD | Tabitha Lam |
| Richard Friesen, PhD | Daryl Koutnik, PhD |
| Tim Laughlin | |

**Project 97-178/TR52419 Representatives**

| | |
|---|---|
| Marc Melinkoff | (818) 224-4384 |
| Kathy Patey | (818) 879-4700 |
| Don Waite | (805) 495-1330 |
| Carl Wishner | (818) 879-4700 |

## MINUTES
### JANUARY 5, 1998

**AGENDA ITEMS**

1. Friesen moved and Fahey seconded to approve the December 1, 1997 Minutes as amended.

**NEW BUSINESS**

2. **Project 97-178/TR52419** - See Attachment Item 2

**********

**NOTE:**
**SEATAC MEETINGS ARE INFORMAL WORKING SESSIONS. MEMBERS ARE APPOINTED VOLUNTEERS IN AN ADVISORY CAPACITY. MINUTES ARE PREPARED BY PLANNING STAFF PRIMARILY FROM NOTES. SESSIONS ARE ALSO TAPE RECORDED BUT THE TAPES ARE PRIMARILY FOR BACK-UP USE BY STAFF. VISITORS ARE ADVISED TO TAKE PROPER NOTES AND/OR RECORD THE SESSION. ISSUES NOT DISCUSSED BY SEATAC DO NOT IMPLY TACIT APPROVAL. NEW OR CLARIFIED INFORMATION PRESENTED IN SUBSEQUENT SUBMITTALS MAY RAISE NEW ISSUES AND MAY REQUIRE FURTHER ANALYSIS. MINUTES ARE GENERALLY APPROVED AT THE NEXT SEATAC MEETING. DRAFT MINUTES MAY BE REQUESTED BUT ARE SUBJECT TO REVISION.**

# SEATAC REPORT AND COMMENTS

## PROJECT 97-178/TR52419 -

## SEATAC MEETING DATE JANUARY 5, 1998 ITEM 2

## BIOLOGICAL CONSTRAINTS ANALYSIS Dated February 14, 1997

Initial SEATAC meeting

---

**PROPOSED PROJECT:** 97-178/TR52419. The proposed project is a subdivision of ±320-acres into 143 single family and 14 open space lots, both east and west of Kanan and Cornell Roads, partially within the Las Virgenes SEA (SEA No. 6). The project requests a zone change, conditional use permit and oak tree permit in addition to the subdivision. Species covered by both the state and federal endangered species acts are present and an EIR is required.

---

**SEA DESCRIPTION:** The Las Virgenes SEA (SEA No. 6) contains a number of plants common in interior areas of southern California, but found nowhere else in the Santa Monica Mountains region. The most conspicuous of these is *Juniperus californica*, the California juniper, which has recently become scarce as a result of frequent brush fires. Also common on the hillside is *Ericameria* (*Haplopappus*) *linearifolius*, interior goldenbush, a characteristic shrub of interior hillside and desert ranges. *Calochortus venustus*, a species of the interior coast ranges of central California, is at its southern distribution limit in the Santa Monica Mountains and is found only at two other localities in the range. In addition, this is a primary locality for the federally threatened species, *Dudleya cymosa* ssp. *ovatifolia*, Santa Monica Mountains dudleya. More recently, *Pentachaeta lyonii*, Lyon's pentachaeta, has been discovered to occur in scattered populations within the surrounding coastal sage scrub and chaparral vegetation.

---

**SEATAC COMMENTS AND RECOMMENDATIONS:** (Carl Wishner abstained from SEATAC commenting on this project.)

1. The federal status "Candidate species Category 2" is not currently accepted by the U.S. Fish & Wildlife Service; if consultant wishes to acknowledge the prior status of such species then these species should be categorized differently (e.g., "former Category 2").
2. Provide a definition of what is meant by "locally sensitive".
3. The Biological Constraints Analysis contains lots of information and is a high caliber report.
4. Provide "Status" and "Potential On Site" information for those expected species listed at end of Table 1 (e.g., hairy woodpecker); there is no connection between ringtail potential for occurrence on-site and its ability to be observed (i.e., "shyness").

5. Wildlife movement discussion should be made stronger ("tightened up"); the on-site wildlife movement choke point should have higher resource sensitivity.
6. Coastal sage scrub should be discussed and listed as a separate plant community (page 11 & Figure 6); the term "undeveloped" instead of "open" more accurately describes the land surrounding the project site (top of page 29); fire does not "rejuvenate" chaparral species (page 29); clarify statement about coastal sage scrub species having roots with the "ability to regenerate after a fire" (page 31); check current spellings and generic placement of animal species (e.g., alligator lizard, white-tailed versus black-shouldered kite, plain versus oak titmouse).
7. Address potential project impacts to nesting raptors for compliance to Migratory Bird Act.

---

**ACTION TAKEN:** Further SEATAC review is required; submit full SEATAC Biota Report which includes responses addressing the above comments and recommendations.

*Los Angeles County*
*Department of Regional Planning*
*Director of Planning James E. Hartl, AICP*

# MINUTES OF THE SIGNIFICANT ECOLOGICAL AREA TECHNICAL ADVISORY COMMITTEE (SEATAC) MEETING OF APRIL 6, 1998

(Approved October 5, 1998)

**PERSONS IN ATTENDANCE:**

| **SEATAC MEMBERS** | **REGIONAL PLANNING STAFF** |
|---|---|
| Jonathan Baskin, PhD | Ellen Fitzgerald |
| Janet Fahey, PhD | Tabitha Lam |
| Frank Hovore | Daryl Koutnik, PhD |
| Carl Wishner | |

**Project 97-178/TR52419 Representatives**

| | |
|---|---|
| Wendy Brogin | (818) 906-2135 |
| Marc Melinkoff | (818) 224-4384 |
| Kathy Patey | (818) 879-4700 |
| Carl Wishner | (818) 879-4700 |

**Project 98-008/TR52455 Representatives**

| | |
|---|---|
| Jonathan Baskin | (626) 792-2382 |
| Frank Hovore | (805) 250-8311 |
| Ken Koch | (818) 879-1100 |
| Greg Medeiros | (805) 255-4003 |
| Joel Miller | (213) 450-1217 |
| Bob MacMurray | (714) 833-7800 |
| Steve Nelson | (909) 396-6478 |

## MINUTES

**APRIL 6, 1998**

**AGENDA ITEMS**

1. Fahey moved and Baskin seconded to approve the January 5, 1998 Minutes as amended.

NEW BUSINESS

2. **Project 97-178/TR52419** - See Attachment Item 2

3. **Project 98-008/TR52455** - No quorum was present for review of the Biological Constraints Analysis; the biological constraints analysis adequately meets the County requirements and applicant can proceed with submission of SEATAC Biota Report for SEATAC review.

**********

**NOTE:**
**SEATAC MEETINGS ARE INFORMAL WORKING SESSIONS. MEMBERS ARE APPOINTED VOLUNTEERS IN AN ADVISORY CAPACITY. MINUTES ARE PREPARED BY PLANNING STAFF PRIMARILY FROM NOTES. SESSIONS ARE ALSO TAPE RECORDED BUT THE TAPES ARE PRIMARILY FOR BACK-UP USE BY STAFF. VISITORS ARE ADVISED TO TAKE PROPER NOTES AND/OR RECORD THE SESSION. ISSUES NOT DISCUSSED BY SEATAC DO NOT IMPLY TACIT APPROVAL. NEW OR CLARIFIED INFORMATION PRESENTED IN SUBSEQUENT SUBMITTALS MAY RAISE NEW ISSUES AND MAY REQUIRE FURTHER ANALYSIS. MINUTES ARE GENERALLY APPROVED AT THE NEXT SEATAC MEETING. DRAFT MINUTES MAY BE REQUESTED BUT ARE SUBJECT TO REVISION.**

# SEATAC REPORT AND COMMENTS

## PROJECT 97-178/TR52419 - SUBDIVISION

## SEATAC MEETING DATE April 6, 1998 ITEM 2

## BIOTA REPORT Dated March 10, 1998

Initial SEATAC meeting (for Biota Report)

---

**PROPOSED PROJECT:** 97-178/TR52419. The proposed project is a subdivision of ±320-acres into 143 single family and 14 open space lots, both east and west of Kanan and Cornell Roads, partially within the Las Virgenes SEA (SEA No. 6). The project requests a zone change, conditional use permit and oak tree permit in addition to the subdivision. Species covered by both the state and federal endangered species acts are present and an EIR is required.

---

**SEA DESCRIPTION:** The Las Virgenes SEA (SEA No. 6) contains a number of plants common in interior areas of southern California, but found nowhere else in the Santa Monica Mountains region. The most conspicuous of these is *Juniperus californica*, the California juniper, which has recently become scarce as a result of frequent brush fires. Also common on the hillside is *Ericameria* (*Haplopappus*) *linearifolius*, interior goldenbush, a characteristic shrub of interior hillside and desert ranges. *Calochortus venustus*, a species of the interior coast ranges of central California, is at its southern distribution limit in the Santa Monica Mountains and is found only at two other localities in the range. In addition, this is a primary locality for the federally threatened species, *Dudleya cymosa* ssp. *ovatifolia*, Santa Monica Mountains dudleya. More recently, *Pentachaeta lyonii*, Lyon's pentachaeta, has been discovered to occur in scattered populations within the surrounding coastal sage scrub and chaparral vegetation.

---

**SEATAC COMMENTS AND RECOMMENDATIONS:** (Carl Wishner abstained from SEATAC commenting on this project.)

1. Report is one of the best biota reports to be reviewed by SEATAC; recommend that graphics be bound together at end of document (for ease of reading text).
2. Figure 8 does not clearly identify the middle sensitivities (i.e., S-2 & S-3 are not indicated).
3. Review aquatic habitats analysis, including survey for southwestern pond turtle, since arroyo chub (*Gila orcutti*), a species of special concern, could occur on-site (and *Gambusia* is probably present); reconsider riparian impacts more thoroughly.
4. In order to consider horse grazing as a management tool for *Pentachaeta lyonii* (on the east side of Cornell Road only), this activity needs to be quantified (e.g., number of horses per acre over what period of time); too much or wrong time of year horse grazing could become damaging to plant population; there may be mechanical control of herbs that can substitute for horse grazing benefits.

5. Lot deletions are good suggestions for mitigation to potential impacts of sensitive species.
6. Fuel modification must be sensitive to the presence of sensitive species (and incorporated into tract design); fuel modifications should be reduced wherever possible.
7. Review oak habitat impacts and discussion.
8. List of acceptable plant species (and exotic species to avoid) for landscaping purposes to be provided to homeowners is not likely to be implemented.
9. Provide new tract configuration and new impact analysis of the new design.

---

**ACTION TAKEN:** Further SEATAC review is required.

Los Angeles County
Department of Regional Planning
Director of Planning James E. Hartl, AICP

# MINUTES OF THE SIGNIFICANT ECOLOGICAL AREA TECHNICAL ADVISORY COMMITTEE (SEATAC) MEETING OF DECEMBER 7, 1998

(Approved April 5, 1999)

**PERSONS IN ATTENDANCE:**

| SEATAC MEMBERS | REGIONAL PLANNING STAFF |
|---|---|
| Jonathan Baskin, PhD | George Malone |
| Janet Fahey, PhD | Daryl Koutnik, PhD |
| Tim Laughlin | |

**Project 97-178/TR52419 Representatives**

| | |
|---|---|
| Wendy Brogin | (818) 906-2135 |
| Patrick Callihan | (562) 434-7971 |
| Woody Dike | (949) 376-3683 |
| Diane Fradkin | (949) 644-3514 |
| Marc Melinkoff | (818) 224-4384 |
| Steve Nelson | (949) 753-7001 |
| Kathy Patey | (818) 879-4700 |
| Carl Wishner | (818) 879-4700 |

## MINUTES
### DECEMBER 7, 1998

**AGENDA ITEMS**

1. Laughlin moved and Fahey seconded to approve the November 2, 1998 Minutes as written.

**OLD BUSINESS**

2. **Project 97-178/TR52419** - See Attachment Item 2

**********

**NOTE: SEATAC MEETINGS ARE INFORMAL WORKING SESSIONS. MEMBERS ARE APPOINTED VOLUNTEERS IN AN ADVISORY CAPACITY. MINUTES ARE PREPARED BY PLANNING STAFF PRIMARILY FROM NOTES. SESSIONS ARE ALSO TAPE RECORDED BUT THE TAPES ARE PRIMARILY FOR BACK-UP USE BY STAFF. VISITORS ARE ADVISED TO TAKE PROPER NOTES AND/OR RECORD THE SESSION. ISSUES NOT DISCUSSED BY SEATAC DO NOT IMPLY TACIT APPROVAL. NEW OR CLARIFIED INFORMATION PRESENTED IN SUBSEQUENT SUBMITTALS MAY RAISE NEW ISSUES AND MAY REQUIRE FURTHER ANALYSIS. MINUTES ARE GENERALLY APPROVED AT THE NEXT SEATAC MEETING. DRAFT MINUTES MAY BE REQUESTED BUT ARE SUBJECT TO REVISION.**

# SEATAC REPORT AND COMMENTS

## PROJECT 97-178/TR52419 - SUBDIVISION

## SEATAC MEETING DATE December 7, 1998 ITEM 2

## BIOTA REPORT RESUBMITTAL No. 1 Dated November 11, 1998

Previous SEATAC meeting: April 6, 1998

**PROPOSED PROJECT:** 97-178/TR52419. The proposed project is a subdivision of ±320-acres, both east and west of Kanan and Cornell Roads, into 132 single family lots on 65 acres with 255 acres of open space, partially within the Las Virgenes SEA (SEA No. 6). The project requests a zone change, conditional use permit and oak tree permit in addition to the subdivision. Species covered by both the state and federal endangered species acts are present and an EIR is required.

**SEA DESCRIPTION:** The Las Virgenes SEA (SEA No. 6) contains a number of plants common in interior areas of southern California, but found nowhere else in the Santa Monica Mountains region. The most conspicuous of these is *Juniperus californica*, the California juniper, which has recently become scarce as a result of frequent brush fires. Also common on the hillside is *Ericameria* (*Haplopappus*) *linearifolius*, interior goldenbush, a characteristic shrub of interior hillside and desert ranges. *Calochortus venustus*, a species of the interior coast ranges of central California, is at its southern distribution limit in the Santa Monica Mountains and is found only at two other localities in the range. In addition, this is a primary locality for the federally threatened species, *Dudleya cymosa* ssp. *ovatifolia*, Santa Monica Mountains dudleya. More recently, *Pentachaeta lyonii*, Lyon's pentachaeta, has been discovered to occur in scattered populations within the surrounding coastal sage scrub and chaparral vegetation.

**SEATAC COMMENTS AND RECOMMENDATIONS:**

1. Be specific as to which *Pentachaeta lyonii* management technique (page 5) will be used (i.e., mechanical, horse grazing or both).
2. Provide the rationale (page 6) for the 5:1 ratio for oak replacement (e.g., increased canopy cover).
3. The Master Landscape Plan (page 6 and elsewhere) needs to be developed and reviewed by a qualified biologist; the Plan shall include appropriate measures to exclude the use of invasive, exotic species.
4. The discussed buffer areas around some populations of *Pentachaeta lyonii* (page 9) will be meaningless where portions of these populations are located within the developed area.
5. The fragmentation discussion (page 10) does not adequately address the excessive linear design on the east nor the non-clustered extension of lots to the south into the linear-leaved goldenbush chaparral also in the east; the linear design increases habitat disruption and drainages should remain undisturbed.

6. It is agreed that some lots do need to be reconfigured (page 11, Guideline 3) to provide a more sensitively designed project for biological resources.
7. There needs to be further study of *Pentachaeta lyonii* autecology in order to devise appropriate population management techniques for the species (page 13).
8. Reword statement (last sentence) concerning SEA Guideline 4 (page 11) to more accurately indicate impacts from the proposed development.
9. Discussion of impacts to and any proposed mitigation measures for *Dudleya cymosa* ssp. *ovatifolia* are not presented.
10. The project design needs to reflect all mitigation measures to which the applicant will commit; clearly list all committed appropriate mitigation measures for biological impacts.
11. The project design should offer protection to sensitive species and should cluster lots currently proposed in linear, eastern portion.

---

**ACTION TAKEN:** Further SEATAC review is required; provide project design that will be proposed in Draft EIR and incorporating above comments and recommendations before Screencheck EIR is prepared.

# SEATAC REPORT AND COMMENTS

## PROJECT 97-178/TR52419 - SUBDIVISION

## SEATAC MEETING DATE December 7, 1998 ITEM 2

## BIOTA REPORT RESUBMITTAL No. 1 Dated November 11, 1998

Previous SEATAC meeting: April 6, 1998

**PROPOSED PROJECT:** 97-178/TR52419. The proposed project is a subdivision of ±320-acres, both east and west of Kanan and Cornell Roads, into 132 single family lots on 65 acres with 255 acres of open space, partially within the Las Virgenes SEA (SEA No. 6). The project requests a zone change, conditional use permit and oak tree permit in addition to the subdivision. Species covered by both the state and federal endangered species acts are present and an EIR is required.

**SEA DESCRIPTION:** The Las Virgenes SEA (SEA No. 6) contains a number of plants common in interior areas of southern California, but found nowhere else in the Santa Monica Mountains region. The most conspicuous of these is *Juniperus californica*, the California juniper, which has recently become scarce as a result of frequent brush fires. Also common on the hillside is *Ericameria* (*Haplopappus*) *linearifolius*, interior goldenbush, a characteristic shrub of interior hillside and desert ranges. *Calochortus venustus*, a species of the interior coast ranges of central California, is at its southern distribution limit in the Santa Monica Mountains and is found only at two other localities in the range. In addition, this is a primary locality for the federally threatened species, *Dudleya cymosa* ssp. *ovatifolia*, Santa Monica Mountains dudleya. More recently, *Pentachaeta lyonii*, Lyon's pentachaeta, has been discovered to occur in scattered populations within the surrounding coastal sage scrub and chaparral vegetation.

**SEATAC COMMENTS AND RECOMMENDATIONS:**

1. Be specific as to which *Pentachaeta lyonii* management technique (page 5) will be used (i.e., mechanical, horse grazing or both).
2. Provide the rationale (page 6) for the 5:1 ratio for oak replacement (e.g., increased canopy cover).
3. The Master Landscape Plan (page 6 and elsewhere) needs to be developed and reviewed by a qualified biologist; the Plan shall include appropriate measures to exclude the use of invasive, exotic species.
4. The discussed buffer areas around some populations of *Pentachaeta lyonii* (page 9) will be meaningless where portions of these populations are located within the developed area.
5. The fragmentation discussion (page 10) does not adequately address the excessive linear design on the east nor the non-clustered extension of lots to the south into the linear-leaved goldenbush chaparral also in the east; the linear design increases habitat disruption and drainages should remain undisturbed.

*Los Angeles County*
*Department of Regional Planning*
*Director of Planning James E. Hartl, AICP*

# MINUTES OF THE SIGNIFICANT ECOLOGICAL AREA TECHNICAL ADVISORY COMMITTEE (SEATAC) MEETING OF APRIL 5, 1999

(Approved June 7, 1999)

**PERSONS IN ATTENDANCE:**

| **SEATAC MEMBERS** | **REGIONAL PLANNING STAFF** |
|---|---|
| Janet Fahey, PhD | Tabitha Lam |
| Richard Friesen, PhD | Daryl Koutnik, PhD |
| Carl Wishner | |

**Project 94-114/PM23793 Representatives**

| | |
|---|---|
| Scott Cameron | (818) 879-1100 |
| Jack Dahl | (818) 487-0502 |

**Project 97-178/TR52419 Representatives**

| | |
|---|---|
| Wendy Brogin | (818) 906-2135 |
| Patrick Callihan | (562) 434-7971 |
| Dana Halladay | (714) 993-4500 |
| Diane Fradkin | (949) 644-3514 |
| Joe Johns | (818) 879-4700 |
| Marc Melinkoff | (818) 224-4384 |
| Steve Nelson | (949) 753-7001 |
| Kathy Patey | (818) 879-4700 |

**Project 98-060 Representative**

David Travers (818) 368-3346

## MINUTES
**APRIL 5, 1999**

**AGENDA ITEMS**

1. Fahey moved and Friesen seconded to approve the December 7, 1998 Minutes as written.

OLD BUSINESS

2. **Project 94-114/PM23793** - See Attachment Item 2

3. **Project 97-178/TR52419** - See Attachment Item 3

NEW BUSINESS

4. **Project 98-060** - See Attachment Item 4

**********

**NOTE: SEATAC MEETINGS ARE INFORMAL WORKING SESSIONS. MEMBERS ARE APPOINTED VOLUNTEERS IN AN ADVISORY CAPACITY. MINUTES ARE PREPARED BY PLANNING STAFF PRIMARILY FROM NOTES. SESSIONS ARE ALSO TAPE RECORDED BUT THE TAPES ARE PRIMARILY FOR BACK-UP USE BY STAFF. VISITORS ARE ADVISED TO TAKE PROPER NOTES AND/OR RECORD THE SESSION. ISSUES NOT DISCUSSED BY SEATAC DO NOT IMPLY TACIT APPROVAL. NEW OR CLARIFIED INFORMATION PRESENTED IN SUBSEQUENT SUBMITTALS MAY RAISE NEW ISSUES AND MAY REQUIRE FURTHER ANALYSIS. MINUTES ARE GENERALLY APPROVED AT THE NEXT SEATAC MEETING. DRAFT MINUTES MAY BE REQUESTED BUT ARE SUBJECT TO REVISION.**

# SEATAC REPORT AND COMMENTS

## PROJECT 97-178/TR52419 - SUBDIVISION

## SEATAC MEETING DATE April 5, 1999 ITEM 3

## BIOTA REPORT RESUBMITTAL No. 2 Dated February 8, 1999

Previous SEATAC meeting: April 6, and December 7, 1998

**PROPOSED PROJECT:** 97-178/TR52419. The proposed project is a subdivision of ±320-acres, both east and west of Kanan and Cornell Roads, into 123 single family lots on 65 acres with 255 acres of open space, partially within the Las Virgenes SEA (SEA No. 6). The project requests a zone change, conditional use permit and oak tree permit in addition to the subdivision. Species covered by both the state and federal endangered species acts are present and an EIR is required.

**SEA DESCRIPTION:** The Las Virgenes SEA (SEA No. 6) contains a number of plants common in interior areas of southern California, but found nowhere else in the Santa Monica Mountains region. The most conspicuous of these is *Juniperus californica*, the California juniper, which has recently become scarce as a result of frequent brush fires. Also common on the hillside is *Ericameria* (*Haplopappus*) *linearifolius*, interior goldenbush, a characteristic shrub of interior hillside and desert ranges. *Calochortus venustus*, a species of the interior coast ranges of central California, is at its southern distribution limit in the Santa Monica Mountains and is found only at two other localities in the range. In addition, this is a primary locality for the federally threatened species, *Dudleya cymosa* ssp. *ovatifolia*, Santa Monica Mountains dudleya. More recently, *Pentachaeta lyonii*, Lyon's pentachaeta, has been discovered to occur in scattered populations within the surrounding coastal sage scrub and chaparral vegetation.

**SEATAC COMMENTS AND RECOMMENDATIONS:** (Carl Wishner divulged being a consultant on this project)

1. SEATAC is of the opinion that current project design does not meet the SEA compatibility criteria required for approval of the SEA conditional use permit.
2. Include the Master landscape/Fuel modification plan in the Draft EIR; include Lyon's pentachaeta (*Pentachaeta lyonii*) management criteria in the master landscape plan; fully define what the buffer for Lyon's pentachaeta is.
3. Eastern extension (the long linear development) is not a good design feature and does not protect biological resources.
4. Impacts to *Dudleya cymosa* ssp. *ovatifolia* requires consultation with federal Fish and Wildlife Service.
5. It is suggested that the eastern project extension be removed from the project design; project should be redesigned to reduce impacts to Lyon's pentachaeta, retain the *Dudleya cymosa* population, and to avoid crossing drainage courses.

**ACTION TAKEN:** No further SEATAC review of biota report is required; responses to above comments and recommendations should be included in the Draft EIR, which will be reviewed by SEATAC during County circulation.

# MINUTES OF THE SIGNIFICANT ECOLOGICAL AREA TECHNICAL ADVISORY COMMITTEE (SEATAC) MEETING OF FEBRUARY 2, 2004

(Approved as amended March 1, 2004)

## PERSONS IN ATTENDANCE:

**SEATAC MEMBERS**

Jonathan Baskin, PhD
Martin Cody, PhD
Janet Fahey, PhD
Michael Long
Carl Wishner

**REGIONAL PLANNING STAFF**

Hsiao-ching Chen, PhD
Joe Decruyenaere
Mark Herwick, PhD
Daryl Koutnik
Carol Rosskam
Julie Striplin-Lowry
Susan Tae

**Project 02-194 Representatives**

| | |
|---|---|
| Scott Crawford | (714) 508-4100 |
| Charlie Liu | (949) 450-0590 |
| David Wan | (626) 288-2332 |

No representatives were present for Project 97-178.

# MINUTES
## February 2, 2004

**AGENDA ITEMS**

1. Wishner moved and Fahey seconded to approve the November 1, 2003 SEATAC meeting minutes as amended.

**NEW BUSINESS**

2. Project 02-194 – See Attachment Item 2.

**OLD BUSINESS**

3. Project 97-178 – See Attachment Item 3.

## DISCUSSION ITEMS

4. **SEA/General Plan Update** – General Plan Development Staff briefed SEATAC about the draft General Plan document, Shaping the Future 2025. As part of the General Plan update, staff also explained the proposed SEA regulatory structure. A more detailed SEA regulatory program will be mailed to SEATAC members for their review within the next month.

   Staff expressed the importance of SEATAC's involvement during this process and asked for their input on the proposed SEA regulatory program as well as general plan goals and policies.

5. **Natural Resource Consultants** – SEATAC had no objections to the inclusion of this consultant on the County of Los Angeles Department of Regional Planning Certified List of Consultants to Prepare SEATAC Biota Reports.

6. **David Magney Environmental Consulting** – SEATAC had no objections to the inclusion of this consultant on the County of Los Angeles Department of Regional Planning Certified List of Consultants to Prepare SEATAC Biota Reports.

**********

**NOTE: SEATAC MEETINGS ARE INFORMAL WORKING SESSIONS. MEMBERS ARE APPOINTED VOLUNTEERS IN AN ADVISORY CAPACITY. MINUTES ARE PREPARED BY PLANNING STAFF PRIMARILY FROM NOTES. SESSIONS ARE ALSO TAPE RECORDED BUT THE TAPES ARE PRIMARILY FOR BACK-UP USE BY STAFF. VISITORS ARE ADVISED TO TAKE PROPER NOTES AND/OR RECORD THE SESSION. ISSUES NOT DISCUSSED BY SEATAC DO NOT IMPLY TACIT APPROVAL. NEW OR CLARIFIED INFORMATION PRESENTED IN SUBSEQUENT SUBMITTALS MAY RAISE NEW ISSUES AND MAY REQUIRE FURTHER ANALYSIS. MINUTES ARE GENERALLY APPROVED AT THE NEXT SEATAC MEETING. DRAFT MINUTES MAY BE REQUESTED BUT ARE SUBJECT TO REVISION.**

# SEATAC REPORT AND COMMENTS

## PROJECT 97-178 – CONDITIONAL USE PERMIT, TRACT MAP 52419

## SEATAC MEETING DATE FEBRUARY 2, 2004, ITEM 3

### Screencheck EIR Dated September 2003

Previous SEATAC Meetings: January 5, April 6 and December 7, 1998; April 5, 1999; May 1, 2000

**PROPOSED PROJECT: 97-178** – The proposed project is the development of 81 single family residences, four landscape lots, and five open space lots on a 320.3 acre site south of Agoura, within SEA No. 6 (Las Virgenes), extending east and west of Cornell and Kanan Dume Roads, respectively, between the intersections of Kanan Dume/Cornell Roads and Kanan Dume/Silver Creek Roads. Off site grading to provide a 65 mile per hour sight line on Kanan Dume Road is needed and will disturb an additional 2.08 acres along the west side of the road near its intersection with Silver Creek Road.

**SEA DESCRIPTION:** The Las Virgenes SEA (**SEA No. 6**) contains a number of plants common in the interior areas of southern California, but found nowhere else in the Santa Monica Mountains region. The most conspicuous of these is *Juniperus californica*, the California Juniper. Also common on the hillside is *Haplopappus linearifolius*, a characteristic shrub of interior hillside and desert ranges. *Calochortus venustus*, a species of the interior coast ranges of central California, is at its southern distribution limit in the Santa Monica Mountains and is found only at two other localities in the range. In addition, this is the only locality in the Santa Monica Mountains where *Dudleya cymosa* grows in full sun. All other populations of the species grow on steep, north-facing rocky cliffs. The surrounding vegetation of the area consists of coastal sage scrub and chaparral. In addition to species occurring at the extremes of their ranges, the area contains populations of two federally listed plant taxa, endemic to the region. These are Santa Monica Mountains dudleya (*Dudleya cymosa* var. *ovatifolia*) and Lyon's pentachaeta (*Pentachaeta lyonii*).

The area is relatively undisturbed. No significant development has taken place. Very low-intensity recreational uses are compatible with the resources of the area. However, precautions should be taken to prevent soil compaction by visitors around the base of the California Junipers and disturbance to endangered plant species populations.

**SEATAC COMMENTS AND RECOMMENDATIONS FOR PROJECT 02-178:**

1. Carl Wishner divulged being previously involved as a biological consultant for the project; he conducted biological inventories and is aware of some of the subsequent survey activities on the site; he was last contracted by the project proponent in 1998 to conduct rare plant surveys.
2. Substantial areas occupied by Lyon's pentachaeta were disked by contractors working for the Los Angeles County Agricultural Commissioner in the spring of 2003 under the premise of weed abatement for fuel management; these areas have not recovered and are not expected to; SEATAC and Los Angeles County DRP staff are not aware of authorized 2081 agreements for such activities; this activity may constitute an illegal taking of a Federal and State Endangered species.

3. Year 2003 surveys, conducted by Impact Sciences, do not indicate this area as having been disked, and no explanation of the pentachaeta's absence from areas where it was previously known to occur is given. This discussion must be up-to-date.
4. The applicant must divulge who is responsible for the disking and what the sequence of events related to the disking was; additionally, an explanation should be given as to why disking was conducted in 2003, but not in preceding years.
5. SEA No. 6 was originally designated Class 5 (Biotic resources that are of scientific interest because they are either an extreme in physical/geographical limitations (i.e. California juniper), or they represent an unusual variation in a population or community.), but it has since been recognized as being more valuable, biologically, because of the presence of listed species; this heightened sensitivity should be called out in the EIR.
6. The proposed project bisects the largest Los Angeles County population of Lyon's pentachaeta known to exist; the development footprint should be pulled back to avoid impacts to this population; the loss of 20 percent of occupied *Pentachaeta lyonii* habitat is significant.
7. A population of Federally Threatened *Dudleya cymosa* var. *ovatifolia* will be extirpated by development west of Kanan Road.
8. The project site contains other sensitive species likely to be impacted (Coville's lip fern (*Cheilanthes covillei*) and linear-leaved goldenbush (*Ericameria linearifolia*)) and regionally significant species, such as red shank and California juniper.
9. Fuel modification activities for the proposed project will further degrade the Lyon's pentachaeta population; mitigation measures (i.e. pamphlets for homeowners describing the sensitivity of biological resources in the area) are not sufficient protection.
10. Adequate discussion of Lyon's pentachaeta management is lacking; the funding of mitigation plantings will not be adequate; HOAs are not dependable stewards of rare plant populations or upholders of CUP conditions, and more appropriate habitat management should be proposed.
11. No mechanical weed abatement is to be allowed in the future.
12. Discuss potential impacts to Red-legged frog critical habitat and downstream impacts to Medea Creek.
13. The plant palette is not adequate as a fuel modification plan, and contains species unacceptable in this area; consult with the county biologist to revise this list.
14. Seismic hazards are legally required to be disclosed to prospective buyers; this should be discussed in the DEIR; a more legible map of geological hazards should be given that presents all hazards, including liquefaction areas as depicted on State Seismic Hazard maps.
15. Flood hazards are insufficiently dealt with; address and map hazards on site relating to a 100 year flood based on FEMA maps.
16. Units proposed at the end of the eastern cul de sac should be removed.
17. The project is still considered by SEATAC to be inconsistent with the SEA; Comments and Recommendations given by SEATAC at the meeting of April 5, 1999 have not been adequately addressed.
18. The creeks on this property are considered impaired water bodies by the Regional Board because of non-point source pollution. The EIR should show water quality

objectives and beneficial uses of the creeks and discuss how runoff will be controlled so as not to increase the degradation.

---

**ACTION TAKEN:** No further SEATAC review is required; revise the Screencheck Draft EIR to address the above comments and recommendations.

# *DRAFT ENVIRONMENTAL IMPACT REPORT*

## *TECHNICAL APPENDICES*

# *Vesting Tentative Tract No. 52419*

***Volume 1 of 2***

**County of Los Angeles**

**Los Angeles County Project No. 97-178**

March, 2005

# Draft Environmental Impact Report

## Technical Appendices
## Volume 1 of 2

**Vesting Tentative Tract No. 52419**
**Triangle Ranch**

County of Los Angeles Project No. 97-178
SCH 1998111091

Tentative Tract No. 52419
Conditional Use Permit
Oak Tree Permit

County of Los Angeles
Department of Regional Planning
320 West Temple Street
Los Angeles, California 90012

March 2005

# Technical Appendices
# Volume 1 of 2

## TABLE OF CONTENTS

A. Geotechnical Reports

A-1 Pacific Soils Engineering, Inc., EIR-level Geotechnical Study, Live Oak Ranch, Vesting Tentative Tract 52419 (Revised), County of Los Angeles and City of Agoura Hills, California, January 22, 1999

A-2 Supplemental Geotechnical Investigation and Revision Received Vesting Tentative Tract Geotechnical Review, Vesting Tentative Tract 52419, County of Los Angeles, California, May 15, 2000

A-3 Pacific Soils Engineering, Inc., Updated Geotechnical Report, Revised Tentative Tract Map, Alternate Site Plan "B" - 81 Lots, Tentative Tract No. 52419, Triangle Ranch, Agoura Area, County of Los Angeles, California, June 30, 2003

A-4 Pacific Soils Engineering, Inc., Updated Geotechnical Report, Revision Received Map, Vesting Tentative Tract No. 52419, Triangle Ranch, Agoura Area, County of Los Angeles, California, June 1, 2004

B. Air Quality Impact Analysis

Giroux and Associates Environmental Consultants, Air Quality Impact Analysis, Triangle Ranch, Tract No. 52419, County of Los Angeles, California August 12, 2003

C. Biological Resources Background Materials

C-1 Envicom Corporation, Biological Constraints Analysis for the Beautiful City Site, Agoura Hills, California; February 14, 1997

C-2 Envicom Corporation, Biota Report for the Beautiful Homes Site, Los Angeles County; March 10, 1998

C-3 Envicom Corporation, Biota Report Resubmittal No. 1 for the Beautiful Homes Site, Los Angeles County; revised November 11, 1998

C-4 Envicom Corporation, Biota Report Resubmittal No. 2 for the Beautiful Homes Site, Los Angeles County; revised February 9, 1999

C-5 Tree Life Concern, Inc., County Oak Tree Report, Tentative Tract No. 52419, Los Angeles County, September 13, 2004

# APPENDIX A

# GEOTECHNICAL REPORTS

# APPENDIX A-1

**EIR-Level Geotechnical Study, Live Oak Ranch, Vesting Tentative Tract 52419 (Revised), County of Los Angeles and City of Agoura Hills, California, prepared by Pacific Soils Engineering, Inc.; January 22, 1999**

**PACIFIC SOILS ENGINEERING, INC.**
10653 PROGRESS WAY, P.O. BOX 2249, CYPRESS, CALIFORNIA 90630
TELEPHONE: (714) 220-0770, FAX: (714) 220-9589
*(Corporate Headquarters)*

**SAGE COMMUNITY GROUP, INC.**
3 Corporate Plaza, Suite 102
Newport Beach, CA 92660

January 22, 1999

Work Order 101568-L

Attention: Ms. Diane Furtado Fradkin

Subject: **EIR-LEVEL GEOTECHNICAL STUDY**
Live Oak Ranch
Vesting Tentative Tract 52419 (Revised)
COUNTY OF LOS ANGELES, CALIFORNIA

References: (see Appendix I)

Gentlemen:

In accordance with your request, Pacific Soils Engineering, Inc., (PSE) has carried out an EIR-level geotechnical feasibility study of the subject site -- the findings of which are contained in this report. Comments in this transmittal are based upon a field investigation documented in a Preliminary Geotechnical Report completed in 1988 (PSE, 1988), a November 26, 1997, geotechnical feasibility study (PSE, 1997) carried out for a previous developer, recent unreported backhoe trenches and seismic lines completed in early 1998; and an 80-scale Revised Vesting Tentative Map (RVTTM), dated January 19, 1999, that was prepared by Wagner-Pacific, Inc., the current project Civil Engineer. A copy of the map, on which pertinent geological information has been plotted, accompanies this report as Plate I (two sheets, in pocket). The purpose of this report is to provide initial geotechnical information and recommendations for project planning/design, and for Environmental Impact Report (EIR) requirements.

## 1.0 SITE LOCATION AND DESCRIPTION

The study site is bisected by Kanan Road in the Agoura Hills area of western Los Angeles County, southerly of the Ventura Freeway (U.S. 101). As shown on the Vicinity Map on Plate I, the western part of the site flanks Kanan Road from its intersection with Cornell Road on the north to Silver Creek Road on the south. The eastern part is northeasterly adjacent to the intersection of Cornell and Silver Creek Roads, and is bordered on the west

by Cornell Road. Access to the west part of the site is via unimproved roads emanating from Kanan Road. The eastern parcel can be traversed only with off-road vehicles or by foot.

Two residences and a fire station border the west margin of the part of the site east of Cornell Road. Residences border the south-central margin of the site between Kanan and Cornell Roads. Elsewhere, the site is immediately bordered by undeveloped property or roadways.

The approximately 330-acre site is essentially undeveloped, except for peripheral cut slopes and fills associated with Kanan and Cornell Roads, and a canyon fill near borings B-5 through B-7 (see Plate I). Vestiges of graded pads and an old concrete pad probably used for agriculture exist near trenches T-22 through T-28. A pipe, possibly an old water well, was encountered near trench T-28.

Topographically, the area to be developed west of Kanan Road lies near the base of a series of easterly and westerly trending spur ridges that protrude from a large east-trending major ridge or "cuesta" (see Plate I). Slope ratios vary from nearly flat in Medea Creek to 1½:1± (horizontal to vertical) on the spur ridges. Local relief near the area of proposed development west of Kanan Road varies from about 200 feet to 700 feet.

The eastern parcel consists of a series of westerly trending ridges with numerous small northerly and southerly trending spurs. Natural slopes vary from 3:1 to 1½:1 with local gentler and steeper elements, and vary up to about 200 feet high. The ridges are separated by numerous westerly-draining canyons and valleys; all of which were dry in August 1988 and March 1998.

The site supports a variety of vegetation. In particular dense chaparral and scrub oak cover much of the area west of and near Kanan Road, as well as most north-facing natural slopes. Thick chaparral and sparsely covered grasslands are common east of Cornell Road. Both individual and stands of live oak are scattered throughout the property.

## 2.0 PROPOSED DEVELOPMENT

According to the Revised Vesting Tentative Tract Map (Plate I), it is proposed to use conventional cut-fill grading, as well as yet unspecified retaining/crib walls, to create 132 pads suitable for single-family residences and to create appurtenant roadways.

Proposed cut slopes shown on Plate I have 2:1 (horizontal to vertical) slope ratios to a maximum height of 70 feet. Fill slopes are also shown as 2:1, and are planned up to about 50 feet high. Maximum planned depths of cut and fill are approximately 70 and 47 feet, respectively.

The current plan (Plate I) indicates that retaining wall, crib-type and gabion-type walls, up to 31 feet high, are to be used to create level space. Design and construction of the walls must be in conformance with the recommendations of the wall manufacturers, the geotechnical engineer, and the governing codes.

## 3.0 PREVIOUS GEOTECHNICAL INVESTIGATIONS

A PSE 1988 field investigation included geologic reconnaissance mapping and logging of 58 backhoe trenches and four (4) bucket-auger borings by representatives of this firm. Also, nine (9) shallow refraction seismic lines, useful for estimating rock rippability, were completed by Mr. E.R. Browne, a California-registered geophysicist. A recent (March 1998) investigation included logging by PSE of 48 backhoe trenches and completion of 16 additional seismic lines by Mr. Browne. The Log of Trenches are contained in Appendix II of this report as Table I, the Log of Borings as Plates A-4 through A-7; and the seismic line profiles as Plates S-5 through S-30 in Appendix IV. It should be noted that, because the 1988 investigation of the subject parcel was concurrent with an adjoining project, the Log of 1988 Trenches begins with trench number T-22, the Log of Borings with B-4, and seismic lines at S-5. The locations of trenches and borings, along with other geological data gathered during exploration, are plotted on the enclosed copy of the aforementioned 80-scale RVTTM (Plate I).

Bulk and drive tube samples of representative site materials were taken in various exploratory excavations. Pertinent laboratory soil tests were conducted on these samples and the results of those tests are presented in Table II, Plates B-1 through B-14, and Plates C-1 through C-3 (Appendix II).

Because exploration was accomplished prior to the plan shown on Plate I, it is likely that additional investigative efforts may be required by the governing agencies prior to technical approval.

## 4.0 GEOLOGY

The project is on the north flank of the Santa Monica Mountains, a major east-west trending structural block within southern California. These mountains, in a very general sense, are an uplifted westerly trending anticline composed mainly of Tertiary sedimentary and volcanic rocks on a core of Mesozoic crystalline basement rock. The local geology is consistent with the regional geology in that the site is underlain by a sequence of northerly dipping Miocene volcanic rocks (Conejo Volcanics) and minor sedimentary rock of the Modelo Formation. The bedrock is mantled with Quaternary/Holocene terrace deposits, valley fill, alluvium, colluvium, artificial fill and, locally, talus.

### 4.1 Stratigraphy

In approximate order of deposition, from oldest to youngest, the following bedrock and surficial units have been mapped on or near the site.

#### 4.1.1 Conejo Volcanics (Map Units: Tcb, Tcm)

Several different types of volcanic rock assigned to this middle Miocene-aged formation have been identified on the site. Based on recent field observations by this firm and others (Weber, 1984), the sequence is virtually all extrusive and composed mainly of basalt/ andesite flows, flow breccia, and agglomerate.

Where observed in outcrops, artificial cuts, and exploratory excavations, the rock is generally well-indurated and hard below a weathered "corona" of several

to tens of feet thick. Locally, very hard outcrops are present at the surface as isolated knobs and as discrete beds a few to a few tens of feet thick. Andesite flows mainly account for the most resistant beds. In sum, the visually striking terrain owes its existence to the resistant volcanic bedrock.

Bedding features within the Conejo Volcanics are principally flow boundaries. These vary from well-developed and planar for short distances to poorly developed and undulatory. In most exploratory excavations, bedding was not readily apparent because of either the massiveness of the rock or because the excavating equipment could not penetrate to sufficient depths to identify planar bedding structures.

### 4.1.2 Valley Fill (Qvf)

This unit is composed of unconsolidated to consolidated brown to reddish brown clayey sands with some gravel, cobbles, and occasional boulders. These deposits occur above the modern valley floor and are interpreted to be remnants of a rather extensive alluvial fill deposited during the Pleistocene. They are characterized by broad, relatively flat, dissected "caps" on several of the lower ridges.

It should be noted that these deposits, where observed, contained far fewer boulders than other surficial deposits; suggesting a low energy depositional environment unable to transport large boulders, such as a low-gradient valley.

### 4.1.3 Terrace Deposits (Qt)

Near trenches T-74 and T-127, thin, very hard, veneers of cobbly material mantle the bedrock. They are surmised as being either remnant upstream deposits coeval with the valley fill, relict paleosols, or combinations thereof. Other such deposits may exist on the site, but probably will not significantly impact future development.

#### 4.1.4 Alluvium (Qal)

Later Quaternary and Holocene stream-deposited sediments commonly occur in valleys and swales. Based upon observation of numerous exploratory trenches excavated into these materials, they are composed mainly of poorly consolidated mixtures of sand, silt, clay, and abundant large boulders. It may be anticipated that all alluvium will require removal in areas to be developed, with the possible exception of some in Medea Creek. Where encountered over the project, alluvium averages about 7 to 10 feet deep, but may be locally deeper; particularly at Medea Creek.

#### 4.1.5 Colluvium (Qcol)

Bouldery, loose, soil-like materials that have crept or been washed short distances downslope occupy most draws and slope flanks. Because of the small scale map inherent to the present level of study, only the surmised larger deposits are shown on Plate I. Undoubtedly, others exist.

It should be anticipated that all colluvium will have to be removed in areas to be developed. Such deposits vary from 4 to 15 feet deep, where observed.

#### 4.1.6 Artificial Fill (af)

Several significant deposits of artificial fill exist on or near site. The largest accumulation is near borings B-5 through B-7. Boring B-6, placed in 1988, encountered about 25 feet of canyon fill. The canyon fill, however, has been an active disposal and borrow area, thus the depth of fill has increased and decreased through time. Field observations, measured densities, and consolidation tests of undisturbed samples all indicate this fill is not compacted, nor placed on suitable bearing material. It is of poor quality and undoubtedly contains large rocks. This area has apparently served as a fill disposal/borrow area for many years, and thus the surface elevation of the deposit has varied through

time. In order to identify the depth of the present fill prism, it is likely that additional drilling may be required.

Similar fill deposits occupy the surfaces of two partly graded knobs on the east side of Kanan Road, about opposite the aforementioned fill; although apparently neither as extensive nor as deep, they are also of poor quality. Based on the backhoes trenches, this fill is locally deeper than 13 feet.

Fill to several (8±) feet thick exists near trenches T-22 through T-28. This fill is the result of the grading of several pads. It is uncompacted and rests on porous colluvium/soil.

Road fill embankments placed across canyons and draws during grading for Kanan and Cornell Roads are present at several places adjacent to the subject property (see Plate I, pocket enclosure). These fills will have some impact on future development in that, where these fills cannot be removed to firm bearing material, structural setbacks may be necessary in order to alleviate damage to future adjacent structures resulting from compression and settlement

### 4.1.7 Landslides/Mass Wasting

No significant landslides were mapped on the site. Previous work (Weber, 1984) suggested possible, but unlikely, on-or near-site landslides near trenches T-23 and T-24 and near the east-draining canyon in the southeast corner of proposed develop- ment. Backhoe trenches (for example, trenches T-23 and T-24), as well as the presence of undisplaced marker beds across the areas of concern, revealed such features to be the result of differential weathering. Occasional small slumps exist locally. These are items, however, that can be mitigated during future grading. Where applicable, they will be addressed during review of future plans.

In general, the strength of the Conejo Volcanic bedrock, combined with the relative steep dips of bedding within the rock and generally shallow soil cover, provides for relatively stable slopes that are not particularly susceptible to landsliding. Landslides are thus uncommon locally.

However, if now-unrecognizable landslides are encountered during future exploration, remedial recommendations will be formulated based on data gathered.

Talus and some loose boulders occur on some on-site or superjacent natural slopes, particularly easterly superjacent to Cornell Road. Catchment devices or possible setbacks may be necessary, however, such should be determined during plan review or during grading pending an evaluation of exposed field conditions.

## 4.2 Geologic Structure

On and near the site, the geologic structure is relatively simple, essentially consisting of a steeply north-dipping homocline. Where noted, bedding planes/flow contacts dip consistently northerly at angles of about 40 to 60± degrees, with the preponderance being greater than 45 degrees (1:1).

Joints exist within the bedrock. Predominately steeply dipping, the spacings vary from close to very wide. A detailed study of regional joint pattern was completed during an investigation of a north-adjacent site. Based upon the regional study, joint orientations are generally favorable, but a detailed analysis will be required during future reviews.

No significant faults were mapped on or near the site by this firm nor by others (Weber, 1984). Some evidence of small faults were noted in some road cuts north of the site, but were of limited width and could not be traced significant distances. It is anticipated that any such faults that may exist will not significantly impact future development, other than possibly affecting cut slope stability or potential ground water transmission.

Although evidence of geologically recent fault movement was not noted on or near the site, the project is located in a seismically active region. The recent 1994 Northridge and 1971 San Fernando earthquakes illustrate regional seismicity. This firm therefore includes a Deterministic Seismic Hazards Assessment (Appendix III) in this report.

### 4.3 Hydrology Summary

Although all on-site tributaries are ephemeral, surface drainage throughout the site (both east and west portions) is into active Medea Creek.

Ground water was encountered in borings B-5 and B-7 and trenches T-46, T-47, T-48, T-70, T-112, T-116, T-118 and T-123. Away from Medea Creek, ground water was scarce owing to several dry seasons. Future wet seasons may increase ground water levels. Copious ground water does exist in Medea Creek bottom sediments as encountered in trenches T-121 and T-122. Future exploration to determine the geometry, constraints, and mitigation of ground water in those sediments may be required where development encroaches into Medea Creek bottom.

A possible well, perhaps associated with agriculture, was encountered near trench T-28. Available records, however, did not indicate a well in this area.

### 4.4 Bedrock Excavation Characteristics

As discussed in detail in Appendix IV of this report, the Conejo Volcanics bedrock is dense below relatively shallow weathered zones that range from a few to a few tens of feet deep. Thus, at least some to possibly frequent blasting may be necessary in deeper cuts and locally near the surface to dislodge rock. Also, blasting or overexcavation of bedrock may be required to facilitate the placement of underground utilities or foundations.

### 4.5 California State - Imposed Geological (Seismic Hazards) Zones

The State of California is mandated by both the Alquist-Priolo Earthquake Zone Act and the Urban Seismic Hazard Mapping Act (USHMA) to delineate zones that, owing

to known regional geological conditions, will require investigation of certain seismic hazards; specifically, tectonic ground rupture along known active faults (A-P Act), or for secondary potential hazards that include liquefaction potential and slope stability during strong regional earthquakes.

The study site is not within an A-P Zone, but parts of the site are within potential liquefaction and potential seismically-induced landslide study areas (USHMA) within the Calabasas U.S.G.S. 7½-minute quadrangle. As such, the State mandates that the local building official (in this case, the County of Los Angeles) require studies/ investigations of the potential, or lack thereof, for the occurrence of the aforementioned secondary seismic hazards, together with the appropriate analyses of their impact and mitigation methodology.

It has been the policy of the County to require such studies that are consistent with that of the State. As technical review of the subject project continues, studies focused on the details of such phenomena, their impact on the project, and viable remediation will be required and must be approved by the County. General geotechnical constraints are discussed elsewhere in this document.

## 5.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon the field investigation, laboratory tests, geotechnical analyses, and literature research, development of the subject property is considered feasible from a geotechnical viewpoint. Much of the proposed plan is compatible with the indicated geologic and soils engineering conditions and may be developed as planned with conventional cut and fill procedures. Geotechnical conditions for which designed mitigation may be required are indicated below, together with appropriate general recommendations for remediation of same, intended to result in a safe and stable development.

### 5.1 Geological/Geotechnical Considerations

1. The subject site is underlain by bedrock of the Conejo Volcanics Formation, which is mantled by surficial deposits composed of valley fill, terrace deposits, alluvium,

colluvium, and artificial fill. Upon removal of compressible soils and weathered bedrock, the approved remaining materials are considered to be able to provide a suitable support medium for fills and proposed structures.

2. In general, surficial deposits, including the disposal canyon fill near borings B-5 and B-6, are not suitable for the support of engineered structures or fills. Such materials must be removed in areas to be developed, with the possible exceptions noted below:

   a. Consolidated, non-liquefiable valley fill and alluvium (along Medea Creek) may be left in place pending further engineering studies. Such consolidated sediments, if present, are surmised to be of very limited extent.

   b. In order to protect existing improvements, road fill along Kanan and Cornell Roads may have to be left in place, necessitating structural setbacks.

   An exploration program intended to examine the depths of unsuitable surficial deposits should be carried out in the future, so that the general depths and area limits of surficial deposits can be assessed.

3. As discussed in the Appendix IV of this report, bedrock below a variable weathered zone is hard; therefore, blasting will most likely be required in deeper cuts. Also, it may be anticipated that, in many cut areas, excavation of utility and footing trenches will be extremely difficult or require jackhammering. Consideration may be given, therefore, to overexcavation of utility right-of-ways (possibly 10 feet or greater) and building pads (at least 3 feet minimum) during mass grading. Such overexcavation would facilitate trenching.

   Owing to the presence of surrounding improvements, it is recommended that a blasting consultant be employed to devise a blasting plan acceptable to the agencies and local interests.

4. Oversized rock (greater than 8 inches, long dimension) will be generated during excavation. These rocks must be placed as rock blanket fills or windrows, thus

requiring special handling to be properly placed as fill. Very large boulders may require shooting to facilitate handling during grading.

5. Subdrain systems should be installed in natural water courses prior to placing compacted fill. Loose alluvium subject to hydroconsolidation, existing fills, and colluvium should be removed prior to subdrain installation. The subdrains should extend up the draws to a point within 15 feet of finished grade.

   The flow lines of canyon bottoms cleaned of unsuitable materials will in some cases be below elevations amenable to outletting of subdrains. Therefore, increased fill compaction requirements (below drain outlet elevations) and possible peripheral interceptor drains will most likely be required under those circumstances.

6. The majority of proposed graded slopes are planned at 2:1 (horizontal to vertical) slope ratios with appropriate intervening terraces and drainage devices. Based on this firm's past experience with the typical on-site earth materials and slopes of similar height and ratio, the proposed fill and cut slopes (with favorable geology) should be considered grossly and surficially stable to the heights programmed. Stability analyses should be performed as part of the preliminary geotechnical reports and grading plan reviews, and must be in conformance with County and State (USHMA) requirements. Likewise, if required, any remedial measures such as buttresses, stability fills, slope-laybacks, must conform with local and state codes and policies.

7. Fill-over-cut slopes are acceptable provided favorable geologic conditions are exposed and the fills are constructed on properly excavated keyways having a width equal to at least one-half the ascending slope height (minimum 15 feet wide) founded in firm bearing materials and sloping from toe to heel a minimum of one foot.

8. Where design grades and/or remedial grading activities create a cut/fill transition situation, the cut and shallow fill portions of the building pads shall be overexcavated a minimum depth of 5 feet and replaced to designed grade with compacted fill. In addition, it is anticipated that design cut lots may expose materials with varying engineering characteristics. Therefore, in order to minimize the potential effects of differential expansion potential, cut lots exposing variable bedrock materials should be overexcavated and replaced to grade with a minimum fill thickness of 5 feet. The soil engineer/engineering geologist should be consulted with regard to exposed conditions after undercutting in order to evaluate the need for and disposition of subsurface drainage requirements, which could include sloping of the overexcavation bottom and/or installation of subdrains.

9. In order to reduce the differential settlement potential on lots with steep cut/fill transitions, the cut portion of steep transition lots shall be overexcavated to a depth equal to one-third of the deepest fill section within the lot. The transition between the deep fill and cut (cap) portion of the lot shall not exceed a 2:1 slope gradient. This condition can be best evaluated during the grading operations.

10. Lot pads beneath natural slope areas have the potential of being affected by runoff, soil slip/debris flow, and possibly boulder roll, activity. It will be necessary to implement remedial measures such as drainage control devices, slough\impact walls or fences (where allowed by the code), or earth catchment fills along the periphery of the affected developed areas. Specific recommendations will be made during technical tentative and grading plan reviews. *Because of the heights and ratios of some ascending natural slopes surrounding the development, investigations mandated under the USHMA will be required, and mitigation methods must be approved by the governing agency.*

11. As a preliminary caution, conventional backcuts and backfills for walls and/or remedial grading may encroach into now-planned natural areas. Specialized

construction techniques such as tiebacks may be necessary to reduce encroachment into natural areas.

12. Top-of-cut paved swales will be required at the top of cut slopes where the prevailing drainage is in the same direction as and directed over the cut slope face.

13. It is anticipated that loose, liquefaction-prone alluvial materials will be removed and replaced with engineered fill, thus liquefaction as a result of ground shaking from proximate active faults is considered remote or nil. The bedrock materials are not prone to liquefaction. Possible exceptions to total alluvial removal may be along Medea Creek and adjacent to existing road fills. Here, mitigation that could include, but not be limited to, deepened footings or building setbacks may be required.

14. The residual soils and soft alluvial/colluvial materials excavated from the canyon areas will shrink approximately 10 to 15 percent when recompacted. The bedrock materials that can be excavated by normal methods will probably bulk when placed as fill from 15 to 20 percent. These figures assume that the fill is compacted to an average relative compaction of 92 percent of the laboratory maximum density. Subsidence of 0.4 to 0.6 feet should be anticipated in the alluvial areas programmed to receive fill.

## 5.2 Site Preparation and Fill Compaction

1. In order to achieve a well engineered and designed development, in-grading field observations will be required by qualified personnel. This should include continuous observation and testing of fill soil placement by field technicians and periodic observations of the site grading by the project engineering geologist and soils engineer.

2. Prior to grading, areas within the daylight cut and fill limits should be stripped and cleared of existing vegetation, trash, debris, and other deleterious materials. These materials should be removed and disposed of offsite.

3. On-site water wells must be destroyed in accordance with the applicable County and State regulations. Although none were encountered during the exploratory work, oil wells, oil well plugs, cesspools, and/or private disposal systems, if encountered, shall also be exposed, cut off, and sealed in accordance with the regulations of the applicable governing agency.

4. In areas where compacted fill is placed, existing artificial fill, residual soils, colluvium, and low-density alluvium should be removed to bedrock or firm underlying material as determined by the soils engineer and/or engineering geologist.

5. After clearing, stripping, removals, and overexcavation, the approved exposed surface should be scarified, watered as necessary, and compacted to a minimum of 90 percent of the laboratory maximum density as determined in accordance with ASTM:D-1557.

6. All fill and processed natural ground should be compacted to a minimum relative compaction of 90 percent, as determined by ASTM Test Method:D-1557-91. In order to enhance the performance of the deep fill areas onsite, fills placed below 50 feet from finish grade shall be compacted to a minimum of 93 percent of maximum density as determined by ASTM Test Method:D-1557-91. In addition, fill placed below the available subdrain outlet elevations, should be compacted to a minimum relative compaction of 93 percent of the applicable laboratory maximum density. Compaction shall be achieved at or slightly above optimum moisture content, with the use of sheepsfoot rollers or similar kneading type equipment. Mixing and moisture conditioning will be required in order to achieve the required moisture conditions. The contractor should have suitable and sufficient support

equipment to achieve adequate compaction and moisture during placement of compacted fills. When necessary, loaded scrapers may be used for compaction or temporarily halted until fill is compacted to acceptable standards.

7. Excavated materials that are approved by the project geotechnical engineer may be used in compacted fills provided that trash, vegetation, and other deleterious and/or hazardous materials are removed prior to placement.

8. It is anticipated that oversized boulders may be generated during excavation. All rock burial must be in accordance with the County of Los Angeles or City of Agoura Hills Codes or be wasted offsite.

9. Compacted fill material should be keyed and benched into bedrock or firm approved materials where the natural slope is steeper than 5-horizontal to 1-vertical, as directed by the soils engineer.

10. Fill slopes shall be overfilled to an extent determined by the contractor, but not less than 2 feet measured perpendicular to the slope face, so that when trimmed back to the compacted core, the required compaction is achieved.

    Compaction of each fill lift should extend out to the temporary slope face. Backrolling during mass filling at intervals not exceeding 4 feet in height is recommended unless more extensive overfill is undertaken.

    As an alternate to overfilling, fill slopes may be built to the finish slope fill in accordance with the following recommendations.

    a. Compaction of each fill lift shall extend to the face of the slopes.

    b. Backrolling during mass grading shall be undertaken at intervals not exceeding 4 feet in height. Backrolling at more frequent intervals may be required.

    c. Care shall be taken to avoid spillage of loose materials down the face of the slopes during grading.

d. At completion of mass filling, the slope surface shall be watered, shaped and compacted first with a sheepsfoot roller, then with a grid roller operated from a side boom Cat, or equivalent, such that compaction to project standards is achieved to the slope face.

Proper seeding and planting of the slopes should follow as soon as practical, to inhibit erosion and deterioration of the slope surfaces. Proper moisture control will enhance the long-term stability of the finished slope surface.

11. Fill should be tested at the time of placement to ascertain that the required compaction is achieved. The minimum basis of testing should be 1 test per 2 feet of depth or each 1,000 cubic yards of fill placed. At least half the required tests should be made at the location of the final fill slope, except that not more than one such test need be made for each 50 horizontal feet of slope in each 2-foot vertical lift.

Shear strength parameters should be verified during grading. The results of the observation and testing of the rough grading should be presented in a soils engineering report following the completion of grading.

## 5.3 Preliminary Design

1. Cut slopes are shown on the attached plan to a maximum height of 65± feet at a 2:1 ratio. These cut slopes are considered to be grossly stable to their planned heights provided they expose favorable geologic conditions.

Cut slopes will be monitored and evaluated during grading. Mitigation by means of remedial grading will be prescribed if deemed necessary based on exposed geologic conditions.

2. Fill slopes are indicated at slope ratios of 2:1 to maximum heights of about 30 feet. Properly constructed and maintained, both the gross and surficial stability are considered acceptable per the governing Code requirements.

3. It is anticipated that the proposed structures will be founded on conventional and/or post-tensioned slab-on-grade foundations. Selection of foundation type should be based on soils engineering and geologic conditions, and should take into account the proposed structural layout and framing design. At a minimum, foundation design and construction should be in accordance with Los Angeles County Building Code requirements.

4. Retaining/crib/gabion walls ranging in height up to approximately 31 feet are preliminarily planned for the project. The walls should be founded on bedrock or compacted fill; although special foundations may be required for walls that encroach into Medea Creek. Temporary backcuts in bedrock to accommodate retaining wall construction should be made at slope ratios no steeper than 1:1. Backdrains should be incorporated into the design and construction of the proposed retaining walls. External gross stability analyses of the retaining walls should be performed when wall layout designs are available. The internal stability of "gabion" or crib wall systems would need to be analyzed by the wall designers.

5. The on-site bedrock, terrace, and alluvial materials are considered to be in the "low" to "high" range of expansion potential when tested and classified in accordance with Los Angeles County Building Code Standard 18-2 and classified according to Table 18-1-B. Final evaluation of expansive characteristics should be made after the completion of grading.

6. Preliminary chemical testing of the onsite soil samples (Reference 1) indicate that these materials contain "negligible" amounts of soluble sulfates when classified in accordance with U.B.C. Table 19-A-3.

   Testing of earth material samples on other nearby projects indicated these materials to be "moderately corrosive" to "corrosive" to onsite ferrous improvements. Con-

sideration should be given to consulting a corrosion engineer for a more detailed evaluation.

Additional chemical testing should be performed during and at the completion of grading to assess the as-graded conditions.

## 5.4 Site Drainage and Site Maintenance

Although the design and construction of slopes during mass grading is planned to create slopes which possess both stability against mass rotational failure and stability against surficial slumping and pop-outs, certain factors are beyond the control of the soils engineer and geologist and must be the responsibility of the developer and resident. These include the following:

1. Site Drainage

   a. The homeowners should be made aware of the potential problems which may develop when drainage is altered through construction of retaining walls, swimming pools, paved walkways and patios. Conditions which will lead to ground saturation must be avoided.

   b. No water must be allowed to flow over the slopes. No alteration of pad gradients should be allowed which will prevent pad and roof runoff from being directed to approved disposal areas.

   c. As part of fine grading by the developer and site maintenance by the resident, all roof and pad drainage shall be directed away from slopes and around structures to approved disposal areas. All berms shall be constructed and compacted as part of fine grading and shall be maintained by the resident. The recommended drainage patterns shall be established at the time of fine grading and maintained throughout the life of the structure.

2. Slope Drainage

   Residents should be made aware that they are responsible for maintenance and cleaning of all interceptor ditches, drainage terraces, downdrains and any other drainage devices which have been installed to promote slope stability.

3. Planting and Irrigation

   a. It is strongly recommended that slope planting consist of ground cover, shrubs and trees which require a minimum of irrigation. It should be the responsibility of the landscape architect to provide such plants initially and of the resident to maintain such planting. Alteration of such a planting scheme is at the resident's risk.

   b. The resident is responsible for proper irrigation and for maintenance and repair of properly installed irrigation systems. Leaks should be repaired immediately. Sprinklers should be adjusted to provide maximum uniform coverage with a minimum of water usage and overlap. Overwatering with consequent wasteful runoff and serious ground saturation must be avoided.

   c. If automatic sprinkler systems are installed their use must be adjusted to account for natural rainfall conditions.

4. Burrowing Animals

   Residents must undertake a program for the elimination of burrowing animals. This must be an ongoing program in order to promote slope stability.

## 5.5 Miscellaneous

1. A general requirement imposed on grading projects involves reducing hazards from interim temporary construction excavations. Normal earthwork grading schedules are established by the project grading contractor, initially in the bidding and subsequent pre-job planning stages of a project. Delineating and maintaining absolute controls over specific backcut exposure time imposes difficulties in enforcement, particularly when considering the wide variation in size of engineered earthwork stabilization and the range in capabilities of grading contractors participating in the bidding process. In lieu of assigning a specific time limit, this firm would recommend incorporating the following as a note on the grading plan.

   "It is imperative that the grading schedule be coordinated by the project grading contractor to minimize the unsupported exposure time of temporary backcuts created during landslide or buttress and stabilization fill construction as well as other unsuitable soil removals. Once started, temporary excavations and subsequent fill operations should be main-

tained to completion without intervening delays imposed by avoidable circumstances. Grading should be planned to avoid exposing at or near grade temporary backcut excavations through non-work periods. Where improvements (either on or off-site) may be affected by temporary instability, further restrictions such as slot cutting, extending work day and/or weekend schedules or other requirements considered critical to serving the specific circumstances may be imposed."

2. The detailed grading plans, site plans and foundation plans should be reviewed by this firm as they become available for possible additional comments and recommendations if necessary.

3. Prior to submittal of the detailed grading plans, a grading plan review transmittal should be written and submitted to the governing agency for review.

The findings and recommendations contained in this report are based upon the specific excavations and observations as noted. The materials immediately adjacent to or beneath those observed may have different characteristics, and no representations are made as to the quality or extent of materials not observed.

This report is subject to review by the controlling authorities for the project. If you have any questions or require additional information, please contact this office at (714) 220-0770.

Respectfully submitted,
PACIFIC SOILS ENGINEERING, INC.

By: _____
MICHAEL F. MILLS
Geologist/CEG 994
Reg. Exp.: 2-28-98

Reviewed by: _____
PAUL J. ERNST/RGE 2317
RCE 46394/Reg. Exp.: 3-31-99
Manager of Geotechnical Services

REGISTERED PROFESSIONAL ENGINEER
PAUL J. ERNST
No. GE2317
Exp. 3/31/99
GEOTECHNICAL
STATE OF CALIFORNIA

_____
THEODORE M. WOLFE
CEG 1626/Reg. Exp.: 4-30-00
Manager of Geological Services

Distr.: (6) Addressee
(2) Wagner-Pacific - Attn: Mr. Jim Budke
MFM/PJE/TMW:cp-1568L002

# APPENDIX I

## REFERENCES

# APPENDIX I

## REFERENCES

Pacific Soils Engineering, Inc., 1988, Preliminary soils engineering and engineering geologic investigation, Agoura Canyon Ranch, Agoura Hills area, County of Los Angeles, California: Unpublished Consultant's Report dated September 16, 1988 (Work Order 101568-A).

Pacific Soils Engineering, Inc., 1997, Geotechnical feasibility study, Beautiful Homes Development, Vesting Tentative Tract 52419, County of Los Angeles and City of Agoura Hills, California: Unpublished Consultant's Report, dated November 26, 1997 (W.O. 101568-E).

Weber, F.H., Jr., 1984, Geology of the Calabasas-Agoura-eastern Thousand Oaks area, Los Angeles and Ventura counties, California: Calif. Div. Mines and Geol., Open File Report 84-1LA.

# APPENDIX II

## Field and Laboratory Data Excerpted from

## September 16, 1988 Report and From 1998 Field Investigation

Work Order 101568A

September 16, 1988

# A P P E N D I X

A. Field Investigation

Four (4) borings were excavated to depths ranging from 13.5 to 28 feet below the existing ground surface, using a 30-inch diameter bucket drill rig. Logs of the borings are presented on Plate A-4 through A-7.

Undisturbed samples, for detailed testing in our laboratory were obtained from the borings by driving a sampling spoon into the material. A split barrel type spoon, having inside diameter of 2.5 inches, with a tapered cutting tip at the lower end was used. The barrel is lined with thin brass rings, each one-inch in length. The spoons penetrated into the soil approximately 12 inches. The central portion of the sample was retained for testing. All samples in the natural field condition were sealed in air-tight containers and transported to the laboratory. Bulk samples representative of the surface and/or near-surface materials were also obtained

Blow counts were noted for each sample and are presented in the Log of Borings (Plates A-4 through A-7). Ground water was encountered in all borings (except boring 5) at the depths indicated. Caving did not occur in any of the borings.

B. Laboratory Tests

Shear tests (ASTM:D 3080-72) were made with a direct shear machine of the strain control type in which the rate of strain is 0.05-inch per minute. Specimens were subjected to shear under various normal loads at various moisture conditions. The results, expressed as friction angle and cohesion, are presented on Plates B-1 through B-14.

Consolidation tests (ASTM:D 2435-80) were performed on specimens of the representative soils. The consolidometers are designed to receive the specimens in the rings in the natural field condition. Porous stones, placed at the top and bottom of each specimen, permit the free flow of water from the specimen during the test. Progressive and final settlements under increasing load increments were recorded to an accuracy of 0.0001-inch. The final settlements so obtained are plotted to determine the curves shown on Plates C-1 through C-3.

Work Order 101568A

September 16, 1988

Laboratory maximum density and optimum moisture content were determined on samples of the existing surface materials to determine the suitability of these soils for compaction. Tests were conducted in accordance with ASTM:D 1557-78. Results of these tests are shown on the accompanying Table II.

Particle size determinations were conducted to aid in classification of the soils (modified hydrometer portion ASTM:D 422-72).

Chemical and resistivity tests were conducted to determine soluble sulfate concentrations and the minimum resistivity of the representative materials.

Expansion Index Tests were conducted in accordance with UBC Standard 29-2.

Moisture-density tests were performed on undisturbed samples of the subsurface materials.

The results of these and other tests are summarized on the Log of Borings and Table II.

# UNIFIED SOIL CLASSIFICATION SYSTEM

| MAJOR DIVISIONS | | | GROUP SYMBOLS | TYPICAL NAMES | FIELD IDENTIFICATION PROCEDURES |
|---|---|---|---|---|---|
| Coarse-grained Soils: More than half the material is larger than No. 200 sieve size | Gravels: More than half of coarse fraction is larger than No. 4 sieve size. (For visual classification, the ¼-in size may be used as equivalent to the No. 4 sieve size) | Clean Gravels (little or no fines) | GW | Well-graded gravels, gravel sand mixtures, little or no fines | Wide range grain sizes and substantial amounts of all intermediate particle sizes |
| | | | GP | Poorly-graded gravels, gravel-sand mixtures, little or no fines | Predominately one size or a range of sizes with some intermediate sizes missing |
| | | Gravels with Fines (appreciable amount of fines) | GM | Silty gravels, gravel-sand-silt mixtures | Nonplastic fines or fines with low plasticity (for identification procedures see ML below) |
| | | | GC | Clayey gravels, gravel-sand-silt mixtures | Plastic fines (for identification procedures see CL below) |
| | Sands: More than half of coarse fraction is smaller than No. 4 sieve size. (For visual classification, the ¼-in size may be used as equivalent to the No. 4 sieve size) | Clean Sands (little or no fines) | SW | Well-graded sands, gravelly sands, little or no fines | Wide range in grain sizes and substantial amounts of all intermediate particle sizes |
| | | | SP | Poorly-graded sands, gravelly sands, little or no fines | Predominately one size or a range of sizes with some intermediate sizes missing |
| | | Sands with Fines (appreciable amount of fines) | SM | Silty sands, sand-silt mixtures | Nonplastic fines or fines with low plasticity (for identification procedures see ML below) |
| | | | SC | Clayey sands, sand-clay mixtures | Plastic fines (for identification procedures see CL below) |
| Fine-grained Soils: More than half of material is smaller than No. 200 sieve size. The No. 200 sieve size is about the smallest particle visible to naked eye | | | | | IDENTIFICATION PROCEDURES on fraction smaller than No. 40 sieve size |
| | | | | | Dry Strength (crushing characteristics) / Dilatancy (reaction to shaking) / Toughness (consistency near PL) |
| | Silts and Clays: Liquid limit less than 50 | | ML | Inorganic silts and fine sands, rock flour silty or clayey fine sands or clayey silts with slight plasticity. | None to slight / Quick to slow / None |
| | | | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. | Medium to high / None to very slow / Medium |
| | | | OL | Organic silts and organic silty clays of low plasticity | Slight to medium / Slow / Slight to medium |
| | Silts and Clays: Liquid limit greater than 50 | | MH | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts | Slight to medium / Slow to none / Slight to medium |
| | | | CH | Inorganic clays of high plasticity, fat clays | High to very high / None / High |
| | | | OH | Organic clays of medium to high plasticity, organic silts | Medium to high / None to very slow / Slight to medium |
| HIGHLY ORGANIC SOILS | | | Pt | Peat and other highly organic soils | Readily identified by color, odor, spongy, feel and frequently by fibrous texture |

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

PARTICLE SIZE LIMITS

| SILT OR CLAY | SAND | | | GRAVEL | | COBBLES | BOULDERS |
|---|---|---|---|---|---|---|---|
| | FINE | MEDIUM | COARSE | FINE | COARSE | | |

No. 200 No. 40 No. 10 No. 4 3/4 in 3 in (12 in)

U.S. STANDARD SIEVE SIZE

## CONSISTENCY CLASSIFICATION

| GRANULAR SOIL | COHESIVE SOIL | BEDROCK |
|---|---|---|
| Very loose | Very soft | |
| Loose | Soft | |
| Moderately dense | Firm | Soft |
| Medium dense | Stiff | Moderately hard |
| Dense | Very stiff | Hard |
| Very dense | Hard | Very hard |

## MOISTURE CONDITION

Dry
Slightly moist
Moist
Wet
Saturated

## OTHER SYMBOLS

R- Undisturbed sample
B- Bulk sample
▽ Groundwater
Ω Groundwater seepage

Reference:
The Unified Soil Classification System, Corps of Engineers, U.S. Army Technical Memorandum No 3-357, Volume I, March, 1953. (Revised April, 1960)

PACIFIC SOILS ENGINEERING, INC.

PLATE A

# PACIFIC SOILS ENGINEERING, INC.

## LOG OF BORING No. 4

DATE OBSERVED 7/13/88 METHOD OF DRILLING 30" Bucket

LOGGED BY PAF/MM GROUND ELEVATION _____ WORK ORDER No. 101568

| Depth ft. | Sample | Blows/ft. | Group Syb. | Unit Dry Wt. (lbs/cu.ft.) | % Moisture | Description and Remarks |
|---|---|---|---|---|---|---|
| 0 | | | | | | ALLUVIUM: Clayey sand with gravel, cobbles and boulders, dark brown, slightly moist, medium dense, very porous. |
| | | | | | | @ 3.0 ft. drilling stopped by boulder |
| | | | | | | TOTAL DEPTH 3.0 ft. |
| | | | | | | No Caving |
| | | | | | | No Water |
| 5 | | | | | | |
| 10 | | | | | | |
| 15 | | | | | | |
| 20 | | | | | | |
| 25 | | | | | | |

PLATE A-4

# PACIFIC SOILS ENGINEERING, INC.

## LOG OF BORING No. 4A

DATE OBSERVED 7/13/88 METHOD OF DRILLING 30" Bucket

LOGGED BY PAF/MM GROUND ELEVATION _____ WORK ORDER No. 101568

| Depth ft. | Sample | Blows/ft. | Group Sym. | Unit Dry Wt. (lbs/cu.ft.) | % Moisture | Description and Remarks |
|---|---|---|---|---|---|---|
| 0 | | | | | | ALLUVIUM: Clayey sand with gravel and cobbles, dark brown, slightly moist, medium dense, very porous.<br>Below 3 ft. gravelly, cobbly |
| 10 | R | | | 128.9 | 7.8 | CONEJO VOLCANICS: Dark brown, fractured, moist, becomes hard with depth.<br><br>@ 14.0 ft. water seepage |
| 15 | | | | | | TOTAL DEPTH 14.0 ft.<br>No Caving<br>Water at 14.0 ft. |
| 20 | | | | | | |
| 25 | | | | | | |

PLATE A-4A

# PACIFIC SOILS ENGINEERING, INC.

## LOG OF BORING No. 5

DATE OBSERVED 7/13/88 METHOD OF DRILLING 30" Bucket

LOGGED BY PAF/MM GROUND ELEVATION _____ WORK ORDER No. 101568

| Depth ft. | Sample | Blows/ft. | Group Sym. | Unit Dry Wt. (lbs/cu.ft.) | % Moisture | Description and Remarks |
|---|---|---|---|---|---|---|
| 0 | | | | | | FILL: Gravel and cobbles in a clayey sand and sand matrix with scattered boulders, dark brown, slightly moist to moist. |
| 5 | R | 3 | | 114.1 | 13.7 | |
| | | | | | | Below 9 ft. cobble size diminishes |
| 10 | R | 2 | | 112.2 | 11.9 | |
| | | | | | | @ 13.5 ft. large boulders, could not penetrate |
| 15 | | | | | | TOTAL DEPTH 13.5 ft.<br>No Caving<br>No Water |
| 20 | | | | | | |
| 25 | | | | | | |

PLATE A-5

# PACIFIC SOILS ENGINEERING, INC.

## LOG OF BORING No. 6

DATE OBSERVED 7/12/88 METHOD OF DRILLING 30" Bucket

LOGGED BY PAF/MM GROUND ELEVATION _____ WORK ORDER No. 101568

| Depth ft. | Sample | Blows/ft. | Group Sym. | Unit Dry Wt. (lbs/cu.ft.) | % Moisture | Description and Remarks |
|---|---|---|---|---|---|---|
| 0 | | | | | | FILL: Sandy clay/clayey sand with cobbles, boulders and concrete pieces, brown, dry to slightly moist. Matrix becomes predominantly sandy clay with depth. |
| 5 | B/R | 1 | | Disturbed | | |
| 10 | R | P | | 101.4 | 19.5 | @ 11±ft. moist with gravel size rock fragments |
| | | | | | | @ 13±ft. small piece of plastic |
| 15 | B/R | 1 | | 100.2 | 19.5 | |
| 20 | | | | | | @ 19.5 ft. gravelly clayey sand<br>@ 20.0 ft. rock in sampler |
| | R | 8 | | 127.6 | 8.7 | |
| | | | | | | ALLUVIUM: Clayey sand, yellowish brown, moist, medium dense, very porous |
| 25 | | | | | | |

PLATE A-6

# PACIFIC SOILS ENGINEERING, INC.

## LOG OF BORING No. 6 Cont'd

DATE OBSERVED 7/12/88 METHOD OF DRILLING 30" Bucket

LOGGED BY PAF/MM GROUND ELEVATION _____ WORK ORDER No. 101568

| Depth ft. | Sample | Blows/ft. | Group Syb. | Unit Dry Wt. (lbs/cu.ft.) | % Moisture | Description and Remarks |
|---|---|---|---|---|---|---|
| 25 | R | 30/1" | | 121.3 | 13.0 | CONEJO VOLCANICS: Moderately hard, fractured<br><br>@ 27±ft. water seepage |
| | | | | | | TOTAL DEPTH 28.0 ft.<br>No Caving<br>Water at 27±ft. (at end of drilling 1½ ft. of water in the hole) |
| 30 | | | | | | |
| 35 | | | | | | |
| 40 | | | | | | |
| 45 | | | | | | |
| 50 | | | | | | |

PLATE A-6

# PACIFIC SOILS ENGINEERING, INC.

## LOG OF BORING No. 7

DATE OBSERVED 7/12/88 METHOD OF DRILLING 30" Bucket

LOGGED BY PAF GROUND ELEVATION _____ WORK ORDER No. 101568

| Depth ft. | Sample | Blows/ft. | Group Syb. | Unit Dry Wt. (lbs/cu.ft.) | % Moisture | Description and Remarks |
|---|---|---|---|---|---|---|
| 0 | | | | | | FILL: Sandy clay/clayey sand, brown, slightly moist with cobbles<br>moist with depth |
| 5 | | | | | | @ 7.0 ft. Clayey sand, black, heavily organic with gravelly cobbly (organic odor) |
| 10 | | | | | | |
| 15 | | | | | | ALLUVIUM: Clayey sand with gravel, dark brown, moist to saturated<br>@ 17.ft slow water seepage |
| 20 | | | | | | CONEJO VOLCANICS: Fractured, saturated hard to very hard |
| 25 | | | | | | TOTAL DEPTH 21.0 ft.<br>Caving between 7 and 16 ft.<br>Water at 17.5 ft. |

PLATE A-7

Work Order 101568A
Date Exc. July/August 1
Logged by MM/PF
Elevation
Equipment

# T A B L E I

## LOG OF TRENCHES

| Trench No. | Depth (ft) | USCS | Description |
|---|---|---|---|
| T-22 | | | |
| | 0.0 - 9.0 | | FILL/COLLUVIUM: Cobbly clayey sand, dark gray, dry, very porous. |
| | 9.0 - 10.0 | | COLLUVIUM: Sandy cobbly clay, moist, soft, refusal on hard boulder. |
| T-23 | | | |
| | 0.0 - 11.0 | | COLLUVIUM: Gravelly slightly clayey sand, brown, damp, slightly cemented but porous. Shard are angular, oriented volcanics. |
| | 11.0 - 11.5 | | CONEJO VOLCANICS: Basalt, brown, weathered contact appears gradationed.. |
| T-24 | | | |
| | 0.0 - 2.0 | | SOIL: Clayey sand, brown, dry, porous. |
| | 2.0 - 12.0 | | CONEJO VOLCANICS: Basalt, gray, weathered upper 4 feet, hard below. |

T-25

| | |
|---|---|
| 0.0 - 5.0 | FILL:<br>Clayey, cobbly sand, dark brown, dry to damp, soft. |
| 5.0 - 8.0 | CONEJO VOLCANICS:<br>Basalt, greenish gray to red, weathered but dense. |

---

T-26

| | |
|---|---|
| 0.0 - 8.0 | FILL:<br>Sandy clay/clayey sand cobbly, brown, dry. |
| 8.0 - 9.0 | CONEJO VOLCANICS:<br>Basalt, dark gray, hard, refusal at 9.0 ft. |

---

T-27

| | |
|---|---|
| 0.0 - .33 | concrete |
| .33 - 1.0 | FILL:<br>Clayey sand, brown, dry, porous. |
| 1.0 - 3.5 | CONEJO VOLCANICS:<br>Basalt, yellowish brown, slightly vesicular, weathered but hard. |

---

T-28

| | |
|---|---|
| 0.0 - 2.5 | FILL:<br>Clayey sand, brown, dry, porous. |
| 2.5 - 5.0 | COLLUVIUM:<br>Clayey sand, dark brown, cobbly, dry, porous. |
| 5.0 - 9.0 | CONEJO VOLCANICS:<br>Basalt, yellowish brown, damp, extremely weathered, friable, firmer at bottom of hole. |

| | | |
|---|---|---|
| T-29 | | |
| | 0.0 - 9.0 | FILL/COLLUVIUM:<br>Cobbly clayey sand, dark gray, dry, very porous. |
| | 9.0 - 10.0 | COLLUVIUM:<br>Sandy cobbly clay, moist, soft,refusal on hard boulder. |

---

| | | |
|---|---|---|
| T-30 | | |
| | 0.0 - 6.5 | ALLUVIUM:<br>Bouldery clayey sand, dark gray, damp, porous, numerous large roots. |
| | 6.5 - 7.5 | CONEJO VOLCANICS:<br>Basalt, yellowish brown, slightly vesicular, weathered but hard. |

---

| | | |
|---|---|---|
| T-31 | | |
| | 0.0 - 2.5 | FILL:<br>Cobbly clayey sand, dark brown, dry, porous. |
| | 2.5 - 4.0 | COLLUVIUM:<br>Sandy clay, brown, damp, stiff but porous. |
| | 4.0 - 7.5 | CONEJO VOLCANICS:<br>Basalt, yellowish brown, slightly vesicular, weathered but hard. |

---

| | | |
|---|---|---|
| T-32 | | |
| | 0.0 - 5.0 | FILL:<br>Mixture of imported cobbly soils, dry to moist, soft. |
| | 5.0 - 10.0 | COLLUVIUM:<br>Clayey sand, reddish brown, numerous roots, dry, porous |
| | | @ 10.0 ft. possible bedrock. |

| | | |
|---|---|---|
| T-33 | | |
| | 0.0 - 5.0 | ALLUVIUM:<br>Clayey sand, dark grayish brown, damp, porous. |
| | 5.0 - 7.5 | CONEJO VOLCANICS:<br>Basalt, greenish brown, damp, weathered but firm. |
| T-34 | | |
| | 0.0 - 5.5 | ALLUVIUM:<br>Cobbly, bouldery clayey sand, brown, damp, porous. |
| | 5.5 - 6.5 | CONEJO VOLCANICS:<br>Basalt, greenish brown, damp, weathered but firm. |
| T-35 | 0.0 - 7.0 | ALLUVIUM:<br>Cobbly silty sand, brown, dry, porous. |
| | 7.0 - 8.5 | CONEJO VOLCANICS:<br>Basalt, greenish brown, damp, weathered but firm. |
| T-36 | | |
| | 0.0 - 4.5 | ALLUVIUM:<br>Mainly boulders and large cobbles with a brown silty sand matrix, loose, dry. |
| | 4.5 - 5.0 | CONEJO VOLCANICS:<br>Basalt, gray, weathered but hard, fractured. |
| T-37 | | |
| | 0.0 - 3.0 | CONEJO VOLCANICS:<br>Basalt, brown to yellowish brown, iron oxide stains, firm but fractured, not as weathered as in T-36. |

T-38

| | |
|---|---|
| 0.0 - 0.33 | FILL:<br>Veneer of bedrocl-derived material |
| 0.33 - 3.5 | CONEJO VOLCANICS:<br>Basalt, brown to yellowish brown, iron oxide stains, firm but fractured, not as weathered as in T-36. |

---

T-39

| | |
|---|---|
| 0.0 - 3.0 | SOIL:<br>Sandy clay, dark brown, dry to moist, stiff but porous. |
| 3.0 - 14.5 | VALLEY FILL:<br>Clayey sand, tan to brown, damp, medium dense, porous, less porous with depth. |

---

T-40

| | |
|---|---|
| 0.0 - 1.5 | SOIL:<br>Sandy clay, brown, dry, roots. |
| 1.5 - 7.0 | CONEJO VOLCANICS:<br>Basalt, greenish brown, damp, weathered but firm. |

---

T-41

| | |
|---|---|
| 0.0 - 5.0 | ALLUVIUM:<br>Cobbly sandy clay to cobbly clayey sand, dark brown, dry, stiff but porous. |
| 5.0 - 6.0 | CONEJO VOLCANICS:<br>Basalt, grayish brown, somewhat friable, firm. |

Work Order 101568A

T-42

| | |
|---|---|
| 0.0 - 3.0 | ALLUVIUM:<br>Clayey sand, slightly reddish brown, dry, very porous, numerous roots. |
| 3.0 - 4.0 | CONEJO VOLCANICS:<br>Slightly vesicular basalt, slightly yellowish brown, weathered and fractured but tight.<br><br>Attitudes: NS, 60E - Joint<br>N80E, 85SE - Joint |

---

T-43

| | |
|---|---|
| 0.0 - 4.0 | ALLUVIUM:<br>Clayey sand, slightly reddish brown, dry, very porous, numerous roots. |
| 4.0 - 6.0 | CONEJO VOLCANICS:<br>Slightly vesicular basalt, slightly yellowish brown, weathered and fractured but tight. |

---

T-44

| | |
|---|---|
| 0.0 - 1.5 | FILL:<br>Gravelly clayey sand, gray, dry, loose, Modelo chips. |
| 1.5 - 5.0 | MIXED SOIL/FILL:<br>Cobbly clayey sand, damp, porous, volcanic cobbles. |
| 5.0 - 7.0 | CONEJO VOLCANICS:<br>Slightly vesicular basalt, slightly yellowish brown, weathered and fractured but tight.<br><br>Attitude: N50E, 60SE - joint. |

Work Order 101568A

| | | |
|---|---|---|
| T-45 | | |
| | 0.0 - 1.5 | FILL:<br>Gravelly clayey sand, gray, dry, loose, Modelo chips. |
| | 1.5 - 2.5 | SOIL:<br>Sandy clay, dark brown, dry, porous. |
| | 2.5 - 7.0 | VALLEY FILL:<br>Cobbly to bouldery silty sand, tan, damp, medium dense, but uncemented, refusal on boulders. |

---

| | | |
|---|---|---|
| T-46 | | |
| | 0.0 - 5.0 | ALLUVIUM:<br>Clayey sand, brown, slightly cobbly, dry to saturated, soft. water perched on contact.<br><br>water at 4.5 feet |
| | 5.0 - 6.0 | CONEJO VOLCANICS:<br>Basalt, brown, weathered. |

---

| | | |
|---|---|---|
| T-47 | | |
| | 0.0 - 7.0 | ALLUVIUM:<br>Cobbly clayey sand, brown, dry to damp, porous, roots. |
| | 7.0 - 9.0 | CONEJO VOLCANICS:<br>Salt and pepper basalt, black and gray, very weathered, friable. |
| | 9.0 - 11.0 | CONEJO VOLCANICS:<br>Basalt, dark gray, firm, not as weathered, water along joints and at 9 ft. |

Work Order 101568A

| | | |
|---|---|---|
| T-48 | | |
| | 0.0 - 4.0 | COLLUVIUM:<br>Cobbly clayey sand, dark brown, dry, porous |
| | 4.0 - 12.0 | ALLUVIUM:<br>Fine to medium-grained sand, buff, uncemented, water at 10 feet, caving; @ 12.0 ft. possible bedrock. |

---

| | | |
|---|---|---|
| T-49 | | |
| | 0.0 - 5.0 | COLLUVIUM/ALLUVIUM:<br>Cobbly clayey sand, dark brown, dry, porous. |
| | 5.0 - 7.0 | ALLUVIUM:<br>Silty fine-grained sand, tan, dry, porous. |
| | 7.0 - 7.5 | CONEJO VOLCANICS:<br>Basalt, greenish gray, weathered but hard. |

---

| | | |
|---|---|---|
| T-50 | | |
| | 0.0 - 6.0 | COLLUVIUM/ALLUVIUM:<br>Cobbly clayey sand, dark brown, dry porous. |
| | 6.0 - 7.0 | CONEJO VOLCANICS:<br>Basalt, greenish gray, weathered but hard. |

---

| | | |
|---|---|---|
| T-51 | | |
| | 0.0 - 4.5 | ALLUVIUM:<br>Cobbly to bouldery clayey sand, dark grayish brown, dry, porous. |
| | 4.5 - 5.5 | CONEJO VOLCANICS:<br>Basalt, grayish brown, damp, weathered, friable but dense. |

| | | |
|---|---|---|
| T-52 | | |
| | 0.0 - 0.5 | SOIL:<br>Clayey sand, brown, dry, porous. |
| | 0.5 - 1.5 | CONEJO VOLCANICS:<br>Basalt, grayish brown, damp, weathered, friable, but dense. |

---

| | | |
|---|---|---|
| T-53 | | |
| | 0.0 - 5.0 | ALLUVIUM:<br>Bouldery clayey sand, brown, dry, porous. |
| | 5.0 - 7.0 | CONEJO VOLCANICS:<br>Basalt, grayish brown, damp, weathered, friable, but dense. |

---

| | | |
|---|---|---|
| T-54 | | |
| | 0.0 - 6.5 | ALLUVIUM:<br>Very bouldery clayey sand, brown, very loose, porous, sub-angular clasts. |
| | 6.5 - 8.0 | CONEJO VOLCANICS:<br>Basalt, grayish brown, damp, weathered, friable, but dense. |

---

| | | |
|---|---|---|
| T-55 | | |
| | 0.0 - 6.5 | ALLUVIUM:<br>Very bouldery clayey sand, brown, very loose, porous, sub-angular clasts. |
| | 6.5 - 7.5 | CONEJO VOLCANICS:<br>Basalt, dark gray, weathered but hard. |

| | | |
|---|---|---|
| T-56 | | |
| | 0.0 - 1.0 | SOIL:<br>Gravelly silty sand, brown, dry, porous. |
| | 1.0 - 2.5 | CONEJO VOLCANICS:<br>Andesite, grayish red, unweathered, very hard, intact, not slide debris. |

---

| | | |
|---|---|---|
| T-57 | | |
| | 0.0 - 3.0 | SOIL/SLOPEWASH:<br>Gravelly silty sand, brown, dry, porous. |
| | 3.0 - 5.0 | CONEJO VOLCANICS:<br>Andesite, grayish red, unweathered, very hard, intact, not slide debris. |

---

| | | |
|---|---|---|
| T-58 | | |
| | 0.0 - 10.0 | ALLUVIUM:<br>Very cobbly to bouldery silty sand, brown, dry, porous. |
| | 10.0 - 11.0 | CONEJO VOLCANICS:<br>Basalt, greenish gray, damp, weathered, firm. |

---

| | | |
|---|---|---|
| T-59 | | |
| | 0.0 - 6.5 | COLLUVIUM:<br>Sandy clay, slightly reddish-brown some gravel, stiff but porous. |
| | 6.5 - 8.5 | CONEJO VOLCANICS:<br>Basalt, grayish green, weathered but very firm. |

Work Order 101568A

| | | |
|---|---|---|
| T-60 | | |
| | 0.0 - 6.5 | ALLUVIUM:<br>Very cobbly to bouldery silty sand, brown, dry, porous. |
| | 6.5 - 8.0 | CONEJO VOLCANICS:<br>Andesite, red, weathered but firm |

---

| | | |
|---|---|---|
| T-61 | | |
| | 0.0 - 5.0 | ALLUVIUM:<br>Very cobbly to bouldery silty sand, brown, dry, porous. |
| | 5.0 - 7.0 | CONEJO VOLCANICS:<br>Andesite, red, weathered but firm. |

---

| | | |
|---|---|---|
| T-62 | | |
| | 0.0 - 6.0 | ALLUVIUM:<br>Very cobbly to bouldery silty sand, brown, dry, porous. |
| | 6.0 - 8.0 | CONEJO VOLCANICS:<br>Basalt, greenish gray, weathered but hard. |

---

| | | |
|---|---|---|
| T-63 | | |
| | 0.0 - 5.0 | COLLUVIUM:<br>Clayey sand, dark brown, dry, porous. |
| | 5.0 - 11.0 | VALLEY FILL:<br>Very clayey slight gravelly fine-grained sand, reddish brown, very stiff but porous upper 5 ± feet, numerous cobbles and boulders. |

T-64

| | |
|---|---|
| 0.0 - 7.0 | ALLUVIUM:<br>Cobbly, bouldery silty sand, brown, dry, loose, roots, numerous boulders. |
| 7.0 - 9.0 | CONEJO VOLCANICS:<br>Basalt, gray, weathered. |

---

T-65

| | |
|---|---|
| 0.0 - 6.0 | ALLUVIUM:<br>Slight gravelly silty sand, grayish brown, dry, loose. |
| 6.0 - 7.0 | CONEJO VOLCANICS:<br>Basalt, gray, weathered. |

---

T-66

| | |
|---|---|
| 0.0 - 2.5 | SOIL/COLLUVIUM:<br>Clayey sand, dark brown, dry, porous. |
| 2.5 - 4.5 | CONEJO VOLCANICS:<br>Basalt, yellowish brown, stained, weathered but tight.<br><br>Attitude: N60E, 90 - small shear |

---

T-67

| | |
|---|---|
| 0.0 - 5.0 | ALLUVIUM:<br>Cobbly to bouldery silty sand, brown, dry, loose. |
| 5.0 - 6.5 | CONEJO VOLCANICS:<br>Basalt, brown, dry, weathered but tight. |

Work Order 101568A

| | | |
|---|---|---|
| T-68 | | |
| | 0.0 - 5.5 | ALLUVIUM:<br>Bouldery cobbly clayey sand, brown, dry, porous. |
| | 5.5 - 6.5 | CONEJO VOLCANICS:<br>Basalt, brown, dry, weathered but tight. |

---

| | | |
|---|---|---|
| T-69 | | |
| | 0.0 - 10.0 | ALLUVIUM:<br>Gravelly to cobbly clayey sand, brown, damp, loose, medium dense at depth, cobbles (mainly below 5 feet.) |
| | 10.0 - 10.5 | CONEJO VOLCANICS:<br>Basalt, gray, firm. |

---

| | | |
|---|---|---|
| T-70 | | |
| | 0.0 - 13.0 | ALLUVIUM:<br>Clayey sand with gravel, brown, dry to slightly moist with depth, scattered cobbles, very porous. |
| | 13.0 - 14.0 | CONEJO VOLCANICS:<br>Basalt<br>@ 14.0 ft. water |

---

| | | |
|---|---|---|
| T-71 | | |
| | 0.0 - 7.5 | ALLUVIUM:<br>Gravelly/cobbly silty sand, brown, dry, medium dense, very porous. |
| | 7.5 - 8.0 | CONEJO VOLCANICS:<br>Basalt. |

| | | |
|---|---|---|
| T-72 | | |
| | 0.0 - 7.0 | ALLUVIUM:<br>Gravelly/cobbly silty sand, brown, dry to slightly moist with depth, medium dense, very porous. |
| | 7.0 - 8.0 | CONEJO VOLCANICS:<br>Basalt. |

---

| | | |
|---|---|---|
| T-73 | | |
| | 0.0 - 2.0 | SOIL:<br>Gravelly/cobble silty sand, brown, dry, medium dense, very porous. |
| | 2.0 - 3.0 | CONEJO VOLCANICS:<br>Basalt, gray, hard. |

---

| | | |
|---|---|---|
| T-74 | | |
| | 0.0 - 3.0 | SOIL:<br>Cobbly sand, brown, porous but cemented. |
| | 3.0 - 4.0 | TERRACE DEPOSITS/RELICT SOIL:<br>Cobbles, tan, refusal. |

---

| | | |
|---|---|---|
| T-75 | | |
| | 0.0 - 6.0 | ALLUVIUM:<br>Cobbly clayey sand, dark brown, moist, soft. |
| | 6.0 - 8.0 | CONEJO VOLCANICS:<br>Basalt, gray, firm. |

---

| | | |
|---|---|---|
| T-76 | | |
| | 0.0 - 6.0 | FILL:<br>Clayey cobbly sand, gray, dry, porous. Minor debris. |
| | 6.0 - 13.0 | FILL:<br>Slight cobbly clayey sand, reddish brown, damp, soft, clean. |

T-77

| | |
|---|---|
| 0.0 - 10.0 | FILL:<br>Slight gravelly silty to clayey fine-grained sand, tan, damp, medium dense, clean. |
| 10.0 - 12.0 | SOIL:<br>Sandy clay, black, damp, stiff, porous; possible bedrock at bottom of hole. |

---

T-78

| | |
|---|---|
| 0.0 - 6.5 | ALLUVIUM:<br>Sandy clay, dark brown, dry, porous. |
| 6.5 - 7.0 | CONEJO VOLCANICS:<br>Andesite, red, weathered but hard. |

---

T-79

| | |
|---|---|
| 0.0 - 6.0 | ALLUVIUM:<br>Cobbly clayey sand, brown, dry to damp. |
| 6.0 - 8.0 | CONEJO VOLCANICS:<br>Basalt, grayish green, weathered but firm. |

January 22, 1999
Work Order 101568-L

## Trench Logs

### Logged in March 1998

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-101 | 0.0 - 1.0 | Fill/Topsoil: Silty Sand, dark brown, very moist, soft, porous, wood fragments. |
| | 1.0 - 2.0 | Conejo Volcanics: Basalt, dark gray, massive, hard, refusal at 2.0 feet. |
| T-102 | 0.0 - 8.0 | Fill: Silty, Cobbly Sand, brown, moist, loose to moderately dense, very slight odor, boulders. |
| | 8.0 -10.0 | Conejo Volcanics: Basalt, gray to reddish brown, weathered upper 1 to 1.5 feet, massive. |
| T-103 | 0.0 - 3.0 | Conejo Volcanics: Basalt, dark brown, coarse-grained, phenocrysts of plagioclase, weathered, closely jointed, hard at 3.0 feet. Thin fill veneer.<br>Attitudes: N50E, 50SE - J<br>N50E, 78SE - J<br>N30E, 90SE - J |
| T-104 | 0.0 - 1.0 | Fill: Silty, Cobbly Sand, brown, moist, loose to moderately dense, very slight odor, boulders. |
| | 1.0 - 3.5 | Conejo Volcanics: Basalt, dark brown where weathered. At 1 foot, gray, hard basalt bed, very difficult digging.<br>Attitudes: N60W, 50NE - B |

Note: J = Joint surface; B = Bedding

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-105 | 0.0 - 1.5 | Soil: Silty Sand, dark brown, very moist, soft, porous. |
| | 1.5 - 3.0 | Weathered Conejo Volcanics: Vesicular Basalt, light to dark brown, moderately weathered. |
| | 3.0 - 5.0 | Conejo Volcanics: Vesicular Basalt, dark brown, hard. |
| | | Attitudes: NS - 90 - J<br>EW - 80S- J |
| T-106 | 0.0 - 1.5 | Soil: Silty Sand, dark brown, very moist, soft, porous. |
| | 1.5 - 3.5 | Weathered Conejo Volcanics: Vesicular Basalt, light to dark brown, moderately weathered. |
| | 3.5 - 6.5 | Conejo Volcanics: Vesicular Basalt, dark brown, slightly weathered, hard. |
| | | Attitudes: N80W, 60SW - J<br>N80W, 50NE - J<br>N10E, 90NE - J |
| T-107 | 0.0 - 6.0 | Fill/Colluvium: Bouldery Silt, brown, very moist, soft. |
| | 6.0 - 8.0 | Conejo Volcanics: Vesicular Basalt, dark brown, slightly weathered. |
| T-108 | 0.0 - 0.5 | Soil: Silty Sand, dark brown, very moist, soft, porous. |
| | 0.5 - 1.0 | Conejo Volcanics: Agglomerate, gray, very hard, massive, one joint plane. |
| | | Attitude: N80W, 45S - J |

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-109 | 0.0 - 3.0 | Colluvium: Sandy Silt, dark brown, very moist, soft. |
| | 3.0 - 9.0 | Conejo Volcanics: Upper 5.5 feet is brown, very weathered basalt, "shattered" looking from weathering; at 8½ feet, gray porphyritic andesite, hard. No obvious joint pattern.<br><br>Attitude: N80W, 48NE - B |
| T-110 | 0.0 - 5.0 | Colluvium: Sandy Silt to Silty fine Sand, brown, moist, soft, porous. |
| | 5.0 - 7.0 | Weathered Conejo Volcanics: Decomposed Basalt, weak residual rock fabric, soft. |
| | 7.0 -10.0 | Conejo Volcanics: Basalt, firm, fracture surfaces, moist. |
| T-111 | 0.0 - 3.0 | Soil: Sandy Silt to Silty fine Sand, brown, moist, soft, porous. |
| | 3.0 - 6.0 | Conejo Volcanics: Fractured, brown, fine-grained, Basalt (no phenocrysts), damp.<br><br>Attitudes: N50E, 40SE - J - rough<br>N50E, 75SE - J - moderately smooth |
| T-112 | 0.0 - 5.0 | Fill: Sandy Silt, brown, moist, moderately dense, abundant cobbles. |
| | 5.0 - 7.0 | Colluvium/Alluvium: Cobbly, Silty Sand, brown, moist to wet; water at basal contact. |
| | 7.0 - 7.5 | Conejo Volcanics: Basalt, gray, hard, refusal at 7.5 feet. |

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-113 | 0.0 - 5.0 | Conejo Volcanics: Porphyritic Basalt, gray to brown, dry, hard, difficult digging.<br><br>Attitudes: N50E, 40SE - J<br>N50W, 90 - J - Joints are moderately smooth to rough. |
| T-114 | 0.0 - 1.0 | Soil: Silty Sand, brown, moist, soft, porous. |
| | 1.0 - 7.0 | Conejo Volcanics: Porphyritic Basalt, brown, damp, weathered in upper four feet.<br><br>Attitude: N50E, 45NW - J/B |
| T-115 | 0.0 - 6.0 | Conejo Volcanics: Porphyritic Basalt, brown, damp, weathered in upper four feet.<br><br>Attitudes: N70W, 75SW - J<br>N80E, 90 - J |
| T-116 | 0.0 - 5.0 | Colluvium: Silty Sand to Clayey Sand, some cobbles, brown, moist to saturated. |
| | 5.0 - 7.0 | Conejo Volcanics: Weathered basalt, copious water at contact. |
| T-117 | 0.0 - 1.0 | Soil: Silty Sand, brown, moist, soft, porous. |
| | 1.0 - 6.0 | Conejo Volcanics: Dark gray basalt, some small pillows.<br><br>Attitude: N45W, 45SW - common orientation<br>N5E, 90 - J<br>N70E, 75NW - J<br>N80E, 48NW - B |

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-118 | 0.0 - 7.0 | Colluvium: Cobbly Silty Sand, brown, moist to saturated, porous, water at contact.. |
| | 7.0 - 8.0 | Conejo Volcanics: Water at contact. |
| T-119 | 0.0 - 4.0 | Fill: Cobbly Sandy Silt, brown, moist, porous, soft, roots. |
| | 4.0 - 6.0 | Topsoil: Sandy Silt, dark brown, moist, soft to medium stiff, no cobbles, scattered roots. |
| | 6.0 - 7.5 | Conejo Volcanics: Weathered Basalt, gray, firm but weathered. |
| T-120 | 0.0 - 2.0 | Soil: Silty Sand, brown, moist, loose, gravel. |
| | 2.0 - 4.0 | Weathered Conejo Volcanics: Decomposed Basalt, rock fabric gone, yellowish brown, pliable, wet. |
| | 4.0 - 7.0 | Conejo Volcanics: Basalt, brown to gray, moderately dense, jointed.<br>Attitudes: EW, 60S - well-developed<br>N60W, 45NE - rough, discontinuous. |
| T-121 | 0.0 -10.0 | Alluvium: Silty Sand, brown, loose, moist to saturated, carbonate at base, copious ground water at nine feet. |
| | 10.0 -12.0 | Alluvium: Cobble-supported sand, rounded clasts, saturated. |
| | 12.0 -12.5 | Weathered Conejo Volcanics: Extremely weathered Basalt, poorly defined rock fabric. |

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-122 | 0.0 - 8.0 | Alluvium: Silty Sand, brown, loose, moist to saturated, carbonate at base, copious ground water at eight feet. |
| | 8.0 -10.5 | Alluvium: Cobble-supported sand, rounded clasts, saturated. |
| | 10.5 -11.5 | Weathered Conejo Volcanics: Extremely weathered Basalt, brown, some rock fabric. |
| T-123 | 0.0 -11.0 | Fill: Bouldery Clayey Sand, brown, moist, clean, soft, fresh Basalt, boulders to 3 feet in diameter. |
| | 11.0 -11.5 | Soil: Clay, black, wet, soft, seepage at 11 feet. |
| | 11.5 -12.0 | Weathered Conejo Volcanics: Extremely weathered Basalt, brown, some rock fabric. |
| T-124 | 0.0 - 9.0 | Fill: Bouldery Clay Sand, brown, moist, clean, soft, fresh Basalt boulders to 3 feet in diameter. |
| | 9.0 -12.0 | Soil/Colluvium: Sandy Silt, dark brown, moist, soft to medium stiff, no cobbles, scattered roots. |
| T-125 | 0.0 - 2.0 | Soil: Cobbly Sandy Clay, brown, moist, soft. |
| | 2.0 - 6.0 | Conejo Volcanics: Basalt, gray with brown iron oxide stains, very fractured but hard, dug to refusal.<br><br>Attitudes: N60W, 45SW - J N25E, 90 - J<br>N70E, 50NW - J<br>N85E, 47NW - B |

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-126 | 0.0 - 2.0 | Soil: Clayey Sand, brown, moist, loose to slightly dense, cobbly. |
| | 2.0 - 6.0 | Conejo Volcanics: Basalt, gray to brown, weathered upper one to two feet, hard below. |
| | | Attitude: N30E, 80SE - J |
| T-127 | 0.0 -12.0 | Terrace Deposits: Clayey Sand, brown, moist, loose to slightly dense, cobbly. At seven feet, one foot thick, layered medium- to coarse-grained sand. |
| | 12.0 -12.5 | Weathered Conejo Volcanics: Extremely weathered Basalt, brown, some rock fabric. |
| T-128 | 0.0 - 2.0 | Soil: Clayey Sand, brown, moist, loose to slightly dense, cobbly. |
| | 2.0 - 6.0 | Conejo Volcanics: Basalt, gray to brown, weathered upper one to two feet, hard below. |
| | | Attitude: N40E, 50NW - B(?) |
| T-129 | 0.0 - 8.0 | Valley Fill: Sandy Clay, reddish brown, moist, soft, occasional gravel. |
| | 8.0 -12.5 | Valley Fill: Sandy Clay, light reddish brown, damp to moist, stiff, not very porous, carbonate. |
| T-130 | 0.0 - 4.0 | Scattered Artificial Fill: Sandy Clay, dark brown, moist, soft porous. |
| | 4.0 -12.0 | Valley Fill: Bouldery to Cobbly Sand, brown to gray, coarse-grained, clean, moist, porous to moderately dense, common boulders to 2 feet in diameter. |

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-131 | 0.0 - 8.0 | Artificial Fill: Cobbly to Bouldery Sand Clay, reddish brown, moist, soft. Four inch road A.C. at eight feet, many roots. |
| | 8.0 -12.0 | Valley Fill: Clayey Sand, brown, moist, pliable, clean, loose to moderately dense. |
| T-132 | 0.0 - 4.0 | Soil/Colluvium: Cobbly Clay, dark brown, very moist, pliable, porous. |
| | 4.0 - 5.0 | Weathered Conejo Volcanics: Extremely weathered Basalt, brown, some rock fabric. |
| | 5.0 - 5.5 | Conejo Volcanics: Basalt, gray, massive, very hard, refusal. |
| T-133 | 0.0 -10.0 | Artificial Fill: Cobbly to Bouldery Sand Clay, reddish brown, moist, soft. |
| | 10.0 -12.0 | Conejo Volcanics: Basalt, gray to brown, weathered upper one foot, hard below. |
| T-134 | 0.0 - 8.0 | Artificial Fill: Cobbly to Bouldery Sand, reddish brown, moist, loose, caving. |
| | 8.0 - 9.0 | Conejo Volcanics: Basalt, dark brown, hard, refusal. |
| T-135 | 0.0 - 1.0 | Soil: Clayey Sand, brown, moist, soft. |
| | 1.0 - 6.0 | Conejo Volcanics: Basalt, olive brown, fractured, firm at depth, joints tighter with depth; joint shards are 1 inch to 4 inches in upper four feet of rock.<br><br>Attitudes: EW, 90 - J - abundant<br>N20W, 85SW - J - irregular surfaces<br>N10E, 52SE - J - not common<br>N80E, 45NW - B |

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-136 | 0.0 - 1.0 | Soil: Clayey Sand, brown, moist, soft. |
| | 1.0 - 6.0 | Conejo Volcanics: Basalt, olive brown, fractured, firm at depth; less fractured or weathered than T-135.<br><br>Attitudes: N30W, 35NE - J - discontinuous<br>N75E, 90 - J<br>N30E, 35SE - J |
| T-137 | 0.0 - 1.0 | Soil: Clayey Sand, brown, moist, soft. |
| | 1.0 - 4.0 | Conejo Volcanics: Basalt, olive brown, fractured firm at depth. |
| T-138 | 0.0 - 4.0 | Soil: Clayey Sand, brown, moist, porous, soft. |
| | 4.0 - 6.0 | Conejo Volcanics: Basalt to Andesite, brown, massive, weathered in upper one foot, firm below. |
| T-139 | 0.0 - 1.0 | Soil: Silty Sand, brown, fine-grained, moist, porous. |
| | 1.0 - 5.0 | Conejo Volcanics: Basalt, dark brown, slightly weathered, joints open upper two± feet, tight below, hard digging.<br><br>Attitudes: N50E, 70NW - J - rough surfaces<br>N10E, 90 - J |
| T-140 | 0.0 - 4.0 | Alluvium: Cobbly, Clayey, fine-sand, moist, soft. |
| | 4.0 - 7.0 | Conejo Volcanics: Basalt, dark gray, weathered upper two (2±) feet, firm below. |

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-141 | 0.0 - 0.5 | Alluvium: Cobbly Silty Sand, reddish brown, dry, porous. |
| | 0.5 -12.0 | Conejo Volcanics: Basalt , locally vesicular, firm but excavatable. |
| T-142 | 0.0 - 0.5 | Soil: Cobbly Silty Sand, reddish brown, dry, porous. |
| | .05- 1.0 | Conejo Volcanics: Basalt , extremely hard, refusal. |
| | | Attitude: N15E, 90 - J |
| T-143 | 0.0 - 4.0 | Soil/Colluvium: Cobbly/bouldery Clayey Sand, brown, dry, loose. |
| | 4.0 - 5.0 | Conejo Volcanics: Basalt, dark gray, slightly fractured, hard, refusal. |
| | | Attitudes: N40E, 45NW - B<br>NS, 35E - J<br>N40W, 85SW - J |
| T-144 | 0.0 - 1.0 | Soil: Cobbly Silty Sand. |
| | 1.0 - 5.0 | Conejo Volcanics: Basalt , locally vesicular, firm but excavatable. |
| | | Attitudes: N15E, 75NW - J<br>N55E, 80SE - J |
| T-144 | 0.0 - 1.0 | Soil: Cobbly Silty Sand. |
| | 1.0 - 5.0 | Conejo Volcanics: Basalt , locally vesicular, firm but excavatable.<br>Attitudes: N15E, 75NW - J<br>N55E, 80SE - J |

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-145 | 0.0 - 4.0 | Soil/Colluvium: Cobbly, Sandy Clay, dark brown, moist, soft, porous. |
| | 4.0 - 6.5 | Conejo Volcanics: Basalt, dark brownish gray, phenocrysts, massive, some carbonate deposition in upper one foot, weathered upper one foot. |
| T-146 | 0.0 - 2.0 | Soil: Cobbly Silty Sand, reddish brown, dry, porous. |
| | 2.0 - 3.0 | Conejo Volcanics: Basalt , extremely hard, refusal. |
| T-147 | 0.0 - 4.0 | Soil: Clayey Sandy reddish brown, moist, loose porous. |
| | 4.0 - 7.0 | Conejo Volcanics: Basalt, brown, firm, but not hard except at bottom. |
| T-148 | 0.0 - 6.0 | Valley Fill: Clayey Sandy reddish brown, moist, loose porous. |
| | 6.0 - 9.0 | Conejo Volcanics: Basalt, brown, firm, but not hard except at bottom. |

mm/1568L003

September [redacted], 1988
Work Order 101568A

# TABLE II

## SUMMARY OF LABORATORY TEST DATA

| BORING/PIT NO. | DEPTH (ft.) | SOIL DESCRIPTION | GROUP SYMBOL, Unified Soil Classification System | MAXIMUM DRY DENSITY: Maximum Density (pcf) | MAXIMUM DRY DENSITY: Optimum Moisture (%) | GRAIN SIZE ANALYSIS: % + No. 4 Screen | GRAIN SIZE ANALYSIS: % Coarse Sand | GRAIN SIZE ANALYSIS: % Med.-Fine Sand | GRAIN SIZE ANALYSIS: % Silt (0.074 to 0.005mm) | GRAIN SIZE ANALYSIS: % Clay (-0.005 mm) | EXPANSION INDEX, UBC 29-2 | DIRECT SHEAR: Cohesion (psf) | DIRECT SHEAR: Ø, (Degrees) | DIRECT SHEAR: Test Conditions | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-6 | 5.0 | Medium brown clayey silt | ML | 110.5 | 17.0 | | | 45 | 25 | 30 | 58 | | | | |
| P-37 | 3.0 | Lt. green silty sand | SM | 119.5 | 14.0 | | | 86 | 12 | 2 | | | | | |
| P-39 | 1.0 | Dark brown medium clay | CH | 106.5 | 19.5 | | | 24 | 19 | 57 | 115 | | | | |
| P-45 | 2.0 | Lt. brown silty sand | SM | 122.5 | 11.5 | | | 83 | 10 | 7 | | | | | |
| P-64 | 2.0 | Dark brown silty sand | SM | 119.0 | 14.0 | | | 78 | 19 | 3 | 16 | | | | |
| P-66 | 2.0 | Dark brown clayey silt | ML | 112.5 | 15.5 | | | 47 | 38 | 15 | 86 | | | | |
| P-66 | 5.0 | Dark brown sand | SP/SM | 112.0 | 18.0 | | | 91 | 8 | 1 | | | | | |

TEST CONDITIONS: R – Remolded, S – Saturated, U – Undisturbed, N – Natural Moisture

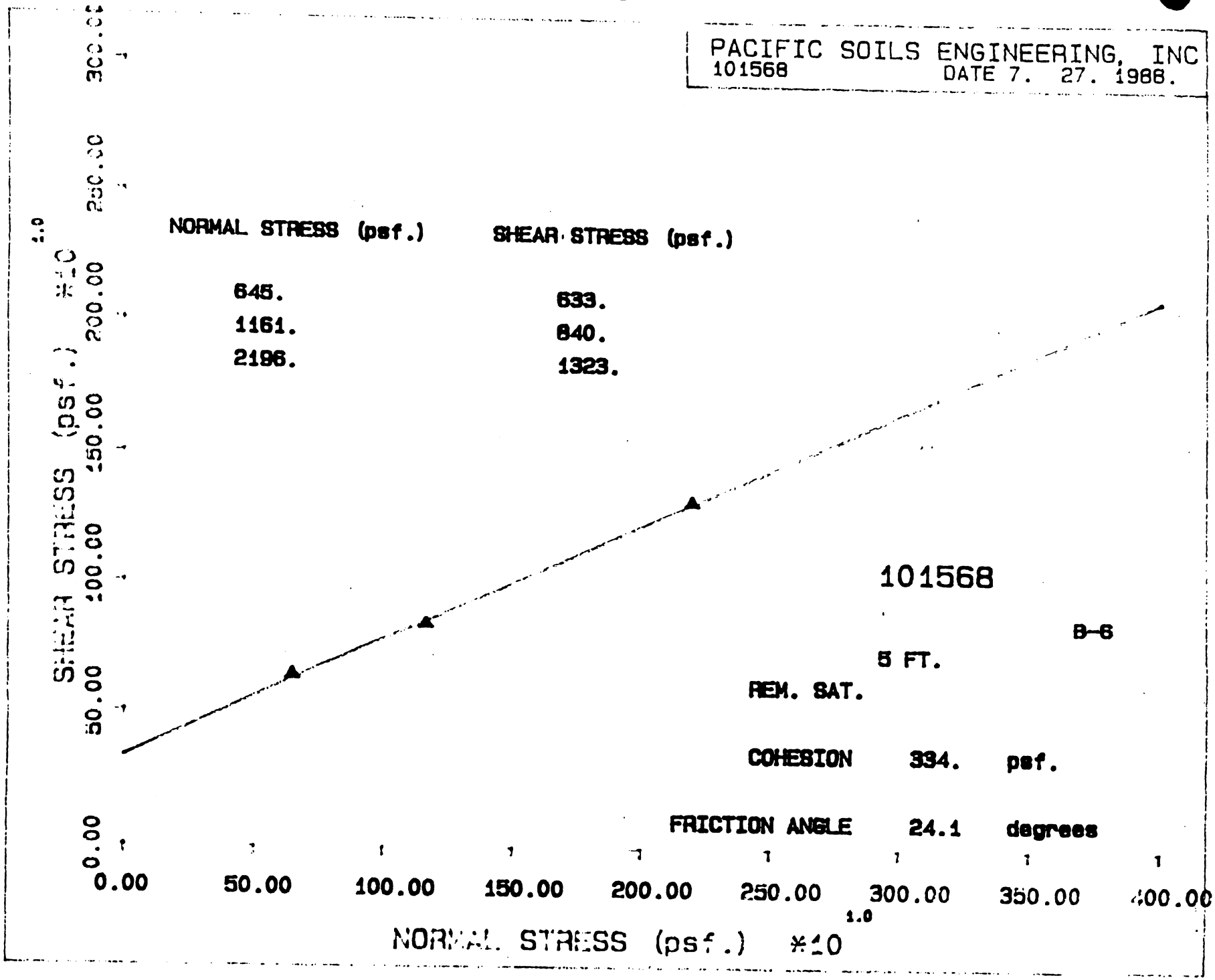
Work Order 101568A

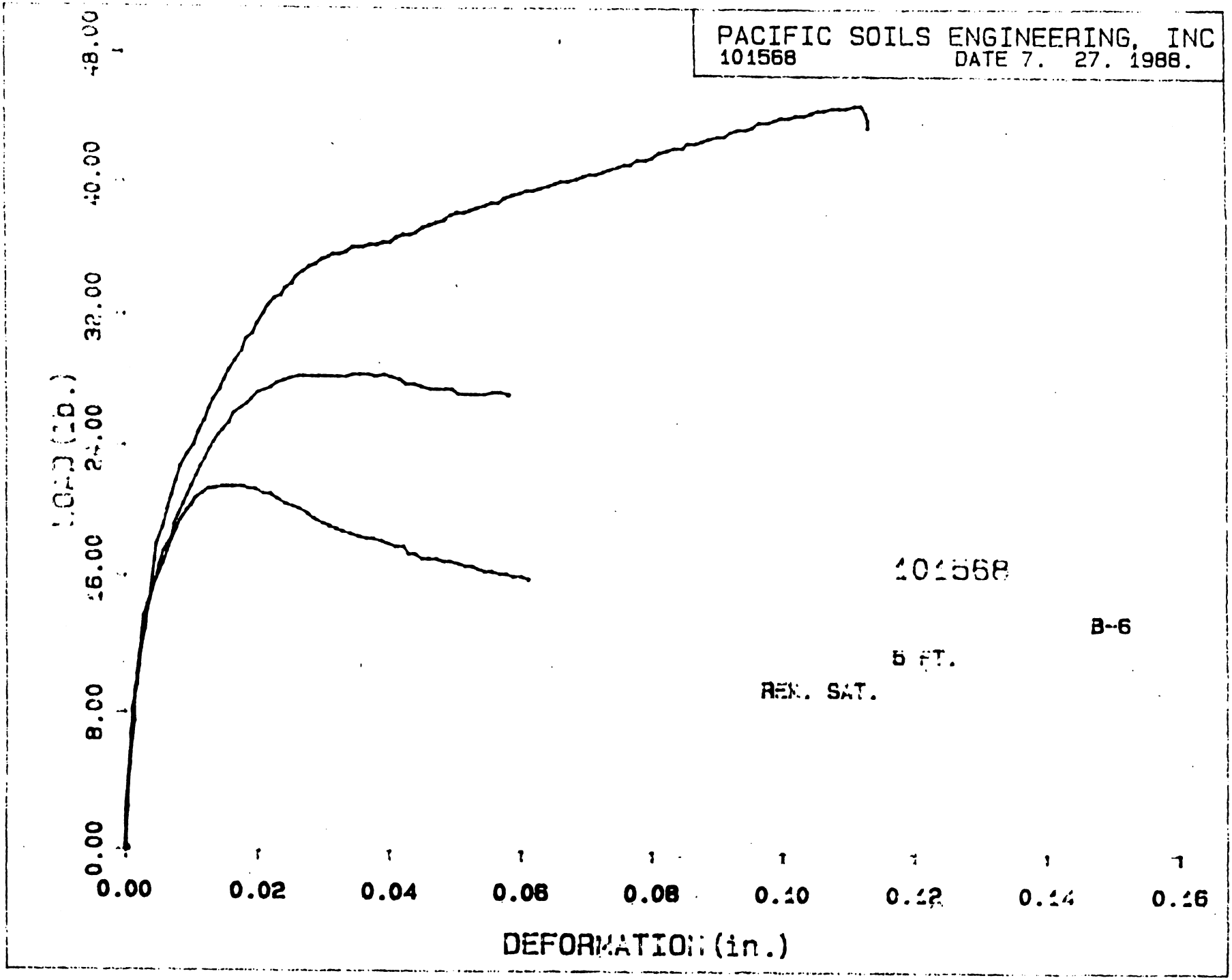
Table II Continued

| Sample | pH | Sulfates % Dry Soil | Chlorides (ppm) | Alkalinity (Ca C03) (ppm) | Resistivity ohm-cm |
|---|---|---|---|---|---|
| T-45 @ 2.0 | 7.6 | 0 | 4 | 10 | 2660 |
| T-64 @ 2.0 | 7.9 | 0 | 4 | 14 | 2250 |
| T-34 @ 1.0 | 8.0 | 0 | 10 | 75 | 954 |
| T-66 @ 2.0 | 8.1 | 0 | 5 | 63 | 1120 |
| T-66 @ 5.0 | 8.8 | 0 | 4 | 52 | 1260 |

Tests performed by Twining Laboratories of Southern California, Inc.

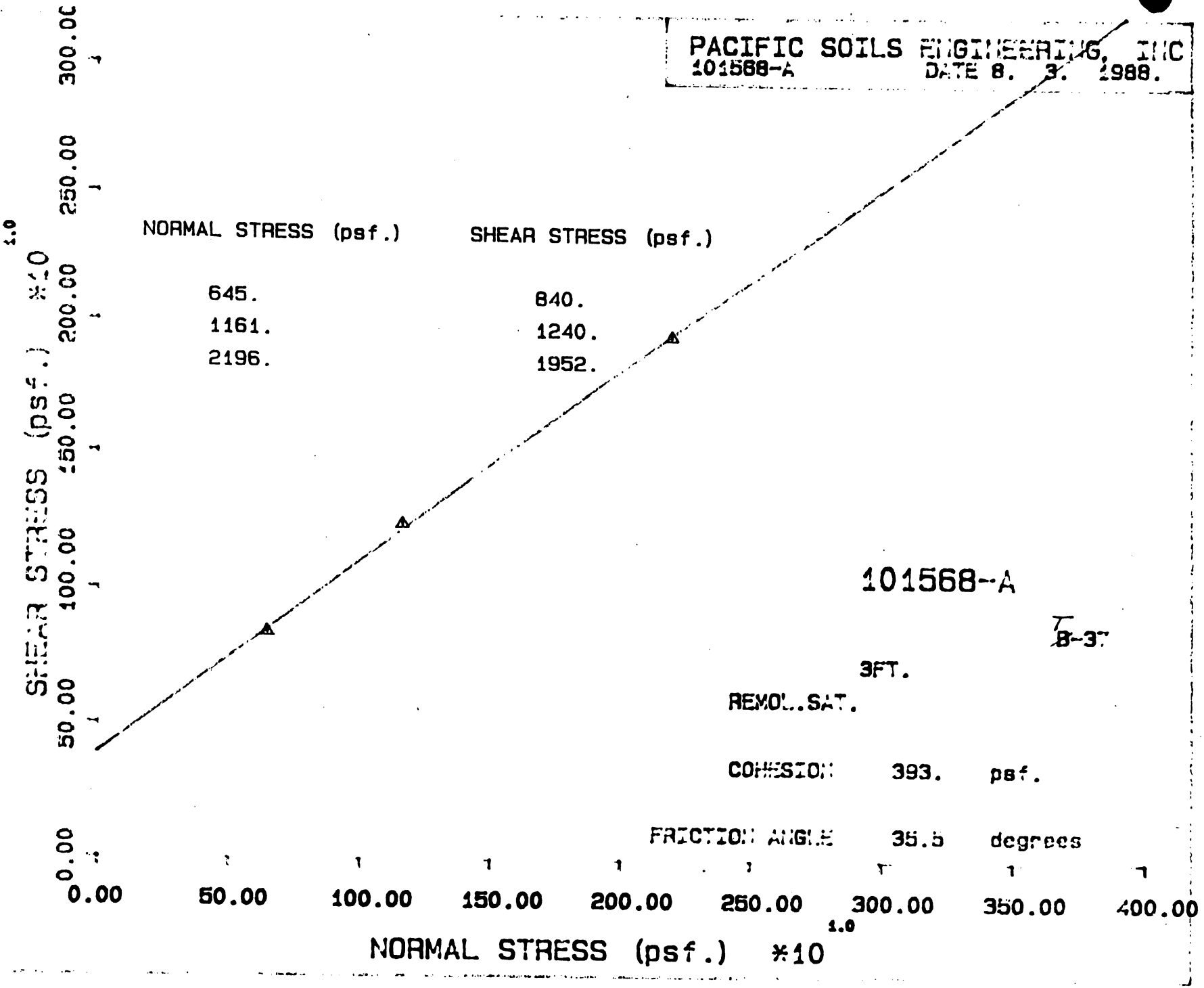
PACIFIC SOILS ENGINEERING, INC
101568 DATE 7. 27. 1988.



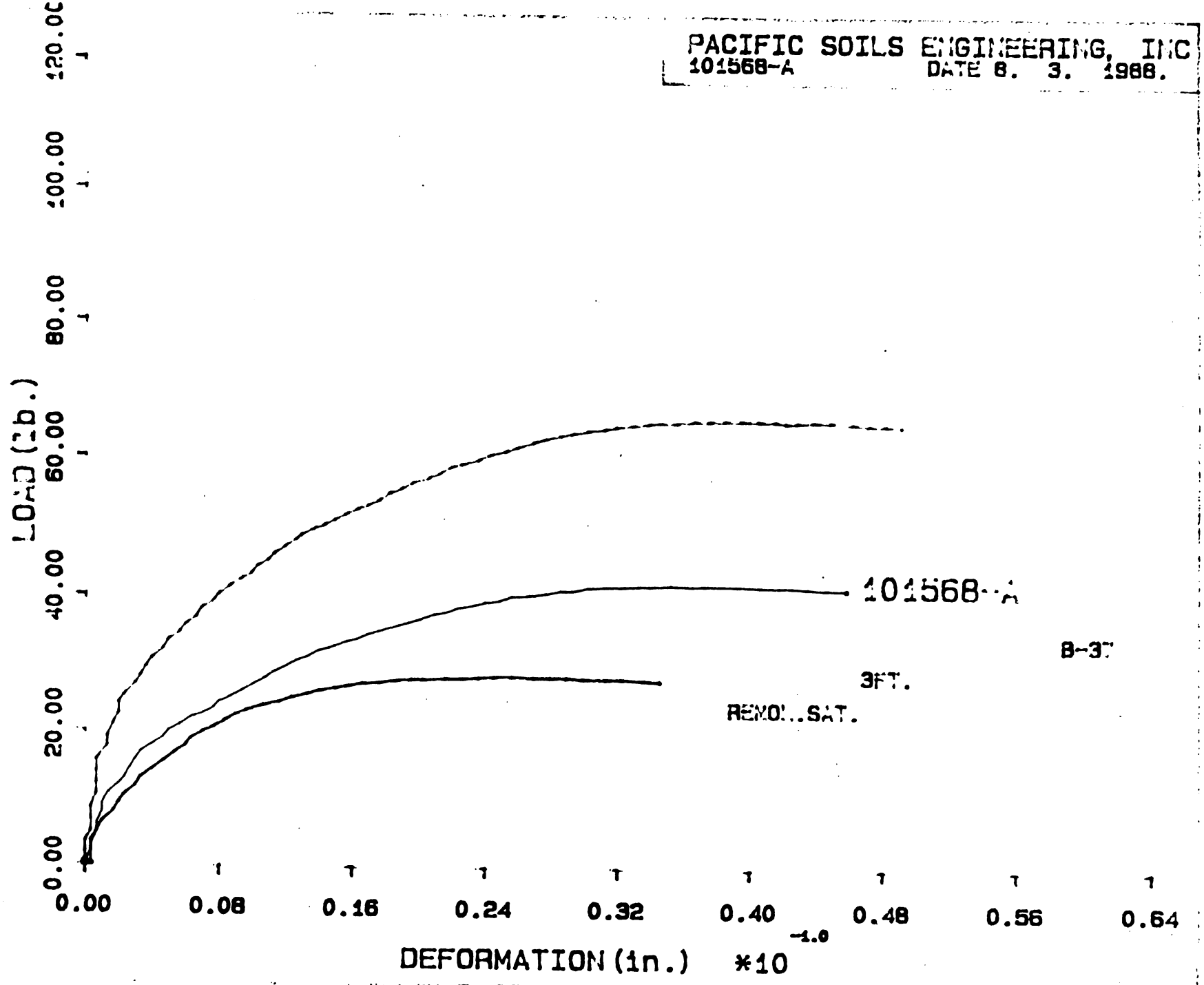

PACIFIC SOILS ENGINEERING, INC
101568
DATE 7. 27. 1988.
48.00
40.00
32.00
24.00
16.00
8.00
0.00
LOAD (lb.)
101568
B-6
5 FT.
REM. SAT.
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
DEFORMATION (in.)

B2

PACIFIC SOILS ENGINEERING, INC
101568-A DATE 8. 3. 1988.



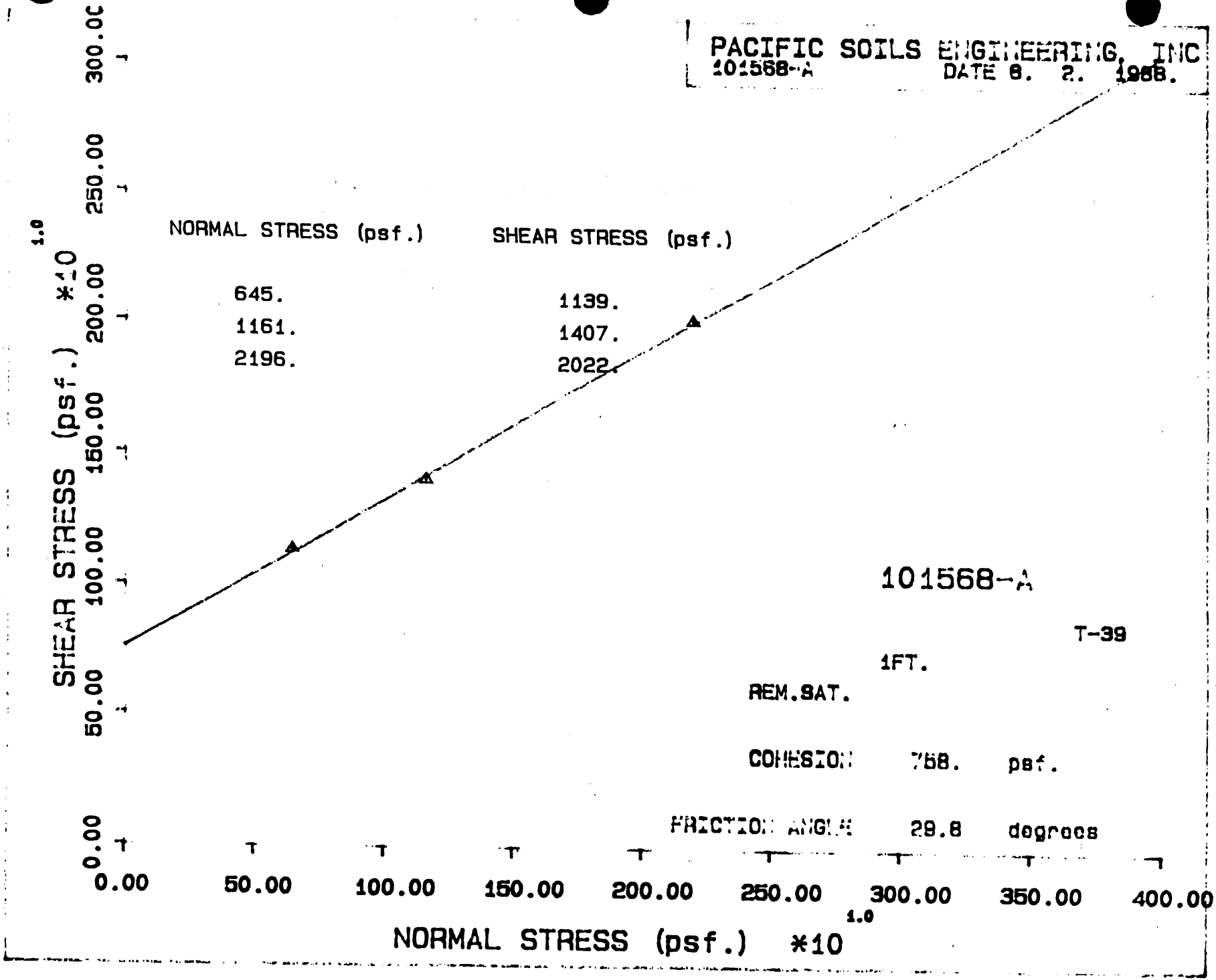

R-2


PACIFIC SOILS ENGINEERING, INC
101568-A
DATE 6. 3. 1988.
LOAD (lb.)
120.00
100.00
80.00
60.00
40.00
20.00
0.00
101568-A
B-3
3FT.
REMOLDED SAT.
0.00
0.08
0.16
0.24
0.32
0.40
0.48
0.56
0.64
DEFORMATION (in.) *10 -1.0

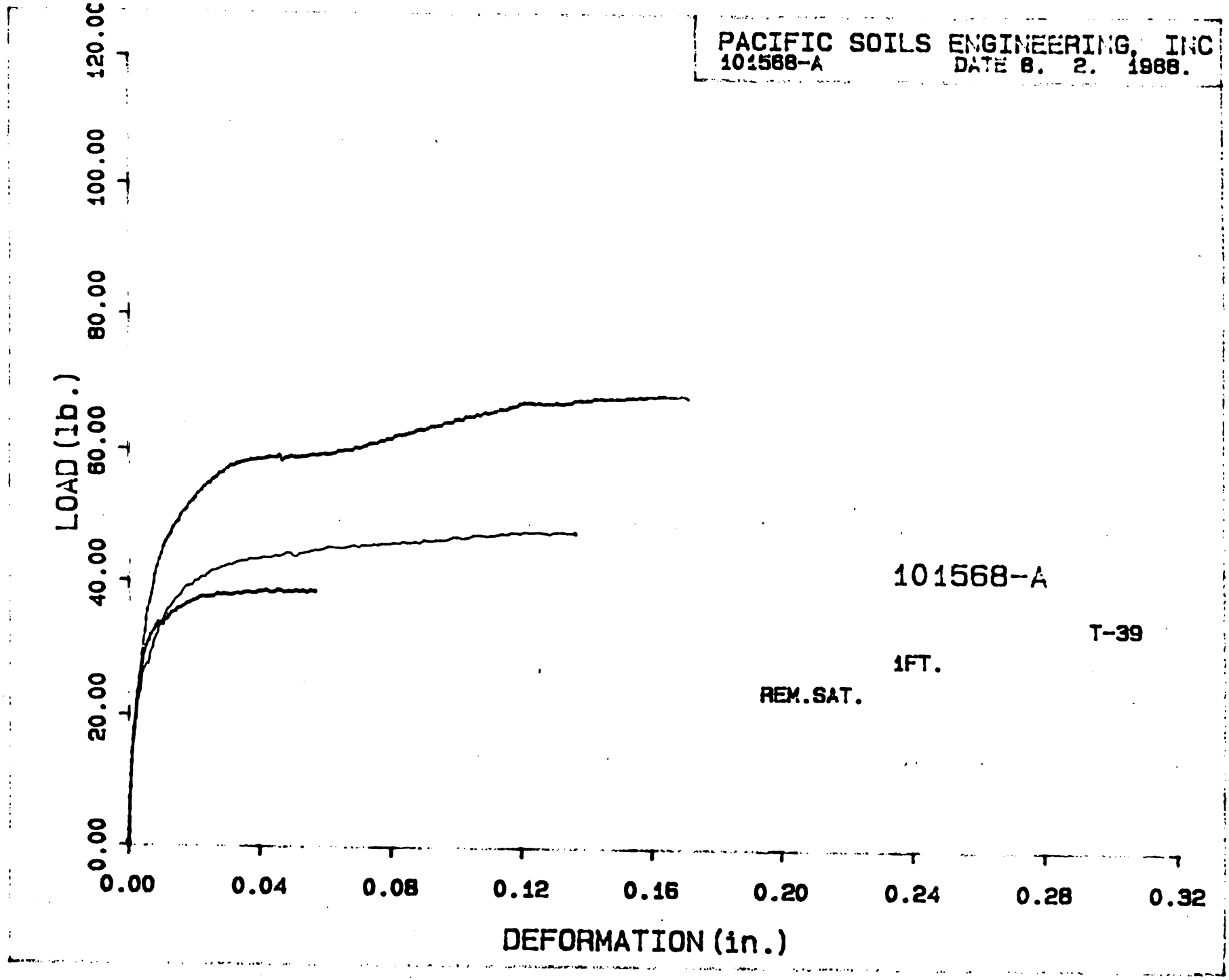
R-4

PACIFIC SOILS ENGINEERING, INC

101568-A DATE 8. 2. 1988.

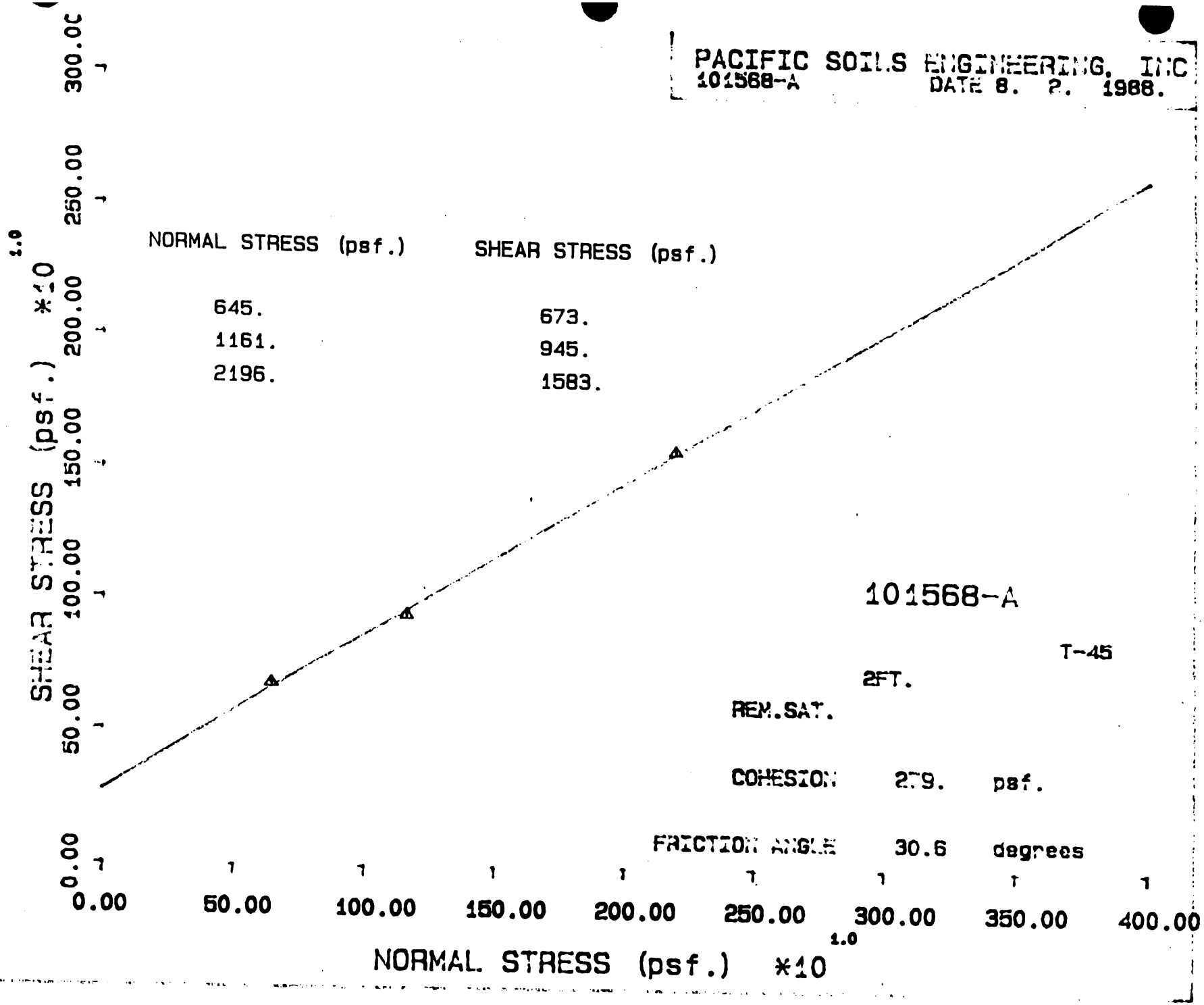



B-5

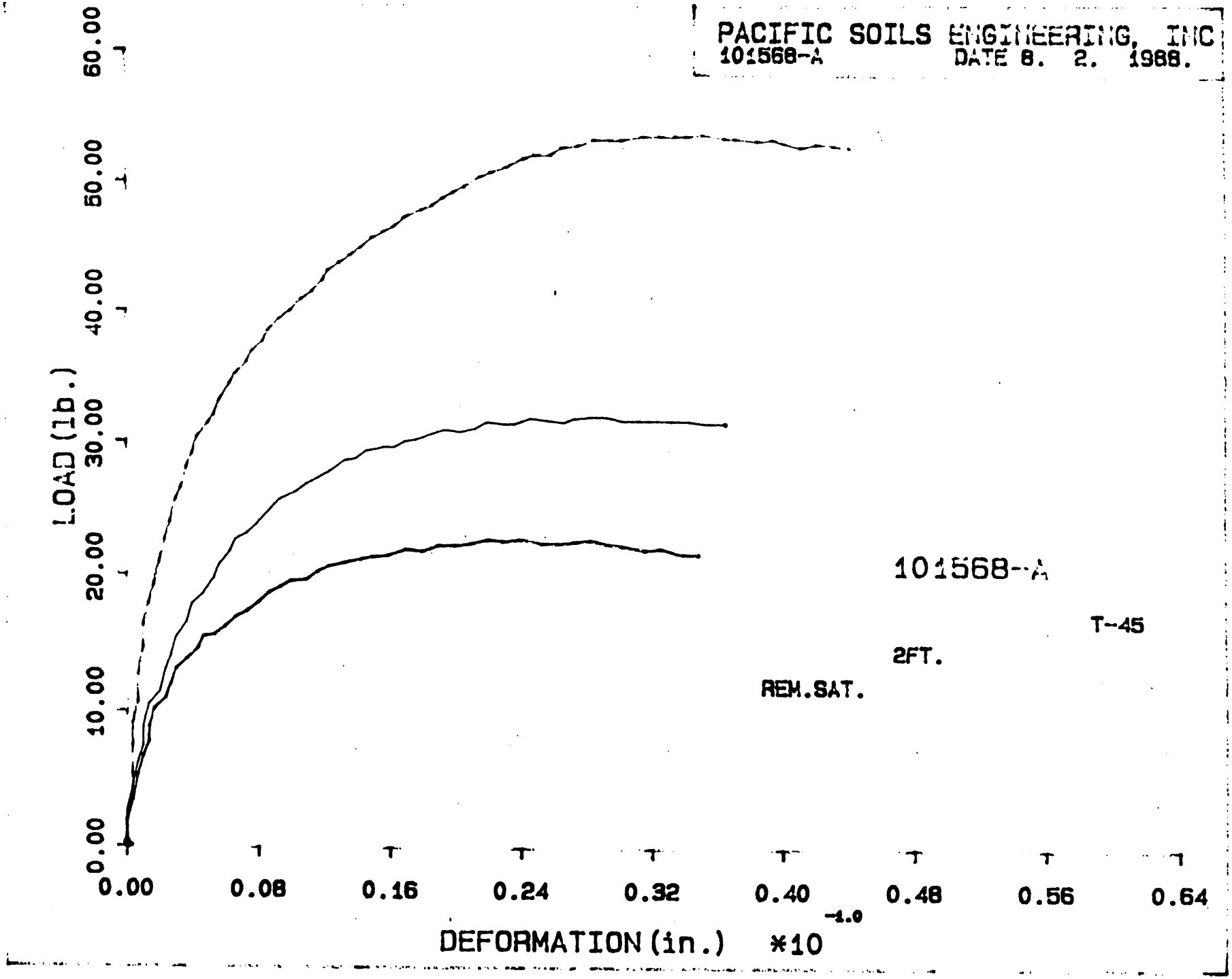

PACIFIC SOILS ENGINEERING, INC
101568-A
DATE 8. 2. 1988.
LOAD (lb.)
120.00
100.00
80.00
80.00
40.00
20.00
0.00
0.00
0.04
0.08
0.12
0.16
0.20
0.24
0.28
0.32
DEFORMATION (in.)
101568-A
T-39
1FT.
REM.SAT.

R-6

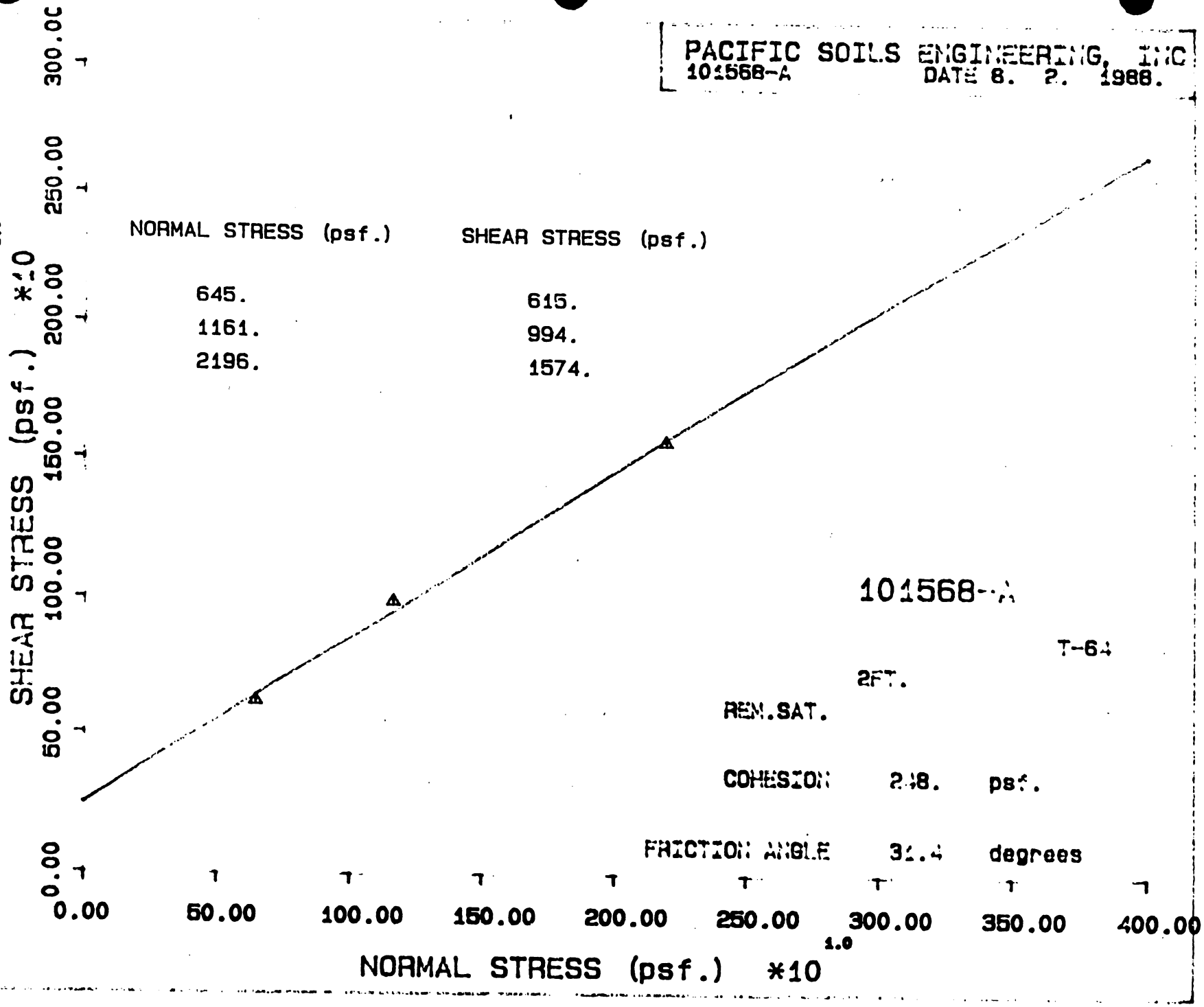
PACIFIC SOILS ENGINEERING, INC
101568-A DATE 8. 2. 1988.



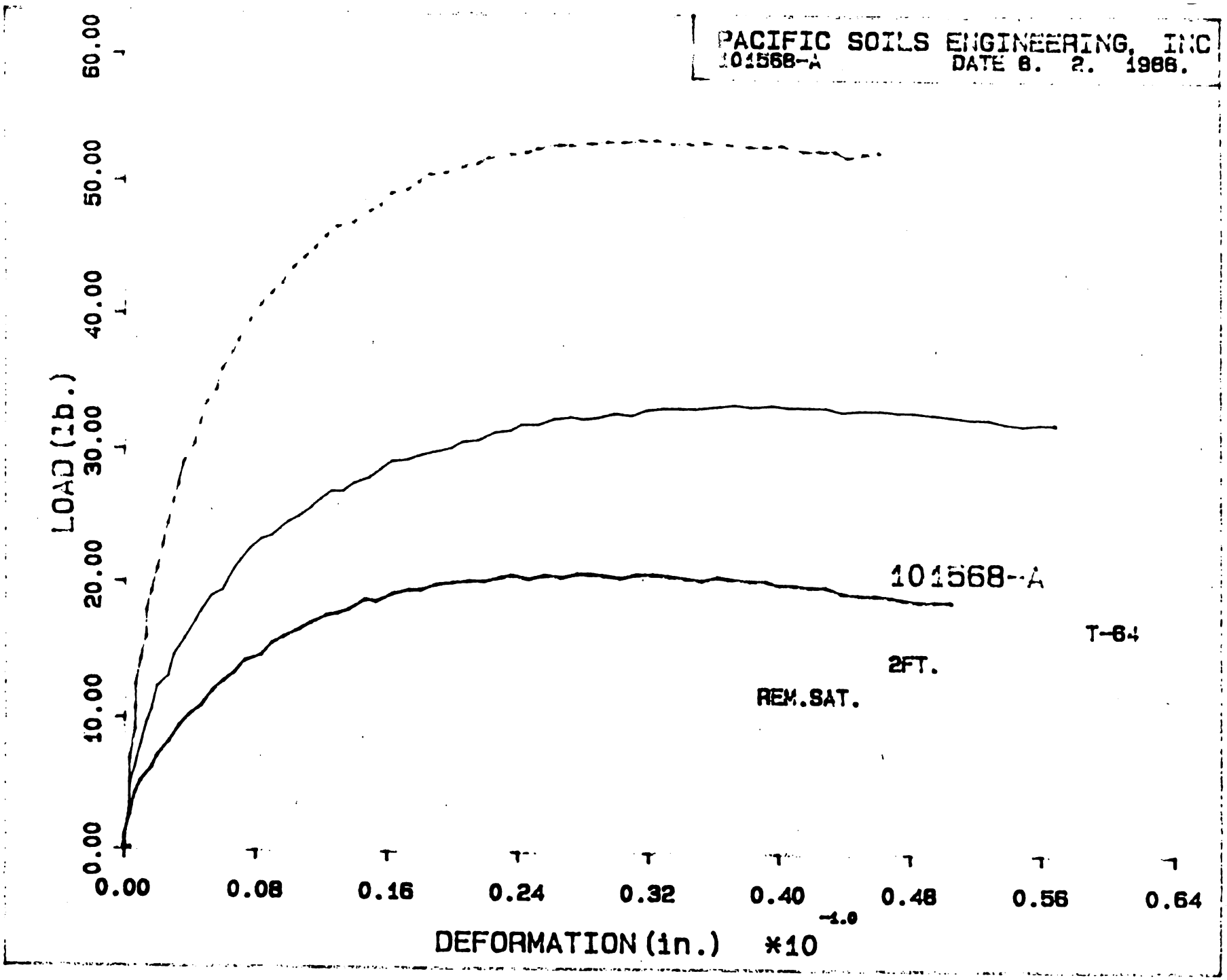

R-7


PACIFIC SOILS ENGINEERING, INC
101568-A
DATE 8. 2. 1988.
LOAD (lb.)
0.00
10.00
20.00
30.00
40.00
50.00
60.00
0.00
0.08
0.16
0.24
0.32
0.40
0.48
0.56
0.64
DEFORMATION (in.) *10 -1.0
101568--A
T-45
2FT.
REM.SAT.

PACIFIC SOILS ENGINEERING, INC
101568-A DATE 8. 2. 1988.

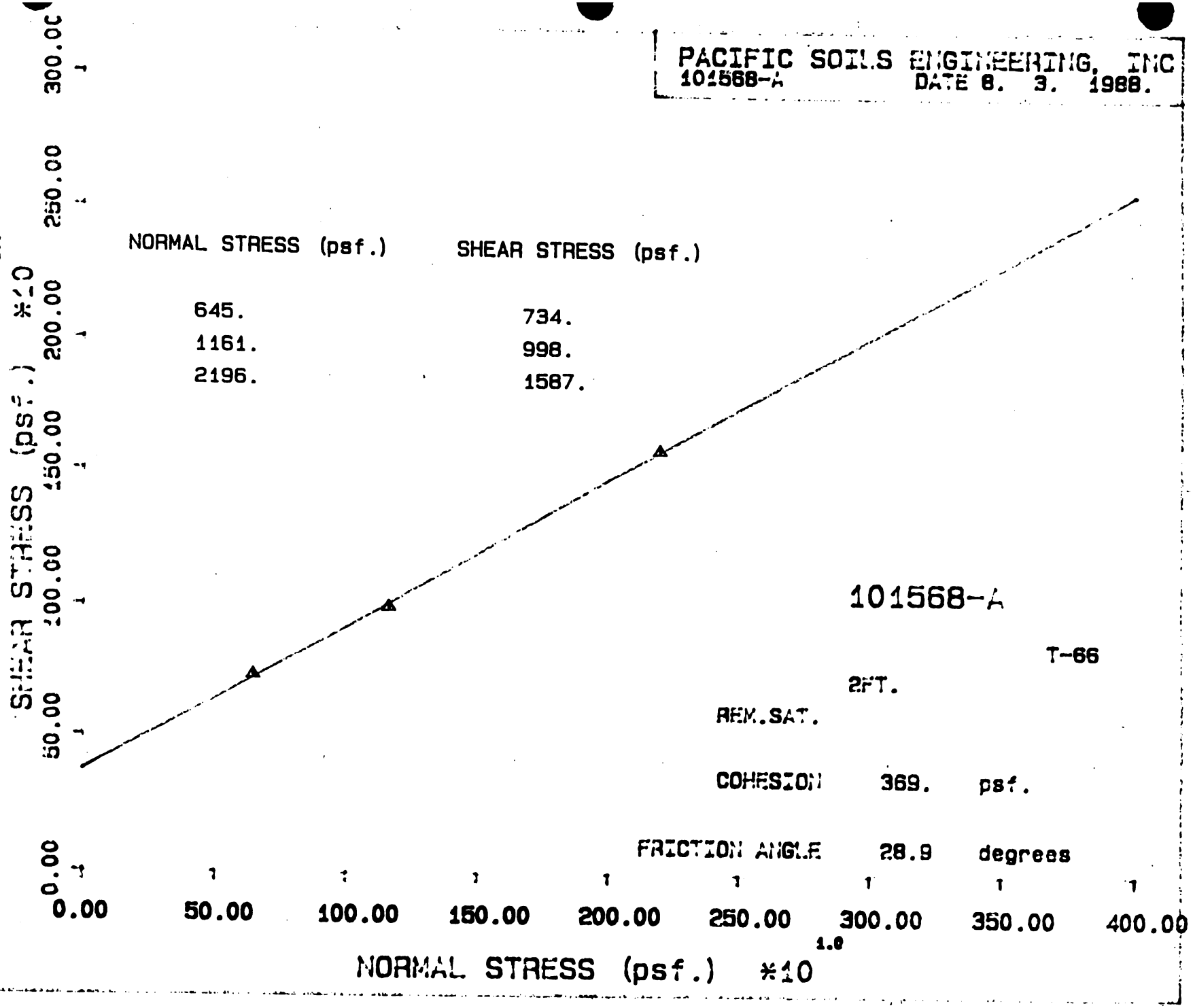



R-9

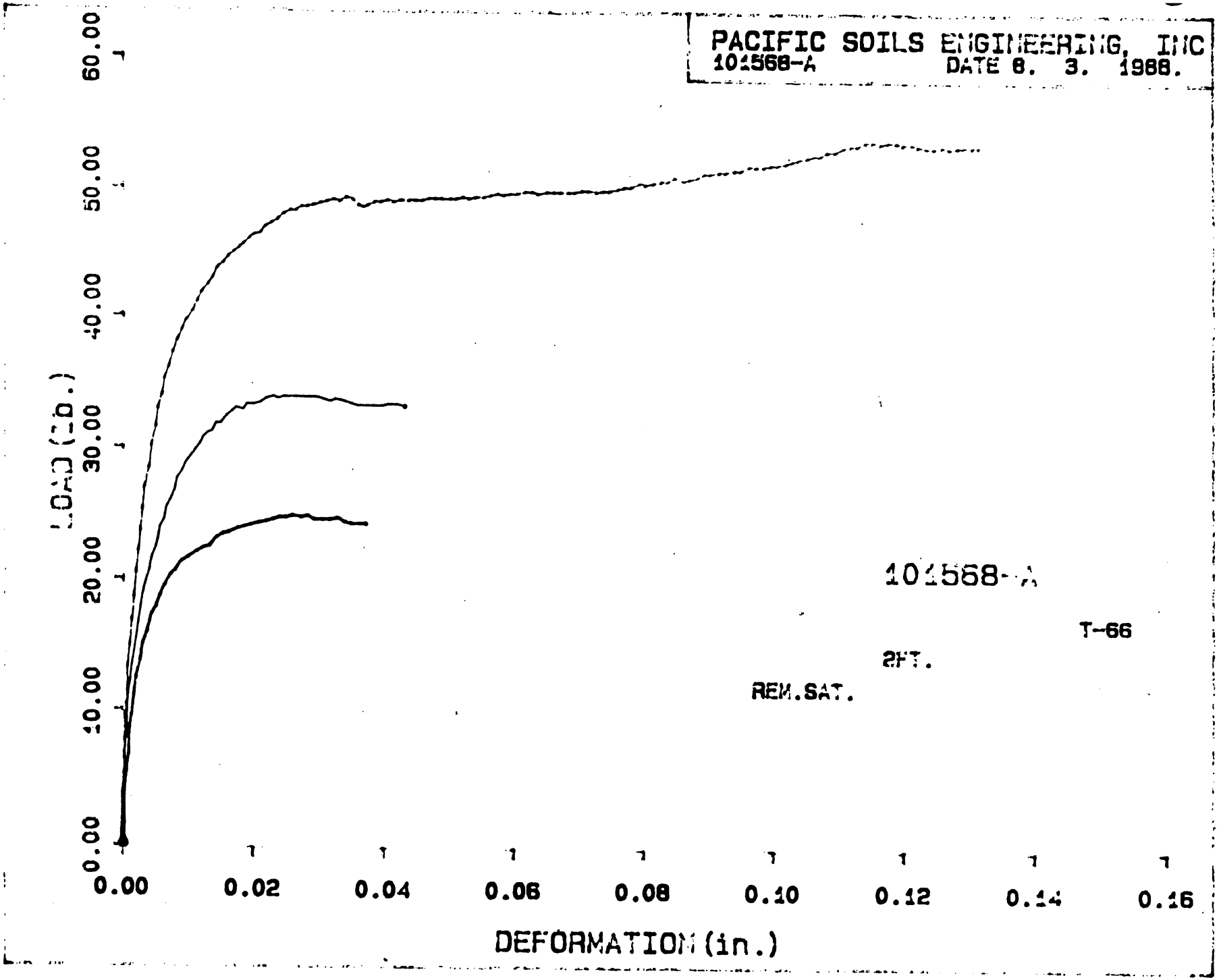

PACIFIC SOILS ENGINEERING, INC
101568-A
DATE 8. 2. 1988.
LOAD (lb.)
60.00
50.00
40.00
30.00
20.00
10.00
0.00
101568--A
T-64
2FT.
REM.SAT.
0.00
0.08
0.16
0.24
0.32
0.40
0.48
0.56
0.64
-1.0
DEFORMATION (in.) *10

Rin

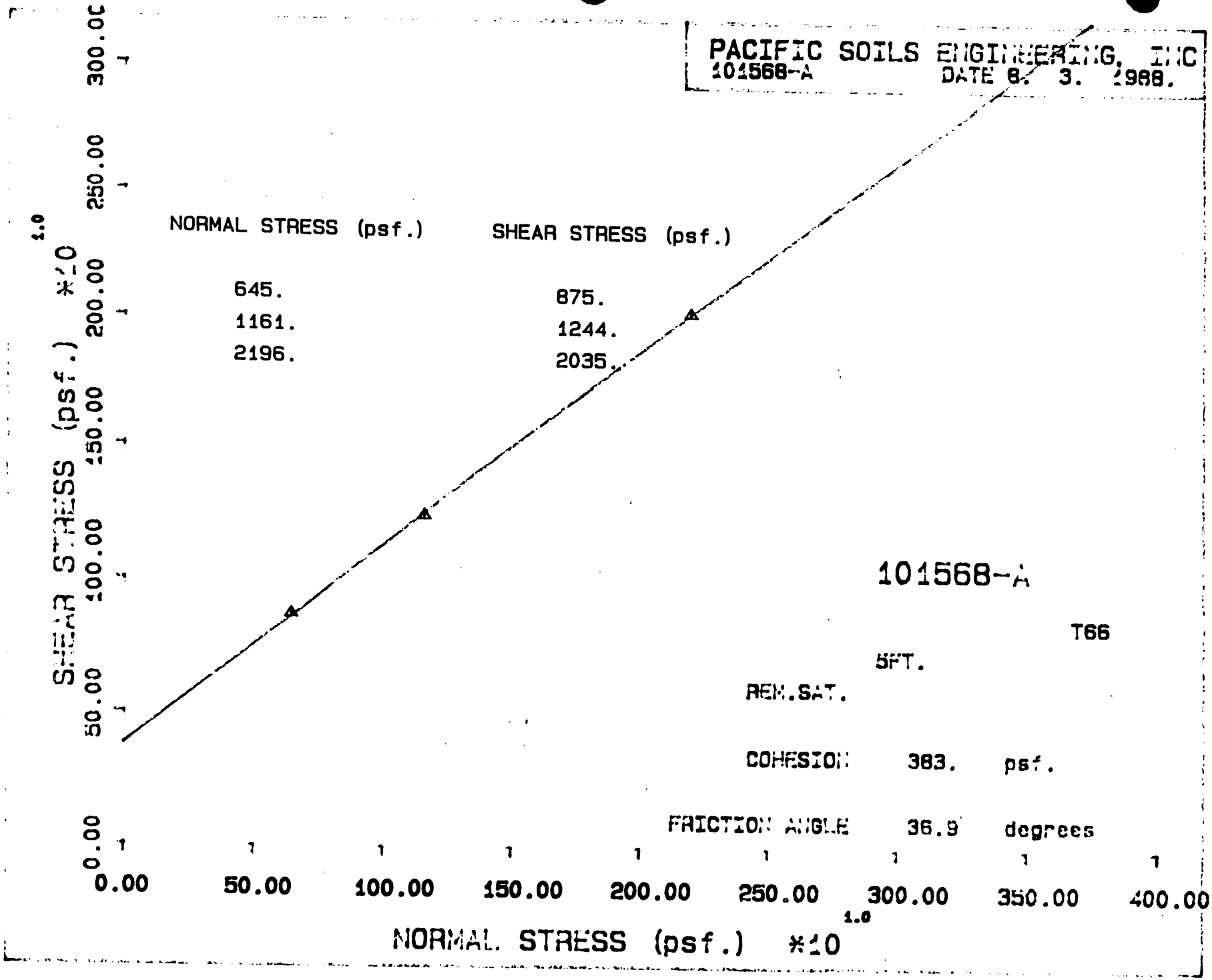
PACIFIC SOILS ENGINEERING, INC
101568-A DATE 8. 3. 1988.



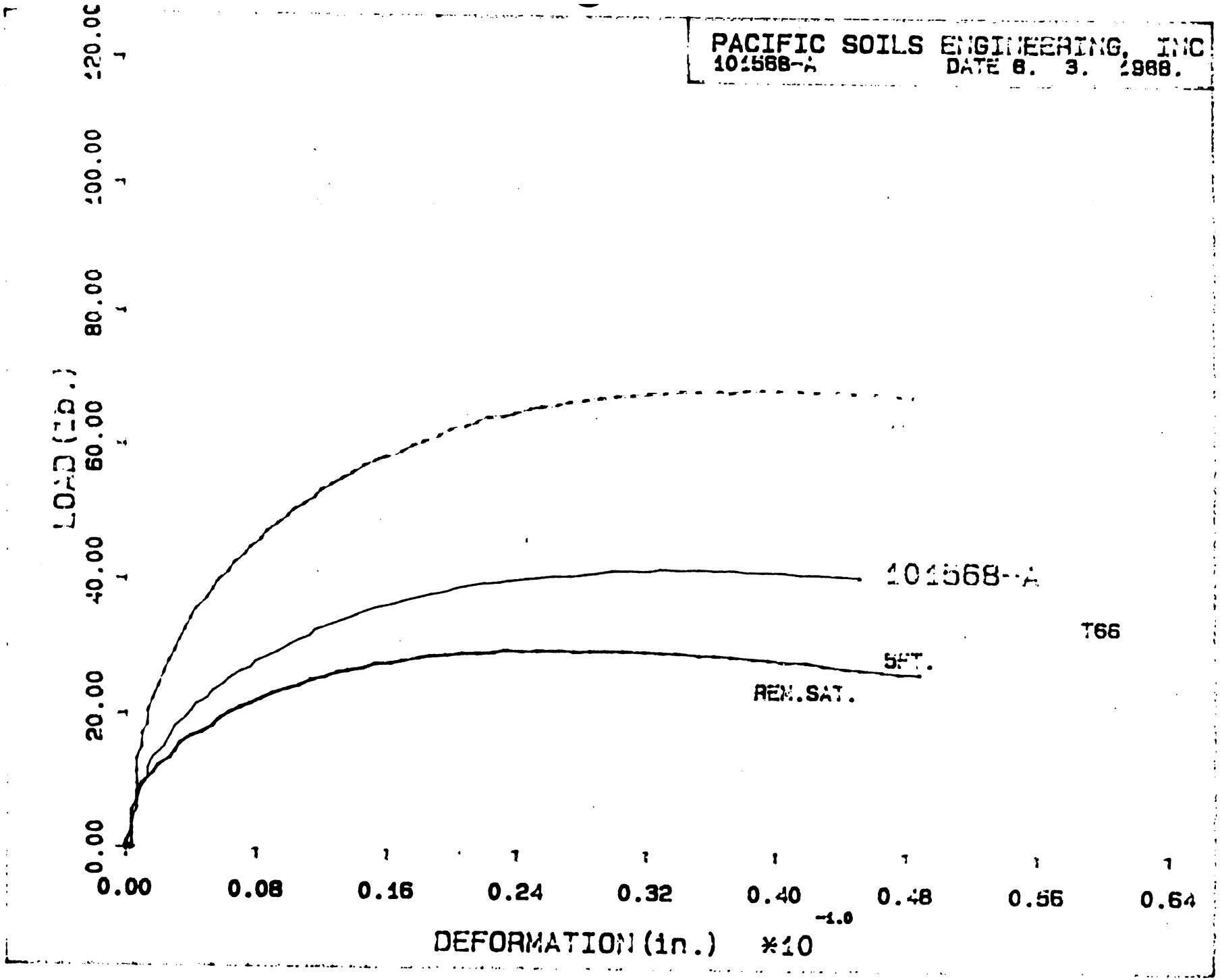

B-11

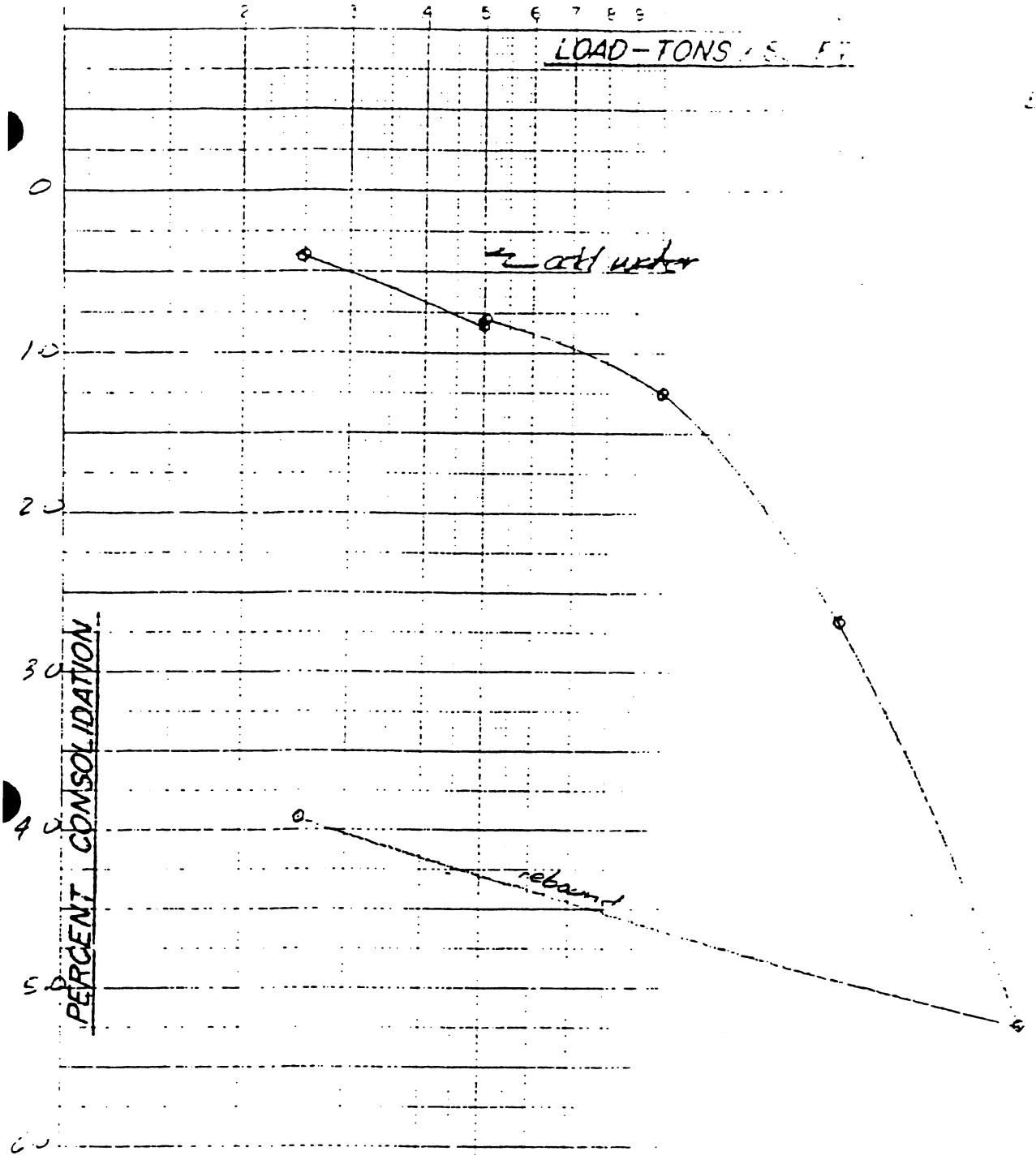

PACIFIC SOILS ENGINEERING, INC
101568-A
DATE 8. 3. 1988.
LOAD(lb.)
60.00
50.00
40.00
30.00
20.00
10.00
0.00
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
DEFORMATION(in.)
101568-A
T-66
2FT.
REM.SAT.

R-17


PACIFIC SOILS ENGINEERING, INC
101568-A
DATE 8. 3. 1988.
NORMAL STRESS (psf.)
SHEAR STRESS (psf.)
645.
1161.
2196.
875.
1244.
2035.
101568-A
T66
5FT.
REM.SAT.
COHESION 383. psf.
FRICTION ANGLE 36.9 degrees
SHEAR STRESS (psf.) *10
NORMAL STRESS (psf.) *10
0.00
50.00
100.00
150.00
200.00
250.00
300.00
350.00
400.00
50.00
100.00
150.00
200.00
250.00
300.00
1.0
1.0

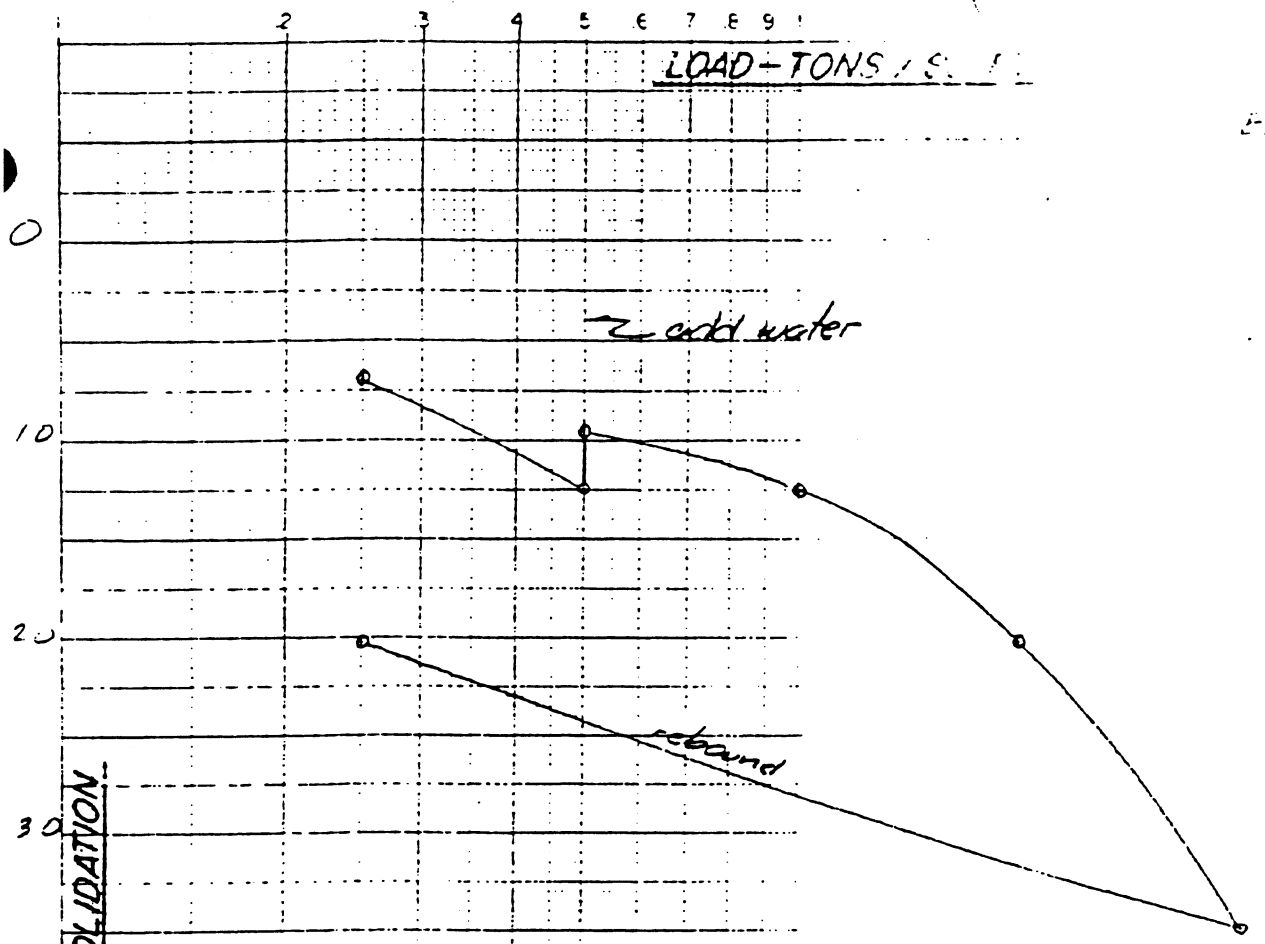
D 12


PACIFIC SOILS ENGINEERING, INC
101568-A
DATE 8. 3. 1988.
120.00
100.00
80.00
60.00
40.00
20.00
0.00
LOAD (lb.)
101568--A
T66
5FT.
REM.SAT.
0.00
0.08
0.16
0.24
0.32
0.40
0.48
0.56
0.64
-1.0
DEFORMATION (in.) *10



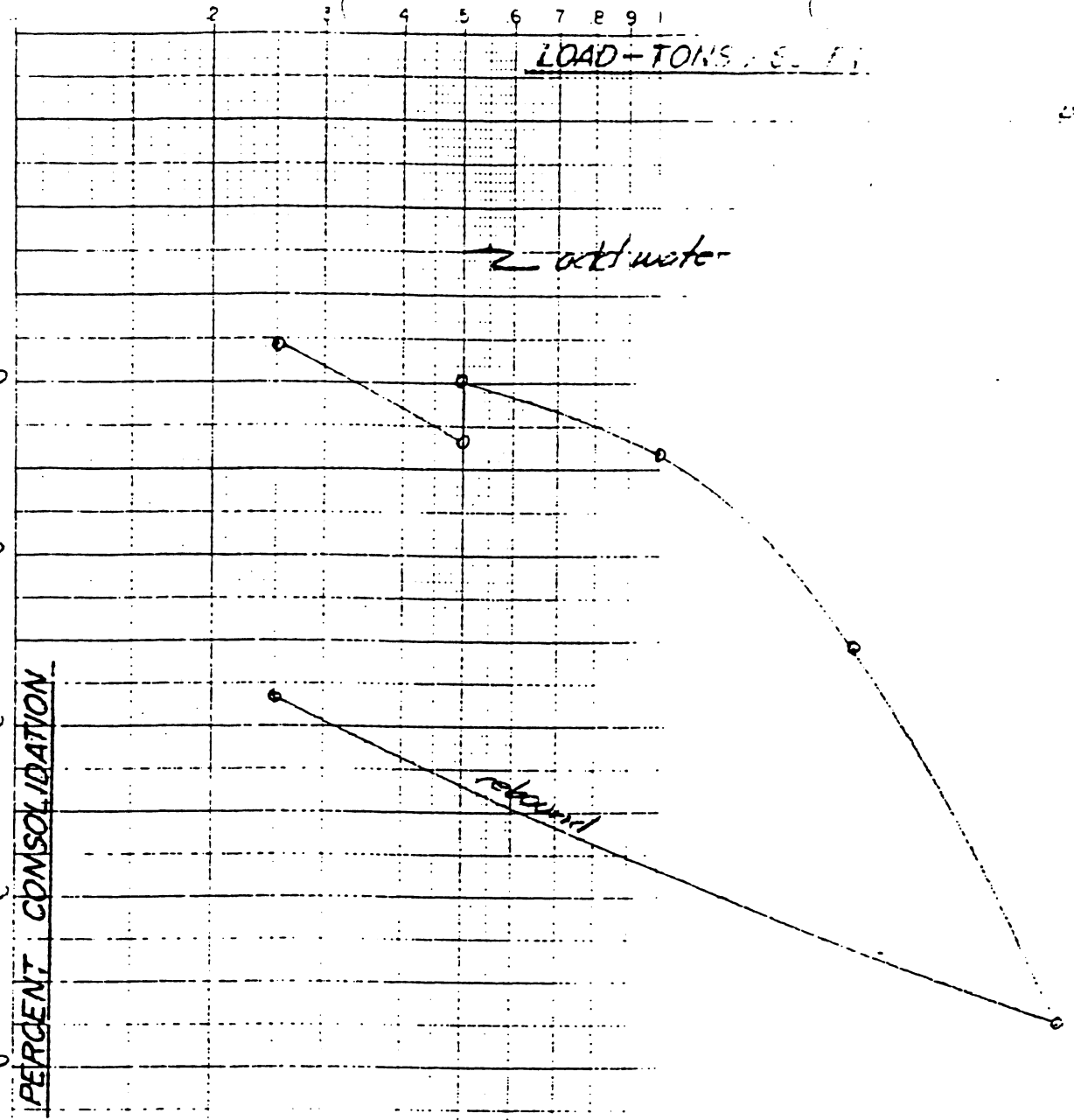

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
W.O. 411-515-A DATE 7-5-66




CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
W.O. KV 566A DATE 7-25-66




CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
W.O. 1564-A DATE 7-15-69

Work Order 101568A
September 16, 1988

## SLOPE STABILITY CALCULATIONS

Stability analyses have been performed on the highest proposed fill slope. The analyses have been performed utilizing STABL4, a computer program developed originally by Ronald A. Siegel as a joint Highway Research at Purdue University and later adapted by Design Professional Management Systems of Kirkland Washington. A searching routine, using a random technique for generating circular surfaces has been adopted. One hundred trial surfaces have been generated form which the ten most critical surfaces have been plotted (Plate D-4). The data relative to the most critical surface generated is presented in Plates D-1 through D-3. The lowest factor of safeties thus obtained are 1.64 and 1.19 for static and pseudostatic cases, respectively.

```
**********************************************
* ****************************************** *
* *                                        * *
* * Design Professionals Management Systems * *
* *          Kirkland,  Washington         * *
* *                                        * *
* *         ----------------------         * *
* *         STABL4  Slope Stability        * *
* *         ----------------------         * *
* *                                        * *
* *    IBM PC & 8086/8088 MS-DOS Version   * *
* *         Revision 4.1 - 03/03/86        * *
* *                                        * *
* ****************************************** *
**********************************************
```

--SLOPE STABILITY ANALYSIS--
SIMPLIFIED JANBU METHOD OF SLICES
OR SIMPLIFIED BISHOP METHOD

PROBLEM DESCRIPTION  W.O. 101568A, STABILITY OF FILL SLOPE

BOUNDARY COORDINATES

3 TOP BOUNDARIES
3 TOTAL BOUNDARIES

| BOUNDARY NO. | X-LEFT (FT) | Y-LEFT (FT) | X-RIGHT (FT) | Y-RIGHT (FT) | SOIL TYPE BELOW BND |
|---|---|---|---|---|---|
| 1 | 0.00 | 60.00 | 50.00 | 60.00 | 1 |
| 2 | 50.00 | 60.00 | 190.00 | 130.00 | 1 |
| 3 | 190.00 | 130.00 | 250.00 | 130.00 | 1 |

ISOTROPIC SOIL PARAMETERS

1 TYPE(S) OF SOIL

| SOIL TYPE NO. | TOTAL UNIT WT. (PCF) | SATURATED UNIT WT. (PCF) | COHESION INTERCEPT (PSF) | FRICTION ANGLE (DEG) | PORE PRESSURE PARAMETER | PRESSURE CONSTANT (PSF) | PIEZ SU |
|---|---|---|---|---|---|---|---|
| 1 | 120.0 | 120.0 | 300.0 | 30.0 | 0.00 | 0.0 | |

A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM TECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

100 TRIAL SURFACES HAVE BEEN GENERATED.

100 SURFACES INITIATE FROM EACH OF 1 POINTS EQUALLY SPACED ALONG THE GROUND SURFACE BETWEEN X = 50.00 FT.
AND X = 50.00 FT.

EACH SURFACE TERMINATES BETWEEN X = 180.00 FT.
AND X = 210.00 FT.

UNLESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION AT WHICH A SURFACE EXTENDS IS Y = 0.00 FT.

18.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

* * * SAFETY FACTORS ARE CALCULATED BY THE MODIFIED JANBU METHOD * * *

FAILURE SURFACE SPECIFIED BY 11 COORDINATE POINTS

| POINT NO. | X-SURF (FT) | Y-SURF (FT) |
|---|---|---|
| 1 | 50.00 | 60.00 |
| 2 | 67.92 | 58.31 |
| 3 | 85.91 | 58.89 |
| 4 | 103.68 | 61.74 |
| 5 | 120.96 | 66.81 |
| 6 | 137.45 | 74.02 |
| 7 | 152.90 | 83.25 |
| 8 | 167.06 | 94.36 |
| 9 | 179.71 | 107.17 |
| 10 | 190.64 | 121.47 |
| 11 | 195.59 | 130.00 |

*** 1.635 ***

A HORIZONTAL EARTHQUAKE LOADING COEFFICIENT
OF0.150 HAS BEEN ASSIGNED

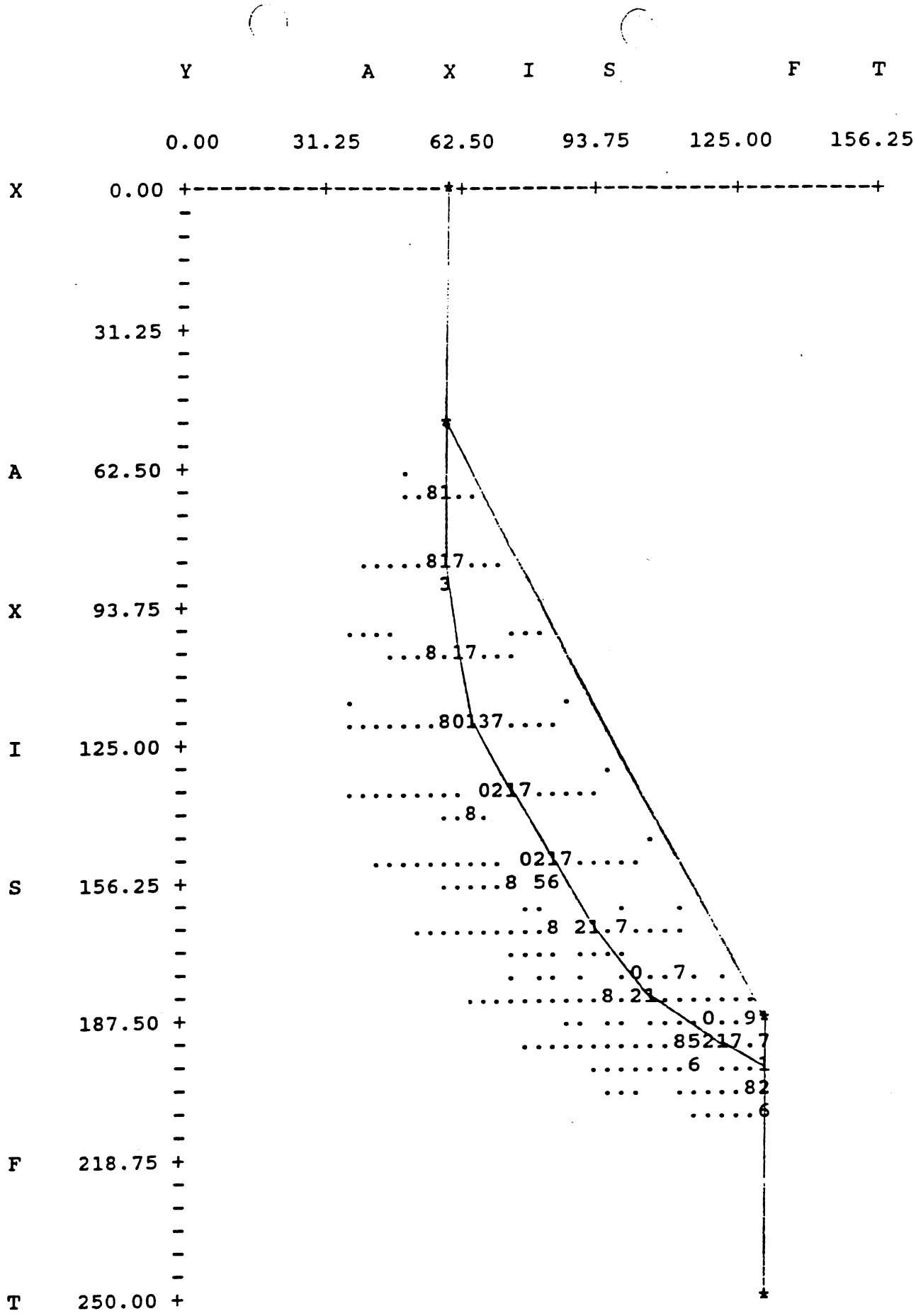
A VERTICAL EARTHQUAKE LOADING COEFFICIENT
OF0.000 HAS BEEN ASSIGNED

CAVITATION PRESSURE = 0.0 PSF

TRIAL FAILURE SURFACE SPECIFIED BY 11 COORDINATE POINTS

| POINT NO. | X-SURF (FT) | Y-SURF (FT) |
|---|---|---|
| 1 | 50.00 | 60.00 |
| 2 | 67.92 | 58.31 |
| 3 | 85.91 | 58.89 |
| 4 | 103.68 | 61.74 |
| 5 | 120.96 | 66.81 |
| 6 | 137.45 | 74.02 |
| 7 | 152.90 | 83.25 |
| 8 | 167.06 | 94.36 |
| 9 | 179.71 | 107.17 |
| 10 | 190.64 | 121.47 |
| 11 | 195.59 | 130.00 |

FACTOR OF SAFETY FOR THE PRECEDING SPECIFIED SURFACE = 1.188


Y A X I S F T
0.00
31.25
62.50
93.75
125.00
156.25
X 0.00
31.25
A 62.50
X 93.75
I 125.00
S 156.25
187.50
F 218.75
T 250.00

# APPENDIX III

## Deterministic Seismic Hazard Analysis

# APPENDIX III

## DETERMINISTIC SEISMIC HAZARD ASSESSMENT

### Introduction

The study site is within the seismically active Transverse Ranges of southern California, Los Angeles County, California. The recent 1971 San Fernando and 1994 Northridge earthquakes particularly illustrate both the seismic activity of the region and the need to incorporate seismic considerations into project design and construction. This Deterministic Seismic Hazard Assessment (DSHA) therefore sets forth deterministic estimates of on-site free-field ground accelerations that hypothetically could be generated by earthquakes along known regional active faults. Additionally, in accordance with the State of California Seismic Hazards Mapping Act (California Division of Mines and Geology, 1997), other potential site effects, including ground rupture, liquefaction, and the possible effects of earthquakes on slope stability are briefly discussed.

This DSHA is based on review of geological and seismological literature about regional active faults, about possible magnitudes of future earthquakes along same, and about empirical relationships among fault dimensions, distances between the subject site and those faults and hypothetical on-site ground acceleration. This firm judges that this DSHA is standard of practice for the subject area, but owing to abundant knowledge gained from each new earthquake, and from on-going geological and seismological investigations, the sciences, as well as legislative action, are expanding so rapidly that in some cases seismic guidelines can be obsolete after only a few years.

### Regional Active Faults

The geological literature is replete with many definitions of an active fault (for example, Ziony and Yerkes, 1985). Major late Quaternary faults in general and Holocene (last ~11,000 years; Hart, 1994) faults in particular are among those faults considered seismogenic (that is, capable of producing moderate to large earthquakes). Because the site is located in a seismically active region, numerous active faults that hypothetically could generate moderate to large earthquakes have been mapped within about 50 miles of the study site (Figure 1, following page). Several

Map showing configuration of postulated microplates and large crustal blocks along the southern California part of the Pacific–North American lithospheric boundary. After Legg and others, 1991, p. 174.

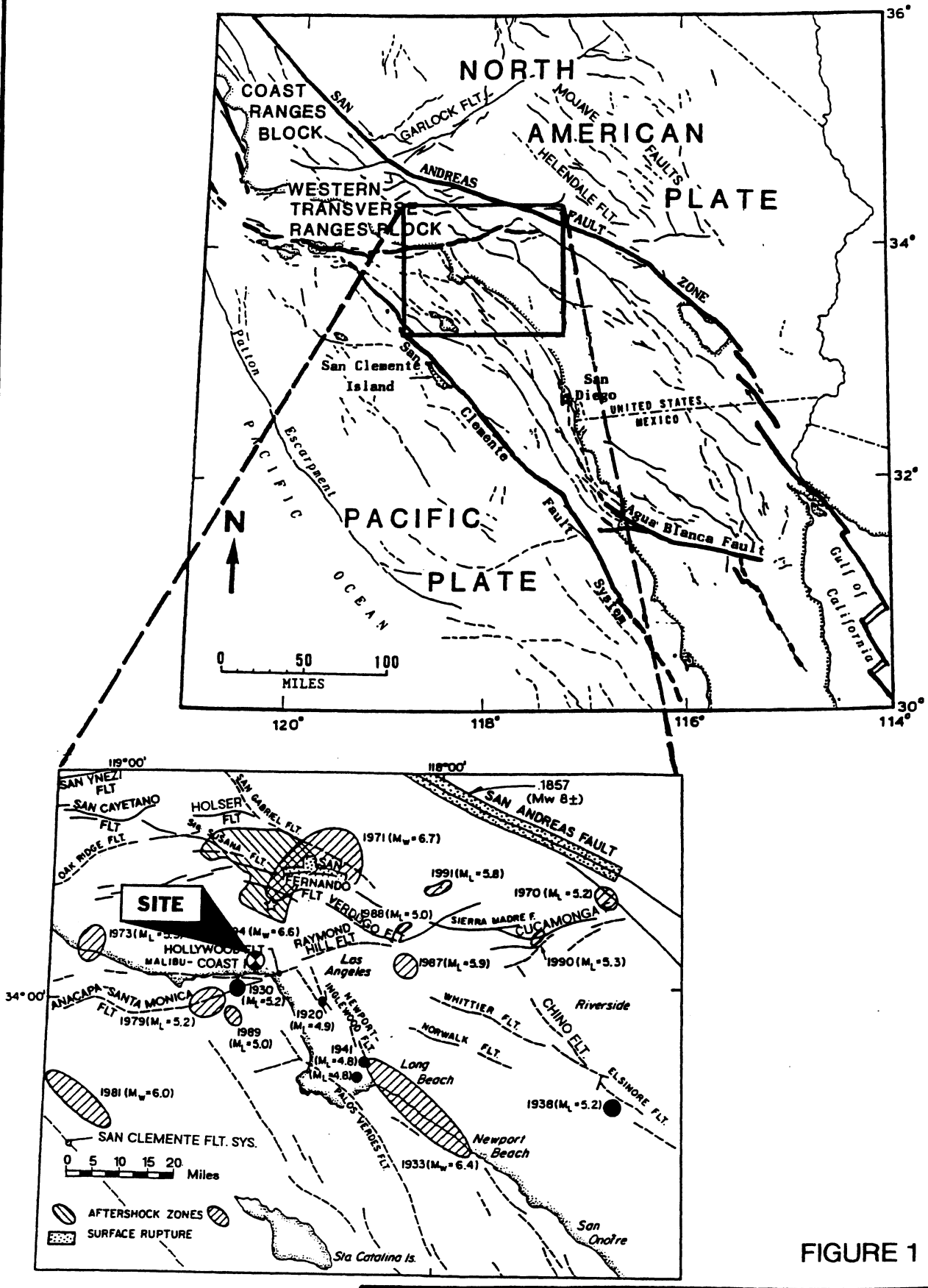



FIGURE 1

Local fault, earthquake magnitude surface rupture and aftershock zones. After Hauksson, 1994


**PACIFIC SOILS ENGINEERING, INC.**
10653 PROGRESS WAY CYPRESS, CALIFORNIA (714)220-0770


**W.O.** W.O.101568L **DATE** 1-22-99

known active faults, however, are sufficiently close to the site to dominate any deterministic seismic hazards assessment. Those faults, listed in Table A (following pages), possess both proximity and the potential to give rise to large earthquakes which could include long-duration earthquakes that could induce strong ground acceleration at the subject site. Although large earthquakes could occur along faults other than those listed, the spatial distribution of the listed faults seemingly permits a representative assessment of regional seismicity.

Two kinds of faults are represented in Table A: 1) northwest-trending, right-lateral, strike-slip faults that occur in a belt that extends from the Mojave Desert on the east to beyond the Channel Islands on the west (Jennings, 1994); and 2) reverse or thrust faults produced by ongoing regional compression resultant from convergence of the North American and Pacific plates in southern California. The San Andreas, Whittier-Elsinore, San Jacinto, San Gabriel, and Newport-Inglewood faults typify the former, whereas the other faults listed in the table are regional examples of the latter (for example, Jennings, 1994; Working Group, 1995). The nearest known active faults are the system of reverse faults that have elevated the Santa Monica, Santa Susana, and San Gabriel Mountains ( all major components of the Transverse Ranges) relative to the lowlands.

The frontal fault system is composed of numerous individual fault strands generally about 10 to 20 miles long (Dolan, et al., 1995; Crook, et al., 1987); some of which reach the surface and some of which do not ("blind thrusts"). Some investigators (for example, Davis, 1988; Hauksson, 1992; Shaw and Suppe, 1995) infer that these faults are merely ramps tied to a deep decollement, possibly associated with the "Elysian Park Thrust". The particular faults proximal to the subject site (see Table A) include the Malibu Coast, Anacapa-Santa Monica, Verdugo, San Fernando faults, and the blind thrust fault that gave rise to the 1994 Northridge earthquake.

## Regional Historic Earthquakes

The aforementioned San Fernando and Northridge earthquakes were centered about 25-miles and 15-miles northeast, respectively, of the study site. The epicenter of the M5.9 1987 "Whittier" was about 38-miles east of the site. And the San Andreas fault system produced the great 1857 "Fort

TABLE A

# ESTIMATED LARGER OF TWO HORIZONTAL COMPONENTS OF MEDIAN PEAK GROUND ACCELERATION

| FAULT SYSTEM | STRIKE/DIP SLIP SS/DS=0 RS=1 | DISTANCE (mi) | LENGTH OF NEAREST SEGMENT(NS1) (1) | LENGTH OF MULTIPLE SEGMENTS(NS2) (1) | MAGNITUDE FOR NS1 (2) | MAGNITUDE FOR NS2 (2) | PGA IN g FOR NS1 (3) | PGA IN g FOR NS2 (3) | PGA+1S.D. FOR NS1 |
|---|---|---|---|---|---|---|---|---|---|
| Malibu Coast | 1 | 6.0 | 16.0 | 41.0 | 6.9 | 7.4 | 0.40 | 0.52 | 0.64 |
| Simi | 1 | 10.0 | 12.0 | 25.0 | 6.7 | 7.2 | 0.26 | 0.32 | 0.42 |
| Anacapa-Santa Monica | 1 | 10.0 | 16.0 | 41.0 | 6.9 | 7.4 | 0.29 | 0.37 | 0.46 |
| Northridge B.T.Z. | 1 | 14.0 | 12.0 | 25.0 | 6.7 | 7.2 | 0.21 | 0.26 | 0.33 |
| Santa Susana | 1 | 15.0 | 15.0 | 15.0 | 6.9 | 6.9 | 0.21 | 0.21 | 0.34 |
| Oak Ridge | 1 | 17.0 | 16.0 | 39.0 | 6.9 | 7.4 | 0.19 | 0.25 | 0.31 |
| San Fernando | 1 | 18.0 | 9.3 | 24.0 | 6.6 | 7.1 | 0.16 | 0.21 | 0.26 |
| Holser | 1 | 21.0 | 6.0 | 12.0 | 6.3 | 6.7 | 0.12 | 0.15 | 0.20 |
| Verdugo | 1 | 22.0 | 12.5 | 20.0 | 6.8 | 7.0 | 0.15 | 0.17 | 0.24 |
| San Cayetano | 1 | 23.0 | 20.0 | 31.0 | 7.0 | 7.3 | 0.17 | 0.19 | 0.26 |
| San Gabriel | 0 | 23.0 | 9.3 | 17.0 | 6.2 | 6.5 | 0.11 | 0.13 | 0.17 |
| Newport-Inglewood | 0 | 24.0 | 18.0 | 45.0 | 6.6 | 7.1 | 0.13 | 0.17 | 0.20 |
| North L.A. Thrust Belt | 1 | 30.0 | 8.0 | 16.0 | 6.5 | 6.9 | 0.10 | 0.13 | 0.17 |
| Pine Mountain | 1 | 34.0 | 23.0 | 23.0 | 7.1 | 7.1 | 0.13 | 0.13 | 0.20 |
| Santa Ynez | 0 | 34.0 | 29.0 | 81.0 | 6.8 | 7.4 | 0.11 | 0.15 | 0.18 |
| San Andreas | 0 | 42.0 | 211.0 | 400.0 | 8.0 | 8.4 | 0.17 | 0.20 | 0.27 |
| Garlock | 0 | 48.0 | 60.0 | 160.0 | 7.3 | 7.8 | 0.11 | 0.14 | 0.17 |

SS=Strike-Slip; DS=Normal-Slip; RS=Reverse-Slip

(4)Site Class: 3

**The nearest known active fault is about 6 miles away.

*Maximum probable median peak horizontal acceleration 0.40

*Maximum credible median peak horizontal acceleration 0.52

*Maximum probable median PGA+1 standard deviation 0.64

(1) Schwartz and Coppersmith (1986); dePolo and Slemmons (1990); Everden and Thomson (1985); Jennings (1992); Wesnousky (1986). Ziony and Jones (1989); Ziony and Yerkes (1985).

(2) Joyner and Fumal (1985); for Mw.

(3) Boore, Joyner and Fumal (1993); for Mw.

(4) Boore, Joyner and Fumal (1993); 1=Site Condition A, 2=Site Condition B, 3=Site Condition C.

W.O.101568L

PACIFIC SOILS ENGINEERING, INC.

Tejon" earthquake that may have been about 50 to 150 miles north of the site. Note that faults typically rupture along a two-dimensional surface rather that at one point source (Hauksson, 1992).

The 1925 M6.3 Santa Barbara and 1973 M6.0 Point Mugu earthquakes were centered about 60 and 20 miles , respectively, northwest of Agoura Hills. These two events may be associated with the Anacapa-Santa Monica fault system.

**Discussion**

Predictions of times of occurrence, locations and magnitudes of, as well as ground response to, future earthquakes are tenuous and subjective. Only probabilities and/or possibilities can be assessed on the basis of the existing geologic data, limited historical and seismic records; and empirical relationships among fault lengths, distances between the faults and the study site, and ground acceleration. However, enough seismic events of magnitude 6.0 or greater have occurred regionally to indicate that such events could recur within the life of the subject development. Table A) presents some general guides for hypothetical maximum credible and maximum probable earthquakes and associated free-field ground acceleration for local fault systems.

By definition, the maximum credible earthquake (MCE) is the maximum earthquake that appears to be reasonably capable of occurring under the conditions of the presently known geological framework. A maximum probable earthquake (MPE) is the maximum earthquake that appears to be reasonably expectable within a 100 year period, (California Division of Mines and Geology, 1975). According to dePolo and Slemmons (1990) and industry-standard usage, the MPE is generally used for most engineered structures, and the MCE for long-lived, high-risk structures (for example, dams, nuclear power plants, schools, and hospitals).

dePolo and Slemmons (1990) suggest that one of several methods is to assume that either single or multi-segments of each particular fault move during a single seismic event. Many California faults consist of a series of discrete salients or blocks that act singly. For example, the 1971 San Fernando and 1994 Northridge earthquakes occurred along single fault segments (Hauksson and Jones, 1994). Yet, it is "credible" that more than one segment of a fault may rupture during one

seismic event, hence producing a larger cascade (Dolan, et al., 1995; Working Group, 1995) or "maximum credible" event. A cascade event is when seismogenic slip migrates from one fault segment to others, thus increasing the length of fault rupture the magnitude of the accompanying earthquake. Weldon and Sieh (1985) and the Working Group, for example, document cascade events along the San Andreas fault system. Schwartz and Coppersmith (1986) also present methods of combining geologic history/geometry and segment-measuring to determine theoretical earthquake magnitudes.

Table A considers slip along single fault segments as representative of the maximum probable earthquakes (MPE), and slip along two or more contiguous faults as representative of cascade or maximum credible earthquakes (MCE; per dePolo and Slemmons, 1990). The lengths are synthesized from published sources (in particular Jennings, 1994; Ziony and Jones, 1989; Wesnousky, 1986; Everden and Thomson, 1985; Ziony and Yerkes, 1985). The magnitudes hypothesized in Table I are judged consistent with the known geologic/seismic histories of the faults. The derived magnitudes and free-field ground accelerations are also in general agreement with the work of others (for example, Maulchin 1996; Dolan, et al., 1995; Peterson and Wesnousky, 1994). Average rupture widths (depths) of 12 kilometers [the average depth of southern California earthquakes (Hauksson, 1992)] are assumed. The seismic moment of potential earthquakes are calculated per Joyner and Fumal (1985). From those seismic moments, the moment magnitudes for hypothetical earthquakes are then calculated; and, finally, hypothetical accelerations (Boore, et al., 1993) were speculated (Table A), using their site condition 3 (alluvium) for conservatism.

The Boore, et al., (1993) attenuation relationships used to hypothesize site accelerations are based upon recent data from western United States earthquakes, and thus are considered "standard of practice." The Boore et al. estimates account for the major earthquakes prior to Northridge. Yet the curves seemingly "fit" most acceleration data recorded on 17 January 1994. However, ground motions somewhat larger than what would have been predicted by any of the commonly used attenuation formulae were recorded locally (Shakal, et al., 1994). Uncertainty exists as to whether the anomalous Northridge accelerations were unusually high owing to local site effects, whether

the accelerometers functioned properly, or whether the high accelerations were representative of that earthquake.

## Possible Site Effects

### *Free-Field Ground Acceleration*

The deterministic analysis of the mean of the larger (seemingly more consistent with recent Landers and Northridge recordings than the random component) of two horizontal components of hypothetical free-field ground acceleration yielded **.40g** for a MPE, and **.52g** for a MCE.

Table A gives the computed MPE acceleration plus one standard error (S.E.) calculation, included to illustrate the range of uncertainty inherent to the methodology. It should be acknowledged that spectral characteristics of site-specific ground motion are the result of numerous factors, including possible subsoil effects, seismogenic mechanisms (Brune, 1970), the wave propagation pattern (Haskell, 1969), nature and geometry of geological discontinuities along the propagation path (Haskell, 1969), surface topography (Boore, 1972), and subsurface geometry (Wong and Trifunac, 1974).

The California Division of Mines and Geology (1997) suggests that the maximum (peak) ground accelerations generally are not the same as seismic design coefficients. Thus, **free-field** maximum accelerations should not necessarily be utilized in empirical engineering formulae currently in use to determine earthquake-resistant structural design. Page, et al., (1972) also noted that a single peak of intense motion (maximum or peak acceleration) may contribute less to cumulative damage potential than multiple cycles of less intense shaking. Therefore, repeatable high ground acceleration may be of greater concern in structural design than the single peak acceleration.

Seismic design should be based on current design practices for similar works in the area.It is the purview of the structural engineer, based upon information presented herein, to select suitable seismic parameters.This firm notes that the derived accelerations are generally consistent with the acceleration **coefficients** for seismic zone 4 of the 1994 UBC (.4) and the 1997 UBC (.44), and that, with the possible exception of "critical structures", code coefficients are seemingly adequate.

## REFERENCES

Boore, D.M., 1972, A note on the effect of simple topography on seismic SH waves: Seism. Soc. Am. Bull., v. 62, no. 1.

Boore, D.M., Joyner, W.B., and Fumal, T.E., 1993, Estimation of response spectra and peak accelerations from western North American earthquakes: An interim report: U.S. Geol. Surv. Open-File Rpt. 93-509, 72 p.

Brune, J.N., 1970, Tectonic stress and the spectra of seismic shear waves from earthquakes: Jour. Geophys. Res.

California Division of Mines and Geology, 1975, Recommended guidelines for determining the maximum credible and the maximum probable earthquakes: Calif. Div. Mines and Geol. Note 43.

California Division of Mines and Geology, 1997, Guidelines for evaluation and mitigating seismic hazards, Spec. Rpt. 117, 74 p.

Davis, T., 1988, Application of retrodeformable cross-sections to seismic risk evaluation of the Los Angeles Basin on the Whittier Narrows Earthquake (M = 5.9) of October 1, 1987: Monthly Mtg. Pacific Sec. Amer. Assoc. Pet. Geol.

dePolo, C.M., and Slemmons, D.B., 1990, Estimation of earthquake size for seismic hazards in Krinitzsky, and Slemmons, editors, Neotectonics in earthquake evaluation: Geol. Soc. Amer. Reviews in Engineering Geology, v. III.

Dolan, and seven others, 1995, Prospects for larger or more frequent earthquakes in the Los Angeles metropolitan region: Science, v.267, p. 199-205.

Everden, J.F., and Thomson, J.M., 1985, Predicting seismic intensities, in, Ziony, J.I., editor, Evaluating earthquake hazards in the Los Angeles region--An earth science perspective: U.S. Geol. Serv. Prof. Paper 1360, p. 151-203.

Haskell, N.A., 1969, Elastic displacements in the near-field of propagating fault: Seism. Soc. Am. Bull., v. 59.

Hart, E.W., 1994, Fault hazard zones in California--Alquist-Priolo Earthquake Zoning Act with index to Earthquake Fault Zones Maps, revised 1994: Calif. Div. Mines and Geol. Spec. Pub. 42, 34 p.

Hauksson, E., 1992, Seismicity, faults and earthquake potential in Los Angeles, southern California, in Pipkin, B.W., and Proctor, R.J., editors, Engineering geology practice in southern California: Assoc. Eng. Geol. Spec. Pub. no. 4.

Hauksson, E., and Jones, L., 1994, Earth science aspects, in Hall, J.F., editor, Northridge Earthquake, January 17, 1994, Preliminary reconnaissance report: Earthquake Engineering Research Institute Rpt. No. 94-01, p. 1-18.

Jennings, C.W., 1994, Fault activity map of California and adjacent areas, with locations and ages of volcanic eruptions: Calif. Div. Mines and Geol. Geologic Data Map No. 6.

Joyner, W.B., and Fumal, T.E., 1985, Predictive mapping of earthquake ground motion, in Ziony, J.I., editor, Evaluating earthquake hazards in the Los Angeles region--An Earth-Science perspective: U.S. Geol. Surv. Prof. Paper 1360.

Maulchin, L., 1996, California seismic hazard map: CalTrans, map scale: 1-in = 40-km.

Oakeshott, G.B., editor, 1975, San Fernando earthquake of 9 February, 1971: Calif. Div. Mines and Geol. Bull. 196.

Page, R.A., Boore, D.M., Joyner, W.B., and Coulter, H.W., 1972, Ground motion values for use in the seismic design of the trans-Alaska pipeline system: U.S. Geol. Survey Circular 672.

Peterson, M.D., and Wesnousky, S.G., 1994, Fault slip rates and earthquake histories for active faults in southern California: Seism. Soc. Amer. Bull. v. 84. n. 5. p. 1608-1649.

Schwartz, D.P., and Coppersmith, K.J., 1986, Seismic hazards: New trends in analysis using geologic data, in R.E. Wallace, editor, active tectonics: National Academy of Sciences Press.

Shakal, A., Huang, M., Darragh, R. Cao, T., Sherburne, R., Malhotra, P., Cramer, C., Sydnor, R., Grazier, V., Maldonado, G., Peterson, and Wanpole, J., 1994, CSMIP Strong-motion records from the Northridge, California earthquake of 17 January 1994: Calif. Div. Mines and Geo. (Report No. 94-07, 252 p.

Shaw, J.H, and Suppe, J., 1996, Earthquake hazards of active blind-thrust faults under the central Los Angeles basin, California: Jour. Geo. Res., v.101, n. B4, p. 8623-8642.

Weldon, R.J. II, and Sieh, K.E., 1985, Holocene rate of slip and tentative recurrence interval for large earthquakes on the San Andreas fault, Cajon Pass, southern California: Geol. Soc. Amer. Bull., v. 96.

Wesnousky, S.G., 1986, Earthquake, Quaternary faults, and seismic hazard in California: Jour. Geophys. Res., v. 91, n. B12.

Wong, H.L. and Trifunac, M.D., 1974, Surface motion of a semi-elliptical alluvial valley for incident plan SH waves: Seism. Soc. Am. Bull., v. 64, no. 5.

Working Group on California Earthquake Probabilities, 1995, Seismic hazards in southern California: probable earthquakes 1994 to 2024: Seism. Soc. Amer. Bull., v.85, no. 2, p. 379-439.

Ziony, J.I., and Jones, L.M., 1989, Map showing late Quaternary faults and 1978-84 seismicity of the Los Angeles region, California: U.S. Geol. Surv. Map MF-1964.

Ziony, J.I., & Yerkes, R.F., 1985, Evaluating earthquake and surface faulting potential, in Ziony, J.I., editor, Evaluating earthquakes hazards in the Los Angeles region -- an earth-science perspective: U.S. Geol. Surv. Prof. Paper 1360, p. 43-92.

# APPENDIX IV

## Seismic Refraction Surveys and Rock Rippability Assessment

# APPENDIX IV

## SEISMIC REFRACTION SURVEYS AND ROCK RIPPABILITY ASSESSMENT

Twenty-five shallow seismic refraction traverses were conducted during the 1988 and 1998 field exploration phases. The primary purpose of the refraction seismic surveys were to provide guidelines to the excavatability of bedrock. As discussed in the geologic section of this report, the Conejo Volcanics bedrock is dense below relatively shallow weathered zones that range from a few to a few tens of feet deep. In a general sense, the higher the velocity of the P-wave (compressional) transmitted through bedrock, the more difficult excavation will be. Based on our experience in the region, P-wave velocities of 6000± feet per second are the upper limits for efficient ripping with a Caterpillar D-9H or the equivalent, the grading industry standard machine for ripping. Bedrock transmitting velocities higher than these numbers usually requires blasting for efficient dislodgment. Additionally, rock exhibiting velocities on the order of 5000 feet per second requires heavy to very heavy ripping to local blasting for dislodgment. It should be emphasized that the measurement of P-wave velocities with seismographs provides only a guideline for rippability. Factors such as fractures, joints, bedding plane and/or flow spacing and orientation, "best fit" interpretation of seismic data in rocks with heterogeneous fabric, and even grading equipment condition and operator skill all play important roles that inhibit a precise determination of the rippable depths of rock.

All velocity survey lines were performed with a Southwest Industrial Electronics 24-channel or Geometrics 12-channel seismographs with photographic recorders. Geophone spreads were a maximum of 400 lineal feet with a spacing of 10 or 20 feet between geophones. A special design gun using 12-gauge shotgun shells or a sledge hammer were the energy sources for the surveys.

Included herein are the seismic profiles showing velocities and their depths as interpreted by Mr. E.R. Browne, Registered Geophysicist (see Plates S-5 through S-30). The profiles delineate the various velocity horizons only. They do not specifically indicate the geologic formations on-site. It should be noted that the seismic lines start at number S-5. Lines S-1 through S-4 were accomplished during a concurrent survey of adjoining property. Also, the locations of the lines

were not based on the current plan, however, the seismic lines do give an "EIR - level" overview of rock rippability. To more specifically assess rippability, further seismic lines may be required as designs evolve. Following is a brief assessment of individual seismic lines relative to rippability.

Line S-5 : A mantle of relatively low to moderate velocity (2000 feet per second) was interpreted as being less than 10 feet deep. Below this approximate depth, a velocity horizon of greater than 9000 feet per second apparently exists. Thus, based on the seismic data, it is anticipated that the bedrock along line S-5 will probably require blasting or jackhammering below 10± feet. Localized near-surface hard zones, however, may also be difficult to dislodge. Up to 33 feet of cut are planned in this area.

Line S-6: An 8- to 10-feet-thick mantle of weathered bedrock (?) with a velocity of about 2000-feet-per-second was indicated by the seismic data. Below this depth, an 8000-feet-per-second zone exists. Thus, based on the seismic data, blasting or jackhammering may be required below 8 to 10± feet. As stated in the discussion of line S-5, localized hard zones that may require blasting may be encountered in the upper horizon.

Line S-7 (Near Lot 38): This line suggests variability in excavation characteristics. An upper horizon of about 3250-feet-per-second material exists. It varies from about 6 to 33 feet deep. Below that horizon, 9100-feet-per-second material is present. In sum, it appears blasting will be necessary below about 6 feet in the west and below 33 feet in the east. Cuts on the order of 10 feet deep are planned in this area. As a word of caution, the 3250-feet-per-second material may provide at least local zones of very difficult excavation and most likely will inhibit trenching with conventional equipment.

Line S-8: As interpreted by Mr. Browne, a "cap" of 2317-feet-per-second material exists to 13± feet (west) to 42± feet (east). Beneath this cap, 8660-feet-per-second material appears to be present. Thus, the upper horizon appears rippable with local difficulty; and blasting appears necessary with depth.

Line S-9: A veneer of several feet of low velocity (1436 feet per second) material mantles the area. Below that, a 5200-feet-per-second horizon to 45 to 60 feet deep exists. Very high velocity material apparently exists below the 5200-feet-per-second horizon. Thus, marginally rippable material to material requiring blasting exists very near the surface to depths of 45± to 60± feet. Below those depths, extensive blasting probably will be required.

Line S-10: As interpreted by Mr. Browne, a "cap" of 2100-feet-per-second material is about 5 to 10 feet thick. Based on the probable occurrence of 6900-feet-per-second material, blasting may be encountered below that cap. Below elevation 910 (west) and 860 (east), blasting appears certain.

Line S-11: Based on the attached seismic profile moderate to heavy ripping and possible local blasting will be necessary from the surface. At shallow depths, 20± feet in the south and 4 feet in the north, blasting appears necessary.

Line S-12: Except for thin mantles at either end of the line, marginally rippable to non-rippable material exists at the surface. Below 15± feet, blasting will likely be necessary in the west.

Line S-13: As interpreted by Mr. Browne, rippable material exists to depths of about 15 to 25 feet. Below those depths, blasting appears certain.

Line S-101: A mantle of low velocity (<1000 feet per second) was interpreted as being 5 to 10 feet deep. Below this approximate depth, an irregular velocity horizon of about 3900 feet per second apparently exists from about the above depths to about 13 to 55 feet below ground surface. Below those depths rock with a velocity greater than 10,000 feet per second is indicated. Thus, based on the seismic data, it is anticipated that the bedrock along line S-101 will probably require blasting or jackhammering below 13 to 55± feet. Localized near-surface hard zones, however, may also be difficult to dislodge; and difficulty with trenching with standard equipment may be locally difficult below 5 to 10 feet.

Line S-102: An 5 to 15 feet-thick mantle of soil/weathered bedrock (?) with a velocity of about 1600-feet-per-second was indicated by the seismic data. Below this depth, a 5683-feet-per-second

zone exists to depths of about 35 to 50 feet. Below this horizon, 20,000 feet per second material is indicated. Thus, based on the seismic data, hard ripping with possible occasional blasting or jack-hammering to dislodge rocks may be required below 5 to 15± feet; and blasting will generally be required below 35 to 50 feet.

Line S-103: An upper horizon of about 1360 feet per second material exists. It varies from about 5 to 12 feet deep. Below that horizon, 7000 feet per second material is present to depths of about 15 to 20 feet. That horizon is underlain by 8290 feet per second rock. In sum, it appears that difficult ripping or blasting will be required below the upper horizon.

Line S-104: As interpreted by Mr. Browne, a "cap" of 1159 feet per second material exists to 8± feet to 12± feet . Beneath this cap, 2993 feet-per-second material appears to be present to 20 to 40 feet below ground surface. Below the intermediate layer, 6829 feet per second rock is interpreted. Thus, the upper two horizons appear rippable to 20 to 40 feet, and the basal horizon may very well require at least local blasting or jackhammering; and blasting appears necessary with depth.

Line S-105: A veneer of several feet of low velocity (1450 feet per second) material mantles the area. Below that, a 3117 feet-per-second horizon to 25 to 35 feet deep exists. Very high velocity material apparently exists below the 3117 feet-per-second horizon. Thus, rippable material seemingly exists to depths of 25± to 35± feet. Below those depths, extensive blasting probably will be required.

Line S-106: As interpreted by Mr. Browne, a "cap" of 1214 to 1368 feet-per-second material is about 5 to 10 feet thick. Based on the probable occurrence of 5333 to 6708 feet-per-second material, heavy ripping and possible blasting or jackhammering may be encountered below that cap. Below about elevation 970 in the north and 960 in the south, blasting appears to be required.

Line S-107: A 1197 feet per second mantle is about 5 to 8 feet thick. a very irregular 4943 feet per second zone ranges to 15 to 45 feet below ground surface. A 9412 feet per second zone underlies the second zone. Below 15± to 45 feet, blasting will likely be necessary.

Line S-108: As interpreted by Mr. Browne, marginally rippable material exists to depths of about 30 feet. Below those depths, blasting appears necessary.

Line S-109: Not a part of this study.

Line S-110: A mantle of low velocity (1540 feet per second) was interpreted as being about 10 feet deep. Below this approximate depth, an irregular velocity horizon of about 5300 feet per second apparently exists from about the above depths to about 25 to 30 feet below ground surface. Below those depths rock with a velocity greater than 10,000 feet per second is indicated. Thus, based on the seismic data, it is anticipated that the bedrock along line S-101 will probably require blasting or jackhammering below 25 to 30± feet. Localized near-surface hard zones, however, may also be difficult to dislodge; and difficulty with trenching with standard equipment may be locally difficult below 10 feet.

Line S-111: An 12 to 20 feet-thick mantle of soil/weathered bedrock (?) with a velocity of about 1242 feet-per-second was indicated by the seismic data. Below this depth, a 8410 feet-per-second zone exists. Thus, based on the seismic data, hard ripping and blasting/jackhammering may be required below 12 to 20± feet.

Line S-112: An upper horizon of about 1222 feet per second material exists. It varies from about 10 to 17 feet deep. Below that horizon, 9566 feet per second material is present. In sum, it appears that blasting may be required below the upper horizon.

Line S-113: As interpreted by Mr. Browne, a "cap" of 1015 feet per second material exists to 5± feet to 10± feet below ground surface. Beneath this cap, 6342 feet-per-second material appears to exist to at least 40 feet. Thus, the basal horizon may very well require at least local to extensive blasting or jackhammering.

Line S-114: About 10 feet of low velocity (1450 feet per second) material mantles the area. Below that, a 7679 feet-per-second horizon at least 40 feet deep exists. Thus, the basal horizon may very well require at least local to extensive blasting or jackhammering.

Line S-115: As interpreted by Mr. Browne, a "cap" of 1853 feet-per-second material is about 12 to 20 feet thick. This is part of the borrow/disposal canyon fill. Based on the probable occurrence of 5484 feet-per-second rock below the fill, heavy ripping and possible blasting or jackhammering may be encountered if excavations are planned below the fill in this area.

Line S-116: A 1779 feet per second mantle is about 5 to 8 feet thick. A steeply north dipping 7342 feet per second zone that probably is related to north-dipping bedding ranges to about 7 to 45 feet below ground surface. An 11,921 feet per second zone underlies the second zone. Below 5± to 8 feet, blasting or special excavating techniques may be necessary; and most likely will be required below 7 to 45 feet.

Line S-117: As interpreted by Mr. Browne, easily rippable material exists to depths of about 30 feet. Below those depths, blasting or special techniques may be necessary

SEISMIC INTERPRETATION BY E.R. BROWNE AND ASSOCIATES

Agoura Hills; Pacific Soils Eng., Inc. LINE 5

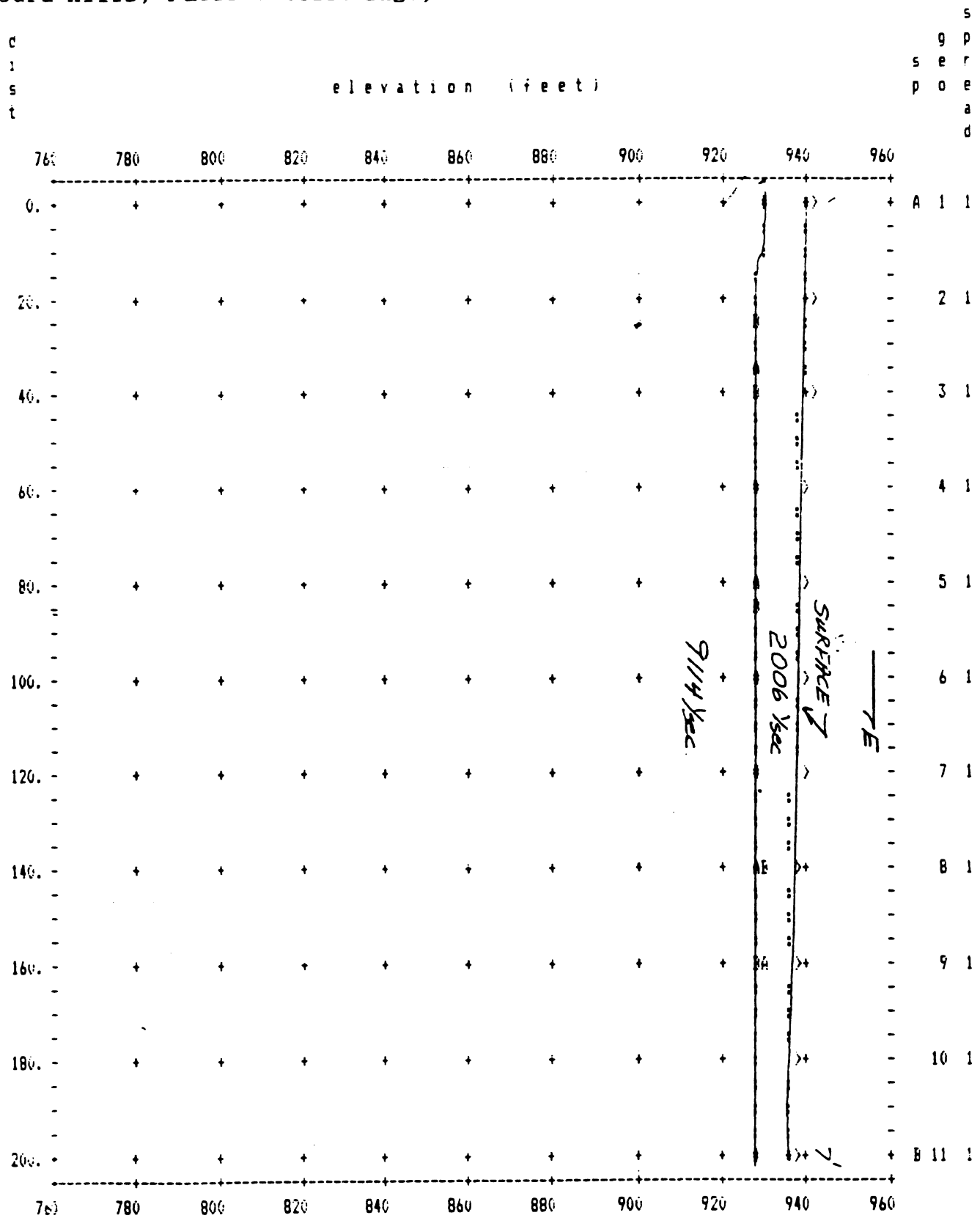



Plate S-5
W.O. 101568-A

SEISMIC INTERPRETATION BY E.R. BROWNE AND ASSOCIATES

goura Hills; Pacific Soils Eng., Inc. LINE 6

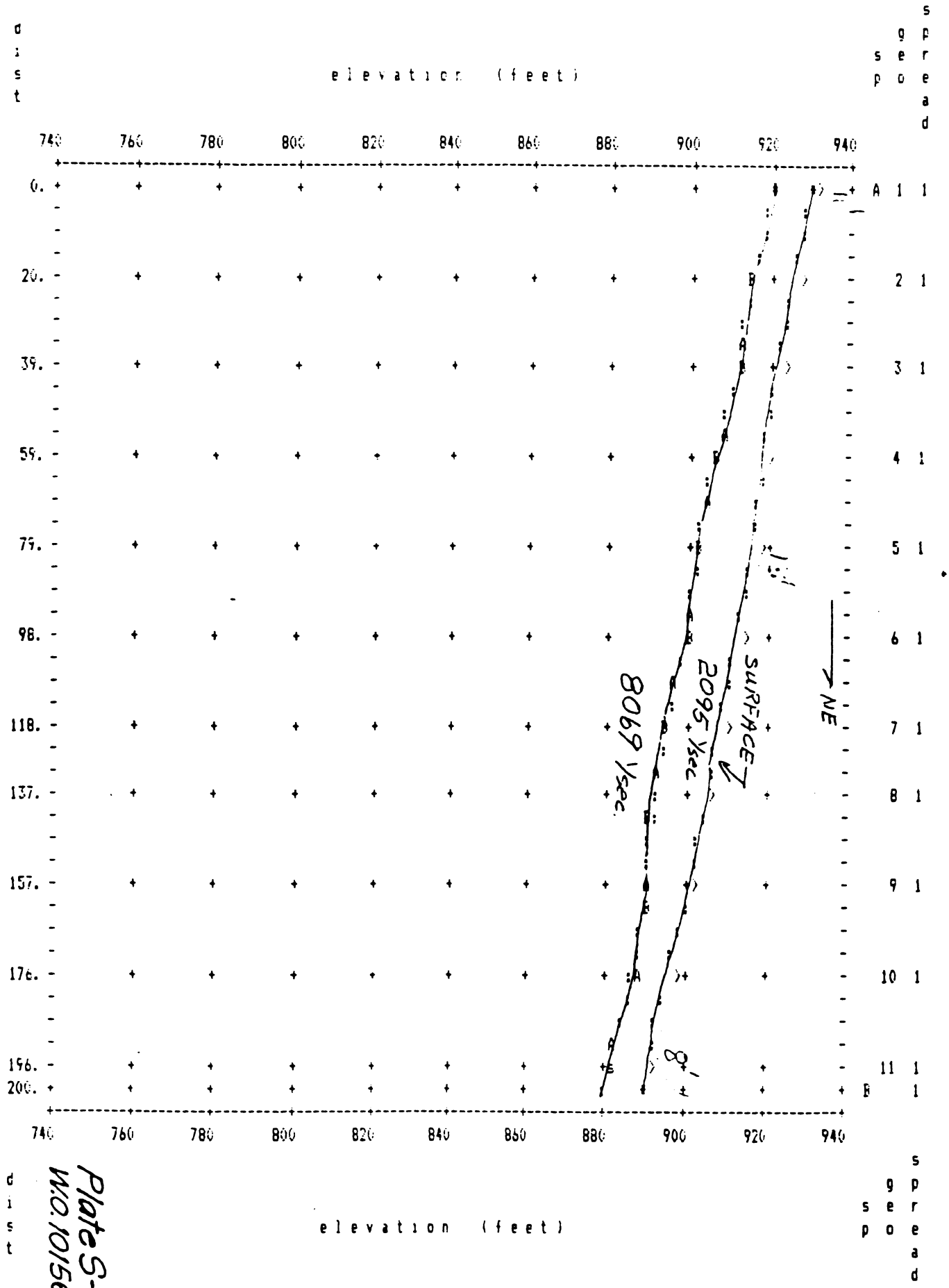



Plate S-6
W.O. 101568-A

SEISMIC INTERPRETATION BY E.R. BROWNE AND ASSOCIATES

goura Hills; Pacific Soils Eng., Inc. LINE 7

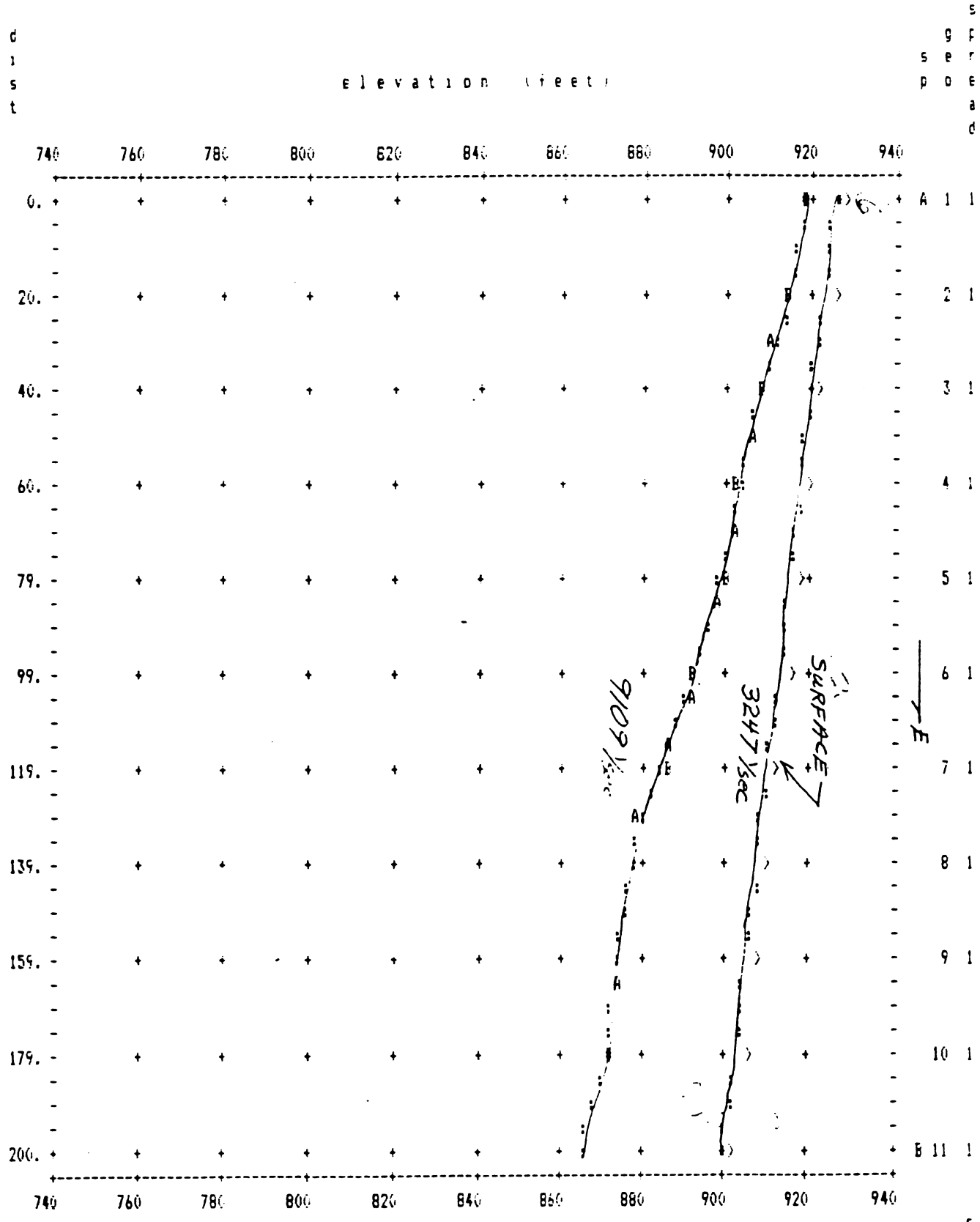



Plate S-7
WO 101568-A

SEISMIC INTERPRETATION BY E.R. BROWNE AND ASSOCIATES

Agoura Hills; Pacific Soils Eng., Inc. LINE 6

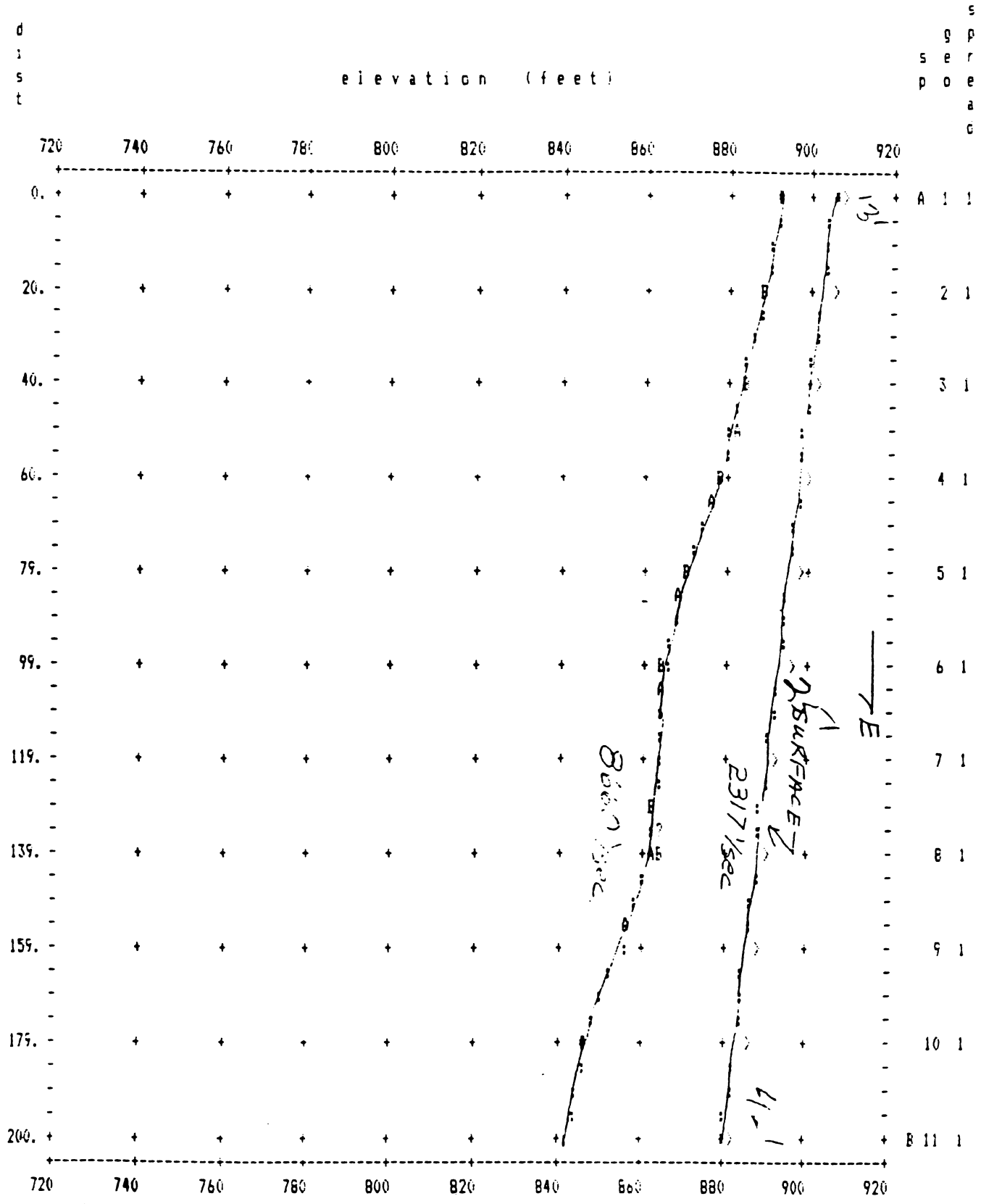



Plate S-8

W.O. 101568-A

SEISMIC INTERPRETATION BY E.R. BROWNE AND ASSOCIATES

goura Hills; Pacific Soils Eng., Inc. LINE 9

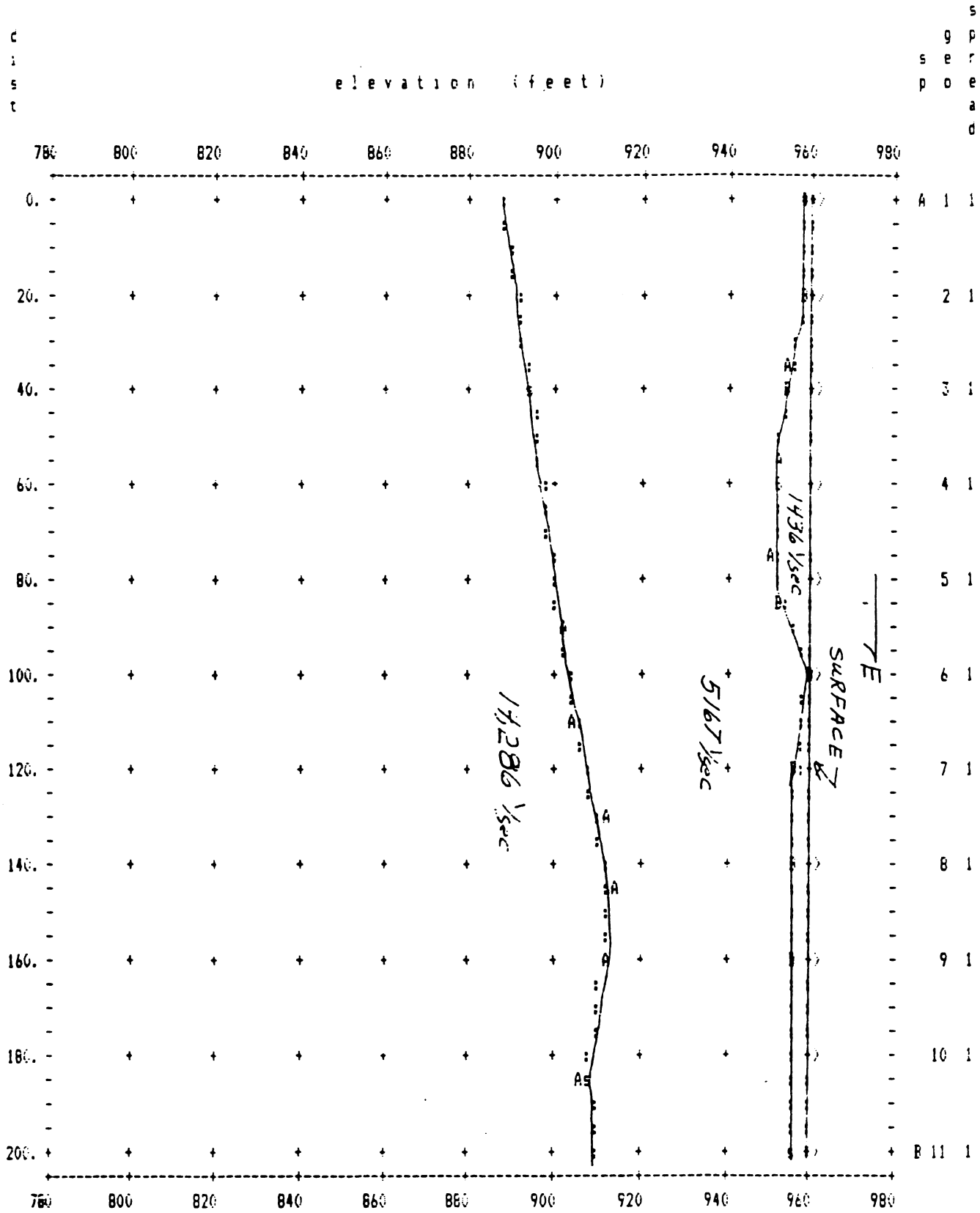



Plate S-9
WO.101568-A

SEISMIC INTERPRETATION BY E.R. BROWNE AND ASSOCIATES

Agoura Hills; Pacific Soils Eng., Inc. LINE 10

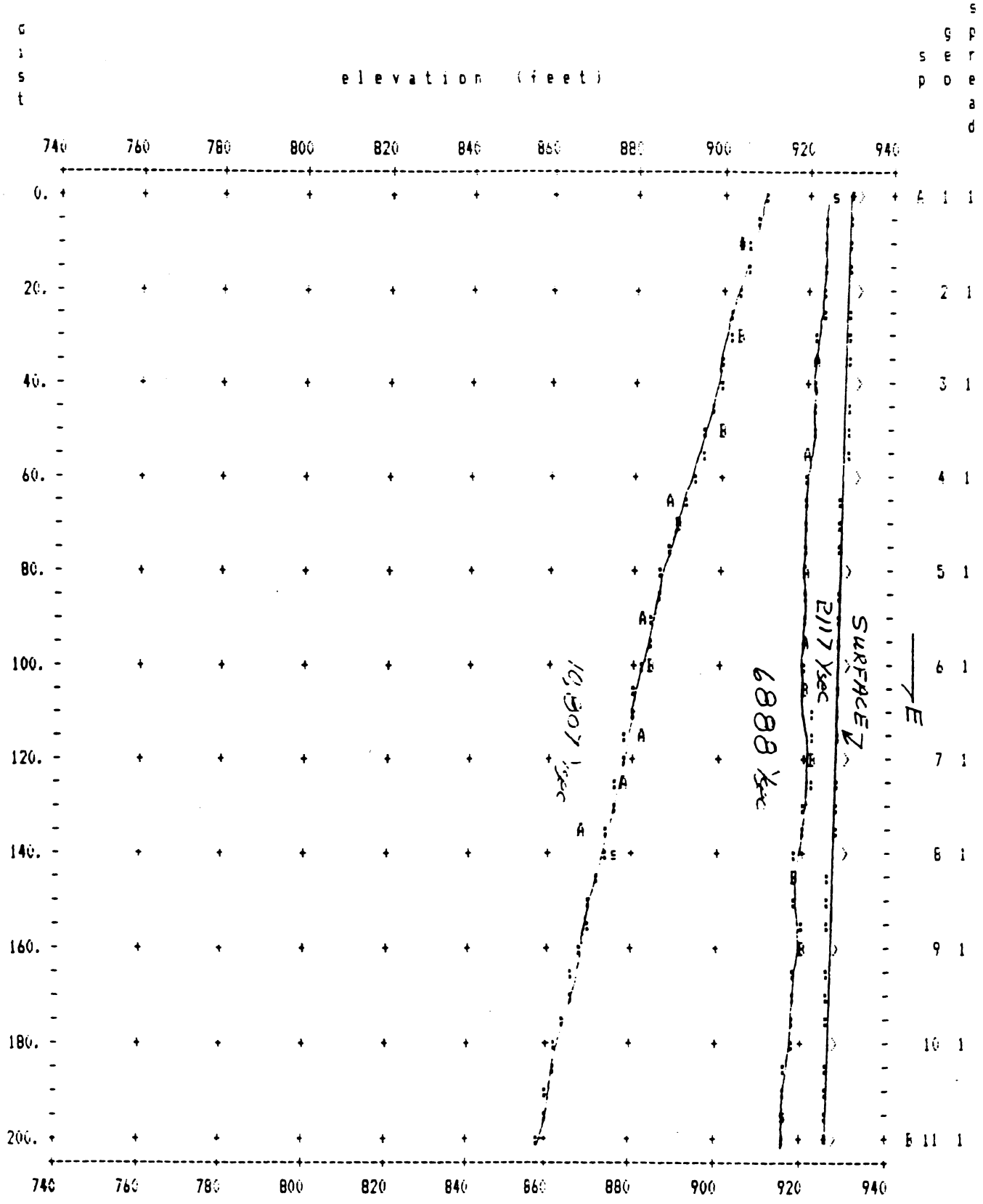



Plate S-10

WO 101568-A

SEISMIC INTERPRETATION BY E.R. BROWNE AND ASSOCIATES

goura Hills; Pacific Soils Eng., Inc. LINE 11

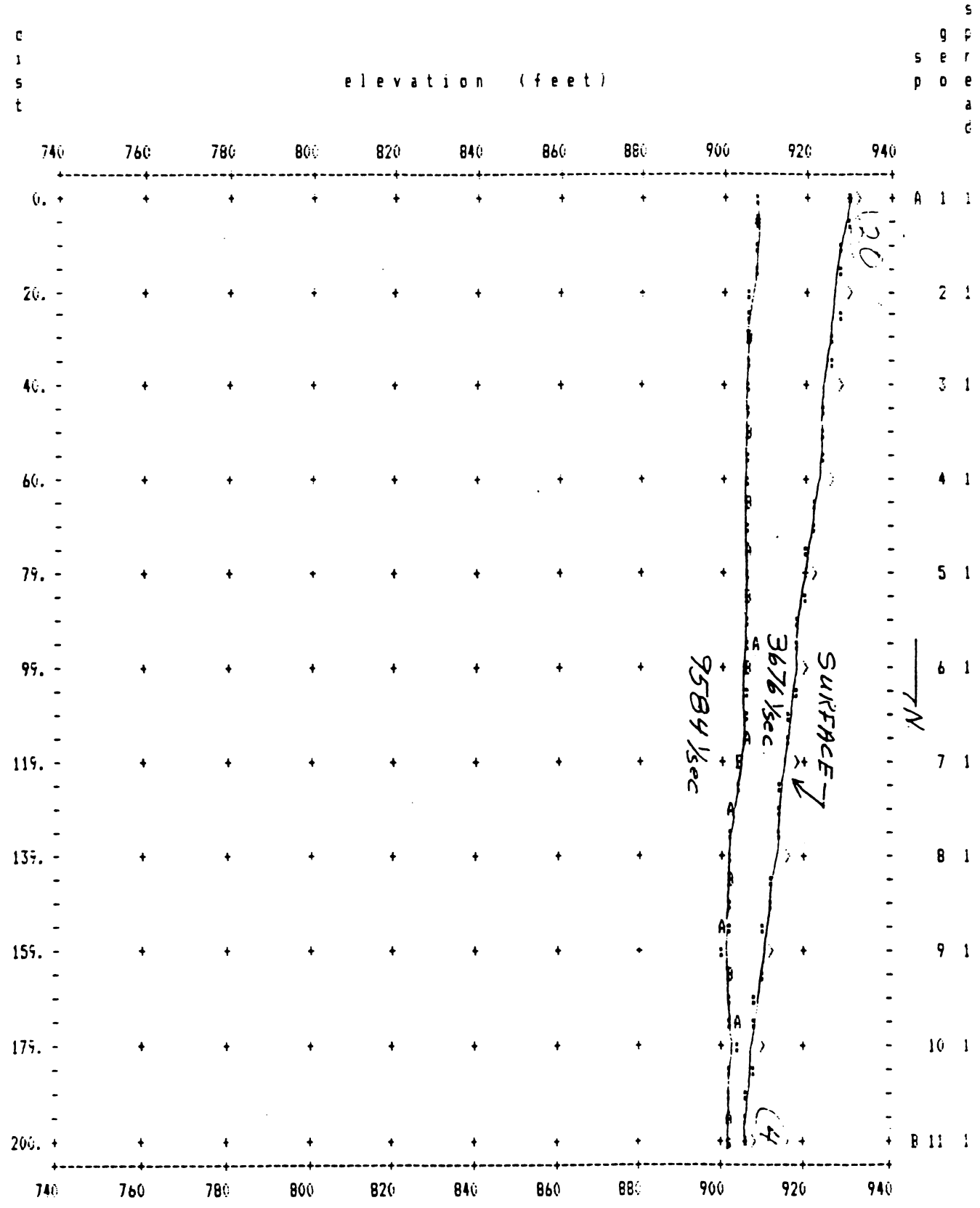



Plate S-11

WO 101568-A

SEISMIC INTERPRETATION BY E.R. BROWNE AND ASSOCIATES

Agoura Hills; Pacific Soils Eng., Inc. LINE 12

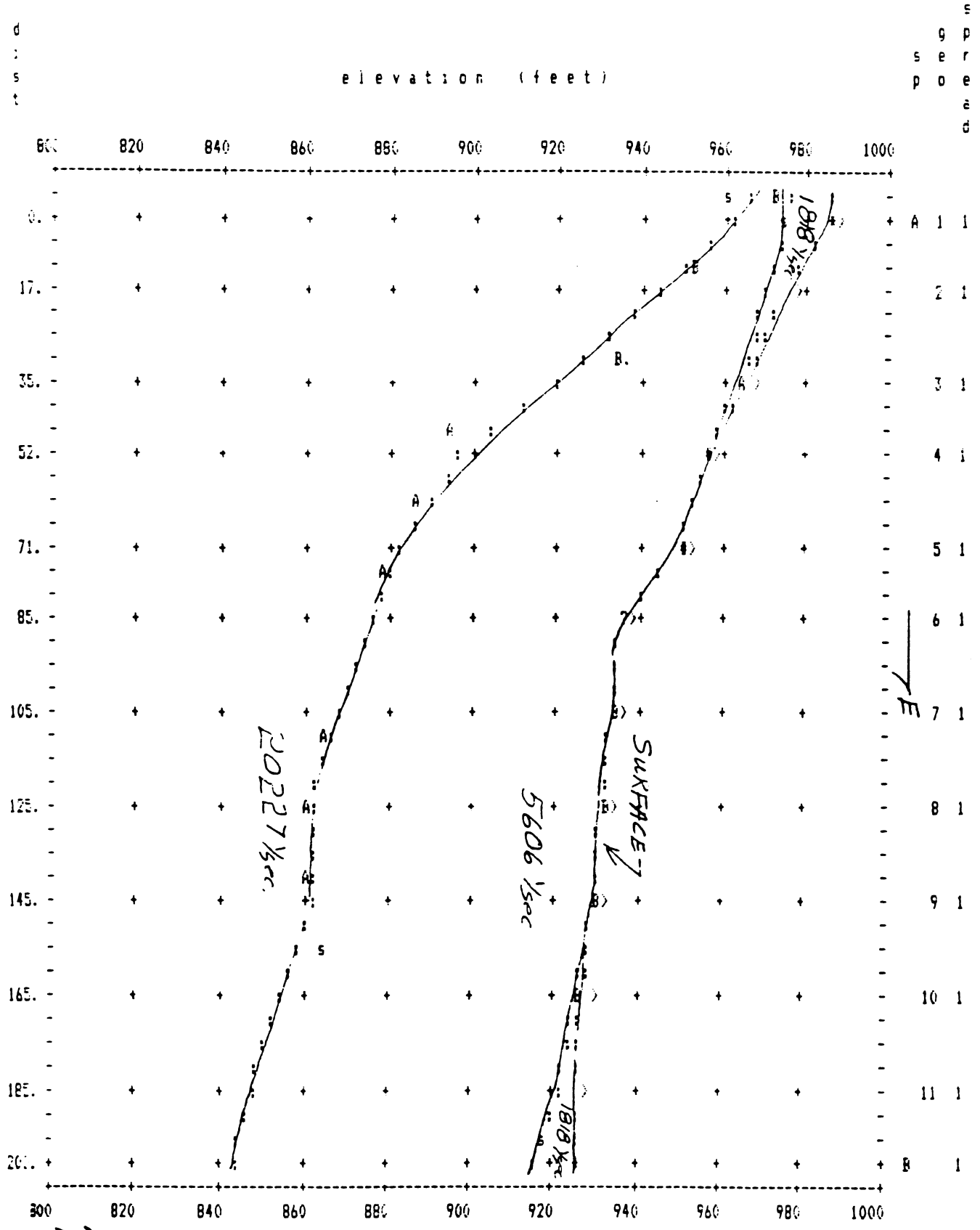



Plate S-12

WO 101568-A

SEISMIC INTERPRETATION BY E.R. BROWNE AND ASSOCIATES

Agoura Hills; Pacific Soils Eng., Inc. LINE 13

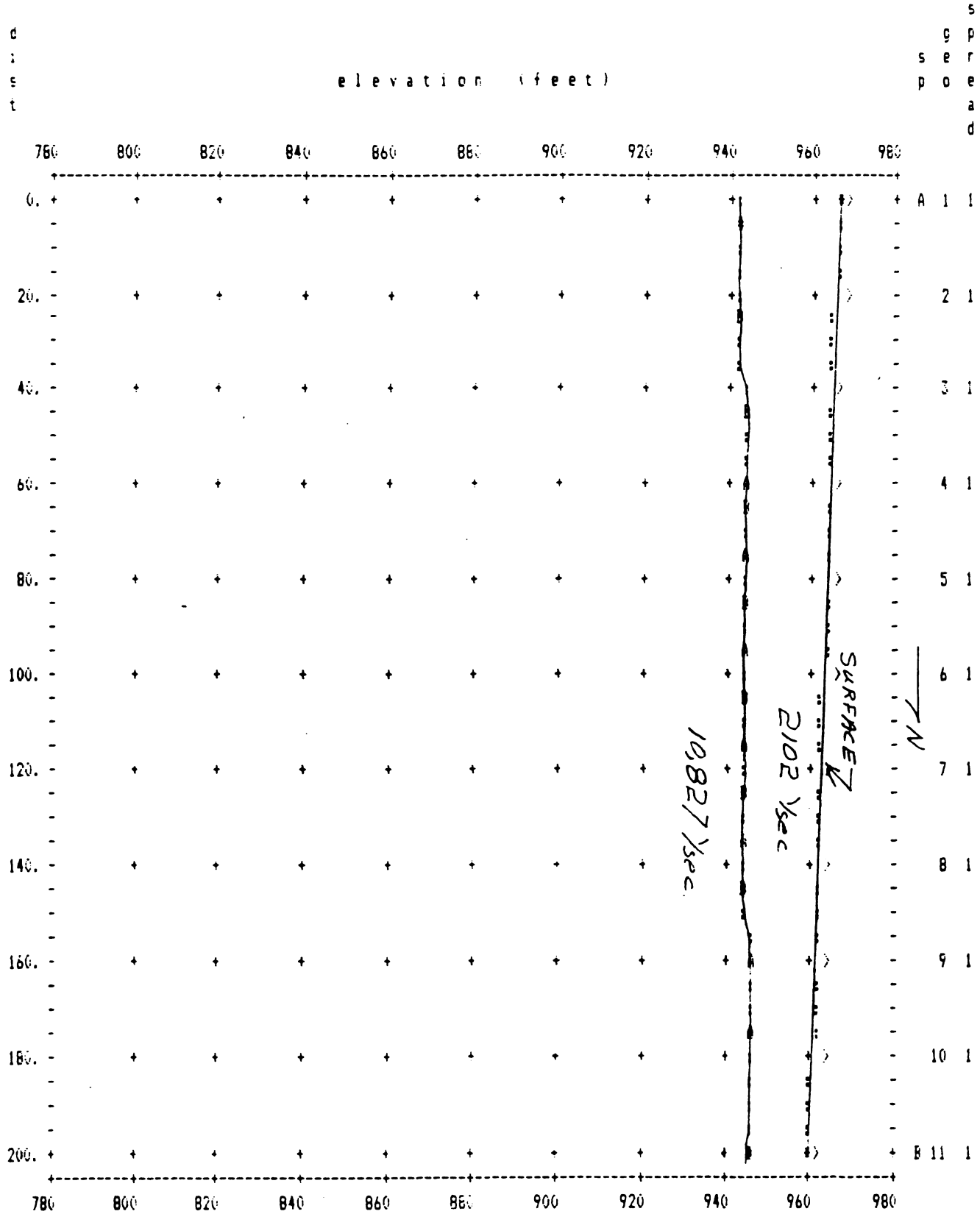
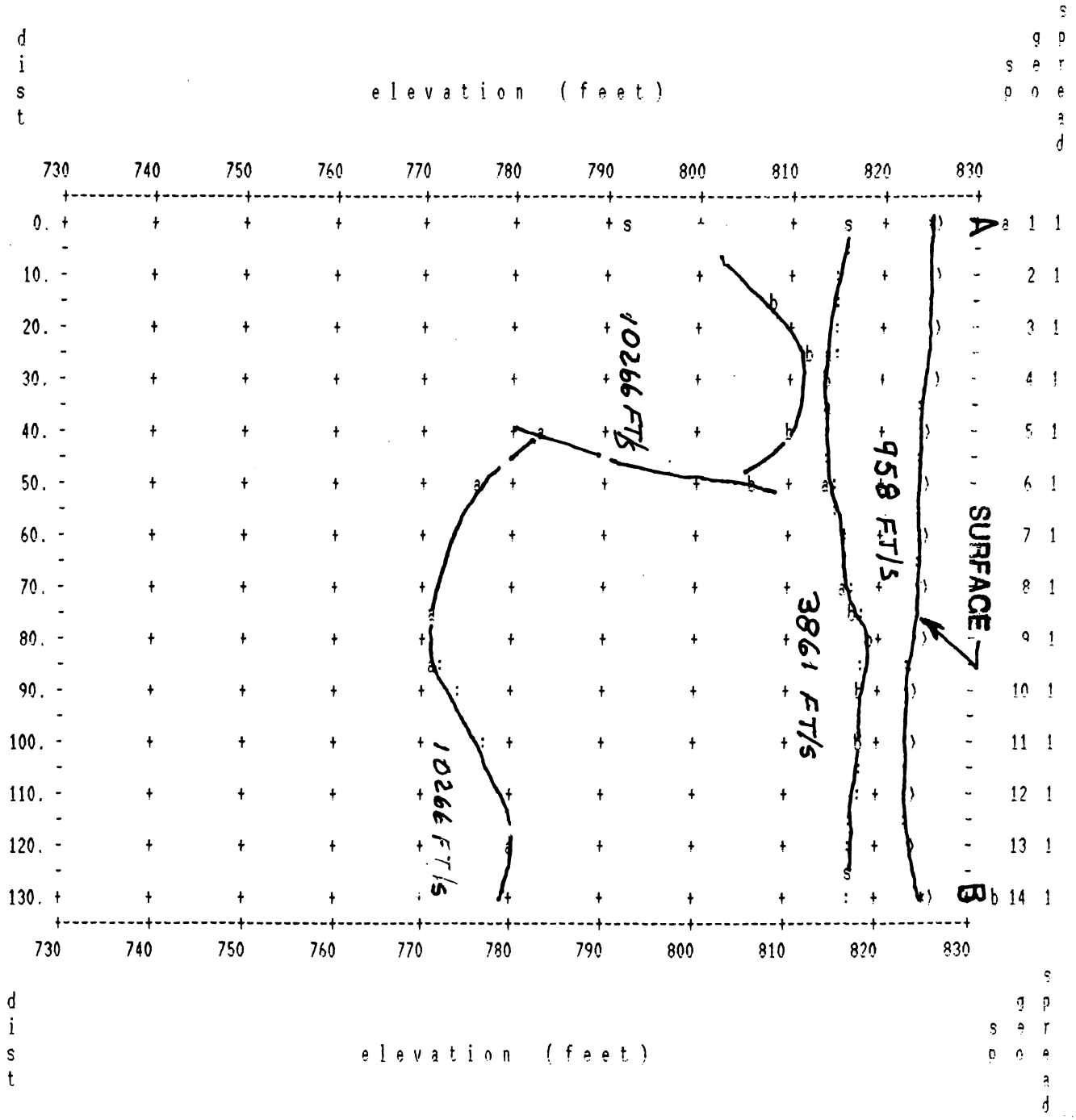


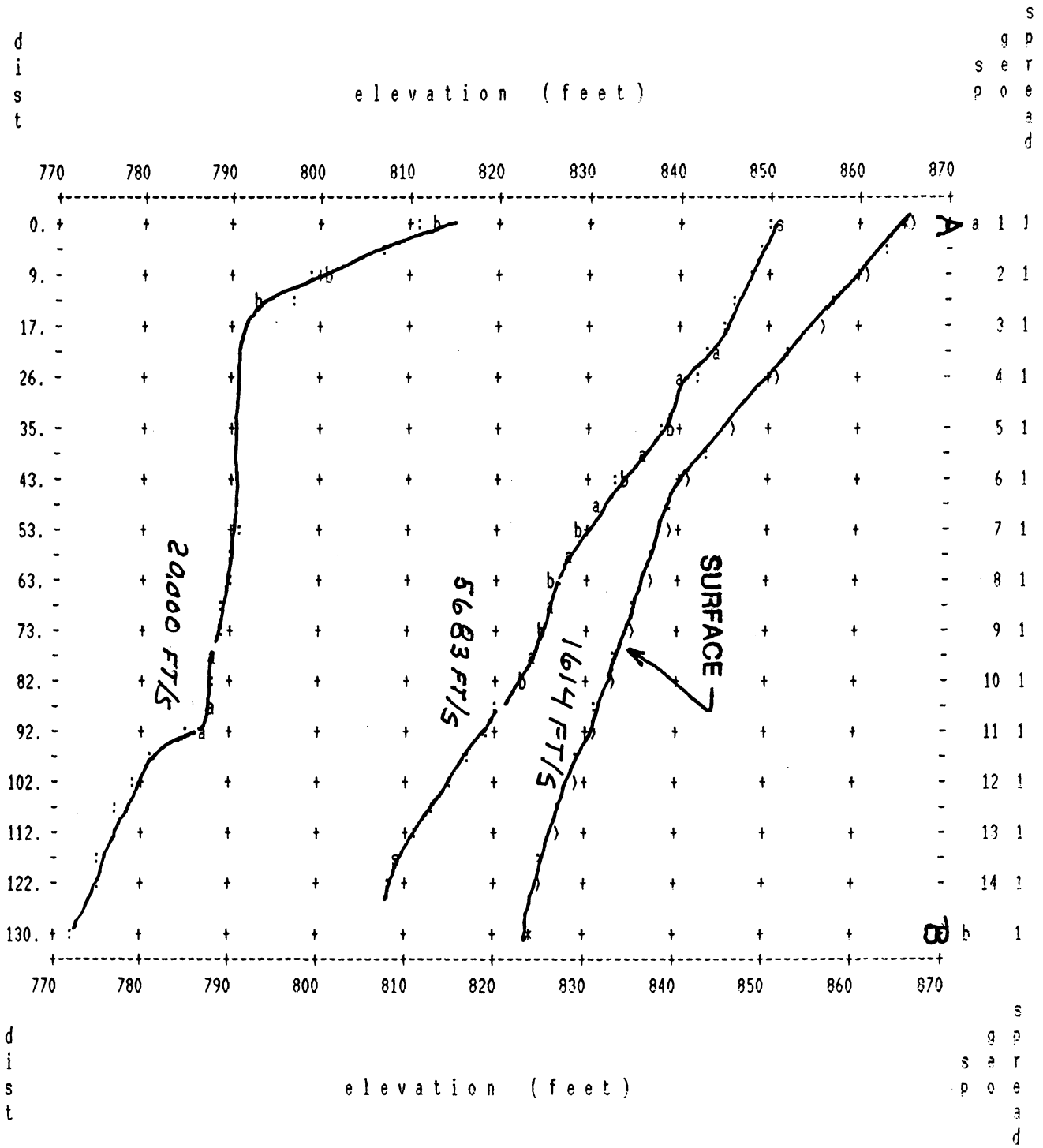

Plate S-13
W.O. 101568-A

PACIFIC SOILS/TRACT 52419, LINE S-101, HDG N., 10'spcng, W.O: 0156 BH 4/10/98




LINE S-101 → N

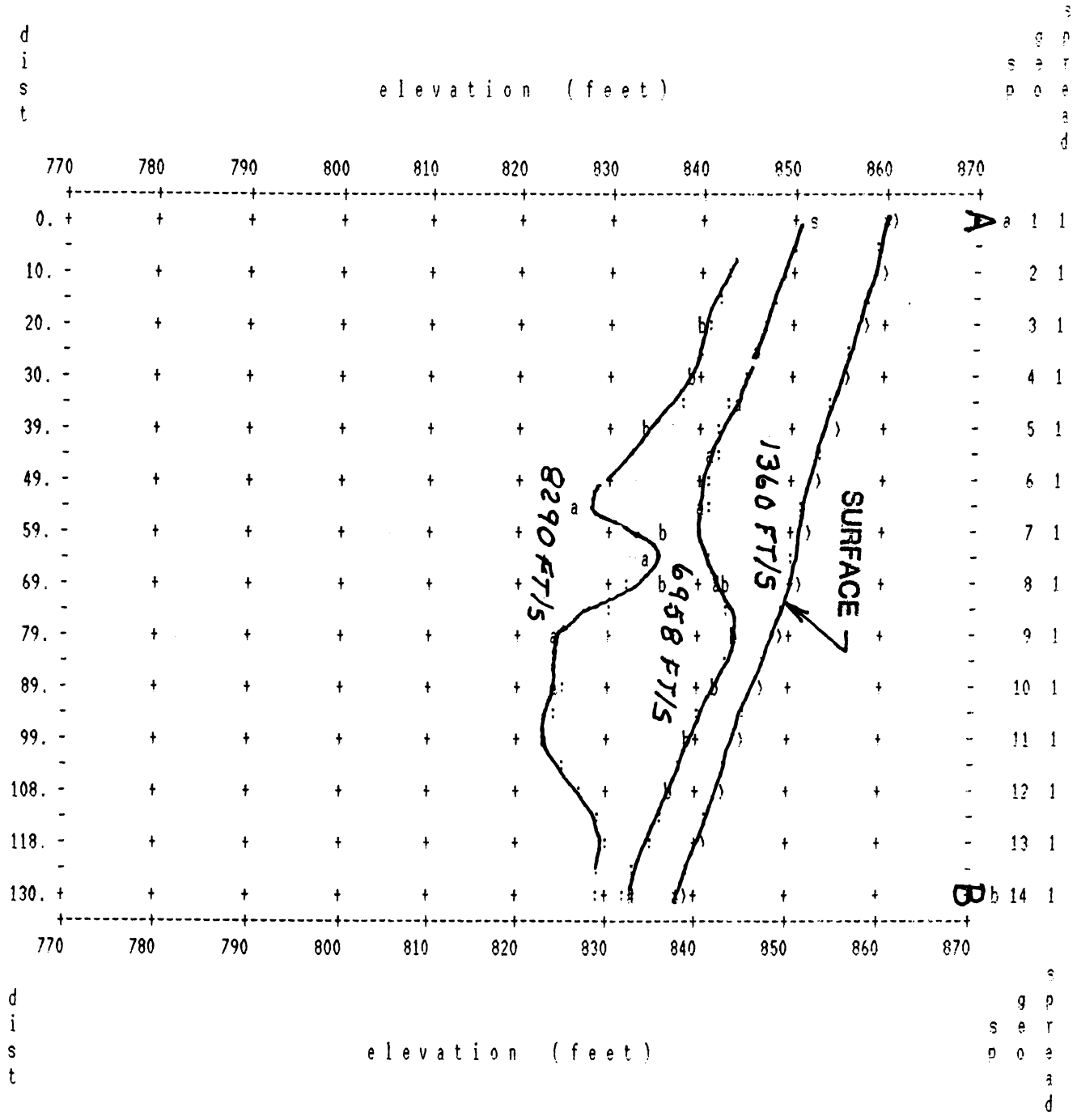
PACIFIC SOILS/TRACT 52419, LINE 102, HDG N., 10'spcng, W.0: 0156 BH 4/10/98




LINE S-102 → N

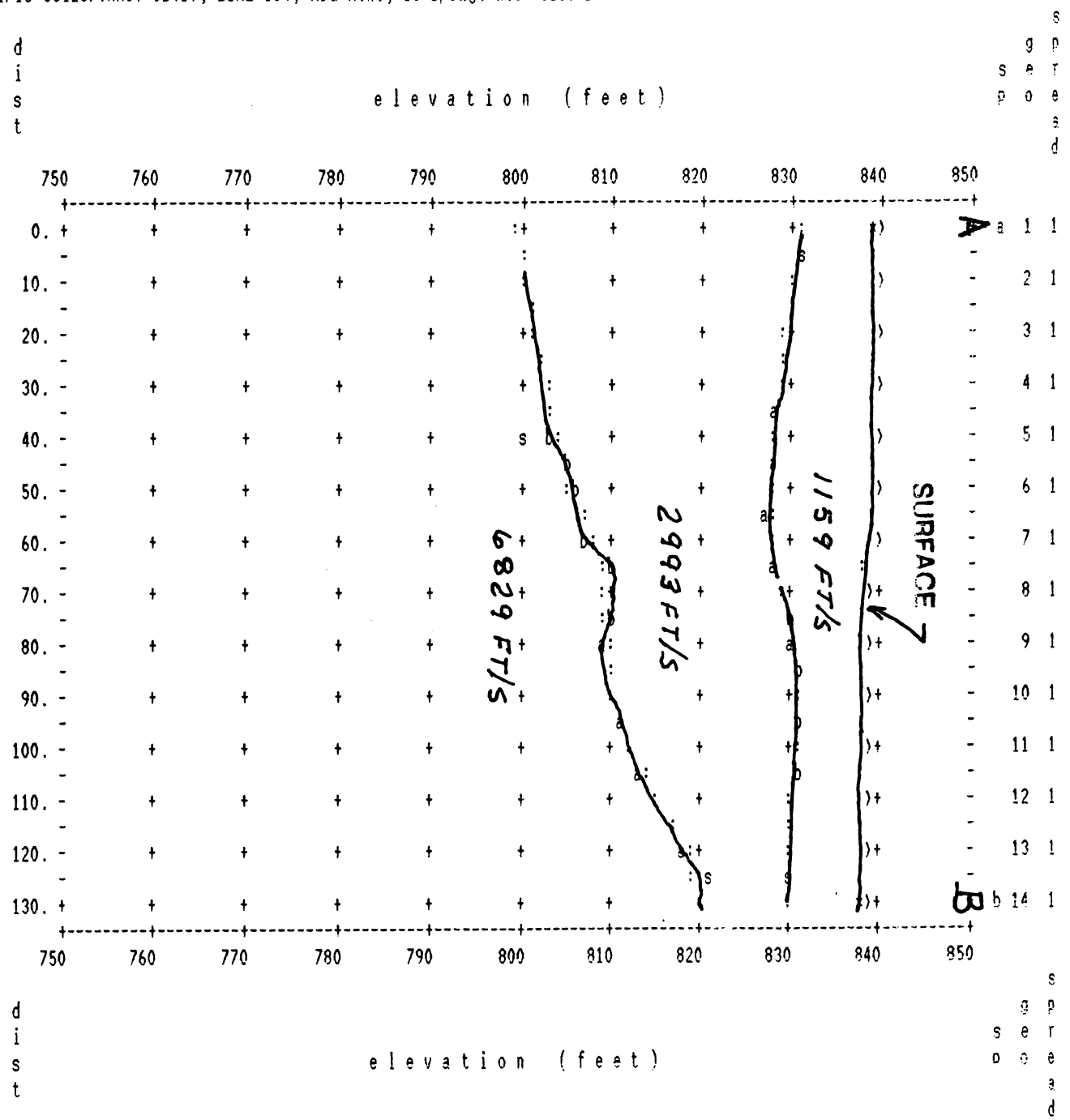
S-15

PACIFIC SOILS/TRACT 52419, LINE 103, HDG N., 10'spcng, W.O: 0156 BH 4/10/98




LINE S-103 → N

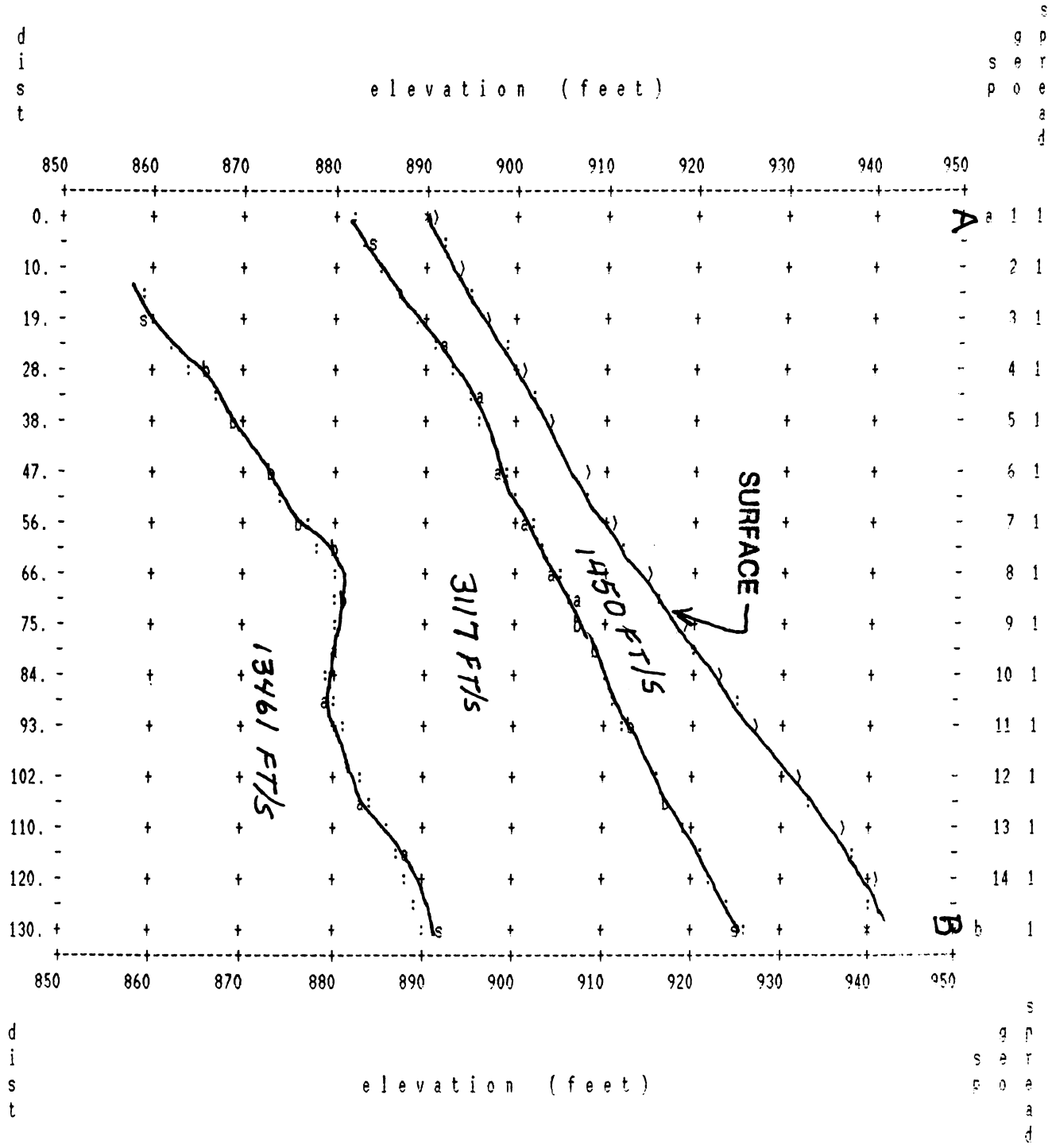
PACIFIC SOILS/TRACT 52419, LINE 104, HDG N.W., 10'spcng, W.O: 0156 BH 4/10/98




LINE S 104 → NW

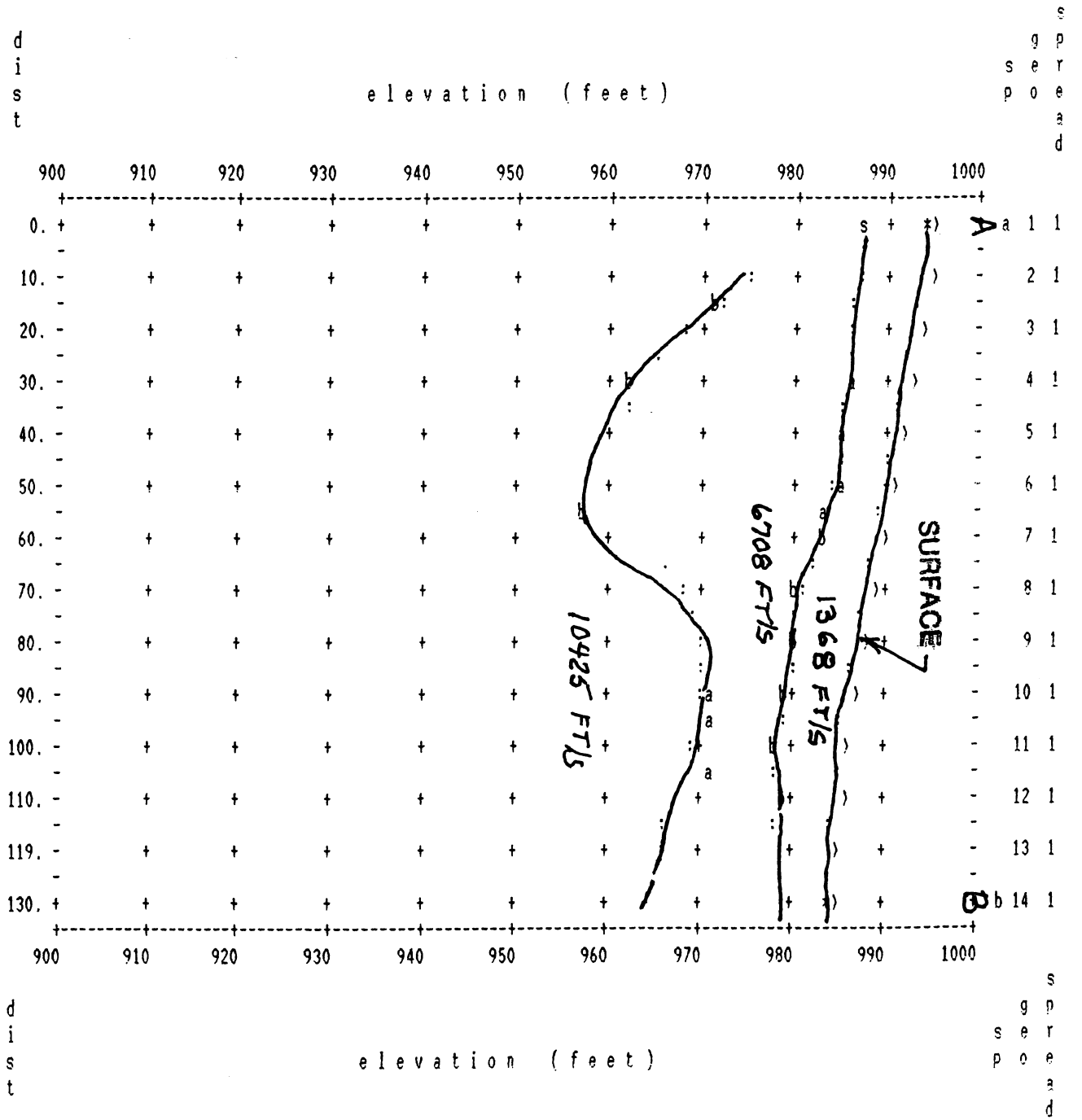
S-17

PACIFIC SOILS/TRACT 52419, LINE S105, HDG N., 10'spcng, W.O: 0156 BH 4/10/98




LINE S-105 → N

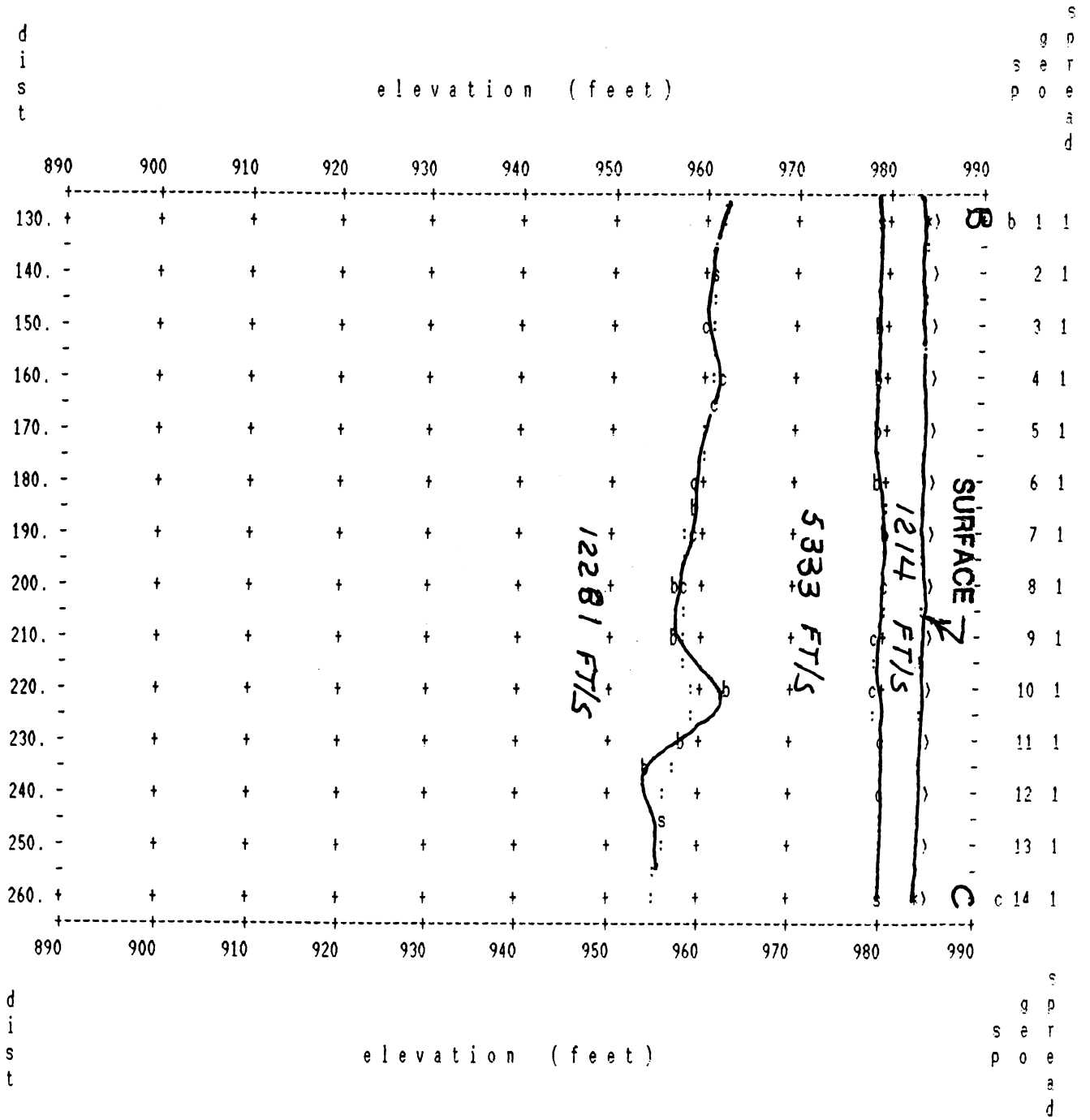
PAC.SOILS/TRACT 52419, LINE S-106AB, HDG S60E, 10'spcng, W.O: 0156 BH 4/10/98



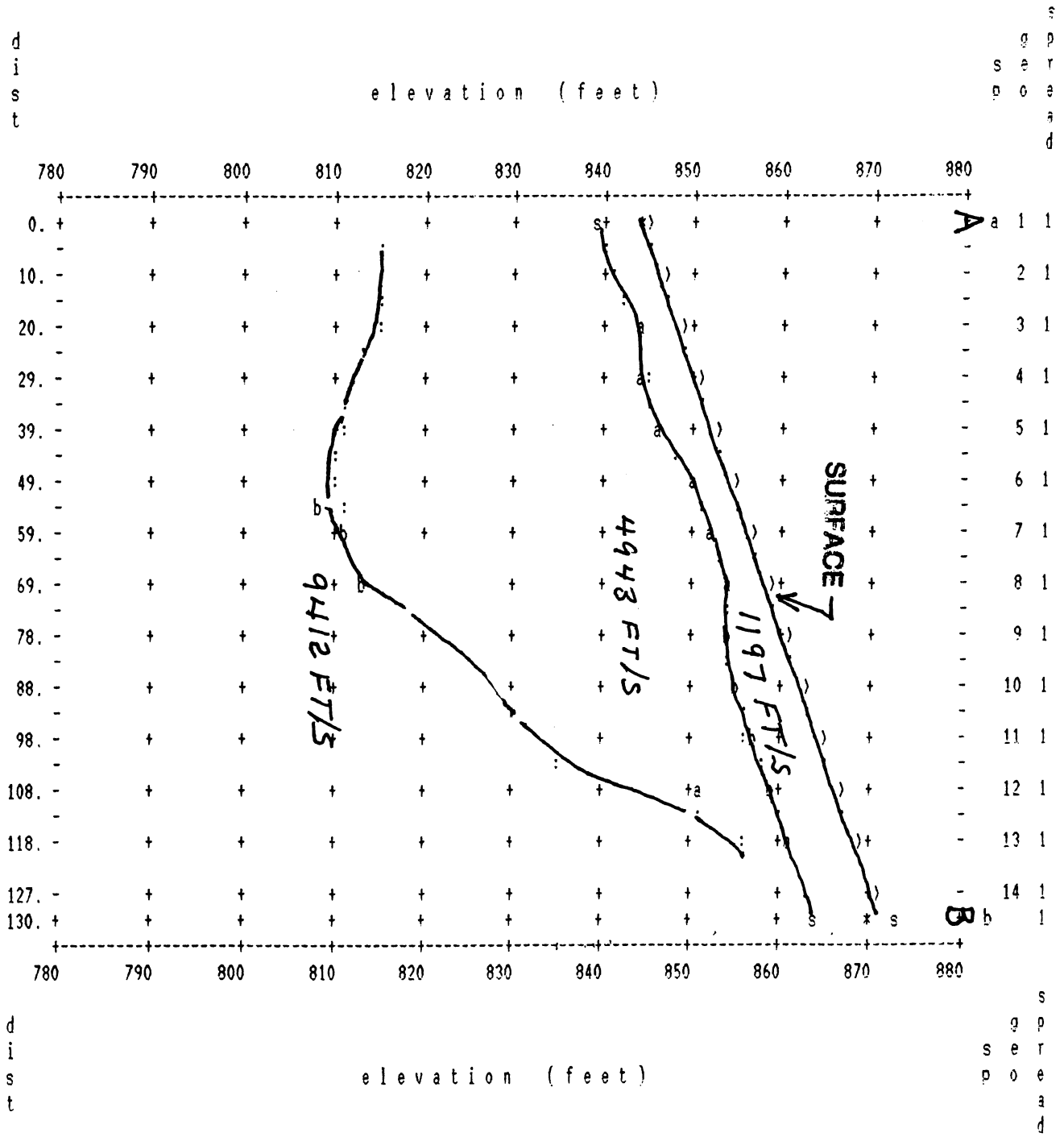

LINE S106 → S60E
A-B

S-19

PAC. SOILS/TRACT 52419, LINE S-106BC, HDG S60E., 10'spcng, W.0: 0156 BH 4/10/98

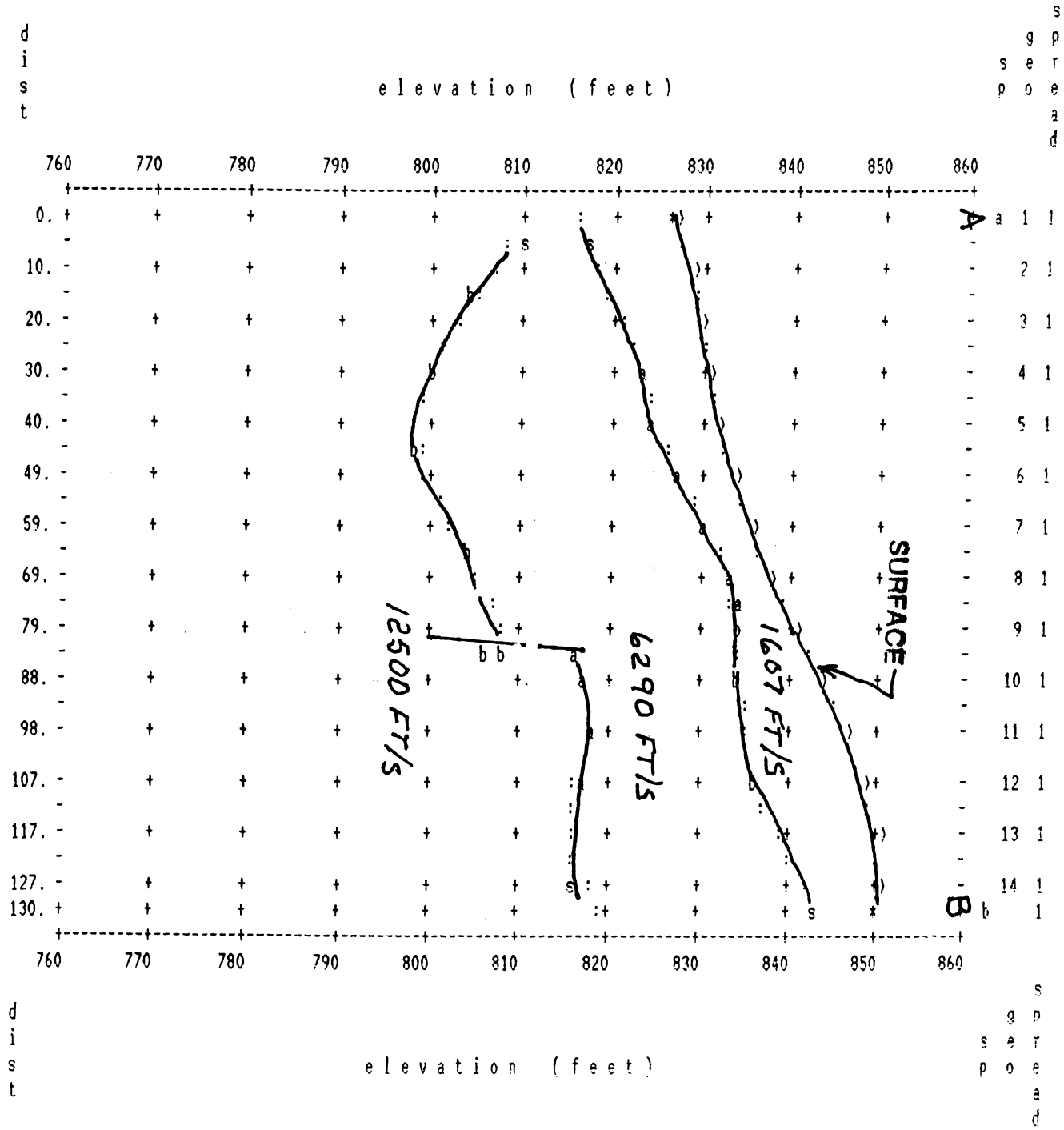


PACIFIC SOILS/TRACT 52419, LINE S107, HDG N., 10'spcng, W.0: 0156 BH 4/10/98




LINE S107 → N

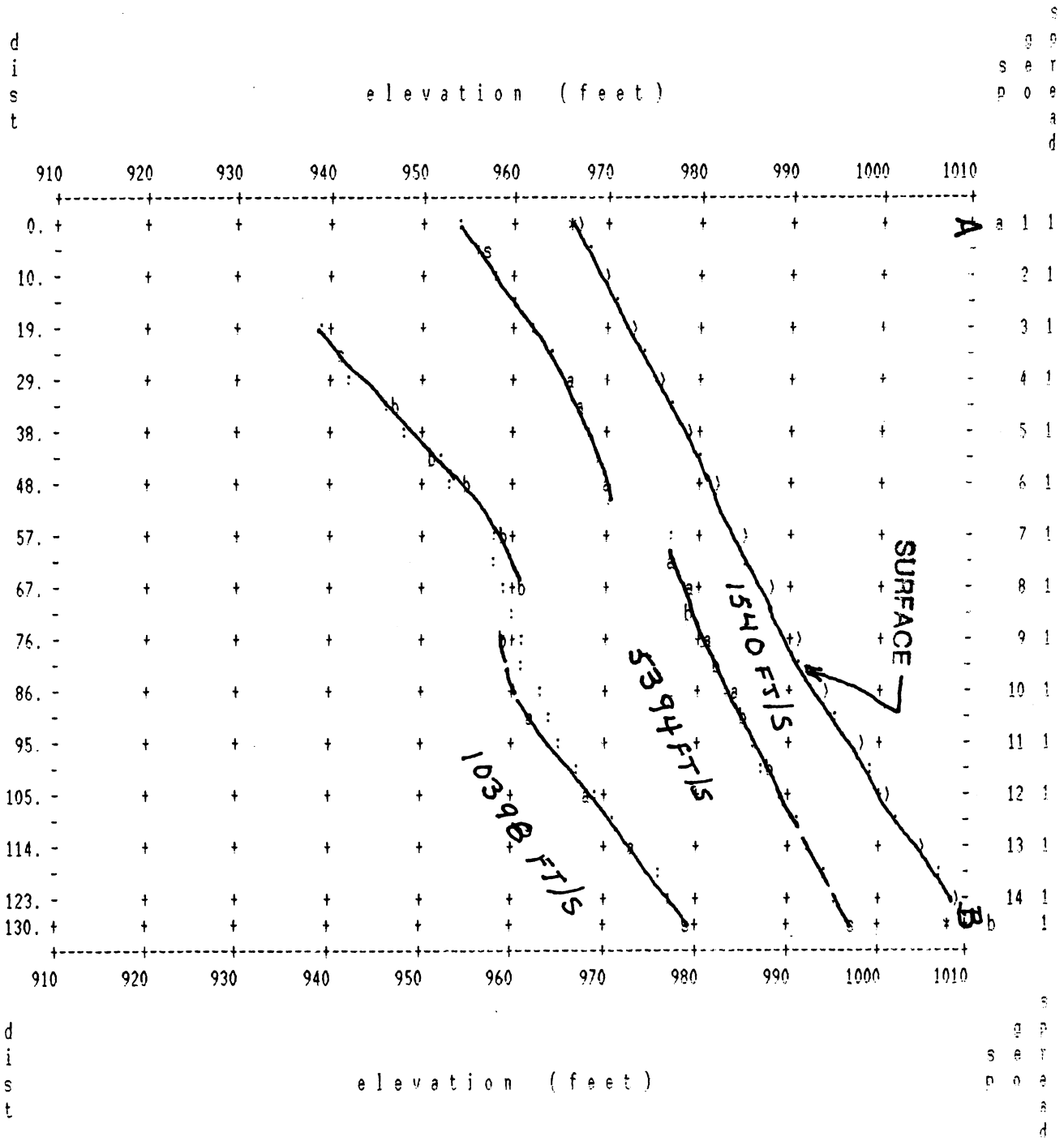
PACIFIC SOILS/TRACT 52419, LINE S-108, HDG N.E., 10'spcng, W.O: 0156 BH 4/10/98




LINE S-108 → NE

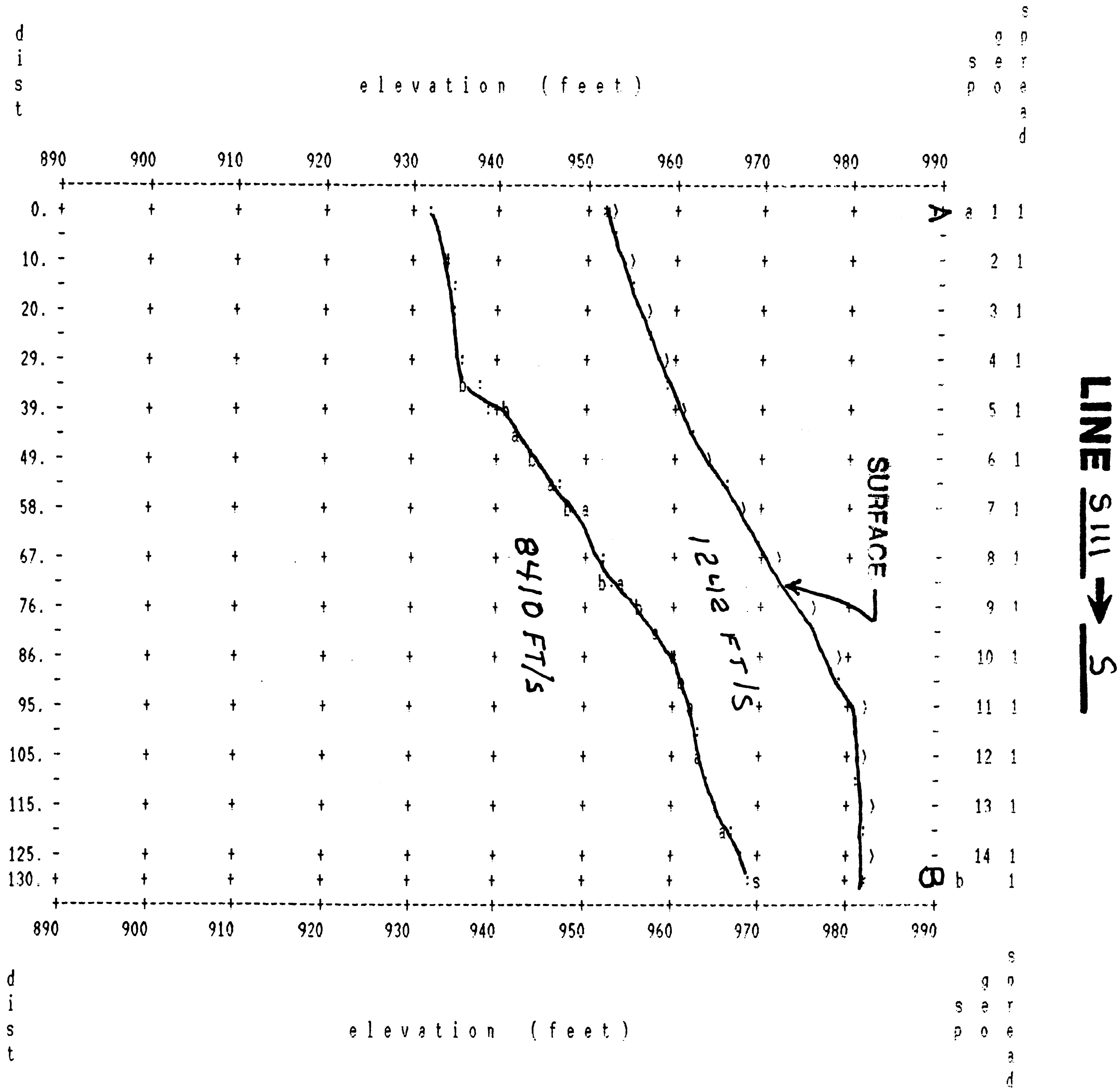
S.22

PACIFIC SOILS/TRACT 52419, LINE S110, HDG W., 10'spcng, W.O: 0156 BH 4/17/98

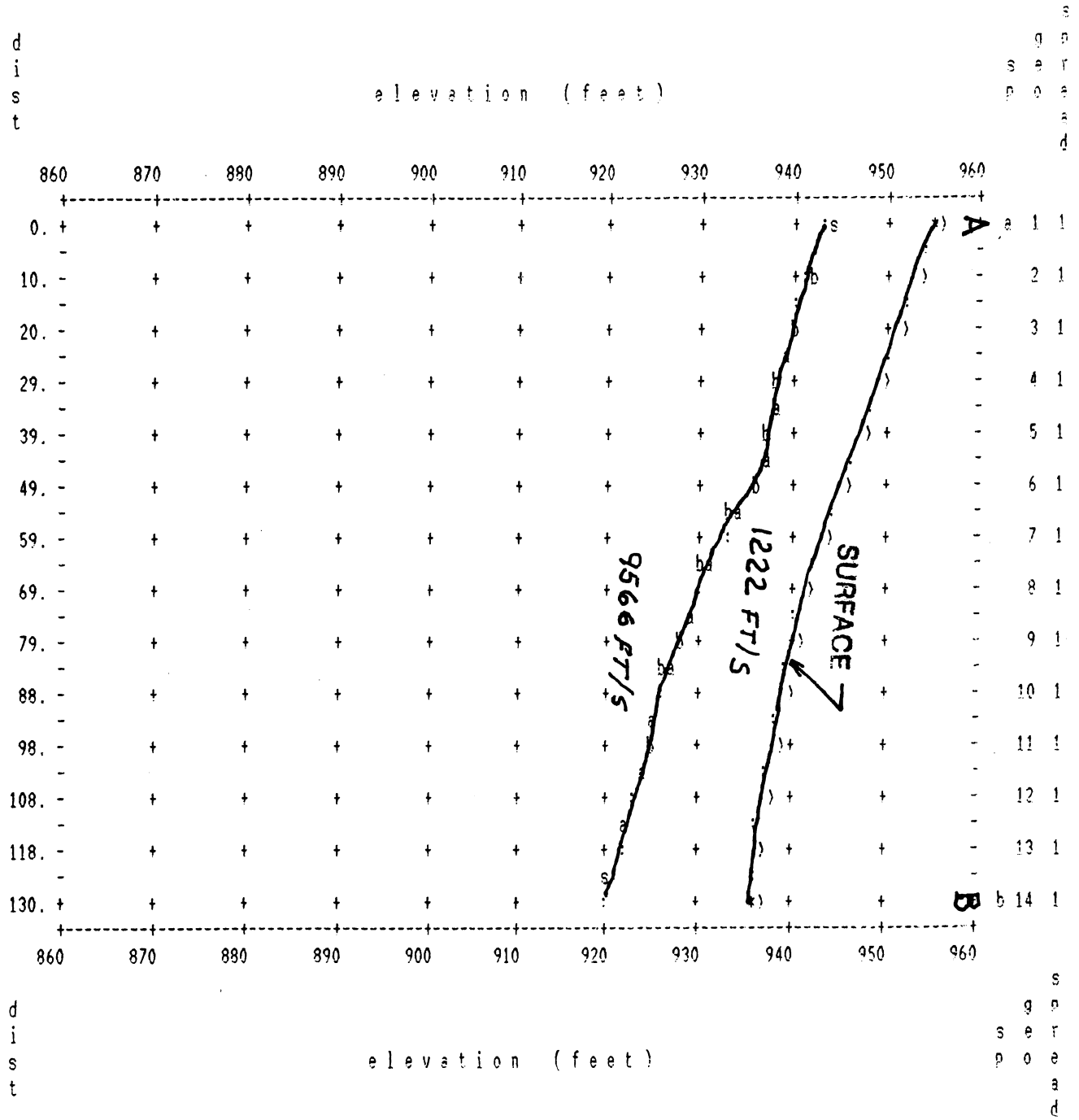



LINE S 110 → W

PACIFIC SOILS/TRACT 52419, LINE S111, HDG S., 10'spcng, W.O: 0156 BH 4/17/98



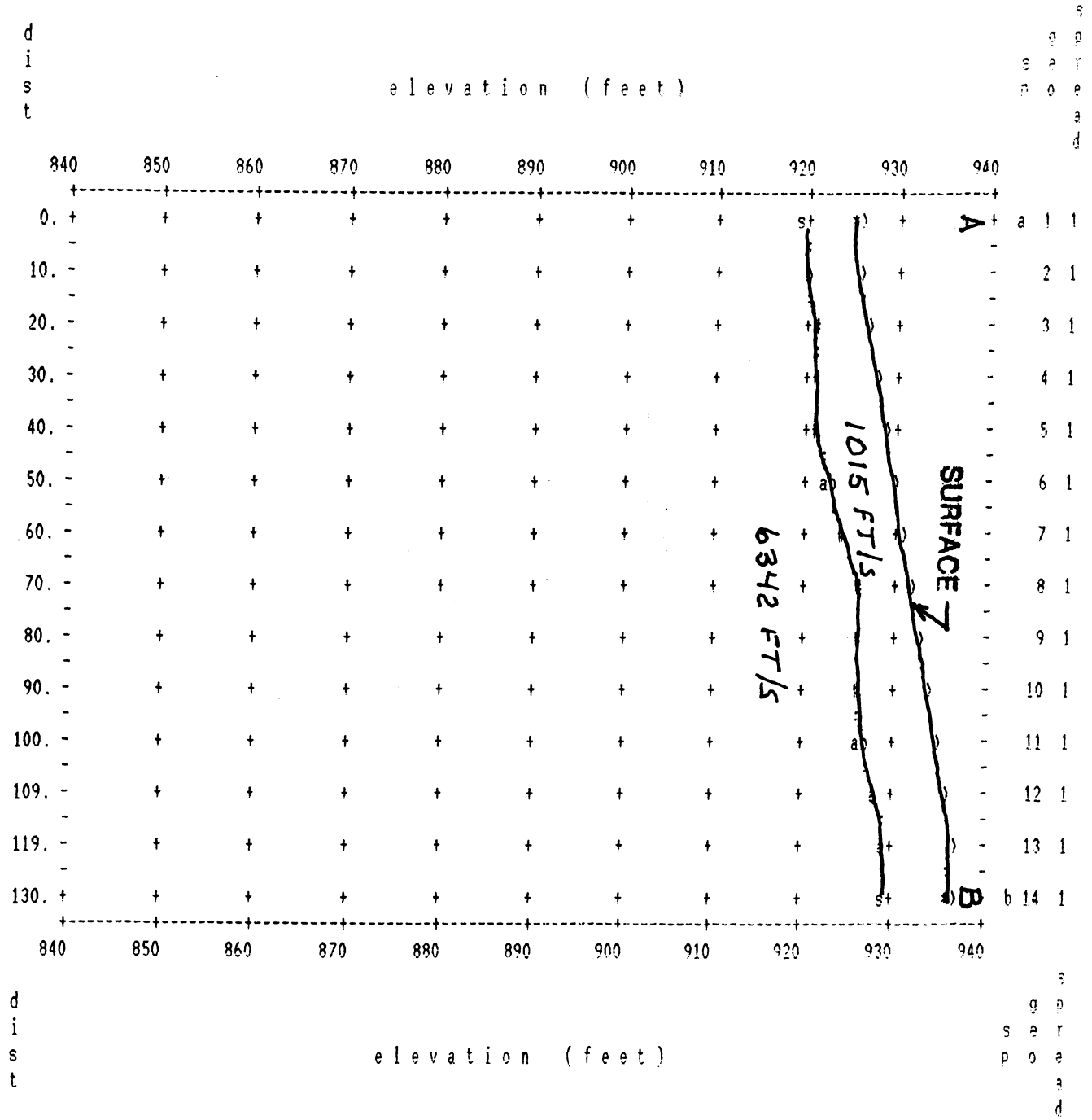
PACIFIC SOILS/TRACT 52419, LINE S112, HDG S.E., 10'spcng, W.O: 0156 BH 4/17/98




LINE S112 → SE

S-25

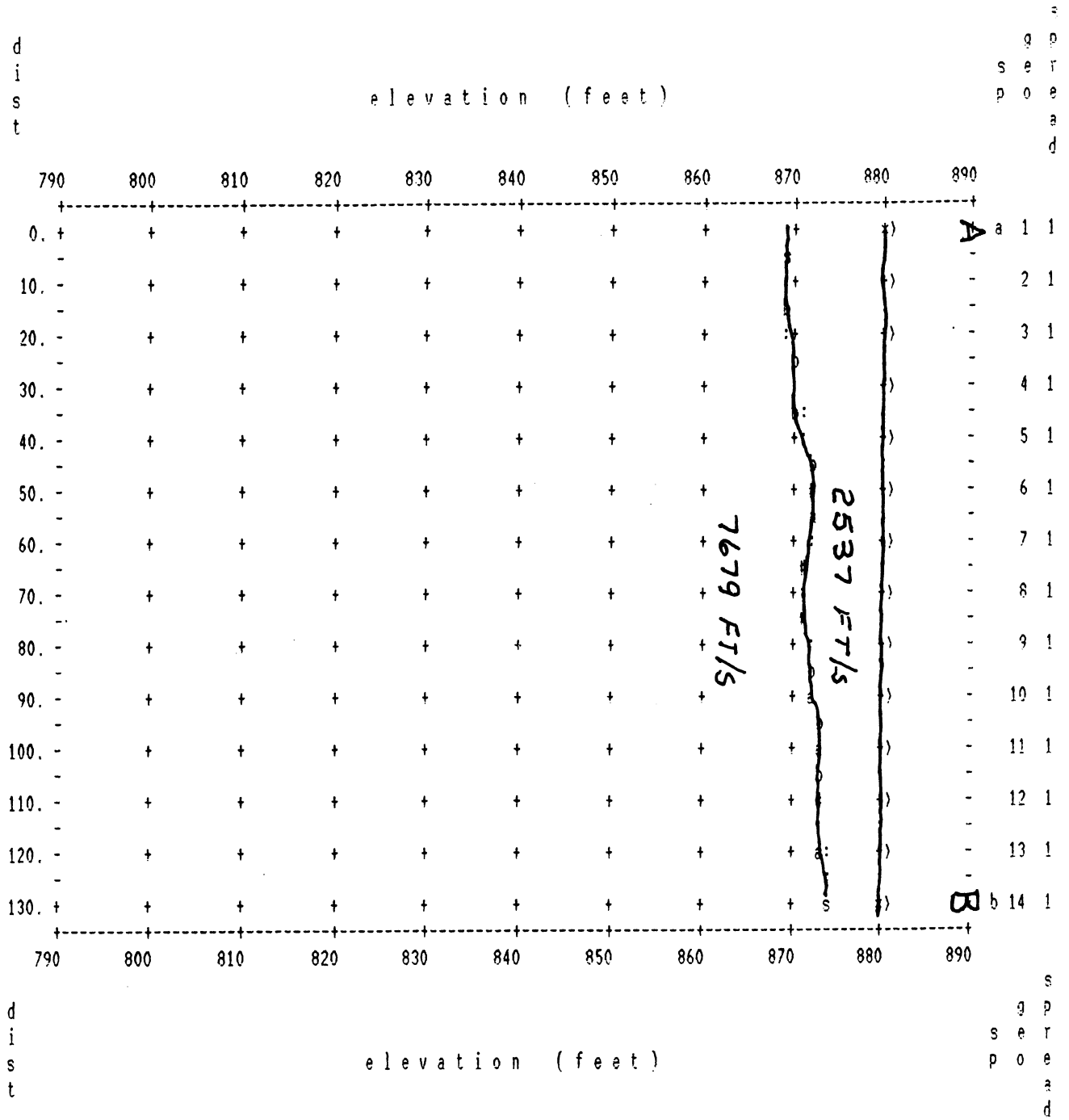
PACIFIC SOILS/TRACT 52419, LINE S113, HDG S.W., 10'spcng, W.0: 0156 BH 4/17/98




LINE S113 → SW

S-26

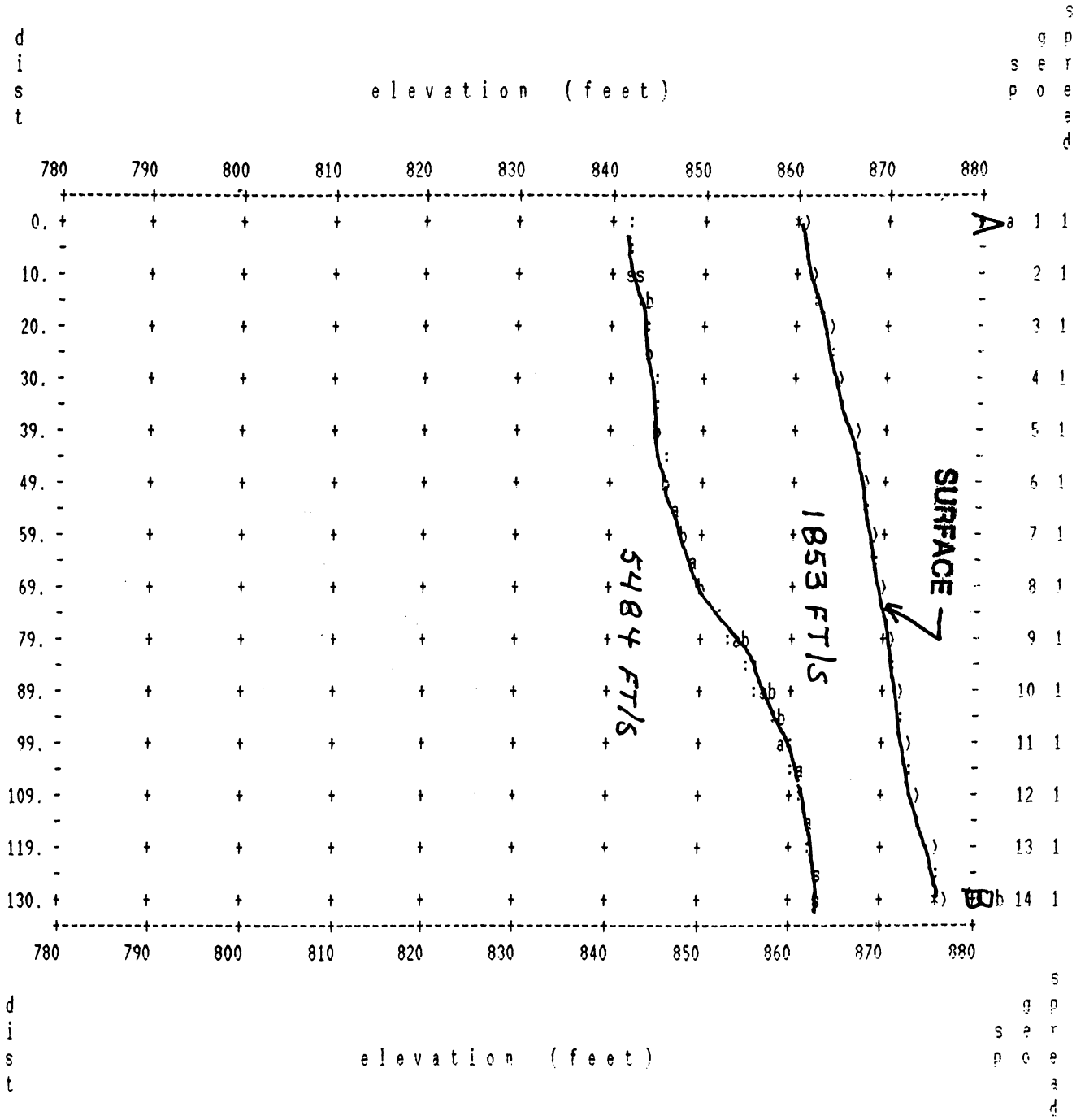
PACIFIC SOILS/TRACT 52419, LINE S114, HDG W., 10'spcng, W.O: 0156 BH 4/17/98




LINE S114 → W

S-27

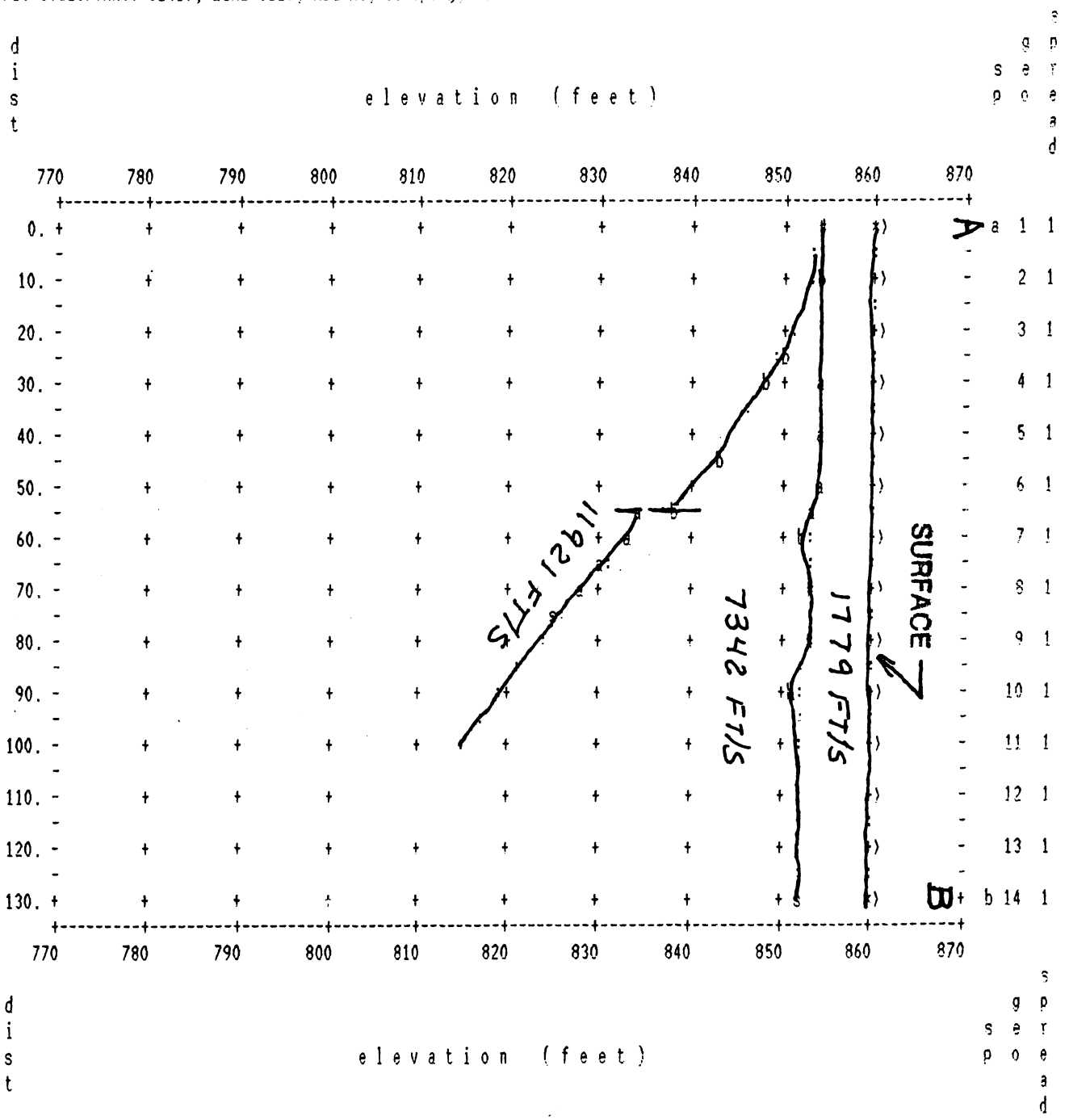
PACIFIC SOILS/TRACT 52419, LINE S115, HDG N.E., 10'spcng, W.O: 0156 BH 4/17/98




LINE S115 → NE

S 28

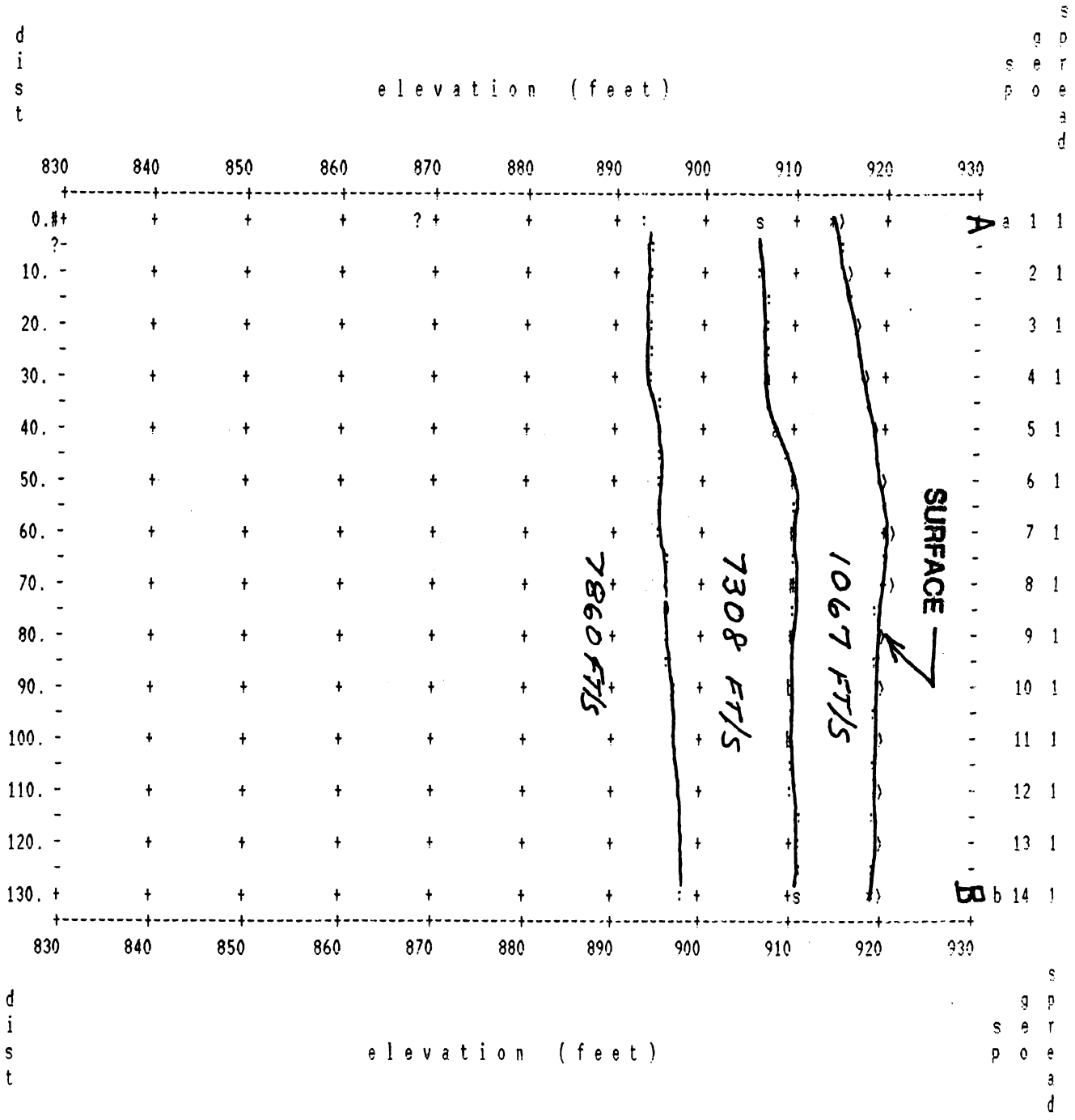
PACIFIC SOILS/TRACT 52419, LINE S116, HDG N., 10'spcng, W.O: 0156 BH 4/17/98




LINE S116 → N

S.29

PACIFIC SOILS/TRACT 52419, LINE S117, HDG N.W., 10'spcng, W.O: 0156 BH 4/17/98




S.30

# APPENDIX A-2

**Supplemental Geotechnical Investigation and Revision Received Vesting Tentative Tract Geotechnical Review, Vesting Tentative Tract 52419, County of Los Angeles, California, prepared by Pacific Soils Engineering, Inc.; May 15, 2000**

**PACIFIC SOILS ENGINEERING, INC.**
10653 PROGRESS WAY, P.O. BOX 2249, CYPRESS, CALIFORNIA 90630
TELEPHONE: (714) 220-0770, FAX: (714) 220-9589
*(Corporate Headquarters)*

**SAGE COMMUNITIES GROUP, INC.**
3 Corporate Plaza, Suite 102
Newport Beach, CA 92660

May 15, 2000

Work Order 101568-MP

Attention: Mrs. Diane Fradkin

Subject: **SUPPLEMENTARY GEOTECHNICAL INVESTIGATION AND REVISION RECEIVED VESTING TENTATIVE TRACT MAP GEOTECHNICAL REVIEW**
Volume I
Vesting Tentative Tract 52419
Near Kanan and Cornell Roads
Agoura Area
COUNTY OF LOS ANGELES, CALIFORNIA

References: See Appendix I

Ladies and Gentlemen:

Pursuant to your request, presented herein is this firm's Geotechnical Review of a 100-scale Revision Received Vesting Tentative Tract Map for Tract No. 52419, located in the Agoura area, County of Los Angeles, California. The major geotechnical/geologic issues identified within this document include:

- Unsuitable soil removals
- Retaining/Crib walls
- Natural slope stability
- Cut and fill slope stability
- Rock excavation characteristics
- Preliminary foundation design parameters
- Slope and lot maintenance recommendations

This document is composed of two volumes. Volume I contains the main text and the pocket enclosures, and Volume II is composed of a set of appendices as enumerated in the text.

Pacific Soils Engineering, Inc., (PSE) appreciates the opportunity to provide you with geotechnical consulting services. If you have any questions or should you require any additional information, please contact the undersigned.

Respectfully submitted,
PACIFIC SOILS ENGINEERING, INC.

By: _____
MICHAEL F. MILLS
Geologist/CEG 994
Reg. Exp.: 2-28-02

By: _____
WILLIAM D. JONES
Civil Engineering Associate

Reviewed by:

REGISTERED PROFESSIONAL ENGINEER
PAUL J. ERNST
No. GE2317
Exp. 3/31/03
GEOTECHNICAL
STATE OF CALIFORNIA

_____
PAUL J. ERNST/RGE 2317
RCE 46394/Reg. Exp.: 3-31-03
Manager of Geotechnical Services

_____
THEODORE M. WOLFE
CEG 1626/Reg. Exp.: 4-30-02
Manager of Geological Services

Distr.: (4) Addressee
(2) Wagner Halladay - Attn: Mr. Dana Halladay
(2) LACDPW - Materials Engineering
(1) LACDPW - Drainage Division - Attn: Mr. Mo Kajbat
(1) LA Co. Regional Planning - Attn: Mr. Paul McCarthy

WDJ:MFM:PJE:TMW/ml-1568MP02

# TABLE OF CONTENTS


1.0 INTRODUCTION ..... 1
1.1 Background and Purpose ..... 1
1.2 Scope of Study ..... 1
1.3 Report Limitations ..... 2
2.0 PROJECT DESCRIPTION ..... 2
2.1 Site Location and Description ..... 2
2.2 Proposed Development ..... 3
3.0 PREVIOUS GEOTECHNICAL INVESTIGATIONS ..... 4
4.0 CURRENT FIELD AND LABORATORY INVESTIGATION ..... 4
4.1 Subsurface Exploration ..... 4
4.2 Laboratory Testing ..... 5
5.0 GEOLOGIC CONDITIONS ..... 6
5.1 Regional Setting ..... 6
5.2 Stratigraphy ..... 6
5.2.1 Conejo Volcanics (Map Units: Tcb, Tca) ..... 6
5.2.2 Valley Fill (Qvf) ..... 7
5.2.3 Terrace Deposits (Qt) ..... 7
5.2.4 Alluvium (Qal) ..... 7
5.2.5 Colluvium (Qcol) ..... 8
5.2.6 Artificial Fill (af) ..... 8
5.2.7 Landslides/Mass Wasting ..... 9
5.3 Geologic Structure ..... 9
5.4 Hydrology Summary ..... 10
5.5 Earthquake Hazards ..... 11
5.5.1 Liquefaction ..... 11
5.5.2 Ground Shaking ..... 11
5.5.3 Surface Rupture ..... 12
5.5.4 California State - Imposed Geological (Seismic Hazards) Zones ..... 12
6.0 ENGINEERING CHARACTERISTICS ..... 13
6.1 Material Properties ..... 13
6.1.1 Excavation Characteristics ..... 13
6.1.2 Earthwork Adjustments ..... 13
6.1.3 Compressibility ..... 13
6.1.4 Expansion Potential ..... 14
6.1.5 Chemical Analyses ..... 14

7.0 GEOTECHNICAL CONCLUSIONS AND RECOMMENDATIONS ..... 14
7.1 Site Preparation and Removals ..... 15
7.1.1 Stripping and Deleterious Material Removal ..... 15
7.1.2 Alluvium/Colluvium ..... 15
7.1.3 Fill ..... 16
7.1.4 Valley Fill ..... 16
7.1.5 Conejo Volcanics ..... 16
7.1.6 Pipelines, Oil and/or Water Wells, Cesspools and Septic Tanks ..... 17
7.2 Slope Stability and Remediation ..... 17
7.2.1 Shear Strength Parameters ..... 17
7.2.2 Cut Slopes ..... 17
7.2.3 Fill Slopes ..... 18
7.2.4 Skin Cut Slopes ..... 18
7.2.5 Skin Fill Slopes ..... 19
7.2.6 Natural Slopes ..... 19
7.2.7 Surficial Stability ..... 19
7.3 Debris Flow Potential ..... 19
7.3.1 General ..... 19
7.3.2 Surficial Geological Setting ..... 20
7.3.2.1 Geomorphology ..... 20
7.3.2.2 Surficial Materials ..... 21
7.3.3 Aerial Photograph Review ..... 22
7.3.4 Discussion ..... 22
7.3.5 Boulder Roll ..... 24
7.4 Overexcavation of Building Pads ..... 25
7.5 Building Pads Above Buttress Fills/Stabilization Fills/Shear Keys ..... 26
7.6 Subsurface Drainage ..... 26
7.6.1 Canyon Subdrains ..... 26
7.6.2 Backdrains ..... 26
7.7 Retaining/Crib Walls ..... 27
7.8 Construction Staking and Survey ..... 28
7.9 Settlement Monitoring ..... 28
7.10 Earthwork Considerations ..... 29
7.10.1 Compaction Standards ..... 29
7.10.2 Observation of Excavations ..... 29
7.10.3 Treatment of Removal Bottoms ..... 29
7.10.4 Fill Placement ..... 30

7.10.5 Rock Disposal ..... 30
7.10.6 Benching ..... 31
7.10.7 Mixing ..... 31
7.10.8 Fill Slope Construction ..... 32
7.10.9 Select Grading Material ..... 32
7.10.10 Import Soils ..... 33
7.10.11 Haul Roads ..... 33
7.10.12 Testing of Compacted Fill ..... 33
7.10.13 Final Reports ..... 34
8.0 DESIGN RECOMMENDATIONS ..... 34
8.1 Structural Design - Residential ..... 34
8.1.1 Slab-On-Grade Foundation Recommendations ..... 35
8.1.2 Post-Tensioned Slab/Foundation System Design Recommendations ..... 37
8.1.3 Differential Settlement ..... 38
8.1.4 Deepened Footings and Setbacks ..... 39
8.1.5 Backyard Improvements ..... 39
8.1.6 Miscellaneous Foundation Recommendations ..... 39
8.2 Other Design and Construction Recommendations ..... 40
8.2.1 Site Drainage ..... 40
8.2.2 Concrete Flatwork and Lot Improvements ..... 40
8.2.3 Utility Trench Excavation ..... 41
8.2.4 Utility Trench Backfill ..... 41
9.0 SLOPE AND LOT MAINTENANCE ..... 42
9.1 Slope Planting ..... 42
9.2 Lot Drainage ..... 42
9.3 Slope Irrigation ..... 42
9.4 Burrowing Animals ..... 42
10.0 FUTURE PLAN REVIEWS ..... 42
11.0 CLOSURE ..... 43

APPENDIX I - References
APPENDIX II - Field and Laboratory Data from Prior Investigations
APPENDIX III - Field and Laboratory Data and Stability Calculations from This Investigation
APPENDIX IV - Seismic Refraction Surveys and Rippability Assessment
APPENDIX V - Seismic Hazards Assessment
APPENDIX VI - Earthwork Specifications and Typical Grading/Construction Details
APPENDIX VII - Homeowner Maintenance and Improvement Considerations

# 1.0 INTRODUCTION

## 1.1 Background and Purpose

Revision Received Vesting Tentative Tract No. 52419 comprises 330± acres in the unincorporated Agoura area of Los Angeles County. The requirements for processing a tentative map through the County of Los Angeles include submittal and approval of Tentative Tract Map-level geological and geotechnical reports. The purpose therefore of this transmittal is to present the County with a Preliminary Geotechnical Report suitable for review. Previous geotechnical investigations have been carried out and subsequent reports have been issued (see Section 3.0, below), but those were intended for general planning and EIR-level, not tentative-level, purposes. Presented herein are geotechnical conclusions and recommendations about the feasibility, design, and construction of the project as presented on the accompanying Revision Received Vesting Tentative Tract Maps prepared by Wagner Halladay, Inc., and dated April 28, 2000.

## 1.2 Scope of Study

This study is aimed at presenting Tentative Map-level preliminary geotechnical and geologic information concerning the existing site conditions along with providing pertinent conclusions and recommendations relative to development of the property as currently proposed. Specific items evaluated as part of this report included fill and cut slope stability, natural slope stability, unsuitable soil removals, engineering and excavation characteristics of the earth materials, preliminary foundation recommendations, and slope and lot maintenance considerations.

The scope of this study included the following tasks:

1) *A review of existing geotechnical and geologic data relative to the site.*
2) *Excavation of 12 exploratory borings, and 15 test pits, along with the performance of 8 refraction seismic lines on the subject property.*
3) *Plotting of geotechnical information on the 100-scale Vesting Tentative Tract Map provided by Wagner Halladay, Inc. (Plates I and II, in pocket).*
4) *Laboratory testing of representative material samples collected from the exploratory excavations.*
5) *Preparation of geologic cross-sections (Plate III, in pocket).*
6) *Engineering and Geologic analysis.*

7) *A limited seismicity analysis.*
8) *Formulation of conclusions and recommendations, based on a results of the field, office, and laboratory studies.*
9) *Preparation of this report.*

### 1.3 Report Limitations

The conclusions and recommendations in this report are based on the data developed during this investigation, on a review of the referenced previous reports, and on the Revision Received Vesting Tentative Tract Map prepared by Wagner Halladay, Inc. The materials immediately adjacent to or beneath those observed may have different characteristics than those observed and no representations are made as to the quality or extent of materials not observed.

## 2.0 PROJECT DESCRIPTION

### 2.1 Site Location and Description

The study site is located southerly of the Ventura Freeway (U.S. 101) and is bisected by Kanan Road in the Agoura Hills area of western Los Angeles County, as shown on the Vicinity Map on Plate II (in pocket). Access to the west part of the site is via unimproved roads emanating from Kanan Road. The eastern parcel can be traversed only with off-road vehicles or by foot.

Two residences and a fire station border the west margin of the part of the site east of Cornell Road. Residences border the south-central margin of the site between Kanan and Cornell Roads. Elsewhere, the site is immediately bordered by undeveloped property or roadways.

The approximately 330-acre site is essentially undeveloped, except for peripheral cut slopes and fills associated with Kanan and Cornell Roads, and a canyon fill in the west central part of the site, west of Kanan Road. Vestiges of graded pads and an old concrete slab probably used for agriculture exist near proposed Lots 1 through 4. A pipe, possibly an old water well, was encountered near trench T-28.

Topographically, the area to be developed west of Kanan Road lies near the base of a series of easterly and westerly trending spur ridges that protrude from a large east-trending major ridge or "cuesta". Slope ratios vary from nearly flat in Medea Creek to locally as deep as 1½:1± (horizontal to vertical) on the spur ridges. Local relief near the area of proposed development west of Kanan Road varies from about 200 feet to 700 feet.

The eastern parcel consists of a series of westerly trending ridges with numerous small northerly and southerly trending spurs. Natural slopes vary from 3:1 to 1½:1 with local gentler and steeper elements, and vary up to about 200 feet high. The ridges are separated by numerous westerly-draining ephemeral canyons and valleys; all of which were dry in August 1988 and March 1998, but in March 2000, the main draw near Lots 104 through 106 carried surface flow.

The site supports a variety of vegetation. In particular dense chaparral and scrub oak cover much of the area west of and near Kanan Road, as well as most north-facing natural slopes. Thick chaparral and sparsely covered grasslands are common east of Cornell Road. Both individual and stands of live oak are scattered throughout the property. The recent supplemental investigation has been locally hampered by recently identified and mapped occurrences of protected vegetation.

## 2.2 Proposed Development

According to the Revision Received Vesting Tentative Tract Map (Plates I and II), it is proposed to use conventional cut-fill grading, as well as yet unspecified retaining/crib walls, to create 108 pads suitable for single-family residences and to create appurtenant roadways and debris/runoff retention devices. Changes to existing Kanan Road are indicated on Plates I and II. The map shows that Kanan Road is to be widened to 100-feet and that a 135-foot high 1.5:1 east-facing cut slope is proposed south of the study site in order to improve sight distance at an existing Kanan Road curve.

Proposed cut slopes shown on Plates I and II have 2:1 (horizontal to vertical) slope ratios to a maximum height of 70 feet behind a retention basin near Lot 18. Exceptions

to the above are the aforementioned proposed slope along Kanan Road, and a 53-foot high (maximum) southerly facing 1.5:1 cut slope behind Lots 81 through 86. Fill slopes are shown as 2:1, and are planned up to about 53 feet high (near Lot 79). Maximum planned depths of cut and fill are approximately 70 and 47 feet, respectively.

The current plan indicates that walls of unspecified design, up to about 30 feet high (near Lot 101), are to be used to create level space. Design and construction of the walls must be in conformance with the recommendations of the wall manufacturers, the geotechnical engineer, and the governing codes.

## 3.0 PREVIOUS GEOTECHNICAL INVESTIGATIONS

A PSE 1988 field investigation included geologic reconnaissance mapping and logging of 58 backhoe trenches and four (4) bucket-auger borings by representatives of this firm. Also, nine (9) shallow refraction seismic lines, useful for estimating rock rippability, were completed by Mr. E.R. Browne, a California-registered geophysicist. A more recent (March 1998) investigation included logging by PSE of 48 backhoe trenches and completion of 16 additional seismic lines by Mr. Browne. The Log of Trenches are contained in Appendix II of this report as Table I, the Log of Borings as Plates A-4 through A-7; and the seismic line profiles as Plates S-5 through S-30 in Appendix IV. Table II presents results of laboratory tests. It should be noted that, because the 1988 investigation of the subject parcel was concurrent with an adjoining project, the Log of 1988 Trenches begins with trench number T-22, the Log of Borings with B-4, and seismic lines at S-5. The locations of trenches and borings, along with other geological data gathered during previous investigations are plotted on Plates I and II.

## 4.0 CURRENT FIELD AND LABORATORY INVESTIGATION

### 4.1 Subsurface Exploration

The subsurface exploration program completed as part of this investigation was directed towards further evaluating the onsite geologic conditions along with evaluating the engineering characteristics of the site soils and bedrock materials. Data

from subsurface excavations were used in the analysis of the design presented on the accompanying Plates I and II.

A truck-mounted bucket auger drill rig was used to advance 12 exploratory boring excavations. In addition, 15 test pits were excavated with a track-mounted backhoe. The excavations were logged by a member of this firm's engineering/geology staff. The approximate locations of the exploratory excavations are shown on the accompanying Plates I and II and the logs of borings and trenches are presented in Appendix III of this report, as is a more detailed description of the subsurface exploration program.

Eight (8) shallow refraction seismic lines were surveyed in areas of deeper cuts that were not previously explored. Advanced Geoscience, Inc. performed the work. Their seismic profiles and the impacts of their work are contained in Appendix IV of this report.

Environmentally sensitive areas, particularly near Lots 15, 16, 33, 34, 42, 43, 44, and near the proposed wall along the east side of Kanan Road (Medea Creek), inhibited the recent exploration. Exploration in those areas must await the proper permits and precede the grading plan review stage of the project. Further, it is this firm's understanding that the need for widening Kanan Road and hence the wall east of Kanan Road, have not been finalized. Owing to the sensitivity of the area, exploration for alluvial/fill depths and quality should await both encroachment permitting and final design.

## 4.2 Laboratory Testing

As part of the boring and trench program, bulk samples were obtained at significant lithologic changes. Relatively "undisturbed" ring samples were obtained from borings at predetermined 5 foot intervals, as well as at significant lithologic changes. Laboratory testing procedures and test results are presented in Appendix III of this report.

## 5.0 GEOLOGIC CONDITIONS

### 5.1 Regional Setting

The project is located on the north flank of the Santa Monica Mountains, a major east-west trending structural block within southern California. These mountains, in a very general sense, are an uplifted westerly trending anticline composed mainly of Tertiary sedimentary and volcanic rocks on a core of Mesozoic crystalline basement rock. The local geology is consistent with the regional geology in that the site is underlain by a sequence of northerly dipping Miocene volcanic rocks (Conejo Volcanics). The bedrock is mantled with Quaternary/Holocene terrace deposits, valley fill, alluvium, colluvium, artificial fill and, locally, talus.

### 5.2 Stratigraphy

In approximate order of deposition, from oldest to youngest, the following bedrock and surficial units have been mapped on or near the site.

#### 5.2.1 Conejo Volcanics (Map Units: Tcb, Tca)

Several different types of volcanic rock assigned to this middle Miocene-aged formation have been identified on the site. Based on recent field observations by this firm and others (Reference 15), the sequence is virtually all extrusive and composed mainly of basalt/andesite flows (Tcb), flow breccia, and agglomerate (Tca).

Where observed in outcrops, artificial cuts, and exploratory excavations, the rock is generally well-indurated and hard below a weathered "corona" of several to tens of feet thick. Locally, very hard outcrops are present at the surface as isolated knobs and as discrete beds a few to a few tens of feet thick. Andesite flows mainly account for the most resistant beds. The visually striking terrain owes its existence to the resistant volcanic bedrock.

Bedding features within the Conejo Volcanics are principally flow boundaries. These vary from well-developed and planar for short distances to poorly developed and undulatory. In most exploratory excavations, bedding was not

readily apparent because of either the massiveness of the rock or because the excavating equipment could not penetrate to sufficient depths to identify planar bedding structures.

### 5.2.2 Valley Fill (Qvf)

This unit is composed of unconsolidated to consolidated brown to reddish brown clayey sands and silts with some gravel, cobbles, and occasional boulders. These deposits occur above the modern valley floor in the central and south areas of the study site and are interpreted to be remnants of a rather extensive alluvial fill deposited during the Pleistocene. They are characterized by broad, relatively flat, dissected "caps" on several of the lower ridges.

It should be noted that these deposits, where observed, contained far fewer boulders than other surficial deposits; suggesting a low energy depositional environment unable to transport large boulders, such as a low-gradient valley.

### 5.2.3 Terrace Deposits (Qt)

Near Lots 77 and 84, thin, very hard, veneers of cobbly material mantle the bedrock. They are surmised as being either remnant upstream deposits coeval with the valley fill, relict paleosols, or combinations thereof. Other such deposits may exist on the site, but probably will not significantly impact future development.

### 5.2.4 Alluvium (Qal)

Later Quaternary and Holocene stream-deposited sediments commonly occur in valleys and swales. Based upon observation of numerous exploratory trenches excavated into these materials, they are composed mainly of poorly consolidated mixtures of sand, silt, clay, and abundant large boulders. Where encountered over the project, alluvium averages about 7 to 10 feet deep, but may be locally deeper; particularly at Medea Creek.

### 5.2.5 Colluvium (Qcol)

Bouldery, loose, soil-like materials that have crept or been washed short distances downslope occupy most draws and slope flanks. Such deposits vary from 4 to 15 feet deep, where observed. Because of the small scale map inherent to the present level of study, only the surmised larger deposits are shown on Plates I and II. Undoubtedly, others exist.

### 5.2.6 Artificial Fill (af)

Several significant deposits of artificial fill exist on or near site. The largest accumulation is in the west central part of the site near borings B-5 through B-7 and B-101 through B-103 and B-111. Boring B-6, placed in 1988, encountered about 25 feet of canyon fill. The canyon fill, however, has been an active disposal and borrow area, thus the depth of fill has increased and decreased through time. Borings B-101 through B-103 and B-112 indicate recent depths of fill on the order of 30+ feet. Field observations, measured densities, and consolidation tests of undisturbed samples all indicate this fill is not compacted, nor placed on suitable bearing material. It is of poor quality and undoubtedly contains large rocks.

Similar fill deposits occupy the surfaces of two partly graded knobs on the east side of Kanan Road, about opposite the aforementioned fill; although apparently neither as extensive nor as deep, they are also of poor quality. Based on the backhoes trenches, and recent borings, B-112, for example, this fill is on the order of 15 feet deep.

Fill to several (8±) feet thick exists in the northwest part of the site near Lots 1 through 4. This fill is the result of the grading of several pads. It is uncompacted and rests on porous colluvium/soil.

Road fill embankments placed across canyons and draws during grading for Kanan and Cornell Roads are present at several places adjacent to the subject property. These fills vary up to about 40 feet thick.

### 5.2.7 Landslides/Mass Wasting

No significant landslides were mapped on the site. Previous work (Reference 15) suggested possible, but unlikely, on-or near-site landslides near trenches T-23 and T-24 and near the east-draining canyon in the southeast corner of proposed development. Backhoe trenches (for example, trenches T-23 and T-24), as well as the presence of undisplaced marker beds across the areas of concern, revealed such features to be the result of differential weathering. Occasional small slumps exist locally.

In general, the strength of the Conejo Volcanic bedrock, combined with the relative steep dips of bedding within the rock and generally shallow soil cover, provide for relatively stable slopes that are not particularly susceptible to landsliding. Landslides are thus uncommon locally.

Talus and loose boulders occur on some on-site or superjacent natural slopes, particularly easterly superjacent to Cornell Road.

## 5.3 Geologic Structure

On and near the site, the geologic structure is relatively simple, essentially consisting of a steeply north-dipping homocline. Where noted, bedding planes/flow contacts dip consistently northerly at angles of about 40 to 60± degrees, with the preponderance being greater than 45 degrees (1:1). Joints exist within the bedrock. Predominately steeply dipping, the joint spacings vary from close to very wide.

A primary goal of the recent exploration was to obtain orientations of on-site structural elements (bedding, joints). In order to establish regional structural patterns, the "pole" orientations of structural discontinuities--bedding planes and joints--were plotted on an equal-area (Schmidt) stereo net. Density contours, using the Keelsbeck Counting

Net, were then drawn. The result is Figure 1 (following page). Clearly, the bedding planes are well clustered, with an "average" strike of about N80E to east-west and a dip of about 45- to 48-degrees to the north. The most prevalent joint systems strike between about N75W and N75E, and dip about vertical; but as indicated on the stereo net, joint orientations are scattered much more widely than are the bedding planes. The intersections of the bedding planes and the dominant joint sets dip at less than ten degrees in east and west directions (Figure 1). However, owing to the general scattering of joint plane attitudes, it is anticipated that those intersections are not pervasive.

Discontinuous joints that possess a variety of orientations are ubiquitous in the upper ~15 feet of bedrock. Some joints are primary or structural, whereas many of these minor joints are seemingly the product of weathering processes, such as insolation, unloading, alternate wetting and drying (Selby, Reference 14). In both the basalt and agglomerate, most observed joints were rough and undulating (JRC of 20; per Wyllie and Norrish, Reference 7).

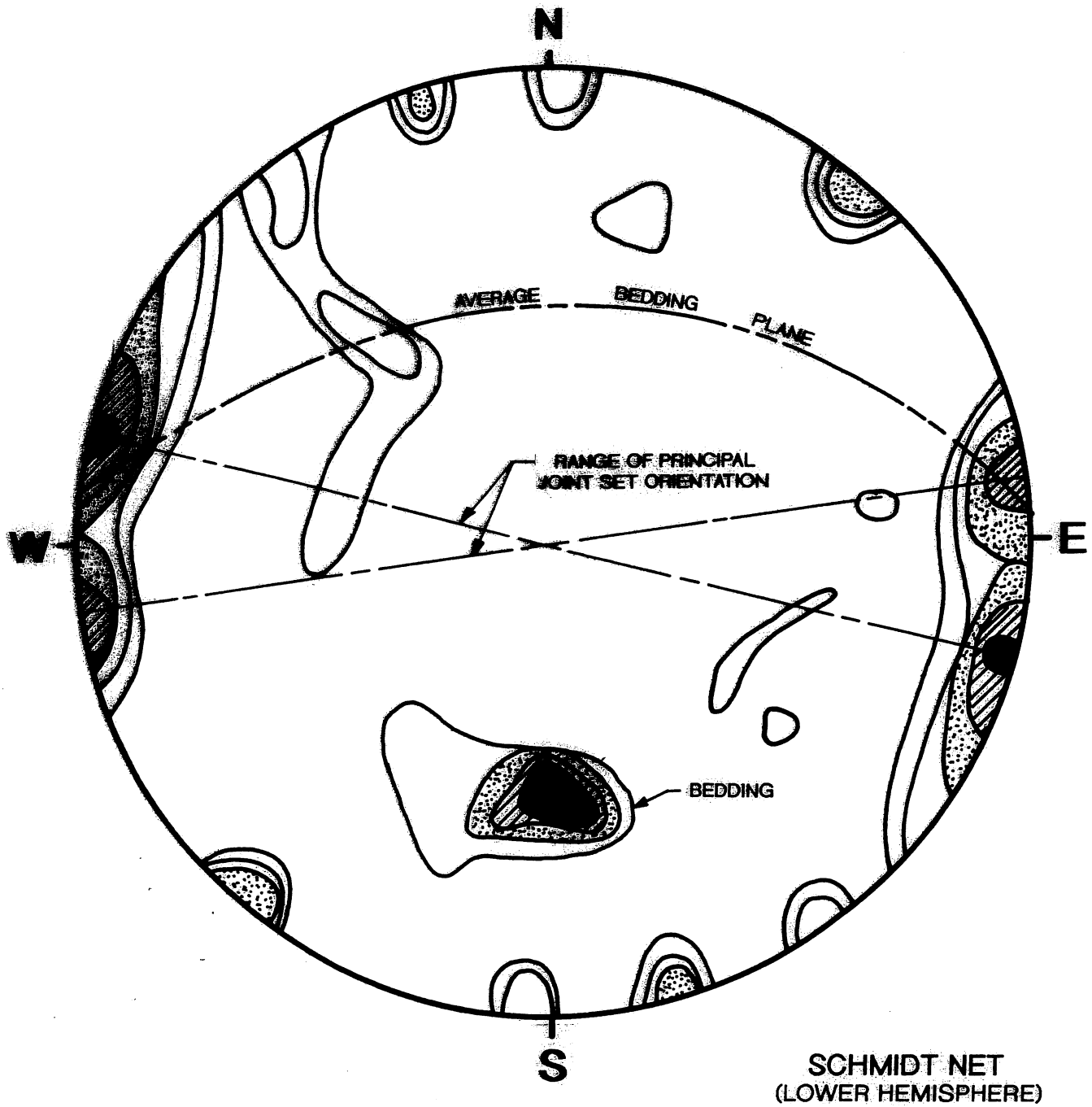
PSE field mapping, subsurface exploration and literature/air photograph review provided no evidence of major on- or near-site faults. Rather, continuous stratigraphy, uninterrupted by structural or stratigraphic breaks or relief exists near the subject site. Only small, possibly penecontemporaneous faults were noted near the proposed 1.5:1 cut slope along Kanan Road, south of the planned residential area. The site, however, is within a seismically active region; a seismotectonic analysis therefore accompanied the PSE 1999 and 1988 reports, but is updated in Appendix V, herein.

## 5.4 Hydrology Summary

Although all on-site tributaries are ephemeral, surface drainage throughout the site (both east and west portions) is into active Medea Creek.

Ground water was encountered at the canyon fill/bedrock contact in borings B-5, B-7, and B-101. Copious ground water does exist in Medea Creek alluvium as encountered in trenches T-121 and T-122. Also, trenches T-47, T-48, T-70, T-112, T-116, T-118,

# DENSITY PLOTS OF POLES OF DISCONTINUITIES SHOWING POINT MAXIMUMS




SCHMIDT NET
(LOWER HEMISPHERE)

| DISCONTINUITY | CONTOUR INTERVALS |
|---|---|
| ——— BEDDING | 15%, 20%, 30%, 40% |
| ——— JOINTS | 4%, 6%, 8%, 10%, 14% |

FIGURE 1

PACIFIC SOILS ENGINEERING, INC.
10653 PROGRESS WAY CYPRESS, CALIFORNIA (714)220-0770
W.O. 101568-MP DATE 5/15/00

T-123, T-302 and T-308 encountered some ground water in tributaries to that creek. In general, however, ground water away from Medea Creek was scarce. Future wet seasons may increase ground water levels. Future exploration to determine the geometry, constraints, and mitigation of ground water in those sediments may be required where development encroaches into Medea Creek bottom.

A possible well, perhaps associated with agriculture, was encountered near trench T-28. Available records, however, did not indicate a well in this area.

## 5.5 Earthquake Hazards

### 5.5.1 Liquefaction

Seismic agitation of loose, saturated sands and silty sands can result in a buildup of pore water pressures. If these pore water pressures are sufficient to overcome overburden stresses, a temporary quick condition known as liquefaction can result. Liquefaction potential of the subject site after grading is considered remote owing to the density of the underlying bedrock, and because loose soils and alluvium, which may be prone to liquefaction, are to be removed and replaced with drained compacted fill materials in structural fill areas. A possible exception is near Lots 45, 46, 54, 55, 56, and 59, where a proposed fill slope will abut existing Kanan Road fill. In order to mitigate possible liquefaction of the road fill and the alluvium that may underlie it, the proposed fill must be keyed into bedrock, and building setbacks should be imposed. Similarly, a wall and a fill is planned adjacent to Kanan Road fill near Lots 32-36. To mitigate the potential effects of liquefaction, both the wall and the proposed fill must be founded in bedrock.

### 5.5.2 Ground Shaking

Throughout southern California, earthquakes and resultant ground shaking are a constant potential hazard. The relative potential for damage is a function of the type and magnitude of earthquake event and the distance of the site from the event. The subject site is in closest proximity to the Malibu Coast fault and

an event on that fault has the greatest potential to cause significant ground shaking at the site. Horizontal accelerations from this and other potential caused faults have been estimated and are presented in the seismicity section of this report (Appendix V).

### 5.5.3 Surface Rupture

Surface rupture is a break in the ground surface during, or as a consequence of, seismic activity. The potential for surface rupture on this site is considered low due to the lack of active faults at the site.

### 5.5.4 California State - Imposed Geological (Seismic Hazards) Zones

The State of California is mandated by both the Alquist-Priolo Earthquake Zone Act and the Urban Seismic Hazard Mapping Act (USHMA) to delineate zones that, owing to known regional geological conditions, require investigation of certain seismic hazards; specifically, tectonic ground rupture along known active faults (A-P Act), or for secondary potential hazards that include liquefaction potential and slope stability during strong regional earthquakes.

The study site is not within an A-P Zone, but parts of the site are within potential liquefaction and potential seismically-induced landslide study areas (USHMA) within the Calabasas U.S.G.S. 7½-minute quadrangle. As such, the State mandates that the local building official (in this case, the County of Los Angeles) require studies/investigations of the potential, or lack thereof, for the occurrence of the aforementioned secondary seismic hazards, together with the appropriate analyses of their impact and mitigation methodology. Part of the function of this report is to satisfy USHMA requirements.

It has been the policy of the County to require such studies that are consistent with that of the State. As technical review of the subject project continues, studies focused on the details of such phenomena, their impact on the project, and viable remediation will be required and must be approved by the County. General geotechnical constraints are discussed elsewhere in this document.

# 6.0 ENGINEERING CHARACTERISTICS

## 6.1 Material Properties

### 6.1.1 Excavation Characteristics

As discussed in detail in Appendix IV of this report, the Conejo Volcanics bedrock becomes hard below relatively shallow weathered zones that range from a few to a few tens of feet deep. Thus, at least some to possibly frequent blasting or specialized excavation techniques (for example, jackhammering) may be necessary in deeper cuts and locally near the surface to dislodge rock. Also, blasting, jackhammering or overexcavation of bedrock may be required to facilitate the placement of underground utilities or foundations. Generation of oversized materials (greater than eight inches in diameter) from these zones should be anticipated. Oversize materials should be handled as recommended in section 7.10.5 of this report.

### 6.1.2 Earthwork Adjustments

The following average earthwork adjustment factors may be used in the preparation of grading plans in an effort to balance earthquake quantities:

| Geologic Unit | Map Symbol | Adjustment Factor |
|---|---|---|
| Conejo Volcanics | Tc(b or a) | Bulk 10-20% |
| Uncertified Fill | af | Shrink 10-15% |
| Alluvium/Colluvium | Qal/Qcol | Shrink 10-15% |
| Valley Fill | Qvf | 3% Bulk to 5% Shrink |

The above factors are estimates based upon the available information and this firm's experience with similar projects. The values may be used in an effort to balance the earthwork requirements. As is the case with every project, contingencies should be made to adjust the earthwork balance when grading is in progress and actual needs are better defined.

### 6.1.3 Compressibility

Soil, existing fill, weathered bedrock, alluvial/colluvial materials and the upper portions of the Valley Fill are compressible in their existing state and will

require removal from areas planned to receive fill and where exposed at grade in cut areas. Estimated depths of unsuitable materials are indicated on Plates I and II. These materials, once properly moisture conditioned, will be suitable for use as compacted fill.

### 6.1.4 Expansion Potential

The onsite materials, when tested in accordance with U.B.C. Standard 18-2 and classified in accordance with Table 18-I-B, are considered to possess potential expansion in the "very low" to "high" ranges. Specific testing for expansion potential should be performed on the as-graded near- surface materials at the completion of grading.

### 6.1.5 Chemical Analyses

Preliminary chemical testing of the onsite soil samples indicate that these materials contain "negligible" amounts of soluble sulfates when classified in accordance with U.B.C. Table 19-A-3. Specific testing for soluble sulfate content on the as-graded, near-surface materials should be performed at the completion of grading for use in determining the concrete mix of improvements as required by U.B.C. Section 1904.

Testing also indicated these materials are "moderately" to "severely" corrosive toward onsite ferrous improvements. Special design/construction consideration need to be incorporated into the project where buried metal improvements are proposed. Consideration should be given to consulting a corrosion engineer for a more detailed evaluation.

Additional chemical testing should be performed during and at the completion of grading to assess the as-graded conditions.

## 7.0 GEOTECHNICAL CONCLUSIONS AND RECOMMENDATIONS

The subject property is considered feasible, from a geotechnical standpoint, for the proposed development, provided that the conclusions and recommendations presented herein are

incorporated into the design and construction of the project. Presented below are specific issues identified by this study or previous studies as possibly impacting site development. Recommendations to mitigate these issues are presented in the text of this report, with graphic presentation of the recommendations on the enclosed plans and cross sections, where appropriate.

## 7.1 Site Preparation and Removals

All grading shall be accomplished under the observation and testing of the project soil engineer and engineering geologist or their authorized representative in accordance with the **recommendations** contained herein, the current **Grading Ordinance** of Los Angeles County, and this firm's **"Earthwork Specifications"** (Appendix VI, herein). All unsuitable materials shall be removed from areas planned to receive fill or where exposed at final grade. The resulting voids should be replaced to design grade with engineered fill. The exact extent of removals can best be determined in the field during grading when observation and evaluation can be performed by the soils engineer and/or engineering geologist. Removals should expose competent, unweathered bedrock or dense valley fill and be observed and mapped by the engineering geologist prior to fill placement. Approximate depths of unsuitable material are indicated on the accompanying Geotechnical Maps and are depicted on the geologic/geotechnical cross sections (Plate III).

### 7.1.1 Stripping and Deleterious Material Removal

Existing vegetation, trash, debris, and any other deleterious materials should be removed and wasted from the site prior to commencing removal of unsuitable soils and placement of compacted fill materials.

### 7.1.2 Alluvium/Colluvium

All alluvial/colluvial soils in proposed structural fill areas and/or where exposed in cuts should be removed to competent bedrock. Anticipated depths of alluvial removals are indicated on the accompanying Plates I and II and range from a few to about 10 to 15 feet.

### 7.1.3 Fill

Existing onsite fill will require complete removal and recompaction in areas that are planned for development. Depths of fill will vary from a few feet along unimproved roads to depths on the order of 25 to greater than 35 feet in the area of the existing canyon fill west of Kanan Road near Lots 11 through 43. It should be noted that part of this fill area will be removed as planned cut. Also, planned cut will remove uncompacted fill on the two mesas east of Kanan Road near Lots 63 through 69, and a proposed retention structure at Boring B-105. The fill remaining below grade must also be removed.

It will be necessary to remove some road fill adjacent to and below existing Kanan Road in order to reduce structural setbacks or deepened footings on those lots adjacent to the road (Cross-Section L-L'). At the grading plan review stage, when a more detailed and "finalized" grading geometry is known, recommendations regarding the protection of Kanan Road will be forthcoming.

### 7.1.4 Valley Fill

The recent exploration indicates that about the upper 10± feet of the Valley Fill is compressible. These upper Valley Fill deposits must be removed where they would underlie engineered structures, and where they are not removed by planned cut. The exact depths of removals should be determined by field observation during grading.

### 7.1.5 Conejo Volcanics

The Conejo Volcanics are mantled by soil and exhibit a weathered profile. The soil ranges from 0 to 3 feet in depth and the weathered profile is approximately 0 to 3 feet thick. In areas where fill placement and/or shallow cut grading is necessary to achieve design grade, the soil and weathered rock should be removed to competent bedrock.

### 7.1.6 Pipelines, Oil and/or Water Wells, Cesspools and Septic Tanks

Pipelines, if encountered, should be removed or be cut and plugged according to the applicable Code requirements as property line conditions dictate. Oil and/or water wells encountered within the developed areas should be abandoned in accordance with local and State of California Code requirements. Cesspools and septic tanks, if encountered, should be removed and replaced with compacted fill.

## 7.2 Slope Stability and Remediation

### 7.2.1 Shear Strength Parameters

The proposed cut slopes are planned for slope ratios no steeper than 1.5 to 1 (horizontal to vertical) and planned fill slopes are no steeper than 2:1 with appropriate drainage devices. Calculations for the slope stability analyses performed for this study used the shear strength parameters tabulated below.

**Shear Strength Parameters**

| Material | Cohesion C (psf) | Angle $\phi$ (degrees) | Plate* | Unit Weight (pcf) |
|---|---|---|---|---|
| Bedrock<br>Weathered Rock | 300 | 43 | * | 130 |
| Compacted Fill (caf) | 400 | 28 | B-1 | 120 |
| Valley Fill (Qvf) | 400 | 30 | B-2 | 125 |

* Values obtained from the Reference 4 report. The parameters are considered residual values.

### 7.2.2 Cut Slopes

The highest designed cut slope for the project is a 135-foot high, 1.5:1 east facing slope along Kanan Road with favorable geologic structure. The results of stability analyses of this slope (Cross-Section G-G') are presented on Plates E-17 through E-24 of Appendix III. These calculations yield factors of safety in excess of County minimums.

Interior cut slopes may expose very fractured or weathered rock or poorly consolidated surficial materials. Slopes that expose these materials will require remediation in the form of stabilization fills a with minimum 15 foot wide keyway per the Grading Details contained in Appendix VI. Backdrains will be required as shown on Plate G-3 (Appendix VI) for slopes over 10 feet in height.

Based on the existing conditions, it is anticipated that the cut slopes proposed for the retention basin near Boring B-105 will expose unsuitable materials that will require stabilization.

Finally, close geologic observations should be provided during grading for all cut slopes, backcuts and keyways. If exposed conditions differ significantly from those anticipated, the slope should be reevaluated and further remedial recommendations provided, as necessary.

### 7.2.3 Fill Slopes

Fill slopes, when properly constructed at a slope ratio of 2:1 (horizontal to vertical) are considered to be grossly stable. The highest designed 2:1 fill slope is roughly 50 feet high (Cross-Section D-D'). Gross stability calculations, which are presented on Plates E-9 through E-16 of Appendix III, indicate factors of safety in excess of the County of Los Angeles minimums.

Toe removals will be required for fill slopes proposed in alluviated canyons or flats. These slopes include those near Lots 1-3, 22, 36-37, 41, 71-80, 96-107, and along the east side of Kanan Road. Typical removal details at the toe of fill slopes are presented on Plates G-5 and G-6 (Appendix VI).

### 7.2.4 Skin Cut Slopes

Skin cuts that will expose soils and/or weathered bedrock, may require stabilization as shown on Plate G-7 (Appendix VI). These slopes should be monitored in the field during grading and evaluated as to the need for localized stabilization.

### 7.2.5 Skin Fill Slopes

In constructing fill slopes where thin fill wedges are created by the grading plan or field grading operations, overexcavation and replacement will be required. Minimally, a fill thickness equivalent to at least one-half the remaining fill slope height shall be constructed as detailed in Plate G-8 (Appendix VI). Skin fill conditions and the need for backdrains will be evaluated in the field during grading.

### 7.2.6 Natural Slopes

Much of the southwest margin of the development from about Lot 37 on the south to Lot 15 on the north, as well as the north side of Street "H" east of Cornell Road, will be adjacent to ascending natural slopes. Cross-Section B-B' represents the highest natural slope east of Cornell Road and Cross-Section J-J' depicts the slope near Lot 23, west of Kanan Road. These natural slopes are considered grossly stable as indicated by analyses presented on Plates E-1 through E-8 and E-23 through E-32 of Appendix III.

### 7.2.7 Surficial Stability

Fill slopes to maximum gradients of 2:1 are proposed. All but two cut slopes will have ratios of 2:1; the exceptions being the planned 1½:1 west-facing cut slope behind Lots 81, 82, 85, 86, and 87, and the 1½:1 east-facing cut slope proposed along Kanan Road. Surficial stability calculations presented in Appendix III (Plate D) yielded factors of safety in excess of the minimum standard of 1.5. It is imperative, however, that proper planting, irrigation, and maintenance be continually performed on completed graded slopes in an effort to maintain surficial stability.

## 7.3 Debris Flow Potential

### 7.3.1 General

In order to assess the feasibility of the proposed development relative to the possible effects of debris flow, PSE has recently carried out field mapping of

the natural slope superjacent to the proposed development. Presented in this section is a discussion of the site conditions as well as comments concerning possible mitigation of debris flows.

### 7.3.2 Surficial Geological Setting

#### 7.3.2.1 Geomorphology

The principal natural slopes in question, rise to as much as about 300 feet above proposed Lots 16 to 40. Slope ratios vary from about 1½:1 to 3:1 with local steeper and gentler elements. In general, the higher slopes are "broken" by a series of east to northeast-draining ravines/ canyons that have been carved out along bedding. These, in turn, allow for the capture and concentration of the major part of any debris generated from the major slopes, except below relatively narrow interfluves. The fluves that are anticipated to capture and debouch the most debris are superjacent to Lots 15, the proposed debris basin west of Lot 17, Lot 22, Lot 37, and Lot 39 west of Kanan Road. These are for the most part second and perhaps third order drainages capable of intercepting and collecting debris evacuated from the higher natural slopes. Debris production as well as runoff are seemingly hydrological issues, in that unusual geological conditions such as thick colluvium, and plentiful landslides are not a consideration.

Of principal geotechnical concern then are the interfluves and north-facing slopes separating the aforementioned canyons/ravines. The hollows and central ravine in these natural slope drainage areas are almost entirely first-order or merely "gentle" swales as named by Hollingsworth and Kovacs (Reference 8). The swales are usually not well defined, are barely "first-order", and are thus less effective "concentrators" of runoff. As noted by Hollingsworth and Kovacs (Reference 8) and Reneau and Dietrich (Reference 9), for example, concentrated runoff in higher order re-entrants tends to increase

debris flow potential over that of planar slopes. Presumably, concentration of colluvium and slope wash in the swales also increases debris flow susceptibility, thus the areas where rain water accumulation might exceed that of planar slopes are marked as colluviated draws on Plates I and II.

#### 7.3.2.2 Surficial Materials

On the basis of previous work (PSE, References 1 through 3) and the current investigation, the estimated limits of colluvium composed of native soil and rock debris are plotted on Plates I and II. PSE surmises that these deposits occupy mainly low-order swales at the foot and toe of the subject natural slopes. Subsurface investigations at the foot-slopes identified generally thin colluvial deposits, on the order of, say, one-half to less than five feet thick (PSE, References 1 through 3; and this report). Rarely were those depths exceeded; and the preponderance of deposits on the interfluves investigated were less than two feet thick.

During recent mapping of the natural slope, PSE found that colluvial deposits are seemingly thin to absent in the upper reaches of the hollows and slopes. Bedrock is clearly exposed in the walls of some swales and at the heads of others. Several areas of bedrock outcrops are shown on Plates I and II.

Most of the upper reaches of the subject natural slopes have seemingly been stripped of thick soils and colluvium, and are thus devoid of large deposits subject to soil slip and/or debris flow. Perhaps such factors as aridity, slope steepness, resistance to weathering, and vegetation (or lack thereof) have contributed to the sparse "colluviation" of the site. The first two items may account for slow

soil formation and the latter two would tend to inhibit build up of surficial deposits (Campbell, Reference 10).

The bedrock in general and the agglomerate in particular produce plentiful boulders on anti-dip slopes. General areas of boulders are shown on Plates I and II. These could be a more significant constraint, particularly during an earthquake, than debris flow potential. PSE sets forth possible mitigative measures elsewhere in this transmittal (Section 7.3.5).

### 7.3.3 Aerial Photograph Review

Seven sets of stereo-pair aerial photographs archived at Whittier College, dating from 1928, were reviewed to gain a historical perspective of site debris flow susceptibility. The 1928, 1949, 1944, and 1945 photographs were taken during or shortly after years of relatively heavy rains, yet, the subject natural slope area, underlain by volcanic bedrock, showed little or no evidence of surficial instability, whereas other regional and local slopes underlain by sedimentary rocks displayed numerous characteristic scars and debris trains associated with shallow debris flows and soil slips.

### 7.3.4 Discussion

Precise estimates of the amount of debris generated during a major storm event are subjective. Debris production numbers depend upon obviously complicated, not totally understood or quantified, factors such as soil types, rainfall (particularly rainfall intensity), burns, slope gradients, vegetation, and drainage patterns; and channel slope, sinuosity and roughness. Much work has been accomplished on prediction of regional debris flow production susceptibility (see References), however, little is published on methods of prediction of quantities for localized areas. Although many authors (e.g., Campbell, Reference 10; Hollingsworth and Kovacs, Reference 8; Reneau and Dietrich, Reference 9) suggest methods for determining local areas most prone to debris flows, they offer little in quantity prediction methodology. Therefore, this

discussion is mostly qualitative, and is based on site reconnaissance, aerial photograph interpretation, estimates of on-site soil accumulations, and available literature.

Campbell (Reference 10), as a result of his study of debris flows in the Santa Monica Mountains, indicated that soil slips are most likely on natural slopes with ratios of about 3:1 or greater, and that deposition tended to occur on slopes of 5:1 or flatter. He further judged that acceleration of failures was uncommon on slopes flatter than 2:1. Hungr and others (Reference 11) further state that deposition is generally initiated on slopes of 5:1 and sometimes on slopes as steep as 2½:1 or 3:1.

According to some investigators, for example, Reneau and Dietrich (Reference 9), and Hollingsworth and Kovacs (Reference 8), debris flows tend to usually occur in draws (hollows, swales), rather than on relatively planar slopes, because of the concentrated accumulations of surficial materials and concentration (or channeling) of runoff during significant storms. Also, Turner (Reference 12) suggests that hollows act as conduits for debris flows that result from initial soil slips. The hollows presumably increase coherence and impetus of flow, whereas slips on planar slopes tend to decelerate because they lack the impetus imparted by channelization. Accordingly, Turner recommended that hollows be given priority when identifying debris flow susceptibility.

Among the methods of debris flow mitigation most suitable for the study site is the possible use of J-walls, catchment fills and/or impact walls. Separate impact walls, fences or catchment devices could be placed upslope of pads, or incorporated into proposed peripheral walls. Hollingsworth and Kovacs (Reference 8) illustrate examples. Alternatively, walls and catchment areas could be incorporated into the margin wall. The catchment areas should be designed to allow periodic clean out and maintenance.

Workers such as Baldwin and others (Reference 17) and Hollingsworth and Kovacs (12) indicate that impact walls should be designed to withstand equivalent fluid pressures of at least 150 pounds per cubic foot. The actual heights of the walls will vary according to the freeboard needed to retain volumes anticipated by the site hydrologist. Rather than short high walls that span only the evacuation widths of the hollows, lower walls that span the interfluves may be considered. Also, the latter would allow some necessary freeboard for catchment of debris generated along the planar elements of the natural slope.

Paved drainage will be required behind impact walls, if used, to reduce the possibility of erosion and to allow for positive drainage along the wall. It is imperative that the catchment areas as well as drainage devices be cleaned as necessary and kept in good working condition. At least pedestrian access for cleaning should be part of the design.

In sum, although some debris production, particularly after burns, may be anticipated, remedial methods are available to adequately and feasibly reduce hazards below the subject natural slope. Final design modifications should be implemented during grading plan review.

### 7.3.5 Boulder Roll

Plates I and II schematically shows areas of boulders strewn on the subject natural slope; some are natural "lag" boulders, others are spoil from tank site grading on the slope. The potential for boulder roll, particularly during regional earthquakes or heavy storms, does exist on the natural slopes. Although impact walls or J-walls designed for debris flow would offer some protection to the proposed subjacent developed area, they may not adequately protect the project; and the potential for wall damage exists. Accordingly, this firm recommends that catchment fences founded in bedrock should be placed strategically on the natural slope. Wyllie and Norrish (Reference 7) indicate

fences are better than walls for boulder roll, for they "give" at impact, and thus absorb energy. It should be noted that, according to County policies, the catchment fences are not intended to mitigate debris flow in channels or swales, but solely for boulder roll protection.

Preliminarily, as shown on Plates I and II, the slopes of concern are those above Lots 16-34, 80-87, and the easterly extension of Street "H". The final design and placement should take place during and after grading when structural locations are set. The geotechnical consultant should work with both the design engineer and the contractor to devise the most economic and effective design and placement.

### 7.4 Overexcavation of Building Pads

Where design grades and/or remedial grading activities create a cut/fill transition situation within bedrock materials, the cut and shallow fill portions of the building pads shall be overexcavated a minimum depth of 5 feet and replaced to designed grade with compacted fill. In order to facilitate footing/utility trenching, overexcavation of bedrock cut lots to a minimum depth of 5 feet should be considered.

Because of the impermeability of the volcanic bedrock, the soil engineer/engineering geologist should be consulted with regard to exposed conditions after undercutting in order to evaluate the need for and disposition of subsurface drainage requirements, which could include sloping of the overexcavation bottoms and/or installation of subdrains.

In order to reduce the differential settlement potential on lots with steep cut/fill transitions or highly variable fill thickness, the cut or shallow fill portion of steep transition lots shall be overexcavated to a depth equal to 1/3 of the deepest fill section within the lot to a maximum thickness of 15 feet. The transition between the deep fill and cut (cap) portion of the lot shall not exceed a 2:1 slope gradient.

## 7.5 Building Pads Above Buttress Fills/Stabilization Fills/Shear Keys

Building pads above all buttress fills, stabilization fills, or shear keys should be overexcavated a minimum of five feet and capped with a compacted, blanket fill to reduce moisture infiltration.

## 7.6 Subsurface Drainage

### 7.6.1 Canyon Subdrains

Canyon subdrains will be required on this project. Proposed subdrain locations are shown on the accompanying plans. Final determination of drain locations will be made in the field based on exposed conditions. In order to daylight canyon subdrains, it may be necessary to "run" the lower portion of the sub-drain through compacted fill. Non-perforated pipe should be used in compacted fill and a concrete head wall constructed at the perf/non-perf transition as per Plate G-14 (Appendix VI). All drains should be constructed in accordance with Plate G-1, G-2, and G-15 (Appendix VI). The compacted fill underlying the non-perforated pipe in these situations should be compacted to a minimum of 93 percent of the applicable laboratory maximum dry density to minimize the adverse affects of saturation (reduction of strength and increased potential for consoldiation).

Owing to the depth of removals associated with the existing fill near borings B-5 through B-7 and B-101 through B-103, in particular will require placement of fill compacted to 93 percent, and peripheral interceptor drains should be installed to capture downward migrating water along the bedrock-fill contact.

### 7.6.2 Backdrains

Backdrains will be required behind all retaining walls, buttresses, stabilization fills, and skin fill slopes in excess of 10 feet in height. Backdrains should be constructed in accordance with Plate G-3 (Appendix VI).

## 7.7 Retaining/Crib Walls

Walls of unspecified design are planned to heights of up to about 30 feet. Because of the uncertainty of wall type, the following is presented for preliminary design purposes. The geotechnical consultants and the design engineer should confer as the project progresses to provide suitable wall specifications.

Retaining walls and other structures or facilities constructed to retain level, drained, non-expansive, structural quality backfill may be designed to resist lateral pressures developed by an equivalent fluid weight for soil of 36 lbs/cu.ft. (55 lbs/cu.ft. for 2:1 slopes) plus allowances for surcharges. Such backfill material must have an Expansion Index value of less than 20 and a Sand Equivalent value of 30 or greater and be placed within a zone extending to a distance behind the wall of one-half the wall height. Wall design should include water-proofing (where appropriate), weep holes and subdrains or backdrains for relieving possible hydrostatic pressures. Retaining wall backfill should be compacted to a minimum of 90 percent of the applicable laboratory maximum dry density. A typical retaining wall backfill detail is shown on Plate G-13 of Appendix VI.

Foundations for retaining walls founded on approved, compacted fill or bedrock may be designed based upon the following:

| | |
|---|---|
| Allowable Bearing | 2000 lb/sq.ft. |
| Lateral Bearing (level conditions at toe)* | 250 psf/ft. of depth to a maximum of 2000 psf |
| Sliding Coefficient | 0.30 |

*Note: Walls with descending slope from toe should be specifically evaluated by the soils engineer.

Some retaining walls are proposed adjacent offsite improvements. The removal of unsuitable soils for the proposed retaining walls in the vicinity of the offsite improvements may be inhibited, and as a result, these retaining walls may require deepened caisson and grade beam type foundations. Other proprietary retention systems (i.e., Keystone, Hilfiker, etc.) could also be adopted to specific sitings.

Northerly facing wall backcuts in bedrock steeper than 1:1 will likely expose unsupported bedding planes that would induce a surcharge to the walls, thus backcuts must be gentler than 1:1 or the walls must be designed to resist the surcharge.

## 7.8 Construction Staking and Survey

All fill keys including those excavated as part of buttress fill and stabilization fill construction shall be surveyed by the Civil Engineer prior to observation and approval by the soils engineer. Backdrain systems and subdrains should be survey located to verify location and gradients.

## 7.9 Settlement Monitoring

Areas of special fill considerations (fill thicknesses in excess of 40 vertical feet--after removal of unsuitable materials) are present beneath Lots 45 and 46, and possibly in the area underlain by valley fill near the existing Fire Station (Plates I and II). In light of the potential magnitude of post-grading settlements in these areas, a settlement monitoring program should be initiated for these lots after rough grades have been achieved and prior to construction. These settlements are typically complete within two to six months after rough grade accomplishment depending upon the thickness of fill, moisture content of the fill, and grain-size characteristics of the earth materials. Surface instrumentation in the form of a concrete monument (Plate G-12) should be placed upon completion of fill operations. These surface settlement monuments should be installed and periodically read (measured) by the project civil engineers (surveyors). For the critical path areas, consideration can be given to installation of settlement plate/extension rod systems as detailed on Plate G-12A. Data should be forwarded to the project geotechnical engineer for review. When the rate and magnitude of settlement has reached acceptable limits for the improvement, formal releases for construction will be provided. It is likely that infrastructure construction and other less settlement-sensitive improvements can be released for early construction in advance of formal release of residential pads. The developer and contractor should consult with the geotechnical engineer in order to formulate the most cost-effective and timely construction schedules.

## 7.10 Earthwork Considerations

### 7.10.1 Compaction Standards

All fill and processed natural ground should be compacted to a minimum relative compaction of 90 percent, as determined by ASTM Test Method: D-1557-91. Fills placed below 40 feet from finish grade are considered "deep fills". Such "deep fills" should be compacted to 93 percent of the applicable laboratory maximum dry density as determined by ASTM Test Method:D-1557-91. The approximate limits of special fill considerations (deep fill areas) have been identified on the accompanying Geotechnical Maps. Fill placed below subdrain elevations shall also be compacted to a minimum of 93 percent of the laboratory maximum dry density as determined by ASTM Test Method:D-1557-91. Compaction shall be achieved as generally discussed in the attached **"Earthwork Specifications"**. Compaction shall be achieved with the use of sheepsfoot rollers or similar kneading type equipment. When necessary, earthmoving equipment may be used for compaction or temporarily shut down in order to permit proper compaction of fills. Mixing and moisture conditioning will be required in order to achieve the required moisture and density conditions. The contractor should have suitable and sufficient compaction equipment and water trucks in operation to handle the amount of fill being placed.

### 7.10.2 Observation of Excavations

All removal bottoms, buttress keyways, stabilization fill keyways, and shear key excavations (if required) shall be observed and approved by the engineering geologist and/or soil engineer prior to fill placement. Toe stakes should be provided by the Civil Engineer in order to verify required key dimensions and locations.

### 7.10.3 Treatment of Removal Bottoms

At completion of unsuitable soil removals and excavation of any required keyways, the exposed bottom shall be scarified to a minimum depth of eight

inches, moisture-conditioned to above optimum conditions, and compacted to the standards set forth in this report. This requirement does not apply to graded surfaces exposing dense, Conejo Volcanics.

### 7.10.4 Fill Placement

After removals, scarification, and compaction of exposed materials are completed, additional fill may be placed. Fills shall be placed in thin lifts (8-inch bulk), properly moisture conditioned, and compacted as grading progresses until final grades are attained.

### 7.10.5 Rock Disposal

During the course of excavation, oversized (greater than 8 inches) material may be generated. The amount of oversized material will be partly a function of the excavation techniques employed by the contractor. The grading contractor should consider the amount of available rock disposal volume afforded by the design when establishing his excavation techniques and grading logistics. Rock disposal areas should be designed in the lower portions of deeper fill areas (greater than 10 feet deep) and outside the limits of utility excavations. Rock disposal techniques should be discussed and approved by the geotechnical consultant and owner prior to implementation. Oversized material may be incorporated into the compacted fill in accordance with the following general procedures:

- Rock Blanket
  Rock blankets consisting of a mixture of sand, gravel, and rock to a maximum dimension of 3 feet may be constructed. The rocks should be placed on prepared grade, mixed with sand and gravel, watered and worked forward with dozers and additional watering until the resulting fill is comprised of a mixture of the various particle sizes, contains no significant voids, and forms a dense, compact, fill matrix. Upon completion of a rock blanket section, the fill area should be proof-rolled with loaded scrapers and approved by the soils engineer prior to further fill operations.
- Rock Windrows
  Rocks larger than two feet in maximum dimension may be placed in windrows in deeper fill areas in accordance with the details on Plate G-10. The windrows should be cut into the compacted fill core with rocks placed

in single file within the excavation. Sands and gravels should be added and thoroughly flooded and tracked until all voids are filled. Windrows should be separated horizontally by at least 15 feet of compacted fill, be staggered vertically and separated by at least 4 vertical feet of compacted fill. Windrows should not be placed within the upper 13 feet from finish grade or within the zone of the deepest proposed utility or other improvement (whichever is greater), or within 15 feet of the finish slope surface unless specifically approved by the owner, geotechnical consultant, and governing agency.

- Rock Burial
  Large rocks may be buried individually by excavation into previously placed and compacted fill and surrounded with a mixture of sand and gravel.

The above requirements can also be applied to inert construction debris (concrete, brick, etc.) as encountered on the site provided that the materials proposed for incorporation into the compacted fill sections have been observed and approved by the project soils engineer prior to placement. The import of select material may be necessary if sufficient granular soils (sand and gravel) are not generated onsite by the excavation techniques employed. All rock disposal operations should be conducted under the observation of the soils engineer or his representative. Lesser rock free zones than required by Plate G-10 can be considered to within 5 feet of finish grade subject to approval of the developer and the governing agency. If lesser clear zones are adopted, the potential homeowners should be advised so that affected homeowner improvements can be designed and constructed accordingly.

### 7.10.6 Benching

Where the natural or temporary graded slope is steeper than 5-horizontal to 1-vertical and where designated by the project soil engineer or geologist, compacted fill material shall be keyed and benched a minimum of 4 feet (vertical) into competent material.

### 7.10.7 Mixing

In order to prevent layering of different soil types and/or different moisture contents, mixing of materials may be necessary. The mixing should be

accomplished prior to and as part of compaction of each fill lift. Discing may be required when either excessively dry or wet materials are encountered.

### 7.10.8 Fill Slope Construction

Fill slopes shall be overfilled to an extent determined by the contractor, but not less than two feet measured perpendicular to the slope face, so that when trimmed back to the compacted core, the required compaction is achieved.

Compaction of each fill lift should extend out to the temporary slope face. Backrolling during mass filling at intervals not exceeding four feet in height is recommended unless more extensive overfill is undertaken.

As an alternative to overfilling, fill slopes may be built to the finish slope face in accordance with the following recommendations:

- Compaction of each fill lift shall extend to the face of the slopes.
- Backrolling during mass grading shall be undertaken at intervals not exceeding four feet in height. Backrolling at more frequent intervals may be required.
- Care shall be taken to avoid spillage of loose materials down the face of the slopes during grading.
- At completion of mass filling, the slope surface shall be moisture conditioned to slightly above optimum, shaped and compacted first with a sheepsfoot roller, then with a grid roller operated from a side boom Cat, or equivalent, such that compaction to project standards is achieved to the slope face.

Proper seeding and planting of the slopes should follow as soon as practical, to inhibit erosion and deterioration of the slope surfaces. Proper moisture control will enhance the long-term stability of the finished slope surface.

### 7.10.9 Select Grading Material

It may be anticipated that a limited amount of finer-grained material exists or will be generated during the on-site grading operations. As such, consideration should be given to placing the finer-grained material, absent of cobble sized and larger material, in stockpile(s) and then utilizing these materials within the

uppermost fill zones to provide a compacted blanket fill section across the site which would facilitate trenching operations for foundations and subsurface improvements.

### 7.10.10 Import Soils

Import soils, as required, should consist of clean, compactible materials having soils engineering properties similar to those onsite and should be free of trash, debris or other objectionable materials.

PLANS AND SPECIFICATIONS SHOULD INDICATE THAT THE GRADING CONTRACTOR SHALL NOTIFY THE PROJECT SOILS ENGINEER NOT LESS THAN 72 HOURS IN ADVANCE OF THE LOCATION OF ANY SOILS PROPOSED FOR IMPORT. EACH PROPOSED IMPORT SOURCE SHALL BE SAMPLED, TESTED AND APPROVED PRIOR TO DELIVERY OF SOILS FOR USE ON THE SITE.

### 7.10.11 Haul Roads

Haul roads should be selected to avoid disturbing terrain that is to remain in a natural state. Also, haul roads traversing compacted fill areas should be coordinated and planned to avoid or minimize generation of loose spill fill thereon. When this condition is unavoidable, close coordination with the project soils engineer and his representative will be required to eliminate intermingling of engineered and non-engineered fill.

During mass grading, special care should be exercised to avoid spilling and depositing of loose soil or debris onto natural slope areas and into areas programmed to remain in a natural state. Any loose slough, debris or other deleterious materials deposited or accumulated on natural areas will have to be removed by the contractor upon completion of grading.

### 7.10.12 Testing of Compacted Fill

Fill should be tested at the time of placement to ascertain that the required compaction is achieved.

### 7.10.13 Final Reports

The results of the observations and testing of all earthwork should be presented in a final geotechnical report following the completion of earthwork and grading. The report should include a Geologic Map.

## 8.0 DESIGN RECOMMENDATIONS

### 8.1 Structural Design - Residential

It is anticipated that one- and two-story wood frame and stucco residential structures with shallow foundations will be constructed on the lots. Maximum anticipated wall loads are expected to be less than 2 kips per foot.

Upon the completion of rough grading, finish grade samples should be collected and tested so as to provide specific recommendations as they relate to individual lots. These test results and corresponding design recommendations will be presented in a Final Rough Grading Report. Final foundation design recommendations should be made based upon specific structure-sitings, loading conditions, and as-graded soil conditions.

It is anticipated that the majority of onsite soils will possess "low" to "medium" expansion potential when tested in accordance with U.B.C. Standard 18-2 and classified in accordance with U.B.C. Table 18-1-B. On lots where soils possessing "medium" or higher expansion potential occur and/or where the potential for differential movement relating to consolidation exists, strong consideration should be given to the use of post-tensioned slab-on-grade foundation systems. For preliminary budgeting purposes, the following foundation design requirements are based on conventional slab-on-grade foundation construction in soils possessing "low" expansion potential, and post-tensioned slab-on-grade construction in soils possessing "medium" expansion potential.

### 8.1.1 Slab-On-Grade Foundation Recommendations

For preliminary purposes, the design of continuous and spread footings should be based on 2,000 lbs./sq.ft. and 2,500 lbs./sq.ft., respectively, for both dead and live loads.

The minimum width for continuous footings and spread footings should be 12 and 24 inches, respectively. The minimum embedment depth should be 18 inches, as measured from the lowest adjacent grade within 5 horizontal feet of the structure for both single- and two-story structures.

Lateral bearing of 250 lbs./sq.ft. per foot of depth to the allowable vertical pressure and a coefficient of friction of 0.30 may be used in the design for resisting lateral forces. Friction and lateral bearing may be combined as allowed by Code. The above values may be increased as allowed by Code to resist seismic or wind loads.

Continuous footings should be reinforced with a minimum of two No. 4 bars, 1 each top and bottom. Slabs-on-grade should be reinforced with a minimum of No. 3 bars at 18 inches on center, each way. Minimum slab thickness should be 4 inches, net. The reinforcement should be located in the middle one-third of the slab thickness.

A vapor/moisture barrier is recommended below slab-on-grade in areas to be tiled, carpeted or otherwise considered moisture sensitive. The vapor barrier underlying slabs should be comprised of two (2) inches of clean sand above and below a 10-mil "Visqueen" type membrane. The moisture barrier must be properly lapped and sealed. It is essential to prevent damage to the "Visqueen" membrane. Care should be utilized in the membrane placement on subgrade to prevent damage. Sharp fragments should be removed from the subgrade surface and penetration of the membrane with screed guides should be avoided.

The membrane should be properly lapped and sealed as well as sealed around all plumbing lines and other openings.

To minimize moisture infiltration under slab-on-grade areas, concrete slurry should be utilized to backfill utility trenches below perimeter foundations. As an alternative, such excavations may be backfilled with fill soils, moisture conditioned to over optimum moisture and compacted to a minimum of 90 percent of the applicable laboratory maximum density.

All foundation excavations should be observed and approved by the project soils engineer prior to the placement of reinforcement or concrete. Forming of footing excavations may be required. Excavations should be free of slough and debris prior to pouring concrete.

Excavated material from footing trenches should not be placed in slab-on-grade areas unless properly compacted and tested.

The soil in the foundation excavations and subgrade for interior concrete slabs should be premoistened to a minimum of 140 percent of optimum moisture to a depth of 12 inches prior to placing concrete.

Final foundation design criteria should be made at the completion of grading, based on "as-graded" soil conditions.

The above foundation considerations are considered (preliminary) minimums. Additional reinforcing steel, deepening of foundation elements and/or additional stiffening elements may be required depending upon structural and/or Building Code considerations. Additional geotechnical design parameters can be provided depending upon the slab design methodology selected by the structural engineer.

### 8.1.2 Post-Tensioned Slab/Foundation System Design Recommendations

Post-tensioned slabs should incorporate a perimeter thickened edge to reduce the potential for moisture infiltration, seasonal moisture fluctuation and associated differential heave/settlement around the slab perimeter. The minimum depth of the thickened edge should be 18 inches for slabs designed for "medium" expansion potential. The minimum embedment depth should be measured from lowest adjacent grade within 5 feet of the structure for both single and two-story structures.

Design and construction of the post-tensioned foundations should be undertaken by firms experienced in the field. It is the responsibility of the foundation design engineer to select the design methodology and properly design the foundation system for the soils conditions indicated herein. The slab designer should provide deflection potential to the project architect/structural engineer for incorporation into the design of the structure.

If the project foundation design engineer elects to use the Post-Tensioning Institute (PTI) foundation design procedures, additional soil design parameters may be presented at the completion of rough grading operations.

For preliminary design purposes, a bearing capacity of 1,000 psf may be used at the surface for approved compacted fill. A bearing capacity of 1,500 psf may be used at an embedment depth of 18 inches below lowest adjacent grade.

Prior to placement of concrete, slab subgrade, perimeter thickened edge excavations and exterior concrete flatwork subgrade should be thoroughly premoistened (140 percent of optimum) to a depth of 12 inches. Moisture conditioning should be verified by the soils engineer or his authorized representative. Excavations should not be allowed to significantly dry out from the time of excavation to the placement of concrete.

Soils from the footing excavations should not be placed in slab-on-grade areas unless properly compacted and tested. The excavations should be cleaned of all loose/sloughed materials and be neatly trimmed at the time of concrete placement.

To minimize moisture penetration beneath the slab-on-grade areas, utility trenches should be backfilled with lean concrete or concrete slurry where they intercept the perimeter footings and/or perimeter thickened edges. As an alternative, such excavations may be backfilled with fill soils, moisture conditioned to over optimum and compacted to a minimum of 90 percent of the applicable laboratory maximum density.

A vapor/moisture barrier is recommended below slab-on-grade in areas to be tiled, carpeted or otherwise considered moisture sensitive. The vapor barrier underlying slabs should be comprised of two (2) inches of clean sand above and below a 10-mil "Visqueen" type membrane. The moisture barrier must be properly lapped and sealed. It is essential to prevent damage to the "Visqueen" membrane. Care should be utilized in the membrane placement on subgrade to prevent damage. Sharp fragments should be removed from the subgrade surface and penetration of the membrane with screed guides should be avoided. The membrane should be properly lapped and sealed as well as sealed around all plumbing lines and other openings.

### 8.1.3 Differential Settlement

In addition to the potential effects of expansive soils, the proposed residential structures should be designed in anticipation of differential settlements on the order of 1 inch in 30 feet.

### 8.1.4 Deepened Footings and Setbacks

Fill slopes with maximum heights on the order of 53 feet are proposed adjacent to the lots. Special considerations are required when evaluating the long-term performance of these slopes. Specifically, the outer, upper portions of these fill and natural slopes are subject to the potential effects of long-term creep resulting from weathering and gravity forces. In order to reduce the effects of creep/lateral spreading on foundations that are adjacent to descending natural and/or design slopes, code requirements set forth in the Uniform Building Code dictate a structural setback equal to 1/3 the descending slope height (40-feet maximum). This setback should be measured horizontally from the bottom outside edge of footing to the slope face. Deepened footings, therefore, may be required for structures that are located within this setback zone. If deepened footings are required, consideration should be given to increasing the minimum required 5-foot lot overexcavation as recommended in Section 7.4. This recommendation should be evaluated based on conditions exposed during grading and when structure sitings are available.

### 8.1.5 Backyard Improvements

Backyard improvements, such as patio slabs, pools, and perimeter walls, should also be designed in consideration of potential creep on descending slopes and in consideration of the as-graded expansive soil characteristics (anticipated to be moderate). Footings for perimeter walls at the top of natural slopes should be founded in competent/unweathered bedrock. Walls should be structurally separated at 10- to 15-foot intervals. These wall footing excavations should be observed by the project soils engineer/engineering geologist.

### 8.1.6 Miscellaneous Foundation Recommendations

Soils from the footing excavations should not be placed in slab-on-grade areas unless properly compacted and tested. The excavations should be cleaned of

all loose/sloughed materials and be neatly trimmed at the time of concrete placement.

To minimize moisture penetration beneath the slab-on-grade areas, utility trenches should be backfilled with compacted fill, lean concrete, or concrete slurry where they intercept the perimeter footing (immediately below perimeter thickened edges).

## 8.2 Other Design and Construction Recommendations

### 8.2.1 Site Drainage

Positive drainage away from structures should be provided and maintained.

### 8.2.2 Concrete Flatwork and Lot Improvements

In an effort to minimize shrinkage cracking, concrete flatwork should be constructed of uniformly cured, low-slump concrete and should contain sufficient control/contraction joints (typically spaced at 8± feet, maximum).

Additional provisions need to be incorporated into the design and construction of all improvements exterior to the proposed structures (pools spas, walls, patios, walkways, planters, etc.) to account for the hillside nature of the project as well as being designed to account for potential expansive soil conditions. Design considerations on any given lot may need to include provisions for differential bearing materials (bedrock vs. compacted fill), ascending/ descending slope conditions, bedrock structure, perched (irrigation) water, special surcharge loading conditions, potential expansive soil pressure, and differential settlement/heave.

All exterior improvements should be designed and constructed by qualified professionals using appropriate design methodologies that account for the onsite soils and geologic conditions. The above considerations should be used when designing, constructing, and evaluating long-term performance of the exterior improvements on the lots.

The homeowners should be advised of their maintenance responsibilities as well as geotechnical issues that could affect design and construction of future homeowner improvements. The information presented in Appendix VII should be considered for inclusion in homeowner packages in order to inform the homeowner of issues relative to drainage, expansive soils, landscaping, irrigation, sulfate exposure, and slope maintenance.

### 8.2.3 Utility Trench Excavation

All utility trenches should be shored or laid back in accordance with applicable OSHA standards. Excavations in bedrock areas should be made in consideration of underlying geologic structure. Pacific Soils Engineering, Inc. should be consulted on these issues during construction.

### 8.2.4 Utility Trench Backfill

Mainline and lateral utility trench backfill should be compacted to at least 90 percent of maximum density as determined by ASTM D-1557- 91. Onsite soils will not be suitable for use as bedding material but will be suitable for use in backfill, provided oversized materials are removed.

Compaction should be accomplished by mechanical means. Jetting of native soils will not be acceptable. Under-slab trenches should also be compacted. If native soils are used, mechanical compaction is recommended. If select granular backfill (SE > 30) is used, compaction by flooding will be acceptable. The soil engineer should be notified for inspection prior to placement of the membrane and slab reinforcement. The use of a double layer of mesh across under-slab plumbing trenches is considered an acceptable alternative to compaction or sand backfill.

## 9.0 SLOPE AND LOT MAINTENANCE

### 9.1 Slope Planting

Slope planting should consist of ground cover, shrubs, and trees that possess deep dense root structures that require a minimum of irrigation. It is the responsibility of the resident to maintain such planting.

### 9.2 Lot Drainage

Design finish grade elevations should be maintained through the life of the structure. If design finish grade elevations are altered, adequate area drains should be installed in order to provide rapid discharge of water, away from the structures and slope areas.

### 9.3 Slope Irrigation

The resident or owner is responsible for installation of proper irrigation systems, as well as maintenance and repair of such systems. Leaks should be repaired immediately. Sprinklers should be adjusted to provide maximum uniform coverage with a minimum of water usage and overlap. Overwatering with consequent wasteful runoff and serious ground saturation should be avoided. If automatic sprinkler systems are installed their use must be adjusted to account for natural rainfall conditions.

### 9.4 Burrowing Animals

Residents or owners should undertake a program for the elimination of burrowing animals. This should be an ongoing program in order to maintain slope stability.

## 10.0 FUTURE PLAN REVIEWS

This report represents a geotechnical review of a 100-scale Vesting Tentative Tract Map. As the project design progresses, site specific geologic and geotechnical issues need to be incorporated into design and construction of the project. Consequently, future plan reviews may be necessary. These reviews may include reviews of:

- 40-scale grading plans
- Precise grading plans
- Foundation plans
- Retaining wall plans

- Debris basin plans

These plans should be forwarded to the project geotechnical engineer/geologist for evaluation and comment, as necessary.

Also, some future exploration may be required in either environmentally sensitive areas or offsite near Kanan Road when the necessary encroachment permits are obtained.

## 11.0 CLOSURE

Given the considerations outlined herein, the proposed building pads indicated on the Vesting Revised Tentative Tract Map will be free from the hazards associated with land-sliding, settlement and slippage provided that the grading construction is performed in an acceptable manner in accordance with applicable Code requirements and recommendations contained herein. Further, the completed grading will not have a detrimental effect on the stability of neighboring offsite properties.

The findings and recommendations contained in this report are based upon the specific excavations, observations and laboratory testing as noted in this report. The materials immediately adjacent to or beneath those observed may have different characteristics and no representations are made as to the quality or extent of materials not observed. This report is subject to review by the controlling authorities for the project.

**PACIFIC SOILS ENGINEERING, INC.**
10653 PROGRESS WAY, P.O. BOX 2249, CYPRESS, CALIFORNIA 90630
TELEPHONE: (714) 220-0770, FAX: (714) 220-9589
*(Corporate Headquarters)*

**SAGE COMMUNITIES GROUP, INC.**
3 Corporate Plaza, Suite 102
Newport Beach, CA 92660

May 15, 2000

Work Order 101568-MP

Attention: Mrs. Diane Fradkin

Subject: **SUPPLEMENTARY GEOTECHNICAL INVESTIGATION AND REVISION RECEIVED VESTING TENTATIVE TRACT MAP GEOTECHNICAL REVIEW**
Volume II
Vesting Tentative Tract 52419
Near Kanan and Cornell Roads
Agoura Area
COUNTY OF LOS ANGELES, CALIFORNIA

References: See Appendix I

Ladies and Gentlemen:

This transmittal is intended to serve as a supplemental Appendix to Volume I of this firm's geotechnical review of Revision Received Vesting Tentative Tract Map 52419.

Volume I contains the text of the report and pocket enclosures. References, Logs of Exploratory Borings and Trenches, laboratory test data, slope stability calculations, a rock rippability assessment, a seismic hazards assessment, earthwork specifications, typical grading/construction details, and homeowner information are contained in Volume II.

Pacific Soils Engineering, Inc., (PSE) appreciates the opportunity to provide you with geotechnical consulting services. If you have any questions or should you require any additional information, please contact the undersigned.

Respectfully submitted,
PACIFIC SOILS ENGINEERING, INC.

By: _____
MICHAEL F. MILLS
Geologist/CEG 994
Reg. Exp.: 2-28-02

By: _____
WILLIAM D. JONES
Civil Engineering Associate

Reviewed by: _____
PAUL J. ERNST/RGE 2317
RCE 46394/Reg. Exp.: 3-31-03
Manager of Geotechnical Services

REGISTERED PROFESSIONAL ENGINEER
PAUL J. ERNST
No. GE2317
Exp. 3/31/03
GEOTECHNICAL
STATE OF CALIFORNIA

_____
THEODORE M. WOLFE
CEG 1626/Reg. Exp.: 4-30-02
Manager of Geological Services

Distr.: (4) Addressee
(2) Wagner Halladay - Attn: Mr. Dana Halladay
(2) LACDPW - Materials Engineering
(1) LACDPW - Drainage Division - Attn: Mr. Mo Kajbat
(1) LA Co. Regional Planning - Attn: Mr. Paul McCarthy
WDJ:MFM:PJE:TMW/ml-1568MP02

# APPENDIX I

# REFERENCES

## APPENDIX I

## REFERENCES

1. Preliminary Soils Engineering and Engineering Geologic Investigation, Agoura Canyon Ranch, Agoura Hills area, County of Los Angeles, California; by Pacific Soils Engineering, Inc.; dated September 16, 1988 (W.O. 101568-A).

2. Geotechnical Feasibility Study, Beautiful Homes Development, Vesting Tentative Tract 52419, County of Los Angeles and City of Agoura Hills, California; by Pacific Soils Engineering, Inc., dated November 26, 1997 (W.O. 101568-E).

3. EIR-Level Geotechnical Study, Live Oak Ranch, Vesting Tentative Tract 52419 (Revised), County of Los Angeles, California; by Pacific Soils Engineering, Inc., dated January 22, 1999 (W.O. 101568-L).

4. Grading Plan Review and Responses to Geological and Geotechnical Review Sheets, Creekside Center, City of Agoura Hills, California; by Pacific Soils Engineering, Inc., dated October 16, 1996 (W.O. 101568-GP).

5. Geologic Map of the Calabasas Quadrangle, Los Angeles and Ventura Counties, California; by Dibblee, T.W., Jr.; Dibblee Geological Foundation Map #DF-37, 1:24,000, dated 1992.

6. Geologic Map of the Thousand Oaks Quadrangle, Ventura and Los Angeles Counties, California; by Dibblee, T.W., jr., and Ehrenspeck, Dibblee Foundation Map No. DF-49, 1:24,000, dated 1993.

7. Rock Strength Properties and their Measurement; by Wyllie, D.C., and Norrish, N.I., in Turner, A.K., and Shuster, R.L., eds., Landslides: Investigation and Mitigation: Transportation Research Board Spec. Rpt 247, p. 372-390, dated 1996.

8. Soil Slumps and Debris Flows: Prediction and Protection; by Hollingsworth, R., and Kovacs, G.S., Bull. Assoc. Eng. Geol., v. 18, n.1, p. 17-28, dated 1981.

9. The Importance of Hollows in Debris Flow Studies; Examples from Marin County, California; by Reneau, S.L., and Dietrich, W.E., in Costa, J.E., and Wieczorek, G.F., eds., Debris Flows/Avalanches: Process, Recognition and Mitigation, Geol. Soc. Amer. Reviews in Engineering Geology, Volume VII, p. 165-180,. dated 1987.

10. Soil Slips, Debris Flows, and Rain Storms in the Santa Monica Mountains and Vicinity, Southern California; by Campbell, R.H., U.S. Geol. Surv. Prof. Paper 851, 51p., dated 1975.

11. Debris Flow Defenses in British Columbia; by Hungr, O., Morgan, G.C., Van Dine, D.F., and Lister, D.R., in Costa, J.E. and Wieczorek, G.F., eds., Debris Flows/Avalanches: Process, Recognition and Mitigation, Geol. Soc. Amer. Reviews in Engineering Geology, Volume VII, p. 201-222, dated 1987.

12. Colluvium and Talus; by Turner, A.K., in, Turner, A.K., and Shuster, R.L., eds., Landslides: Investigation and Mitigation: Transportation Research Board Spec. Rpt 247, p. 525-554, dated 1996.

13. On Debris Flow/Avalanche Mitigation and Control, San Francisco Bay Area, California; by Baldwin II, J.E., Donley, H.F., and Howard, T.R., in Costa, J.E., and Wieczorek, G.F., eds., Debris Flows/Avalances: Process, Recognition , dated 1987.

14. Hillslope Materials and Processes; by Selby, M.J., Oxford University Press, Oxford England, 264 p., dated 1982.

15. Geology of the Calabasas-Agoura, Eastern Thousand Oaks Area; Los Angeles and Ventura Counties, California; by Weber, F.H., Jr., California Division of Mines and Geology Open-File Report 84-1 LA, dated 1984.

May 15, 2000
Work Order 101568-MP

# APPENDIX II

## FIELD AND LABORATORY DATA

**(Excerpted from 1988 and 1999 Reports)**

Work Order 101568A

September 16, 1988

# A P P E N D I X

## A. Field Investigation

Four (4) borings were excavated to depths ranging from 13.5 to 28 feet below the existing ground surface, using a 30-inch diameter bucket drill rig. Logs of the borings are presented on Plate A-4 through A-7.

Undisturbed samples, for detailed testing in our laboratory were obtained from the borings by driving a sampling spoon into the material. A split barrel type spoon, having inside diameter of 2.5 inches, with a tapered cutting tip at the lower end was used. The barrel is lined with thin brass rings, each one-inch in length. The spoons penetrated into the soil approximately 12 inches. The central portion of the sample was retained for testing. All samples in the natural field condition were sealed in air-tight containers and transported to the laboratory. Bulk samples representative of the surface and/or near-surface materials were also obtained

Blow counts were noted for each sample and are presented in the Log of Borings (Plates A-4 through A-7). Ground water was encountered in all borings (except boring 5) at the depths indicated. Caving did not occur in any of the borings.

## B. Laboratory Tests

Shear tests (ASTM:D 3080-72) were made with a direct shear machine of the strain control type in which the rate of strain is 0.05-inch per minute. Specimens were subjected to shear under various normal loads at various moisture conditions. The results, expressed as friction angle and cohesion, are presented on Plates B-1 through B-14.

Consolidation tests (ASTM:D 2435-80) were performed on specimens of the representative soils. The consolidometers are designed to receive the specimens in the rings in the natural field condition. Porous stones, placed at the top and bottom of each specimen, permit the free flow of water from the specimen during the test. Progressive and final settlements under increasing load increments were recorded to an accuracy of 0.0001-inch. The final settlements so obtained are plotted to determine the curves shown on Plates C-1 through C-3.

Work Order 101568A

September 16, 1988

Laboratory maximum density and optimum moisture content were determined on samples of the existing surface materials to determine the suitability of these soils for compaction. Tests were conducted in accordance with ASTM:D 1557-78. Results of these tests are shown on the accompanying Table II.

Particle size determinations were conducted to aid in classification of the soils (modified hydrometer portion ASTM:D 422-72).

Chemical and resistivity tests were conducted to determine soluble sulfate concentrations and the minimum resistivity of the representative materials.

Expansion Index Tests were conducted in accordance with UBC Standard 29-2.

Moisture-density tests were performed on undisturbed samples of the subsurface materials.

The results of these and other tests are summarized on the Log of Borings and Table II.

# UNIFIED SOIL CLASSIFICATION SYSTEM

| MAJOR DIVISIONS | | | GROUP SYMBOLS | TYPICAL NAMES | FIELD IDENTIFICATION PROCEDURES |
|---|---|---|---|---|---|
| Coarse-grained Soils: More than half the material is larger than No. 200 sieve size | Gravels: More than half of coarse fraction is larger than No. 4 sieve size. (For visual classification, the ¼-in size may be used as equivalent to the No. 4 sieve size) | Clean Gravels (little or no fines) | GW | Well-graded gravels, gravel sand mixtures, little or no fines | Wide range grain sizes and substantial amounts of all intermediate particle sizes |
| | | | GP | Poorly-graded gravels, gravel-sand mixtures, little or no fines | Predominately one size or a range of sizes with some intermediate sizes missing |
| | | Gravels with Fines (appreciable amount of fines) | GM | Silty gravels, gravel-sand-silt mixtures | Nonplastic fines or fines with low plasticity (for identification procedures see ML below) |
| | | | GC | Clayey gravels, gravel-sand-silt mixtures | Plastic fines (for identification procedures see CL below) |
| | Sands: More than half of coarse fraction is smaller than No. 4 sieve size. (For visual classification, the ¼-in size may be used as equivalent to the No. 4 sieve size) | Clean Sands (little or no fines) | SW | Well-graded sands, gravelly sands, little or no fines | Wide range in grain sizes and substantial amounts of all intermediate particle sizes |
| | | | SP | Poorly-graded sands, gravelly sands, little or no fines | Predominately one size or a range of sizes with some intermediate sizes missing |
| | | Sands with Fines (appreciable amount of fines) | SM | Silty sands, sand-silt mixtures | Nonplastic fines or fines with low plasticity (for identification procedures see ML below) |
| | | | SC | Clayey sands, sand-clay mixtures | Plastic fines (for identification procedures see CL below) |

| Fine-grained Soils: More than half of material is smaller than No. 200 sieve size. The No. 200 sieve size is about the smallest particle visible to naked eye | | GROUP SYMBOLS | TYPICAL NAMES | IDENTIFICATION PROCEDURES on fraction smaller than No. 40 sieve size | | |
|---|---|---|---|---|---|---|
| | | | | Dry Strength (crushing characteristics) | Dilatancy (reaction to shaking) | Toughness (consistency near PL) |
| Silts and Clays: Liquid limit less than 50 | | ML | Inorganic silts and fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity. | None to slight | Quick to slow | None |
| | | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. | Medium to high | None to very slow | Medium |
| | | OL | Organic silts and organic silty clays of low plasticity | Slight to medium | Slow | Slight to medium |
| Silts and Clays: Liquid limit greater than 50 | | MH | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts | Slight to medium | Slow to none | Slight to medium |
| | | CH | Inorganic clays of high plasticity, fat clays | High to very high | None | High |
| | | OH | Organic clays of medium to high plasticity, organic silts | Medium to high | None to very slow | Slight to medium |
| HIGHLY ORGANIC SOILS | | Pt | Peat and other highly organic soils | Readily identified by color, odor, spongy feel and frequently by fibrous texture | | |

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

## PARTICLE SIZE LIMITS

| SILT OR CLAY | SAND | | | GRAVEL | | COBBLES | BOULDERS |
|---|---|---|---|---|---|---|---|
| | FINE | MEDIUM | COARSE | FINE | COARSE | | |

No. 200 No. 40 No. 10 No. 4 3/4 in 3 in (12 in.)

U.S. STANDARD SIEVE SIZE

## CONSISTENCY CLASSIFICATION

| GRANULAR SOIL | COHESIVE SOIL | BEDROCK |
|---|---|---|
| Very loose | Very soft | |
| Loose | Soft | |
| Moderately dense | Firm | Soft |
| Medium dense | Stiff | Moderately hard |
| Dense | Very stiff | Hard |
| Very dense | Hard | Very hard |

## MOISTURE CONDITION

Dry
Slightly moist
Moist
Wet
Saturated

## OTHER SYMBOLS

R- Undisturbed sample
B- Bulk sample
▽ Groundwater
Ω Groundwater seepage

Reference:
The Unified Soil Classification System, Corps of Engineers, U.S. Army Technical Memorandum No. 3-357, Volume I, March, 1953. (Revised April, 1960)

PACIFIC SOILS ENGINEERING, INC.

PLATE A

# PACIFIC SOILS ENGINEERING, INC.

## LOG OF BORING No. 4

DATE OBSERVED 7/13/88 METHOD OF DRILLING 30" Bucket

LOGGED BY PAF/MM GROUND ELEVATION _____ WORK ORDER No. 101568

| Depth ft. | Sample | Blows/ft. | Group Syb. | Unit Dry Wt. (lbs/cu.ft.) | % Moisture | Description and Remarks |
|---|---|---|---|---|---|---|
| 0 | | | | | | ALLUVIUM: Clayey sand with gravel, cobbles and boulders, dark brown, slightly moist, medium dense, very porous. |
| | | | | | | @ 3.0 ft. drilling stopped by boulder |
| | | | | | | TOTAL DEPTH 3.0 ft.<br>No Caving<br>No Water |
| 5 | | | | | | |
| 10 | | | | | | |
| 15 | | | | | | |
| 20 | | | | | | |
| 25 | | | | | | |

PLATE A-4

# PACIFIC SOILS ENGINEERING, INC.

## LOG OF BORING No. 4A

DATE OBSERVED 7/13/88 METHOD OF DRILLING 30" Bucket

LOGGED BY PAF/MM GROUND ELEVATION _____ WORK ORDER No. 101568

| Depth ft. | Sample | Blows/ft. | Group Sym. | Unit Dry Wt. (lbs/cu.ft.) | % Moisture | Description and Remarks |
|---|---|---|---|---|---|---|
| 0 | | | | | | ALLUVIUM: Clayey sand with gravel and cobbles, dark brown, slightly moist, medium dense, very porous.<br>Below 3 ft. gravelly, cobbly |
| 10 | R | | | 128.9 | 7.8 | CONEJO VOLCANICS: Dark brown, fractured, moist, becomes hard with depth.<br>@ 14.0 ft. water seepage |
| 15 | | | | | | TOTAL DEPTH 14.0 ft.<br>No Caving<br>Water at 14.0 ft. |
| 20 | | | | | | |
| 25 | | | | | | |

PLATE A-4A

# PACIFIC SOILS ENGINEERING, INC.

## LOG OF BORING No. 5

DATE OBSERVED 7/13/88 METHOD OF DRILLING 30" Bucket

LOGGED BY PAF/MM GROUND ELEVATION _____ WORK ORDER No. 101568

| Depth ft. | Sample | Blows/ft. | Group Syb. | Unit Dry Wt. (lbs/cu.ft.) | % Moisture | Description and Remarks |
|---|---|---|---|---|---|---|
| 0 | | | | | | FILL: Gravel and cobbles in a clayey sand and sand matrix with scattered boulders, dark brown, slightly moist to moist. |
| 5 | R | 3 | | 114.1 | 13.7 | |
| | | | | | | Below 9 ft. cobble size diminishes |
| 10 | R | 2 | | 112.2 | 11.9 | |
| | | | | | | @ 13.5 ft. large boulders, could not penetrate |
| 15 | | | | | | TOTAL DEPTH 13.5 ft.<br>No Caving<br>No Water |
| 20 | | | | | | |
| 25 | | | | | | |

# PACIFIC SOILS ENGINEERING, INC.

## LOG OF BORING No. 6

DATE OBSERVED 7/12/88 METHOD OF DRILLING 30" Bucket

LOGGED BY PAF/MM GROUND ELEVATION _____ WORK ORDER No. 101568

| Depth ft. | Sample | Blows/ft. | Group Syb. | Unit Dry Wt. (lbs/cu.ft.) | % Moisture | Description and Remarks |
|---|---|---|---|---|---|---|
| 0 | | | | | | FILL: Sandy clay/clayey sand with cobbles, boulders and concrete pieces, brown, dry to slightly moist. Matrix becomes predominantly sandy clay with depth. |
| 5 | B/R | 1 | | Disturbed | | |
| 10 | R | P | | 101.4 | 19.5 | @ 11±ft. moist with gravel size rock fragments |
| | | | | | | @ 13±ft. small piece of plastic |
| 15 | B/R | 1 | | 100.2 | 19.5 | |
| 20 | | | | | | @ 19.5 ft. gravelly clayey sand<br>@ 20.0 ft. rock in sampler |
| | R | 8 | | 127.6 | 8.7 | |
| 25 | | | | | | ALLUVIUM: Clayey sand, yellowish brown, moist, medium dense, very porous |

# PACIFIC SOILS ENGINEERING, INC.

## LOG OF BORING No. 6 Cont'd

DATE OBSERVED 7/12/88 METHOD OF DRILLING 30" Bucket

LOGGED BY PAF/MM GROUND ELEVATION _____ WORK ORDER No. 101568

| Depth ft. | Sample | Blows/ft. | Group Sym. | Unit Dry Wt. (lbs/cu.ft.) | % Moisture | Description and Remarks |
|---|---|---|---|---|---|---|
| 25 | R | 30/11" | | 121.3 | 13.0 | CONEJO VOLCANICS: Moderately hard, fractured<br><br>@ 27±ft. water seepage |
| 30 | | | | | | TOTAL DEPTH 28.0 ft.<br>No Caving<br>Water at 27±ft. (at end of drilling 1½ ft. of water in the hole) |
| 35 | | | | | | |
| 40 | | | | | | |
| 45 | | | | | | |
| 50 | | | | | | |

PLATE A-6

# PACIFIC SOILS ENGINEERING, INC.

## LOG OF BORING No. 7

DATE OBSERVED 7/12/88 METHOD OF DRILLING 30" Bucket

LOGGED BY PAF GROUND ELEVATION _____ WORK ORDER No. 101568

| Depth ft. | Sample | Blows/ft. | Group Sym. | Unit Dry Wt. (lbs/cu.ft.) | % Moisture | Description and Remarks |
|---|---|---|---|---|---|---|
| 0 | | | | | | FILL: Sandy clay/clayey sand, brown, slightly moist with cobbles<br>moist with depth |
| 5 | | | | | | @ 7.0 ft. Clayey sand, black, heavily organic with gravelly cobbly (organic odor) |
| 10 | | | | | | |
| 15 | | | | | | ALLUVIUM: Clayey sand with gravel, dark brown, moist to saturated<br>@ 17.ft slow water seepage |
| 20 | | | | | | CONEJO VOLCANICS: Fractured, saturated hard to very hard |
| 25 | | | | | | TOTAL DEPTH 21.0 ft.<br>Caving between 7 and 16 ft.<br>Water at 17.5 ft. |

PLATE A-7

Work Order 101568A
Date Exc. July/August 198
Logged by MM/PF
Elevation
Equipment

# T A B L E I

## LOG OF TRENCHES

| Trench No. | Depth (ft) | USCS | Description |
|---|---|---|---|
| T-22 | | | |
| | 0.0 - 9.0 | | FILL/COLLUVIUM: Cobbly clayey sand, dark gray, dry, very porous. |
| | 9.0 - 10.0 | | COLLUVIUM: Sandy cobbly clay, moist, soft, refusal on hard boulder. |
| T-23 | | | |
| | 0.0 - 11.0 | | COLLUVIUM: Gravelly slightly clayey sand, brown, damp, slightly cemented but porous. Shard are angular, oriented volcanics. |
| | 11.0 - 11.5 | | CONEJO VOLCANICS: Basalt, brown, weathered contact appears gradationed.. |
| T-24 | | | |
| | 0.0 - 2.0 | | SOIL: Clayey sand, brown, dry, porous. |
| | 2.0 - 12.0 | | CONEJO VOLCANICS: Basalt, gray, weathered upper 4 feet, hard below. |

Work Order 101568A

| | | |
|---|---|---|
| T-25 | | |
| | 0.0 - 5.0 | FILL:<br>Clayey, cobbly sand, dark brown, dry to damp, soft. |
| | 5.0 - 8.0 | CONEJO VOLCANICS:<br>Basalt, greenish gray to red, weathered but dense. |

---

| | | |
|---|---|---|
| T-26 | | |
| | 0.0 - 8.0 | FILL:<br>Sandy clay/clayey sand cobbly, brown, dry. |
| | 8.0 - 9.0 | CONEJO VOLCANICS:<br>Basalt, dark gray, hard, refusal at 9.0 ft. |

---

| | | |
|---|---|---|
| T-27 | | |
| | 0.0 - .33 | concrete |
| | .33 - 1.0 | FILL:<br>Clayey sand, brown, dry, porous. |
| | 1.0 - 3.5 | CONEJO VOLCANICS:<br>Basalt, yellowish brown, slightly vesicular, weathered but hard. |

---

| | | |
|---|---|---|
| T-28 | | |
| | 0.0 - 2.5 | FILL:<br>Clayey sand, brown, dry, porous. |
| | 2.5 - 5.0 | COLLUVIUM:<br>Clayey sand, dark brown, cobbly, dry, porous. |
| | 5.0 - 9.0 | CONEJO VOLCANICS:<br>Basalt, yellowish brown, damp, extremely weathered, friable, firmer at bottom of hole. |

| | | |
|---|---|---|
| T-29 | | |
| | 0.0 - 9.0 | FILL/COLLUVIUM:<br>Cobbly clayey sand, dark gray, dry, very porous. |
| | 9.0 - 10.0 | COLLUVIUM:<br>Sandy cobbly clay, moist, soft,refusal on hard boulder. |

---

| | | |
|---|---|---|
| T-30 | | |
| | 0.0 - 6.5 | ALLUVIUM:<br>Bouldery clayey sand, dark gray, damp, porous, numerous large roots. |
| | 6.5 - 7.5 | CONEJO VOLCANICS:<br>Basalt, yellowish brown, slightly vesicular, weathered but hard. |

---

| | | |
|---|---|---|
| T-31 | | |
| | 0.0 - 2.5 | FILL:<br>Cobbly clayey sand, dark brown, dry, porous. |
| | 2.5 - 4.0 | COLLUVIUM:<br>Sandy clay, brown, damp, stiff but porous. |
| | 4.0 - 7.5 | CONEJO VOLCANICS:<br>Basalt, yellowish brown, slightly vesicular, weathered but hard. |

---

| | | |
|---|---|---|
| T-32 | | |
| | 0.0 - 5.0 | FILL:<br>Mixture of imported cobbly soils, dry to moist, soft. |
| | 5.0 - 10.0 | COLLUVIUM:<br>Clayey sand, reddish brown, numerous roots, dry, porous<br><br>@ 10.0 ft. possible bedrock. |

| | | |
|---|---|---|
| T-33 | | |
| | 0.0 - 5.0 | ALLUVIUM:<br>Clayey sand, dark grayish brown, damp, porous. |
| | 5.0 - 7.5 | CONEJO VOLCANICS:<br>Basalt, greenish brown, damp, weathered but firm. |
| T-34 | | |
| | 0.0 - 5.5 | ALLUVIUM:<br>Cobbly, bouldery clayey sand, brown, damp, porous. |
| | 5.5 - 6.5 | CONEJO VOLCANICS:<br>Basalt, greenish brown, damp, weathered but firm. |
| T-35 | 0.0 - 7.0 | ALLUVIUM:<br>Cobbly silty sand, brown, dry, porous. |
| | 7.0 - 8.5 | CONEJO VOLCANICS:<br>Basalt, greenish brown, damp, weathered but firm. |
| T-36 | | |
| | 0.0 - 4.5 | ALLUVIUM:<br>Mainly boulders and large cobbles with a brown silty sand matrix, loose, dry. |
| | 4.5 - 5.0 | CONEJO VOLCANICS:<br>Basalt, gray, weathered but hard, fractured. |
| T-37 | | |
| | 0.0 - 3.0 | CONEJO VOLCANICS:<br>Basalt, brown to yellowish brown, iron oxide stains, firm but fractured, not as weathered as in T-36. |

| | | |
|---|---|---|
| T-38 | | |
| | 0.0 - 0.33 | FILL:<br>Veneer of bedrocl-derived material |
| | 0.33 - 3.5 | CONEJO VOLCANICS:<br>Basalt, brown to yellowish brown, iron oxide stains, firm but fractured, not as weathered as in T-36. |

---

| | | |
|---|---|---|
| T-39 | | |
| | 0.0 - 3.0 | SOIL:<br>Sandy clay, dark brown, dry to moist, stiff but porous. |
| | 3.0 - 14.5 | VALLEY FILL:<br>Clayey sand, tan to brown, damp, medium dense, porous, less porous with depth. |

---

| | | |
|---|---|---|
| T-40 | | |
| | 0.0 - 1.5 | SOIL:<br>Sandy clay, brown, dry, roots. |
| | 1.5 - 7.0 | CONEJO VOLCANICS:<br>Basalt, greenish brown, damp, weathered but firm. |

---

| | | |
|---|---|---|
| T-41 | | |
| | 0.0 - 5.0 | ALLUVIUM:<br>Cobbly sandy clay to cobbly clayey sand, dark brown, dry, stiff but porous. |
| | 5.0 - 6.0 | CONEJO VOLCANICS:<br>Basalt, grayish brown, somewhat friable, firm. |

T-42

| | |
|---|---|
| 0.0 - 3.0 | ALLUVIUM:<br>Clayey sand, slightly reddish brown, dry, very porous, numerous roots. |
| 3.0 - 4.0 | CONEJO VOLCANICS:<br>Slightly vesicular basalt, slightly yellowish brown, weathered and fractured but tight.<br><br>Attitudes: NS, 60E - Joint<br>N80E, 85SE - Joint |

---

T-43

| | |
|---|---|
| 0.0 - 4.0 | ALLUVIUM:<br>Clayey sand, slightly reddish brown, dry, very porous, numerous roots. |
| 4.0 - 6.0 | CONEJO VOLCANICS:<br>Slightly vesicular basalt, slightly yellowish brown, weathered and fractured but tight. |

---

T-44

| | |
|---|---|
| 0.0 - 1.5 | FILL:<br>Gravelly clayey sand, gray, dry, loose, Modelo chips. |
| 1.5 - 5.0 | MIXED SOIL/FILL:<br>Cobbly clayey sand, damp, porous, volcanic cobbles. |
| 5.0 - 7.0 | CONEJO VOLCANICS:<br>Slightly vesicular basalt, slightly yellowish brown, weathered and fractured but tight.<br><br>Attitude: N50E, 60SE - joint. |

| | | |
|---|---|---|
| T-45 | | |
| | 0.0 - 1.5 | FILL:<br>Gravelly clayey sand, gray, dry, loose, Modelo chips. |
| | 1.5 - 2.5 | SOIL:<br>Sandy clay, dark brown, dry, porous. |
| | 2.5 - 7.0 | VALLEY FILL:<br>Cobbly to bouldery silty sand, tan, damp, medium dense, but uncemented, refusal on boulders. |

---

| | | |
|---|---|---|
| T-46 | | |
| | 0.0 - 5.0 | ALLUVIUM:<br>Clayey sand, brown, slightly cobbly, dry to saturated, soft. water perched on contact.<br><br>water at 4.5 feet |
| | 5.0 - 6.0 | CONEJO VOLCANICS:<br>Basalt, brown, weathered. |

---

| | | |
|---|---|---|
| T-47 | | |
| | 0.0 - 7.0 | ALLUVIUM:<br>Cobbly clayey sand, brown, dry to damp, porous, roots. |
| | 7.0 - 9.0 | CONEJO VOLCANICS:<br>Salt and pepper basalt, black and gray, very weathered, friable. |
| | 9.0 - 11.0 | CONEJO VOLCANICS:<br>Basalt, dark gray, firm, not as weathered, water along joints and at 9 ft. |

T-48

| | |
|---|---|
| 0.0 - 4.0 | COLLUVIUM:<br>Cobbly clayey sand, dark brown, dry, porous |
| 4.0 - 12.0 | ALLUVIUM:<br>Fine to medium-grained sand, buff, uncemented, water at 10 feet, caving; @ 12.0 ft. possible bedrock. |

---

T-49

| | |
|---|---|
| 0.0 - 5.0 | COLLUVIUM/ALLUVIUM:<br>Cobbly clayey sand, dark brown, dry, porous. |
| 5.0 - 7.0 | ALLUVIUM:<br>Silty fine-grained sand, tan, dry, porous. |
| 7.0 - 7.5 | CONEJO VOLCANICS:<br>Basalt, greenish gray, weathered but hard. |

---

T-50

| | |
|---|---|
| 0.0 - 6.0 | COLLUVIUM/ALLUVIUM:<br>Cobbly clayey sand, dark brown, dry porous. |
| 6.0 - 7.0 | CONEJO VOLCANICS:<br>Basalt, greenish gray, weathered but hard. |

---

T-51

| | |
|---|---|
| 0.0 - 4.5 | ALLUVIUM:<br>Cobbly to bouldery clayey sand, dark grayish brown, dry, porous. |
| 4.5 - 5.5 | CONEJO VOLCANICS:<br>Basalt, grayish brown, damp, weathered, friable but dense. |

| | | |
|---|---|---|
| T-52 | | |
| | 0.0 - 0.5 | SOIL:<br>Clayey sand, brown, dry, porous. |
| | 0.5 - 1.5 | CONEJO VOLCANICS:<br>Basalt, grayish brown, damp, weathered, friable, but dense. |
| T-53 | | |
| | 0.0 - 5.0 | ALLUVIUM:<br>Bouldery clayey sand, brown, dry, porous. |
| | 5.0 - 7.0 | CONEJO VOLCANICS:<br>Basalt, grayish brown, damp, weathered, friable, but dense. |
| T-54 | | |
| | 0.0 - 6.5 | ALLUVIUM:<br>Very bouldery clayey sand, brown, very loose, porous, sub-angular clasts. |
| | 6.5 - 8.0 | CONEJO VOLCANICS:<br>Basalt, grayish brown, damp, weathered, friable, but dense. |
| T-55 | | |
| | 0.0 - 6.5 | ALLUVIUM:<br>Very bouldery clayey sand, brown, very loose, porous, sub-angular clasts. |
| | 6.5 - 7.5 | CONEJO VOLCANICS:<br>Basalt, dark gray, weathered but hard. |

T-56

| | |
|---|---|
| 0.0 - 1.0 | SOIL:<br>Gravelly silty sand, brown, dry, porous. |
| 1.0 - 2.5 | CONEJO VOLCANICS:<br>Andesite, grayish red, unweathered, very hard, intact, not slide debris. |

---

T-57

| | |
|---|---|
| 0.0 - 3.0 | SOIL/SLOPEWASH:<br>Gravelly silty sand, brown, dry, porous. |
| 3.0 - 5.0 | CONEJO VOLCANICS:<br>Andesite, grayish red, unweathered, very hard, intact, not slide debris. |

---

T-58

| | |
|---|---|
| 0.0 - 10.0 | ALLUVIUM:<br>Very cobbly to bouldery silty sand, brown, dry, porous. |
| 10.0 - 11.0 | CONEJO VOLCANICS:<br>Basalt, greenish gray, damp, weathered, firm. |

---

T-59

| | |
|---|---|
| 0.0 - 6.5 | COLLUVIUM:<br>Sandy clay, slightly reddish-brown some gravel, stiff but porous. |
| 6.5 - 8.5 | CONEJO VOLCANICS:<br>Basalt, grayish green, weathered but very firm. |

T-60

| | |
|---|---|
| 0.0 - 6.5 | ALLUVIUM:<br>Very cobbly to bouldery silty sand, brown, dry, porous. |
| 6.5 - 8.0 | CONEJO VOLCANICS:<br>Andesite, red, weathered but firm |

---

T-61

| | |
|---|---|
| 0.0 - 5.0 | ALLUVIUM:<br>Very cobbly to bouldery silty sand, brown, dry, porous. |
| 5.0 - 7.0 | CONEJO VOLCANICS:<br>Andesite, red, weathered but firm. |

---

T-62

| | |
|---|---|
| 0.0 - 6.0 | ALLUVIUM:<br>Very cobbly to bouldery silty sand, brown, dry, porous. |
| 6.0 - 8.0 | CONEJO VOLCANICS:<br>Basalt, greenish gray, weathered but hard. |

---

T-63

| | |
|---|---|
| 0.0 - 5.0 | COLLUVIUM:<br>Clayey sand, dark brown, dry, porous. |
| 5.0 - 11.0 | VALLEY FILL:<br>Very clayey slight gravelly fine-grained sand, reddish brown, very stiff but porous upper 5 ± feet, numerous cobbles and boulders. |

T-64

| | |
|---|---|
| 0.0 - 7.0 | ALLUVIUM:<br>Cobbly, bouldery silty sand, brown, dry, loose, roots, numerous boulders. |
| 7.0 - 9.0 | CONEJO VOLCANICS:<br>Basalt, gray, weathered. |

---

T-65

| | |
|---|---|
| 0.0 - 6.0 | ALLUVIUM:<br>Slight gravelly silty sand, grayish brown, dry, loose. |
| 6.0 - 7.0 | CONEJO VOLCANICS:<br>Basalt, gray, weathered. |

---

T-66

| | |
|---|---|
| 0.0 - 2.5 | SOIL/COLLUVIUM:<br>Clayey sand, dark brown, dry, porous. |
| 2.5 - 4.5 | CONEJO VOLCANICS:<br>Basalt, yellowish brown, stained, weathered but tight.<br><br>Attitude: N60E, 90 - small shear |

---

T-67

| | |
|---|---|
| 0.0 - 5.0 | ALLUVIUM:<br>Cobbly to bouldery silty sand, brown, dry, loose. |
| 5.0 - 6.5 | CONEJO VOLCANICS:<br>Basalt, brown, dry, weathered but tight. |

| | | |
|---|---|---|
| T-68 | | |
| | 0.0 - 5.5 | ALLUVIUM:<br>Bouldery cobbly clayey sand, brown, dry, porous. |
| | 5.5 - 6.5 | CONEJO VOLCANICS:<br>Basalt, brown, dry, weathered but tight. |

---

| | | |
|---|---|---|
| T-69 | | |
| | 0.0 - 10.0 | ALLUVIUM:<br>Gravelly to cobbly clayey sand, brown, damp, loose, medium dense at depth, cobbles (mainly below 5 feet.) |
| | 10.0 - 10.5 | CONEJO VOLCANICS:<br>Basalt, gray, firm. |

---

| | | |
|---|---|---|
| T-70 | | |
| | 0.0 - 13.0 | ALLUVIUM:<br>Clayey sand with gravel, brown, dry to slightly moist with depth, scattered cobbles, very porous. |
| | 13.0 - 14.0 | CONEJO VOLCANICS:<br>Basalt<br>@ 14.0 ft. water |

---

| | | |
|---|---|---|
| T-71 | | |
| | 0.0 - 7.5 | ALLUVIUM:<br>Gravelly/cobbly silty sand, brown, dry, medium dense, very porous. |
| | 7.5 - 8.0 | CONEJO VOLCANICS:<br>Basalt. |

T-72

| | |
|---|---|
| 0.0 - 7.0 | ALLUVIUM:<br>Gravelly/cobbly silty sand, brown, dry to slightly moist with depth, medium dense, very porous. |
| 7.0 - 8.0 | CONEJO VOLCANICS:<br>Basalt. |

---

T-73

| | |
|---|---|
| 0.0 - 2.0 | SOIL:<br>Gravelly/cobble silty sand, brown, dry, medium dense, very porous. |
| 2.0 - 3.0 | CONEJO VOLCANICS:<br>Basalt, gray, hard. |

---

T-74

| | |
|---|---|
| 0.0 - 3.0 | SOIL:<br>Cobbly sand, brown, porous but cemented. |
| 3.0 - 4.0 | TERRACE DEPOSITS/RELICT SOIL:<br>Cobbles, tan, refusal. |

---

T-75

| | |
|---|---|
| 0.0 - 6.0 | ALLUVIUM:<br>Cobbly clayey sand, dark brown, moist, soft. |
| 6.0 - 8.0 | CONEJO VOLCANICS:<br>Basalt, gray, firm. |

---

T-76

| | |
|---|---|
| 0.0 - 6.0 | FILL:<br>Clayey cobbly sand, gray, dry, porous. Minor debris. |
| 6.0 - 13.0 | FILL:<br>Slight cobbly clayey sand, reddish brown, damp, soft, clean. |

T-77

| | |
|---|---|
| 0.0 - 10.0 | FILL:<br>Slight gravelly silty to clayey fine-grained sand, tan, damp, medium dense, clean. |
| 10.0 - 12.0 | SOIL:<br>Sandy clay, black, damp, stiff, porous; possible bedrock at bottom of hole. |

---

T-78

| | |
|---|---|
| 0.0 - 6.5 | ALLUVIUM:<br>Sandy clay, dark brown, dry, porous. |
| 6.5 - 7.0 | CONEJO VOLCANICS:<br>Andesite, red, weathered but hard. |

---

T-79

| | |
|---|---|
| 0.0 - 6.0 | ALLUVIUM:<br>Cobbly clayey sand, brown, dry to damp. |
| 6.0 - 8.0 | CONEJO VOLCANICS:<br>Basalt, grayish green, weathered but firm. |

January 22, 1999
Work Order 101568-L
Date Logged: 3/98
Equip.: JD450

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-101 | 0.0 - 1.0 | Fill/Topsoil: Silty Sand, dark brown, very moist, soft, porous, wood fragments. |
| | 1.0 - 2.0 | Conejo Volcanics: Basalt, dark gray, massive, hard, refusal at 2.0 feet. |
| T-102 | 0.0 - 8.0 | Fill: Silty, Cobbly Sand, brown, moist, loose to moderately dense, very slight odor, boulders. |
| | 8.0 -10.0 | Conejo Volcanics: Basalt, gray to reddish brown, weathered upper 1 to 1.5 feet, massive. |
| T-103 | 0.0 - 3.0 | Conejo Volcanics: Basalt, dark brown, coarse-grained, phenocrysts of plagioclase, weathered, closely jointed, hard at 3.0 feet. Thin fill veneer.<br>Attitudes: N50E, 50SE - J<br>N50E, 78SE - J<br>N30E, 90SE - J |
| T-104 | 0.0 - 1.0 | Fill: Silty, Cobbly Sand, brown, moist, loose to moderately dense, very slight odor, boulders. |
| | 1.0 - 3.5 | Conejo Volcanics: Basalt, dark brown where weathered. At 1 foot, gray, hard basalt bed, very difficult digging.<br>Attitudes: N60W, 50NE - B |

Note: J = Joint surface; B = Bedding

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-105 | 0.0 - 1.5 | Soil: Silty Sand, dark brown, very moist, soft, porous. |
| | 1.5 - 3.0 | Weathered Conejo Volcanics: Vesicular Basalt, light to dark brown, moderately weathered. |
| | 3.0 - 5.0 | Conejo Volcanics: Vesicular Basalt, dark brown, hard. |
| | | Attitudes: NS - 90 - J<br>EW - 80S- J |
| T-106 | 0.0 - 1.5 | Soil: Silty Sand, dark brown, very moist, soft, porous. |
| | 1.5 - 3.5 | Weathered Conejo Volcanics: Vesicular Basalt, light to dark brown, moderately weathered. |
| | 3.5 - 6.5 | Conejo Volcanics: Vesicular Basalt, dark brown, slightly weathered, hard. |
| | | Attitudes: N80W, 60SW - J<br>N80W, 50NE - J<br>N10E, 90NE - J |
| T-107 | 0.0 - 6.0 | Fill/Colluvium: Bouldery Silt, brown, very moist, soft. |
| | 6.0 - 8.0 | Conejo Volcanics: Vesicular Basalt, dark brown, slightly weathered. |
| T-108 | 0.0 - 0.5 | Soil: Silty Sand, dark brown, very moist, soft, porous. |
| | 0.5 - 1.0 | Conejo Volcanics: Agglomerate, gray, very hard, massive, one joint plane. |
| | | Attitude: N80W, 45S - J |

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-109 | 0.0 - 3.0 | Colluvium: Sandy Silt, dark brown, very moist, soft. |
| | 3.0 - 9.0 | Conejo Volcanics: Upper 5.5 feet is brown, very weathered basalt, "shattered" looking from weathering; at 8½ feet, gray porphyritic andesite, hard. No obvious joint pattern.<br><br>Attitude: N80W, 48NE - B |
| T-110 | 0.0 - 5.0 | Colluvium: Sandy Silt to Silty fine Sand, brown, moist, soft, porous. |
| | 5.0 - 7.0 | Weathered Conejo Volcanics: Decomposed Basalt, weak residual rock fabric, soft. |
| | 7.0 -10.0 | Conejo Volcanics: Basalt, firm, fracture surfaces, moist. |
| T-111 | 0.0 - 3.0 | Soil: Sandy Silt to Silty fine Sand, brown, moist, soft, porous. |
| | 3.0 - 6.0 | Conejo Volcanics: Fractured, brown, fine-grained, Basalt (no phenocrysts), damp.<br><br>Attitudes: N50E, 40SE - J - rough<br>N50E, 75SE - J - moderately smooth |
| T-112 | 0.0 - 5.0 | Fill: Sandy Silt, brown, moist, moderately dense, abundant cobbles. |
| | 5.0 - 7.0 | Colluvium/Alluvium: Cobbly, Silty Sand, brown, moist to wet; water at basal contact. |
| | 7.0 - 7.5 | Conejo Volcanics: Basalt, gray, hard, refusal at 7.5 feet. |

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-113 | 0.0 - 5.0 | Conejo Volcanics: Porphyritic Basalt, gray to brown, dry, hard, difficult digging.<br><br>Attitudes: N50E, 40SE - J<br>N50W, 90 - J - Joints are moderately smooth to rough. |
| T-114 | 0.0 - 1.0 | Soil: Silty Sand, brown, moist, soft, porous. |
| | 1.0 - 7.0 | Conejo Volcanics: Porphyritic Basalt, brown, damp, weathered in upper four feet.<br><br>Attitude: N50E, 45NW - J/B |
| T-115 | 0.0 - 6.0 | Conejo Volcanics: Porphyritic Basalt, brown, damp, weathered in upper four feet.<br><br>Attitudes: N70W, 75SW - J<br>N80E, 90 - J |
| T-116 | 0.0 - 5.0 | Colluvium: Silty Sand to Clayey Sand, some cobbles, brown, moist to saturated. |
| | 5.0 - 7.0 | Conejo Volcanics: Weathered basalt, copious water at contact. |
| T-117 | 0.0 - 1.0 | Soil: Silty Sand, brown, moist, soft, porous. |
| | 1.0 - 6.0 | Conejo Volcanics: Dark gray basalt, some small pillows.<br><br>Attitude: N45W, 45SW - common orientation<br>N5E, 90 - J<br>N70E, 75NW - J<br>N80E, 48NW - B |

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-118 | 0.0 - 7.0 | Colluvium: Cobbly Silty Sand, brown, moist to saturated, porous, water at contact.. |
| | 7.0 - 8.0 | Conejo Volcanics: Water at contact. |
| T-119 | 0.0 - 4.0 | Fill: Cobbly Sandy Silt, brown, moist, porous, soft, roots. |
| | 4.0 - 6.0 | Topsoil: Sandy Silt, dark brown, moist, soft to medium stiff, no cobbles, scattered roots. |
| | 6.0 - 7.5 | Conejo Volcanics: Weathered Basalt, gray, firm but weathered. |
| T-120 | 0.0 - 2.0 | Soil: Silty Sand, brown, moist, loose, gravel. |
| | 2.0 - 4.0 | Weathered Conejo Volcanics: Decomposed Basalt, rock fabric gone, yellowish brown, pliable, wet. |
| | 4.0 - 7.0 | Conejo Volcanics: Basalt, brown to gray, moderately dense, jointed.<br>Attitudes: EW, 60S - well-developed<br>N60W, 45NE - rough, discontinuous. |
| T-121 | 0.0 -10.0 | Alluvium: Silty Sand, brown, loose, moist to saturated, carbonate at base, copious ground water at nine feet. |
| | 10.0 -12.0 | Alluvium: Cobble-supported sand, rounded clasts, saturated. |
| | 12.0 -12.5 | Weathered Conejo Volcanics: Extremely weathered Basalt, poorly defined rock fabric. |

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-122 | 0.0 - 8.0 | Alluvium: Silty Sand, brown, loose, moist to saturated, carbonate at base, copious ground water at eight feet. |
| | 8.0 -10.5 | Alluvium: Cobble-supported sand, rounded clasts, saturated. |
| | 10.5 -11.5 | Weathered Conejo Volcanics: Extremely weathered Basalt, brown, some rock fabric. |
| T-123 | 0.0 -11.0 | Fill: Bouldery Clayey Sand, brown, moist, clean, soft, fresh Basalt, boulders to 3 feet in diameter. |
| | 11.0 -11.5 | Soil: Clay, black, wet, soft, seepage at 11 feet. |
| | 11.5 -12.0 | Weathered Conejo Volcanics: Extremely weathered Basalt, brown, some rock fabric. |
| T-124 | 0.0 - 9.0 | Fill: Bouldery Clayey Sand, brown, moist, clean, soft, fresh Basalt boulders to 3 feet in diameter. |
| | 9.0 -12.0 | Soil/Colluvium: Sandy Silt, dark brown, moist, soft to medium stiff, no cobbles, scattered roots. |
| T-125 | 0.0 - 2.0 | Soil: Cobbly Sandy Clay, brown, moist, soft. |
| | 2.0 - 6.0 | Conejo Volcanics: Basalt, gray with brown iron oxide stains, very fractured but hard, dug to refusal.<br>Attitudes: N60W, 45SW - J N25E, 90 - J<br>N70E, 50NW - J<br>N85E, 47NW - B |

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-126 | 0.0 - 2.0 | Soil: Clayey Sand, brown, moist, loose to slightly dense, cobbly. |
| | 2.0 - 6.0 | Conejo Volcanics: Basalt, gray to brown, weathered upper one to two feet, hard below. |
| | | Attitude: N30E, 80SE - J |
| T-127 | 0.0 -12.0 | Terrace Deposits: Clayey Sand, brown, moist, loose to slightly dense, cobbly. At seven feet, one foot thick, layered medium- to coarse-grained sand. |
| | 12.0 -12.5 | Weathered Conejo Volcanics: Extremely weathered Basalt, brown, some rock fabric. |
| T-128 | 0.0 - 2.0 | Soil: Clayey Sand, brown, moist, loose to slightly dense, cobbly. |
| | 2.0 - 6.0 | Conejo Volcanics: Basalt, gray to brown, weathered upper one to two feet, hard below. |
| | | Attitude: N40E, 50NW - B(?) |
| T-129 | 0.0 - 8.0 | Valley Fill: Sandy Clay, reddish brown, moist, soft, occasional gravel. |
| | 8.0 -12.5 | Valley Fill: Sandy Clay, light reddish brown, damp to moist, stiff, not very porous, carbonate. |
| T-130 | 0.0 - 4.0 | Scattered Artificial Fill: Sandy Clay, dark brown, moist, soft porous. |
| | 4.0 -12.0 | Valley Fill: Bouldery to Cobbly Sand, brown to gray, coarse-grained, clean, moist, porous to moderately dense, common boulders to 2 feet in diameter. |

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-131 | 0.0 - 8.0 | Artificial Fill: Cobbly to Bouldery Sand Clay, reddish brown, moist, soft. Four inch road A.C. at eight feet, many roots. |
| | 8.0 -12.0 | Valley Fill: Clayey Sand, brown, moist, pliable, clean, loose to moderately dense. |
| T-132 | 0.0 - 4.0 | Soil/Colluvium: Cobbly Clay, dark brown, very moist, pliable, porous. |
| | 4.0 - 5.0 | Weathered Conejo Volcanics: Extremely weathered Basalt, brown, some rock fabric. |
| | 5.0 - 5.5 | Conejo Volcanics: Basalt, gray, massive, very hard, refusal. |
| T-133 | 0.0 -10.0 | Artificial Fill: Cobbly to Bouldery Sand Clay, reddish brown, moist, soft. |
| | 10.0 -12.0 | Conejo Volcanics: Basalt, gray to brown, weathered upper one foot, hard below. |
| T-134 | 0.0 - 8.0 | Artificial Fill: Cobbly to Bouldery Sand, reddish brown, moist, loose, caving. |
| | 8.0 - 9.0 | Conejo Volcanics: Basalt, dark brown, hard, refusal. |
| T-135 | 0.0 - 1.0 | Soil: Clayey Sand, brown, moist, soft. |
| | 1.0 - 6.0 | Conejo Volcanics: Basalt, olive brown, fractured, firm at depth, joints tighter with depth; joint shards are 1 inch to 4 inches in upper four feet of rock.<br><br>Attitudes: EW, 90 - J - abundant<br>N20W, 85SW - J - irregular surfaces<br>N10E, 52SE - J - not common<br>N80E, 45NW - B |

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-136 | 0.0 - 1.0 | Soil: Clayey Sand, brown, moist, soft. |
| | 1.0 - 6.0 | Conejo Volcanics: Basalt, olive brown, fractured, firm at depth; less fractured or weathered than T-135.<br><br>Attitudes: N30W, 35NE - J - discontinuous<br>N75E, 90 - J<br>N30E, 35SE - J |
| T-137 | 0.0 - 1.0 | Soil: Clayey Sand, brown, moist, soft. |
| | 1.0 - 4.0 | Conejo Volcanics: Basalt, olive brown, fractured firm at depth. |
| T-138 | 0.0 - 4.0 | Soil: Clayey Sand, brown, moist, porous, soft. |
| | 4.0 - 6.0 | Conejo Volcanics: Basalt to Andesite, brown, massive, weathered in upper one foot, firm below. |
| T-139 | 0.0 - 1.0 | Soil: Silty Sand, brown, fine-grained, moist, porous. |
| | 1.0 - 5.0 | Conejo Volcanics: Basalt, dark brown, slightly weathered, joints open upper two± feet, tight below, hard digging.<br><br>Attitudes: N50E, 70NW - J - rough surfaces<br>N10E, 90 - J |
| T-140 | 0.0 - 4.0 | Alluvium: Cobbly, Clayey, fine-sand, moist, soft. |
| | 4.0 - 7.0 | Conejo Volcanics: Basalt, dark gray, weathered upper two (2±) feet, firm below. |

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-141 | 0.0 - 0.5 | Alluvium: Cobbly Silty Sand, reddish brown, dry, porous. |
| | 0.5 -12.0 | Conejo Volcanics: Basalt , locally vesicular, firm but excavatable. |
| T-142 | 0.0 - 0.5 | Soil: Cobbly Silty Sand, reddish brown, dry, porous. |
| | 0.5 - 1.0 | Conejo Volcanics: Basalt , extremely hard, refusal. |
| | | Attitude: N15E, 90 - J |
| T-143 | 0.0 - 4.0 | Soil/Colluvium: Cobbly/bouldery Clayey Sand, brown, dry, loose. |
| | 4.0 - 5.0 | Conejo Volcanics: Basalt, dark gray, slightly fractured, hard, refusal. |
| | | Attitudes: N40E, 45NW - B<br>NS, 35E - J<br>N40W, 85SW - J |
| T-144 | 0.0 - 1.0 | Soil: Cobbly Silty Sand. |
| | 1.0 - 5.0 | Conejo Volcanics: Basalt , locally vesicular, firm but excavatable. |
| | | Attitudes: N15E, 75NW - J<br>N55E, 80SE - J |
| T-145 | 0.0 - 4.0 | Soil/Colluvium: Cobbly, Sandy Clay, dark brown, moist, soft, porous. |
| | 4.0 - 6.5 | Conejo Volcanics: Basalt, dark brownish gray, phenocrysts, massive, some carbonate deposition in upper one foot, weathered upper one foot. |

## Trench Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-146 | 0.0 - 2.0 | Soil: Cobbly Silty Sand, reddish brown, dry, porous. |
| | 2.0 - 3.0 | Conejo Volcanics: Basalt , extremely hard, refusal. |
| T-147 | 0.0 - 4.0 | Soil: Clayey Sandy reddish brown, moist, loose porous. |
| | 4.0 - 7.0 | Conejo Volcanics: Basalt, brown, firm, but not hard except at bottom. |
| T-148 | 0.0 - 6.0 | Valley Fill: Clayey Sandy reddish brown, moist, loose porous. |
| | 6.0 - 9.0 | Conejo Volcanics: Basalt, brown, firm, but not hard except at bottom. |

mm/1568L003

# TABLE II
## SUMMARY OF LABORATORY TEST DATA

| BORING/PIT NO. | DEPTH (ft.) | SOIL DESCRIPTION | GROUP SYMBOL, Unified Soil Classification System | MAXIMUM DRY DENSITY: Maximum Density (pcf) | MAXIMUM DRY DENSITY: Optimum Moisture (%) | GRAIN SIZE ANALYSIS: % + No. 4 Screen | % Coarse Sand | % Med.-Fine Sand | % Silt (0.074 to 0.005mm) | % Clay (-0.005 mm) | EXPANSION INDEX, UBC 29-2 | DIRECT SHEAR: Cohesion (psf) | DIRECT SHEAR: Ø, (Degrees) | DIRECT SHEAR: Test Conditions | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -6 | 5.0 | Medium brown. clayey silt | ML | 110.5 | 17.0 | | | 45 | 25 | 30 | 58 | | | | |
| -37 | 3.0 | Lt. green silty sand | SM | 119.5 | 14.0 | | | 86 | 12 | 2 | | | | | |
| -39 | 1.0 | Dark brown medium clay | CH | 106.5 | 19.5 | | | 24 | 19 | 57 | 115 | | | | |
| -45 | 2.0 | Lt. brown silty sand | SM | 122.5 | 11.5 | | | 83 | 10 | 7 | | | | | |
| -64 | 2.0 | Dark brown silty sand | SM | 119.0 | 14.0 | | | 78 | 19 | 3 | 16 | | | | |
| -66 | 2.0 | Dark brown clayey silt | ML | 112.5 | 15.5 | | | 47 | 38 | 15 | 86 | | | | |
| -66 | 5.0 | Dark brown sand | SP/SM | 112.0 | 18.0 | | | 91 | 8 | 1 | | | | | |

TEST CONDITIONS: R – Remolded, U – Undisturbed
S – Saturated, N – Natural Moisture

Work Order 101568A

Table II Continued

| Sample | pH | Sulfates % Dry Soil | Chlorides (ppm) | Alkalinity (Ca C03) (ppm) | Resistivity ohm-cm |
|---|---|---|---|---|---|
| T-45 @ 2.0 | 7.6 | 0 | 4 | 10 | 2660 |
| T-64 @ 2.0 | 7.9 | 0 | 4 | 14 | 2250 |
| T-34 @ 1.0 | 8.0 | 0 | 10 | 75 | 954 |
| T-66 @ 2.0 | 8.1 | 0 | 5 | 63 | 1120 |
| T-66 @ 5.0 | 8.8 | 0 | 4 | 52 | 1260 |

Tests performed by Twining Laboratories of Southern California, Inc.

May 15, 2000
Work Order 101568-MP

# APPENDIX III

## FIELD AND LABORATORY DATA

**(From this Investigation)**

# APPENDIX III

## TABLE OF CONTENTS

Field Investigation ..... Page 1

Plates A-1 through A-10 ..... Boring Logs

Table I ..... Log of Test Pits

Laboratory Tests ..... Pages 5 through 7

Table II ..... Summary of Laboratory Test Data Results

Plates B-1 and B-2 ..... Shear Test

Plates C-1 through C-6 ..... Consolidation Curves

Plate D ..... KYH Analytical

Plates E-1 through E-32 ..... Gross Slope Stability Analyses

## FIELD INVESTIGATION

A total of 12 borings and 15 test pits were excavated during the current investigation. Borings were excavated using a truck-mounted rotary bucket auger drill rig. Test pits were excavated with a track-mounted excavator. The exploratory excavations were logged and sampled at the time of investigation by a member of this firm's geologic staff. Relatively undisturbed samples were obtained from the borings as indicated on the boring logs. A split barrel type spoon with a 2.5 inch inside diameter and a tapered cutting tip at the lower end was used for sampling. The sample barrel is lined with brass rings, each one-inch in length. The samples penetrated bedrock or soil one foot below the bottom of the excavation. Blow counts were noted for each "undisturbed" sample obtained on the boring and test pit logs. The central portion of the sample was retained for testing. Samples were sealed in plastic bags and placed in containers for transportation to the laboratory. Bulk samples representative of onsite soil and bedrock materials were also obtained. Ground water was encountered in borings B-5, B-7, and B-101 and trenches T-46, T-47, T-48, T-70, T-112, T-116, T-118, and T-123. Boring and trench excavations were backfilled upon completion of drilling and sampling. The approximate locations of these excavations are shown on the Geotechnical Maps.

# GEOTECHNICAL BORING LOG



| | | | | | |
|---|---|---|---|---|---|
| PROJECT NO. | 101568-MP | PROJECT NAME | Sage | | |
| DATE STARTED | 4/25/00 | GROUND ELEV. | 842 | BORING DESIG. | B-101 |
| DATE FINISHED | 4/25/00 | GW DEPTH (FT) | 13 | LOGGED BY | DO |
| DRILLER | Ledezma Drilling | DRIVE WT. | See Note | NOTE | 0-24' 3547# |
| TYPE OF DRILL RIG | 30" Bucket Auger | DROP | 12 inches | | |

| DEPTH (feet) | ELEV. | SAMPLE TYPE | BLOWS/FT | LITHOLOGY | ATTITUDES | GEOTECHNICAL DESCRIPTION | MOISTURE CONT. (%) | DRY (pcf) DENSITY | SAT-URATION (%) | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 840 | | | | | **FILL (af):** Silty Clay; dark brown, slightly moist, soft. | | | | |
| 5 | | R | P | | | | 21.0 | 97 | 76 | |
| | 835 | | | | | | | | | |
| 10 | | R | P | | | Clayey Sand; dark brown, slightly moist, medium dense. | 19.2 | 110 | 98 | |
| | 830 | | | | | ▼ | | | | |
| 15 | | R | 4 for 6" | | | **ALLUVIUM (Qal):** Clayey Sand; brown, wet, medium dense.<br>**WEATHERED CONEJO VOLCANICS (Tcb):** Basalt; dark brown, moist, very hard. | 14.7 | 109 | 73 | |
| | 825 | | | | | Total Depth 16 feet.<br>Water at 13 feet.<br>Hole backfilled. | | | | |
| 20 | | | | | | | | | | |

SAMPLE TYPES:
- [R] RING (DRIVE) SAMPLE
- [S] SPT (SPLIT SPOON) SAMPLE
- [B] BULK SAMPLE [T] TUBE SAMPLE

▼ GROUNDWATER LEVEL
► WATER SEEP [C] CONTACT [B] BEDDING [F] FAULT [J] JOINTING [S] SHEAR

**PACIFIC SOILS ENGINEERING, INC.**

PLATE A-1

# GEOTECHNICAL BORING LOG



| | | | | | |
|---|---|---|---|---|---|
| PROJECT NO. | 101568-MP | PROJECT NAME | Sage | | |
| DATE STARTED | 4/25/00 | GROUND ELEV. | 900 | BORING DESIG. | B-102 |
| DATE FINISHED | 4/25/00 | GW DEPTH (FT) | | LOGGED BY | DO |
| DRILLER | Ledezma Drilling | DRIVE WT. | See Note | NOTE | 0-24' 3547# |
| TYPE OF DRILL RIG | 30" Bucket Auger | DROP | 12 inches | | |

| DEPTH (feet) | ELEV. | SAMPLE TYPE | BLOWS/FT | LITHOLOGY | ATTITUDES | GEOTECHNICAL DESCRIPTION | MOISTURE CONT. (%) | DRY (pcf) DENSITY | SAT-URATION (%) | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 900 | | | | | **FILL (af):** Clayey Silt; brown, slightly moist, soft. | | | | |
| 5 | 895 | R | P | | | Color change to dark brown. | 17.9 | 108 | 85 | |
| 10 | 890 | R/B | P | | | | 23.7 | 100 | 94 | |
| 15 | 885 | R | P | | | | 24.9 | 98 | 94 | |
| 20 | 880 | | | | | Few subangular to angular cobbles to 8" in size.<br>**CONEJO VOLCANICS (Tcb):** Basalt; dark brown, very hard.<br>Total Depth 21 feet.<br>No groundwater encountered.<br>Hole backfilled. | | | | |
| 25 | 875 | | | | | | | | | |
| 30 | 870 | | | | | | | | | |

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER LEVEL
- WATER SEEP
- B BEDDING
- J JOINTING
- C CONTACT
- F FAULT
- S SHEAR

**PACIFIC SOILS ENGINEERING, INC.**

PLATE A-2

# GEOTECHNICAL BORING LOG



| | | | | | |
|---|---|---|---|---|---|
| PROJECT NO. | 101568-MP | PROJECT NAME | Sage | | |
| DATE STARTED | 4/25/00 | GROUND ELEV. | 890 | BORING DESIG. | B-103 |
| DATE FINISHED | 4/25/00 | GW DEPTH (FT) | | LOGGED BY | DO |
| DRILLER | Ledezma Drilling | DRIVE WT. | See Note | NOTE | 0-24' 3547# |
| TYPE OF DRILL RIG | 30" Bucket Auger | DROP | 12 inches | | |

| DEPTH (feet) | ELEV. | SAMPLE TYPE | BLOWS/FT | LITHOLOGY | ATTITUDES | GEOTECHNICAL DESCRIPTION | MOISTURE CONT. (%) | DRY (pcf) DENSITY | SAT-URATION (%) | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 890 | | | | | **FILL (af):** Fine Sandy Clay; brown, slightly moist, soft, few subangular to angular gravel to 1 inch in size and few subangular to angular cobbles to 10 inches in size. | | | | |
| 5 | 885 | R | 2 | | | Clayey Silt; light brown, slightly moist, firm, trace subangular gravel to 1" in size. | 22.6 | 95 | 78 | |
| 10 | 880 | R | 2 | | | Color change to brown. | 23.7 | 93 | 78 | |
| | | | | | | Abundant cobbles, matrix light brown. Hole began to bell. | | | | |
| | | | | | | Total Depth 12 feet.<br>No groundwater encountered, belling at 11 feet.<br>Hole backfilled. | | | | |
| 15 | 875 | | | | | | | | | |
| 20 | 870 | | | | | | | | | |

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER LEVEL
► WATER SEEP
B BEDDING
J JOINTING
C CONTACT
F FAULT
S SHEAR

**PACIFIC SOILS ENGINEERING, INC.**

PLATE A-3

# GEOTECHNICAL BORING LOG



| | | | | | |
|---|---|---|---|---|---|
| PROJECT NO. | 101568-MP | PROJECT NAME | Sage | BORING DESIG. | B-104 |
| DATE STARTED | 4/25/00 | GROUND ELEV. | 870 | LOGGED BY | DO |
| DATE FINISHED | 4/25/00 | GW DEPTH (FT) | | NOTE | 0-24' 3547#; 24-47' 2577# |
| DRILLER | Ledezma Drilling | DRIVE WT. | See Note | | |
| TYPE OF DRILL RIG | 30" Bucket Auger | DROP | 12 inches | | |

| DEPTH (feet) | ELEV. | SAMPLE TYPE | BLOWS/FT | LITHOLOGY | ATTITUDES | GEOTECHNICAL DESCRIPTION | MOISTURE CONT. (%) | DRY (pcf) DENSITY | SAT-URATION (%) | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 870 | | | | | **VALLEY FILL (Qvf):** Sandy Clay; reddish brown, slightly moist, soft, trace angular cobbles to 6 inches in size. | | | | |
| 5 | 865 | R/B | 4 | | | Color change to brown, very stiff, some angular cobbles to 6 inches in size. | 11.1 | 109 | 54 | |
| 10 | 860 | R | 7 | | | Color change to brown, hard, some angular cobbles to 8 inches in size. | 10.9 | 121 | 75 | |
| 15 | 855 | R | 3 | | | Clayey Sand; reddish brown, slightly moist, medium dense, few gravel and cobbles. | 15.0 | 110 | 76 | |
| 20 | 850 | R | 2 | | | Clayey Silt; reddish brown, slightly moist, firm, few angular gravel and cobbles to 6 inches in size. | 27.1 | 95 | 96 | |
| 25 | 845 | R | 2 | | | | 28.0 | 92 | 92 | |
| 30 | 840 | R | 4 | | | Color change to light brown, very stiff. | 27.1 | 91 | 86 | |
| 35 | 835 | R | 15 | | | Silty fine Sand; light brown, moist, very dense, trace gravel and cobbles. | 17.2 | 112 | 91 | |
| | 830 | | | | | **CONEJO VOLCANICS (Tcb):** Basalt; dark brown, very hard, weathered. Total Depth 38 feet. No groundwater encountered. Hole backfilled. | | | | |

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER LEVEL
► WATER SEEP
B BEDDING
J JOINTING
C CONTACT
F FAULT
S SHEAR

**PACIFIC SOILS ENGINEERING, INC.**

PLATE A-4

# GEOTECHNICAL BORING LOG



| | | | | | |
|---|---|---|---|---|---|
| PROJECT NO. | 101568-MP | PROJECT NAME | Sage | | |
| DATE STARTED | 4/25/00 | GROUND ELEV. | 860 | BORING DESIG. | B-105 |
| DATE FINISHED | 4/25/00 | GW DEPTH (FT) | | LOGGED BY | DO |
| DRILLER | Ledezma Drilling | DRIVE WT. | See Note | NOTE | 0-24' 3547# |
| TYPE OF DRILL RIG | 30" Bucket Auger | DROP | 12 inches | | |

| DEPTH (feet) | ELEV. | SAMPLE TYPE | BLOWS/FT | LITHOLOGY | ATTITUDES | GEOTECHNICAL DESCRIPTION | MOISTURE CONT. (%) | DRY (pcf) DENSITY | SAT-URATION (%) | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 860 | | | | | **FILL (af):** Clayey Silt; reddish brown, slightly moist, soft, few subangular cobbles to 6 inches. | | | | |
| 5 | 855 | * | 2 for 4" | | | **VALLEY FILL (Qvf):** Silty fine Sand; light brown, slightly moist, dense. some angular gravel and cobbles to 12 inches in size. At 7 feet, Sand grading coarser with depth. Hole abandoned due to refusal (cobbles and boulders). Possible Conejo Volcanics at bottom of boring. | | | | |
| 10 | 850 | | | | | Total Depth 10 feet. No groundwater encountered. Hole backfilled. | | | | |
| 15 | 845 | | | | | | | | | |
| 20 | 840 | | | | | | | | | |
| 25 | 835 | | | | | | | | | |
| 30 | 830 | | | | | | | | | |
| 35 | 825 | | | | | | | | | |
| | 820 | | | | | *No recovery, rock in tip of sample. | | | | |

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

- GROUNDWATER LEVEL
- WATER SEEP
- B BEDDING
- J JOINTING
- C CONTACT
- F FAULT
- S SHEAR

**PACIFIC SOILS ENGINEERING, INC.**

PLATE A-5

# GEOTECHNICAL BORING LOG



| | | | | | |
|---|---|---|---|---|---|
| PROJECT NO. | 101568-MP | PROJECT NAME | Sage | BORING DESIG. | B-106 |
| DATE STARTED | 4/25/00 | GROUND ELEV. | 860 | LOGGED BY | DO |
| DATE FINISHED | 4/25/00 | GW DEPTH (FT) | | NOTE | 0-24' 3547# |
| DRILLER | Ledezma Drilling | DRIVE WT. | See Note | | |
| TYPE OF DRILL RIG | 30" Bucket Auger | DROP | 12 inches | | |

| DEPTH (feet) | ELEV. | SAMPLE TYPE | BLOWS/FT | LITHOLOGY | ATTITUDES | GEOTECHNICAL DESCRIPTION | MOISTURE CONT. (%) | DRY (pcf) DENSITY | SAT-URATION (%) | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 860 | | | | | **FILL (af):** Clayey Silt; reddish brown, slightly moist, soft, trace subangular cobbles to 6 inches in size. | | | | |
| 5 | 855 | R | 4 for 10" | | | **VALLEY FILL (Qvf):** Silty fine Sand; reddish brown, slightly moist, moderately dense (part of rock in tip). | 14.8 | 111 | 77 | |
| | | | | | | At 7 feet, some subangular cobbles to 6 inches in size. | | | | |
| 10 | 850 | | | | | Refusal due to cobbles and boulders. Possible Conejo Volcanics at bottom of boring.<br>Total Depth 10 feet.<br>No groundwater encountered.<br>Hole backfilled. | | | | |
| 15 | 845 | | | | | | | | | |
| 20 | 840 | | | | | | | | | |

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER LEVEL
- WATER SEEP
- B BEDDING
- J JOINTING
- C CONTACT
- F FAULT
- S SHEAR

**PACIFIC SOILS ENGINEERING, INC.**

PLATE A-6

# GEOTECHNICAL BORING LOG



| | | | | | |
|---|---|---|---|---|---|
| PROJECT NO. | 101568-MP | PROJECT NAME | Sage | | |
| DATE STARTED | 4/25/00 | GROUND ELEV. | 860 | BORING DESIG. | B-107 |
| DATE FINISHED | 4/25/00 | GW DEPTH (FT) | | LOGGED BY | DO |
| DRILLER | Ledezma Drilling | DRIVE WT. | See Note | NOTE | 0-24' 3547# |
| TYPE OF DRILL RIG | 30" Bucket Auger | DROP | 12 inches | | |

| DEPTH (feet) | ELEV. | SAMPLE TYPE | BLOWS/FT | LITHOLOGY | ATTITUDES | GEOTECHNICAL DESCRIPTION | MOISTURE CONT. (%) | DRY (pcf) DENSITY | SAT. URATION (%) | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 860 | | | | | **FILL (af):** Sandy Clay; brown, moist, soft, angular cobbles and boulders to 18 inches in size. | | | | |
| 5 | 855 | * | | | | | | | | |
| | | | | | | **WEATHERED CONEJO VOLCANICS (Tcb):** Basalt; dark red, very hard. | | | | |
| 10 | 850 | | | | | Total Depth 9 feet.<br>No groundwater encountered.<br>Hole backfilled. | | | | |
| 15 | 845 | | | | | | | | | |
| 20 | 840 | | | | | | | | | |
| 25 | 835 | | | | | | | | | |
| 30 | 830 | | | | | | | | | |
| 35 | 825 | | | | | | | | | |
| | 820 | | | | | *No sampling attempted due to cobbles and boulders. | | | | |

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

- GROUNDWATER LEVEL
- WATER SEEP
- B BEDDING
- J JOINTING
- C CONTACT
- F FAULT
- S SHEAR

**PACIFIC SOILS ENGINEERING, INC.**

PLATE A-7

# GEOTECHNICAL BORING LOG



| | | | | | |
|---|---|---|---|---|---|
| PROJECT NO. | 101568-MP | PROJECT NAME | Sage | | |
| DATE STARTED | 4/26/00 | GROUND ELEV. | 870 | BORING DESIG. | B-108 |
| DATE FINISHED | 4/26/00 | GW DEPTH (FT) | | LOGGED BY | DO |
| DRILLER | Ledezma Drilling | DRIVE WT. | See Note | NOTE | 0-24' 3547# |
| TYPE OF DRILL RIG | 30" Bucket Auger | DROP | 12 inches | | |

| DEPTH (feet) | ELEV. | SAMPLE TYPE | BLOWS/FT | LITHOLOGY | ATTITUDES | GEOTECHNICAL DESCRIPTION | MOISTURE CONT. (%) | DRY (pcf) DENSITY | SAT-URATION (%) | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 870 | | | | | **VALLEY FILL (Qvf):** Silty fine Sand; reddish brown, slightly moist, medium dense. | | | | |
| 5 | 865 | R | 3 | | | | 18.5 | 103 | 79 | |
| 10 | 860 | R/B | 2 | | | Fine to medium Silty Sand; reddish brown, slightly moist, medium dense. | 9.3 | 97 | 34 | |
| 15 | 855 | * | | | | Medium Silty Sand; light brown, slightly moist, medium dense, few angular gravel and cobbles to 8 inches in size. Gravel and cobbles increasing in amount with depth. Some belling occurring. **WEATHERED CONEJO VOLCANICS (Tcb):** Basalt; dark brown, very hard, fractured. | | | | |
| 20 | 850 | | | | | Total Depth 20 feet. No groundwater encountered. Slight belling at 16 feet. Hole backfilled. | | | | |
| 25 | 845 | | | | | | | | | |
| 30 | 840 | | | | | | | | | |

*No sampling attempted, due to gravel and cobbles.

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

- ▼ GROUNDWATER LEVEL
- ► WATER SEEP
- B BEDDING
- J JOINTING
- C CONTACT
- F FAULT
- S SHEAR

**PACIFIC SOILS ENGINEERING, INC.**

PLATE A-8

# GEOTECHNICAL BORING LOG



| | | | | | |
|---|---|---|---|---|---|
| PROJECT NO. | 101568-MP | PROJECT NAME | Sage | | |
| DATE STARTED | 4/26/00 | GROUND ELEV. | 870 | BORING DESIG. | B-109 |
| DATE FINISHED | 4/26/00 | GW DEPTH (FT) | | LOGGED BY | DO |
| DRILLER | Ledezma Drilling | DRIVE WT. | See Note | NOTE | 0-24' 3547#; 24-47' 2577# |
| TYPE OF DRILL RIG | 30" Bucket Auger | DROP | 12 inches | | |

| DEPTH (feet) | ELEV. | SAMPLE TYPE | BLOWS/FT | LITHOLOGY | ATTITUDES | GEOTECHNICAL DESCRIPTION | MOISTURE CONT. (%) | DRY (pcf) DENSITY | SAT-URATION (%) | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 870 | | | | | **FILL (af):** Silty Clay; dark brown, moist, firm. | | | | |
| | | | | | | **VALLEY FILL (Qvf):** Medium to coarse Sand; reddish brown, slightly moist, medium dense. | | | | |
| 5 | 865 | R | 12 | | | Very dense. | 16.6 | 110 | 84 | |
| | | | | | | At 7 feet, few angular cobbles to 6 inches in size. | | | | |
| 10 | 860 | * | | | | Fine Silty Sand; reddish brown, slightly moist, dense. | | | | |
| | | | | | | Medium to coarse Silty Sand; reddish brown, slightly moist, dense, some angular gravel and cobbles to 8 inches in size. | | | | |
| 15 | 855 | * | | | | Ripping started. | | | | |
| 20 | 850 | * | | | | **WEATHERED CONEJO VOLCANICS (Tcb):** Basalt; red brown, very hard. | | | | |
| | | | | | | Total Depth 22 feet. | | | | |
| | | | | | | No groundwater encountered. | | | | |
| | | | | | | Hole backfilled. | | | | |
| 25 | 845 | | | | | | | | | |
| 30 | 840 | | | | | | | | | |
| 35 | 835 | | | | | | | | | |
| | 830 | | | | | *No sampling attempted. | | | | |

SAMPLE TYPES:
- [R] RING (DRIVE) SAMPLE
- [S] SPT (SPLIT SPOON) SAMPLE
- [B] BULK SAMPLE
- [T] TUBE SAMPLE

- GROUNDWATER LEVEL
- WATER SEEP
- [B] BEDDING
- [J] JOINTING
- [C] CONTACT
- [F] FAULT
- [S] SHEAR

**PACIFIC SOILS ENGINEERING, INC.**

PLATE A-9

# GEOTECHNICAL BORING LOG



| | | | | | |
|---|---|---|---|---|---|
| PROJECT NO. | 101568-MP | PROJECT NAME | Sage | | |
| DATE STARTED | 4/26/00 | GROUND ELEV. | 845 | BORING DESIG. | B-110 |
| DATE FINISHED | 4/26/00 | GW DEPTH (FT) | | LOGGED BY | DO |
| DRILLER | Ledezma Drilling | DRIVE WT. | See Note | NOTE | 0-24' 3547# |
| TYPE OF DRILL RIG | 30" Bucket Auger | DROP | 12 inches | | |

| DEPTH (feet) | ELEV. | SAMPLE TYPE | BLOWS/FT | LITHOLOGY | ATTITUDES | GEOTECHNICAL DESCRIPTION | MOISTURE CONT. (%) | DRY (pcf) DENSITY | SAT-URATION (%) | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 845 | | | | | **FILL (af):** Silty Clay; dark brown, moist, firm. | | | | |
| | | | | | | **VALLEY FILL (Qvf):** Silty Sand; light brown, slightly moist, medium dense, few gravel and cobbles to 6 inches in size. | | | | |
| 5 | 840 | * | | | | | | | | |
| | | | | | | Color changed to brown. | | | | |
| 10 | 835 | R | 7 | | | Color change to light brown, dense. | 15.4 | 121 | 106 | |
| 15 | 830 | R | 8 for 6" | | | **WEATHERED CONEJO VOLCANICS (Tcb):** Basalt; dark brown, moist, very hard, fractured. | 11.5 | 125 | 90 | |
| | | | | | | Total Depth 16 feet.<br>No groundwater encountered.<br>Hole backfilled. | | | | |
| 20 | 825 | | | | | | | | | |
| 25 | 820 | | | | | | | | | |
| 30 | 815 | | | | | | | | | |

*No sample attempted due to cobbles.

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER LEVEL
- WATER SEEP
- B BEDDING
- J JOINTING
- C CONTACT
- F FAULT
- S SHEAR

**PACIFIC SOILS ENGINEERING, INC.**

PLATE A-10

# GEOTECHNICAL BORING LOG



| | | | | | |
|---|---|---|---|---|---|
| PROJECT NO. | 101568-MP | PROJECT NAME | Sage | | |
| DATE STARTED | 4/26/00 | GROUND ELEV. | 875 | BORING DESIG. | B-111 |
| DATE FINISHED | 4/26/00 | GW DEPTH (FT) | | LOGGED BY | DO |
| DRILLER | Ledezma Drilling | DRIVE WT. | See Note | NOTE | 0-24' 3547#; 24-47' 2577# |
| TYPE OF DRILL RIG | 30" Bucket Auger | DROP | 12 inches | | |

| DEPTH (feet) | ELEV. | SAMPLE TYPE | BLOWS/FT | LITHOLOGY | ATTITUDES | GEOTECHNICAL DESCRIPTION | MOISTURE CONT. (%) | DRY (pcf) DENSITY | SAT-URATION (%) | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 875 | | | | | **FILL (af):** Sandy Clay; dark brown, moist, soft. | | | | |
| 5 | 870 | R | P | | | Pieces of brick and concrete. | 16.8 | 106 | 77 | |
| 10 | 865 | R | 2 | | | Color change to brown, stiff. | 19.4 | 106 | 88 | |
| 15 | 860 | R | 2 | | | Sandy Silt; brown, moist, stiff, few angular cobbles to 6 inches in size. | 20.6 | 101 | 82 | |
| 20 | 855 | * | | | | Silty Clay with Sand; gray brown, slightly moist. | | | | |
| 25 | 850 | R | P | | | Sandy Clay; dark brown, moist, soft. | 22.6 | 102 | 93 | |
| 30 | 845 | | 10 for 7" | | | **ALLUVIUM (Qal):** Silty Sand; red brown, dry, dense. No recovery. | | | | |
| 35 | 840 | | | | | Total Depth 35 feet.<br>No groundwater encountered.<br>Hole backfilled. | | | | |
| | 835 | | | | | *No sampling attempted due to cobbles. | | | | |

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

- ▼ GROUNDWATER LEVEL
- ► WATER SEEP
- B BEDDING
- J JOINTING
- C CONTACT
- F FAULT
- S SHEAR

**PACIFIC SOILS ENGINEERING, INC.**

PLATE A-11

# GEOTECHNICAL BORING LOG



| | | | | | |
|---|---|---|---|---|---|
| PROJECT NO. | 101568-MP | PROJECT NAME | Sage | | |
| DATE STARTED | 4/26/00 | GROUND ELEV. | 860 | BORING DESIG. | B-112 |
| DATE FINISHED | 4/26/00 | GW DEPTH (FT) | | LOGGED BY | DO |
| DRILLER | Ledezma Drilling | DRIVE WT. | See Note | NOTE | 0-24' 3547# |
| TYPE OF DRILL RIG | 30" Bucket Auger | DROP | 12 inches | | |

| DEPTH (feet) | ELEV. | SAMPLE TYPE | BLOWS/FT | LITHOLOGY | ATTITUDES | GEOTECHNICAL DESCRIPTION | MOISTURE CONT. (%) | DRY (pcf) DENSITY | SAT-URATION (%) | OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 860 | | | | | **FILL (af):** Sandy Clay; brown, moist, soft, few angular cobbles to 6 inches in size. | | | | |
| | | | | | | Cobble amount and size increases with depth (up to 12"). | | | | |
| 5 | 855 | * | | | | | | | | |
| 10 | 850 | * | | | | | | | | |
| 15 | 845 | * | | | | **PROBABLE CONEJO VOLCANICS (Tcb):** Basalt; brown, slightly moist, very dense, hard. | | | | |
| | | | | | | Total Depth 18 feet.<br>No groundwater encountered.<br>Hole backfilled. | | | | |
| 20 | 840 | | | | | | | | | |
| 25 | 835 | | | | | | | | | |
| 30 | 830 | | | | | | | | | |
| 35 | 825 | | | | | | | | | |
| | 820 | | | | | *No sampling attempted due to cobbles. | | | | |

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

▼ GROUNDWATER LEVEL
► WATER SEEP
B BEDDING
J JOINTING
C CONTACT
F FAULT
S SHEAR

**PACIFIC SOILS ENGINEERING, INC.**

PLATE A-12

**TABLE I**

**Test Pit Logs**

Date Excavated: March 2000
By: MFM
Equip.: JD555

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-301 | 0.0 - 3.0 | Colluvium/Topsoil: Cobbly Clayey Silt, dark brown, cobbles are local volcanics, very moist, soft, porous, roots. |
| | 3.0 - 5.0 | Conejo Volcanics: Basalt, dark grayish brown, weathered, rock fabric destroyed in upper 2 feet, carbonate nodules in upper 2 feet, fresher below. |
| T-302 | 0.0 - 5.5 | Alluvium: Cobbly to Bouldery Sandy Silt, dark brown, moist to saturated, soft, roots, *water at 5 feet.* |
| | 5.5 -6.5 | Conejo Volcanics: Basalt, gray to brown, massive, hard. |
| T-303 | 0.0 - 3.5 | Alluvium: Cobbly to Bouldery Sandy Silt, dark brown, moist to saturated, soft, roots, copious cobbles, *water at 3 feet.* |
| | 3.5 -5.5 | Conejo Volcanics: Basalt, gray to brown, massive, hard. |
| T-304 | 0.0 - 0.5 | Soil: Cobbly Sand, gray, moist, loose. |
| | 0.5 - 3.5 | Conejo Volcanics: Basalt, dark brown where weathered, gray where fresh, difficult digging. |
| | | Attitude: N60E, 50NW - B |
| T-305 | 0.0 - 0.5 | Soil: Silty Sand, dark brown, very moist, soft, porous. |
| | 0.5 - 5.0 | Conejo Volcanics: Basalt, dark brown, hard. |
| | | Attitudes: N85W, 45NE - B<br>N15E, 90 - J |

Note: J = Joint surface; B = Bedding

## Test Pit Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-306 | 0.0 - 1.0 | Soil: Silty Sand, dark brown, very moist, soft, porous. |
| | 1.0 - 4.5 | Conejo Volcanics: Basalt, dark brown, slightly weathered, hard. |
| T-307 | 0.0 - 4.5 | Alluvium: Clayey Silt, light brown, very moist, soft, porous. |
| | 4.5 - 6.5 | Conejo Volcanics: Basalt, dark gray, slightly weathered, blocky but hard. |
| | | Attitudes: N65E, 45N - B<br>NS, 80E - J<br>N65E, 759NW - J |
| T-308 | 0.0 - 10.0 | Fill/Alluvium: Sandy Silt, brown, moist to saturated, soft, *water at 9.5 feet.* |
| T-309 | 0.0 - 0.4 | Soil: Sandy Silt, dark brown, very moist, soft. |
| | 0.4 - 3.0 | Conejo Volcanics: Basalt, gray, hard locally fractured, damp. |
| | | Attitudes: N70E, 65SE - J<br>N60E, 90 - J |
| T-310 | 0.0 - 2.5 | Soil: Clayey Sand, brown, moist, soft, porous. |
| | 2.5 - 3.0 | Conejo Volcanics: Porphyritic Basalt, brown, damp, hard. |
| | | Attitude: N60E, 55SE - J |
| T-311 | 0.0 - 4.5 | Colluvium: Silty Sand, brown, very moist, soft, porous. |
| | 4.5 - 6.5 | Conejo Volcanics: Basalt, grayish brown, very hard below 6 feet, refusal. |

## Test Pit Logs

| Test Pit No. | Depth (feet) | Description |
|---|---|---|
| T-312 | 0.0 - 6.5 | Colluvium/Soil: Silty Clay, dark grayish brown, few cobbles/pebbles, soft, very moist. |
| | 6.5 - 8.0 | Conejo Volcanics: Basalt, dark grayish brown, firm to hard, damp. |
| T-313 | 0.0 - 1.0 | Soil: Sandy Silt, brown, moist, loose, pebbly. |
| | 1.0 - 4.0 | Conejo Volcanics: Basalt, gray, hard, refusal at 4.0 feet. |
| | | Attitude: N80W, 80SW - J |
| T-314 | 0.0 - 0.5 | Soil: Silty Sand, brown, moist, soft, porous. |
| | 0.5 - 3.0 | Conejo Volcanics: Porphyritic Basalt, brown, damp, weathered in upper four feet. |
| | | Attitude: N10E, 70NW - J<br>N 50E, 70SE - J |
| T-315 | 0.0 - 0.5 | Soil: Silty Sand, brown, dry, soft, porous. |
| | 0.5 - 4.0 | Conejo Volcanics: Basalt, brown, damp, weathered in upper 2 feet. |

## LABORATORY TESTS

The results of laboratory testing performed during this study are enclosed within this Appendix. Table II presents a summary of laboratory test results.

The following laboratory tests were performed on representative samples in accordance with the applicable latest standards or methods from the ASTM, Uniform Building Code (U.B.C.), and California Department of Transportation.

### In-Place Moisture and Density

The field moisture content and in-situ dry density were established on relatively undisturbed ring samples obtained from the borings. The moisture content was obtained in accordance with ASTM:D-2216. The in-situ dry density was computed using the net weight of the entire sample. The results of these tests are presented on the boring logs.

### Classification

Soils were classified with respect to the Unified Soil Classification System (USCS) in general accordance with ASTM:D-2487 and D-2488.

### Consolidation Tests

Consolidation tests were performed on six relatively undisturbed soil samples in accordance with procedures outlined in ASTM D-2435. Samples were placed in a consolidometer and loads were applied incrementally in geometric progression. The sample (2.5 inches in diameter and 1 inch in height) was permitted to consolidate under each load increment until the slope of the characteristics linear secondary compression portion of the thickness versus log of time plot was apparent.

The percent consolidation for each load cycle was recorded as the ratio of the amount of vertical compression to the original 1-inch height. Hydroconsolidation (collapse) and expansion characteristics were also evaluated by monitoring the change in volume with saturation while the specimen was confined under a constant normal stress. Consolidation test results are shown on Plates C-1 through C-6.

**Direct Shear Tests**

Direct shear tests were performed on both remolded (90 percent relative compaction) and relatively "undisturbed" samples. The samples were soaked a minimum of 12 hours prior to shearing. The apparatus used is in conformance with the requirements outlined in ASTM: D-3080. The test specimens, 2.5 inches in diameter and 1 inch in height, were subjected to simple shear along a plane at mid-height.

The samples were sheared under varying normal loads approximating existing/proposed over-burdens. A strain rate of 0.050 inches per minute was used to evaluate shear strength values. The specimens were sheared until the shear stress reached a constant value or until the sample deformation had reached approximately 10 percent of the original diameter.

The shear stress values obtained from the tests were plotted versus applied normal pressures. The best-fitting straight lines were drawn through the plotted points to obtain the shear strength envelopes. The cohesion and angle of internal friction of the soil materials were evaluated from the shear strength envelopes. The direct shear test results are shown on Plates B-1 and B-2.

**Maximum Density/Optimum Moisture**

The maximum dry density and optimum moisture content of two selected bulk samples were evaluated in accordance with ASTM:D-1557-91. The results of these tests are summarized in Table II.

**Grain Size Analysis**

Grain size analysis, consisting of modified hydrometer portion of ASTM:D-2422-72, were conducted to aid in classification of the soils. The results of the particle size analyses are presented in Table II.

**Expansion Index**

Two expansion index tests were performed to evaluate the expansion potential of the onsite soils. Testing was carried out in according to UBC Method 18-2. The test results are presented on Table II.

**Chemical Analyses**

Chemical analyses of onsite soil samples were tested by others for the presence of soluble sulfates. Samples were also tested for resistivity and pH and chloride content. The results of these tests are presented in Table II and in a report by KYH Company, attached as Plate D.

## TABLE II

## SUMMARY OF LABORATORY TEST DATA

Work Order 101568-MP

May 15, 2000

| Boring/Test Pit | Depth (ft.) | Sample Type* | Soil Description | Group Symbol, Unified Soil Classification System | ASTM D-1557 | | | Hydrometer Analysis | | | | Direct Shear | | | Sulfate** (% by wt.) | pH | Resistivity (ohm-cms) | Chloride** (% by wt.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maximum Dry Density (pcf) | Optimum Moisture Content (%) | Expansion Index (UBC 18-2) | % plus No. 4 Screen | Sand % - No. 10 Screen | Silt % - No. 10 Screen | Clay % - No. 10 Screen | Cohesion (psf) | Friction Angle ,ϕ, (degrees) | Test Conditions | | | | |
| B-101 | 10 | R | Dark Brown Gravelly Clayey Sand | GC/SC | | | | 22 | 59 | 23 | 18 | | | | | | | |
| B-102 | 10 | B | Dark Brown Clayey Silt | ML | 117.5 | 13.2 | 54 | 3 | 51 | 30 | 19 | 800 | 23 | R,S | 0.001 | 7.9 | 1310 | |
| B-102 | 10 | R | Dark Brown Clayey Sand | SC | | | | 3 | 49 | 29 | 22 | | | | | | | |
| B-103 | 5 | R | Light Brown Gravelly Clayey Silt | CL/ML | | | | 11 | 44 | 28 | 28 | 250 | 47 | U,S | | | | |
| B-104 | 20 | R | Reddish Brown Clayey Silt | ML | | | | 1 | 30 | 47 | 23 | | | | | | | |
| B-104 | 30 | R | Light Brown Clayey Silt | ML | | | | 3 | 36 | 45 | 19 | | | | | | | |
| B-108 | 10 | R | Reddish Brown Silty Sand | SM | | | | 0 | 79 | 19 | 2 | 450 | 30 | U,S | | | | |
| B-108 | 10 | B | Reddish Brown Silty Sand | SM | 114.0 | 13.5 | 2 | 0 | 75 | 23 | 2 | 400 | 31 | R,S | <0.001 | 8.2 | 2380 | 0.003 |
| B-109 | 5 | R | Reddish Brown Gravelly Sand | SP | | | | 3 | 86 | 14 | 0 | 110 | 49 | U,S | | | | |

* B = Bulk and R = Ring

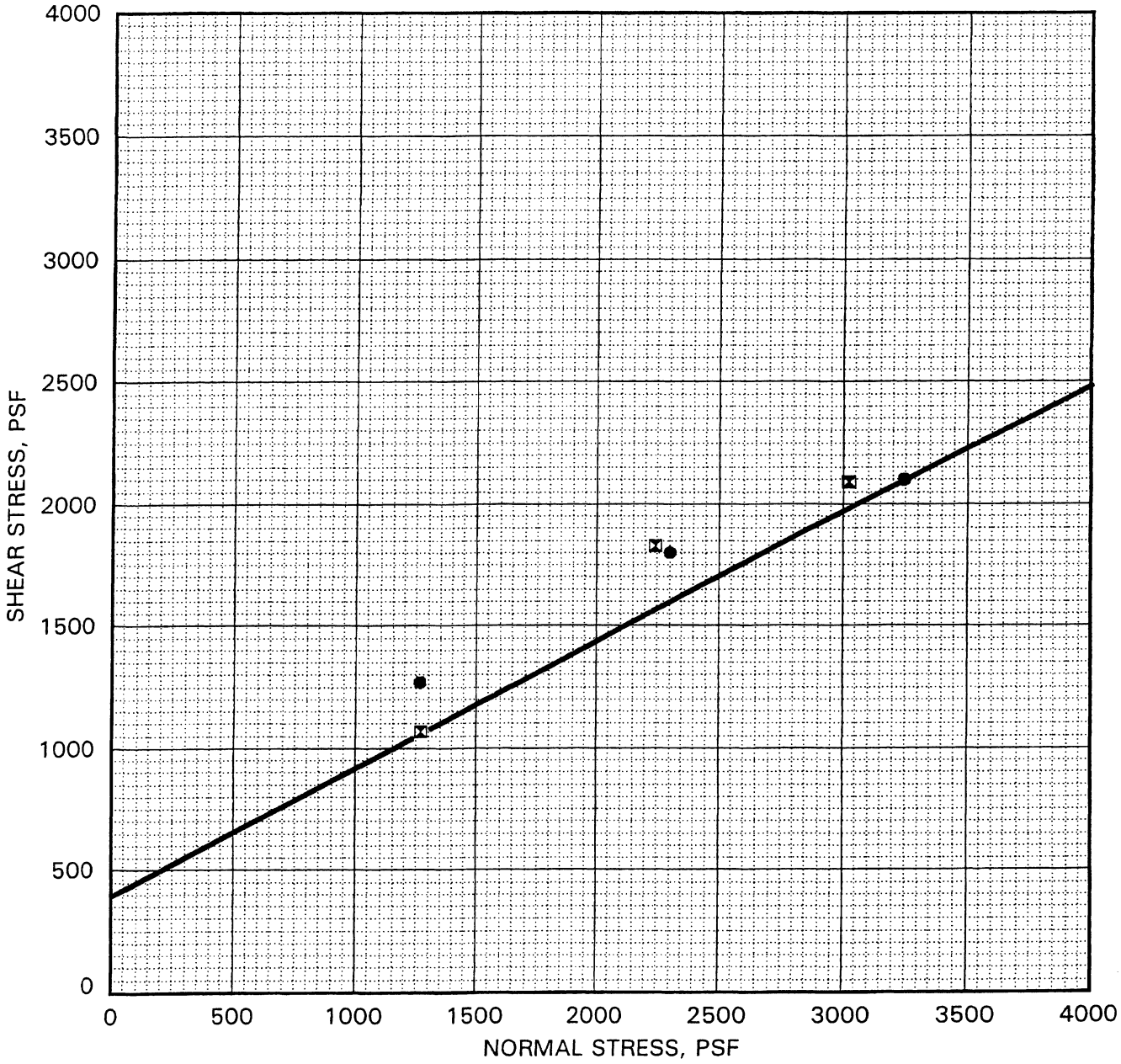
** Tested by others, see Plate D

Test Conditions: R-Remolded; U-Undisturbed

S-Saturated; N-Natural Moisture

# DIRECT SHEAR TEST

## REMOLDED




| COMPACTED FILL<br>VALUES UTILIZED IN ANALYSIS | COHESION **400** psf.<br>FRICTION ANGLE **28** degrees |
|---|---|

| symbol | boring | depth (ft.) | symbol | boring | depth (ft.) |
|---|---|---|---|---|---|
| ● | B-102 | 10.0 | | | |
| ⊠ | B-108 | 10.0 | | | |

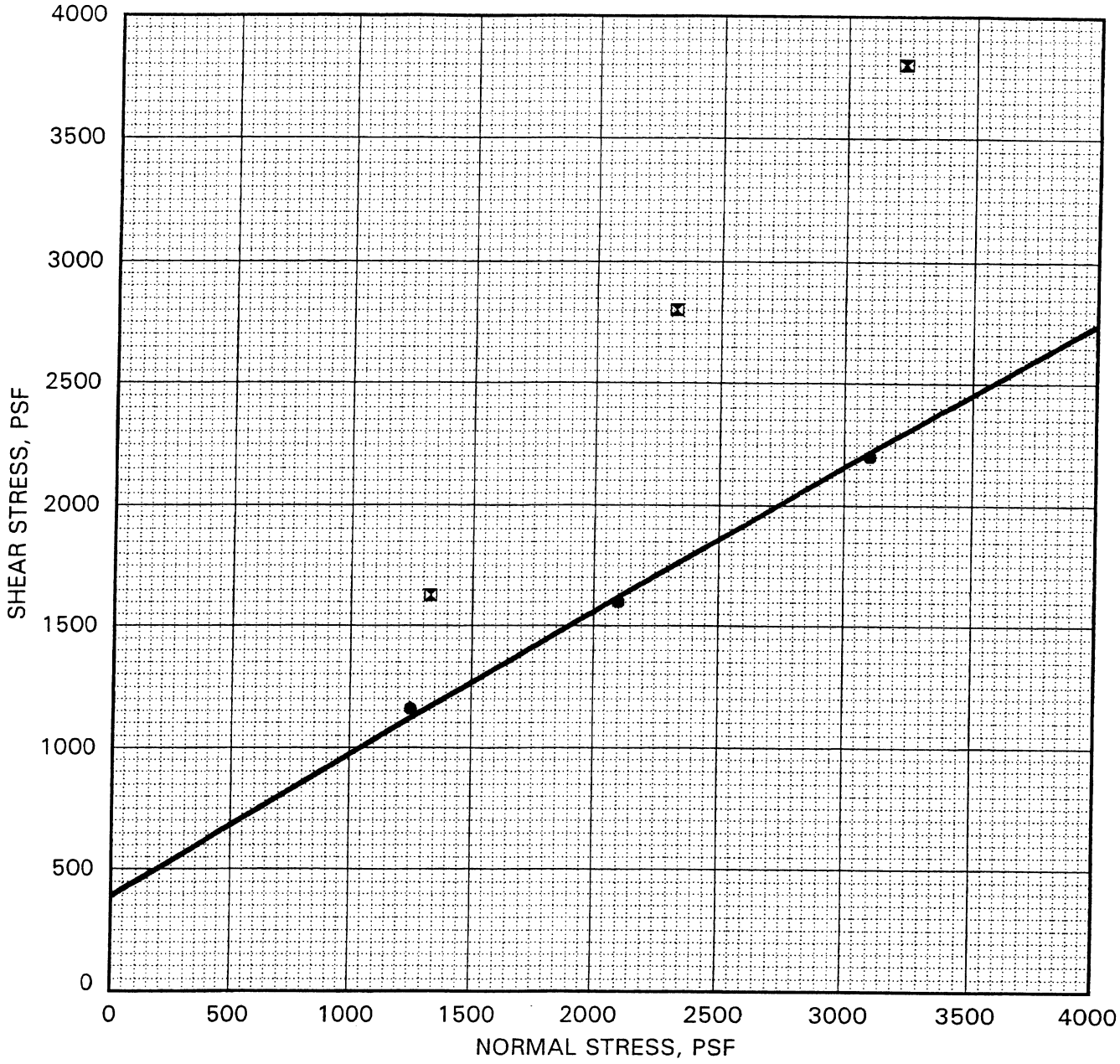
DIRECT SHEAR TEST

**PACIFIC SOILS ENGINEERING, INC.**
10653 PROGRESS WY. CYPRESS, CA 90630 714-220-0770

W.O. 101568-MP PLATE B-1

# DIRECT SHEAR TEST

## "UNDISTURBED"




| "VALLEY FILL" (Qvf) VALUES UTILIZED IN ANALYSIS | COHESION | **400** psf. |
|---|---|---|
| | FRICTION ANGLE | **30** degrees |

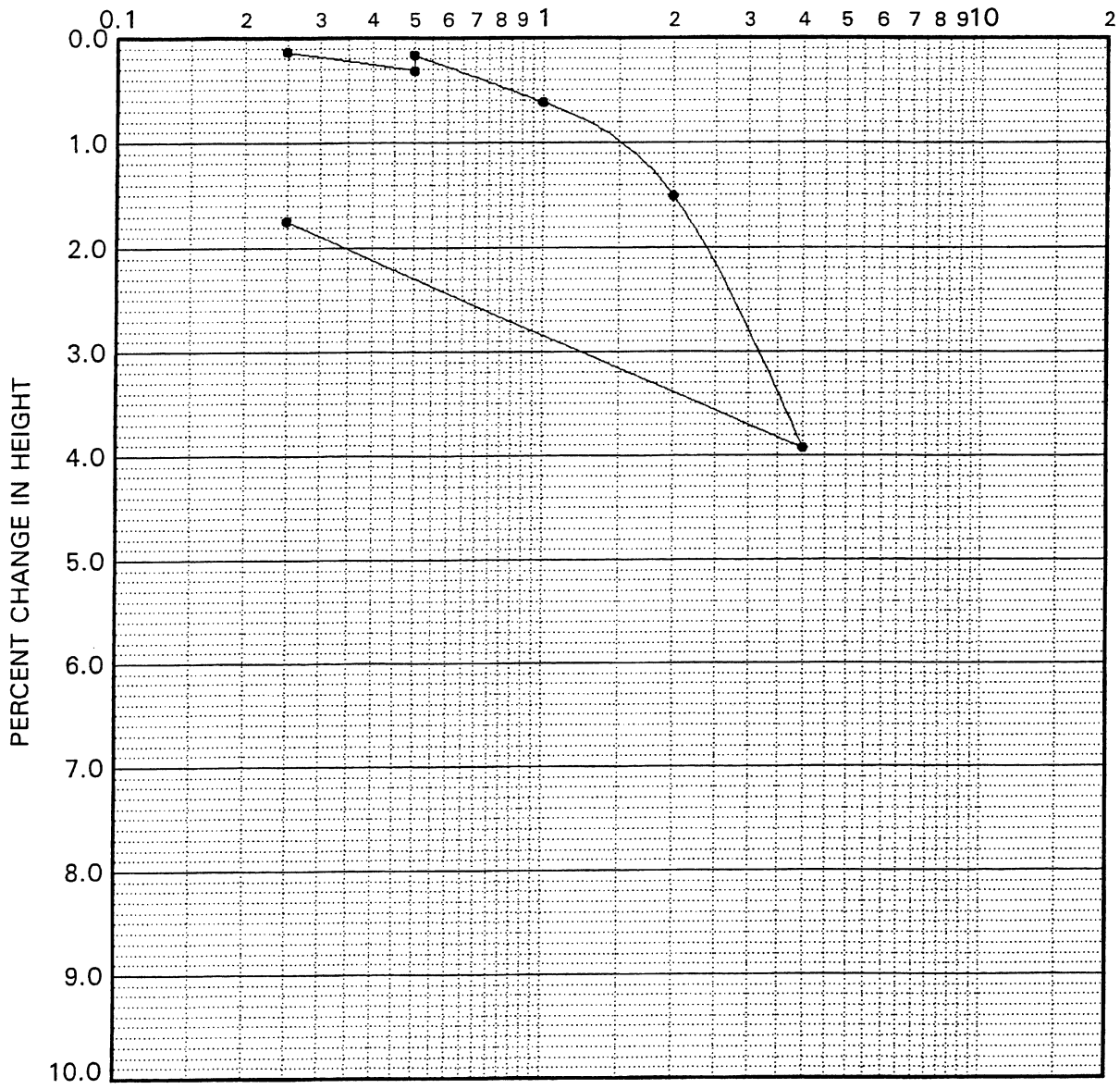
| symbol | boring | depth (ft.) | symbol | boring | depth (ft.) |
|---|---|---|---|---|---|
| ● | B-108 | 10.0 | | | |
| ⊠ | B-109 | 5.0 | | | |

DIRECT SHEAR TEST


**PACIFIC SOILS ENGINEERING, INC.**

10653 PROGRESS WY. CYPRESS, CA 90630 714-220-0770


W.O. 101568-MP PLATE B-2



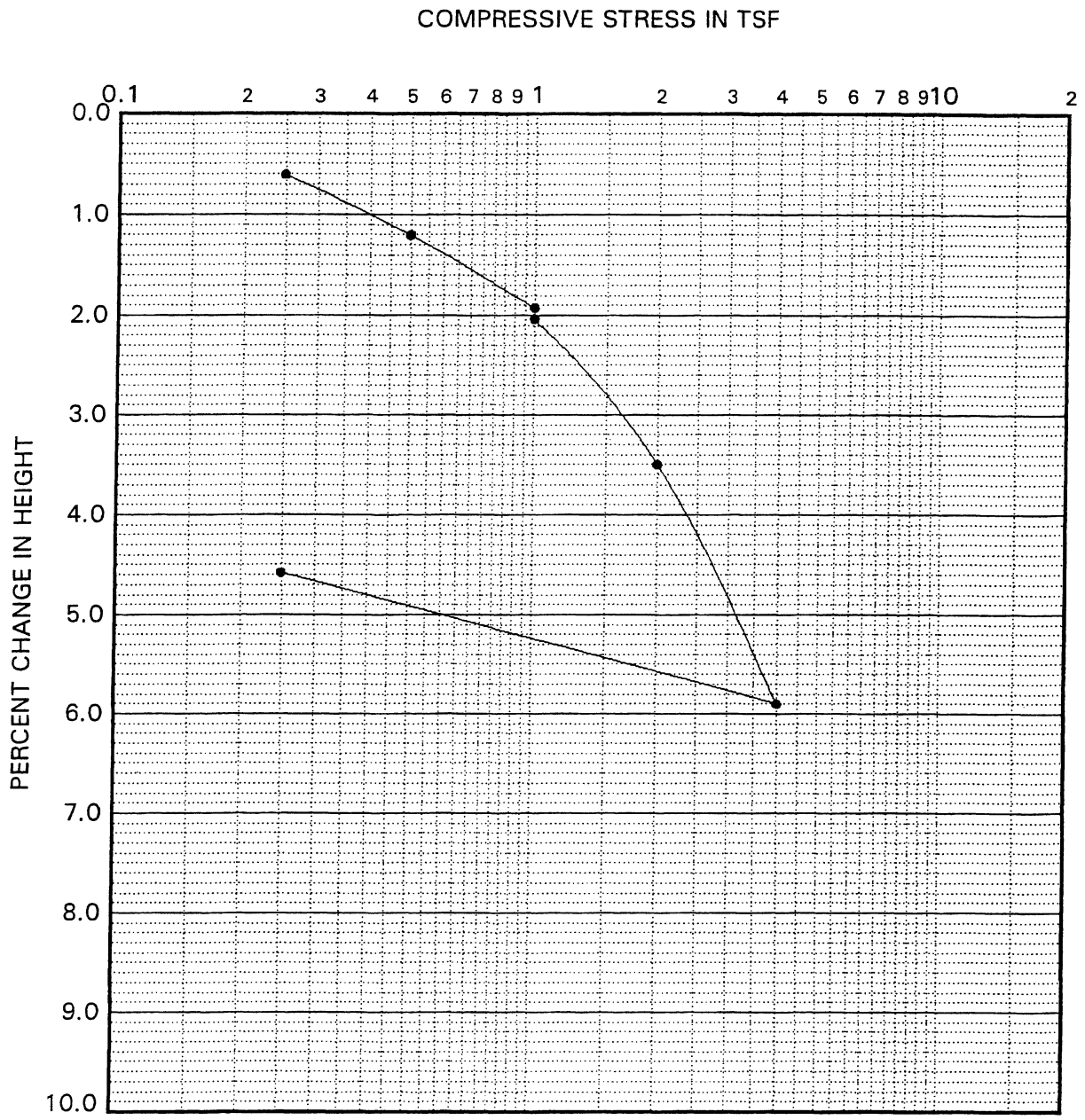

| Boring | Depth(ft.) | Dry Density | in situ Moist. | -200 sieve | Group Symbol | Typical Names |
|---|---|---|---|---|---|---|
| B-104 | 20.0 | 95.4 | 27.1 | 34% | ML | CLAYEY SILT |

WATER ADDED AT 1/2 TSF.

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
10653 PROGRESS WY. CYPRESS, CA 90630 714-220-0770

W.O. 101568-MP PLATE C-1



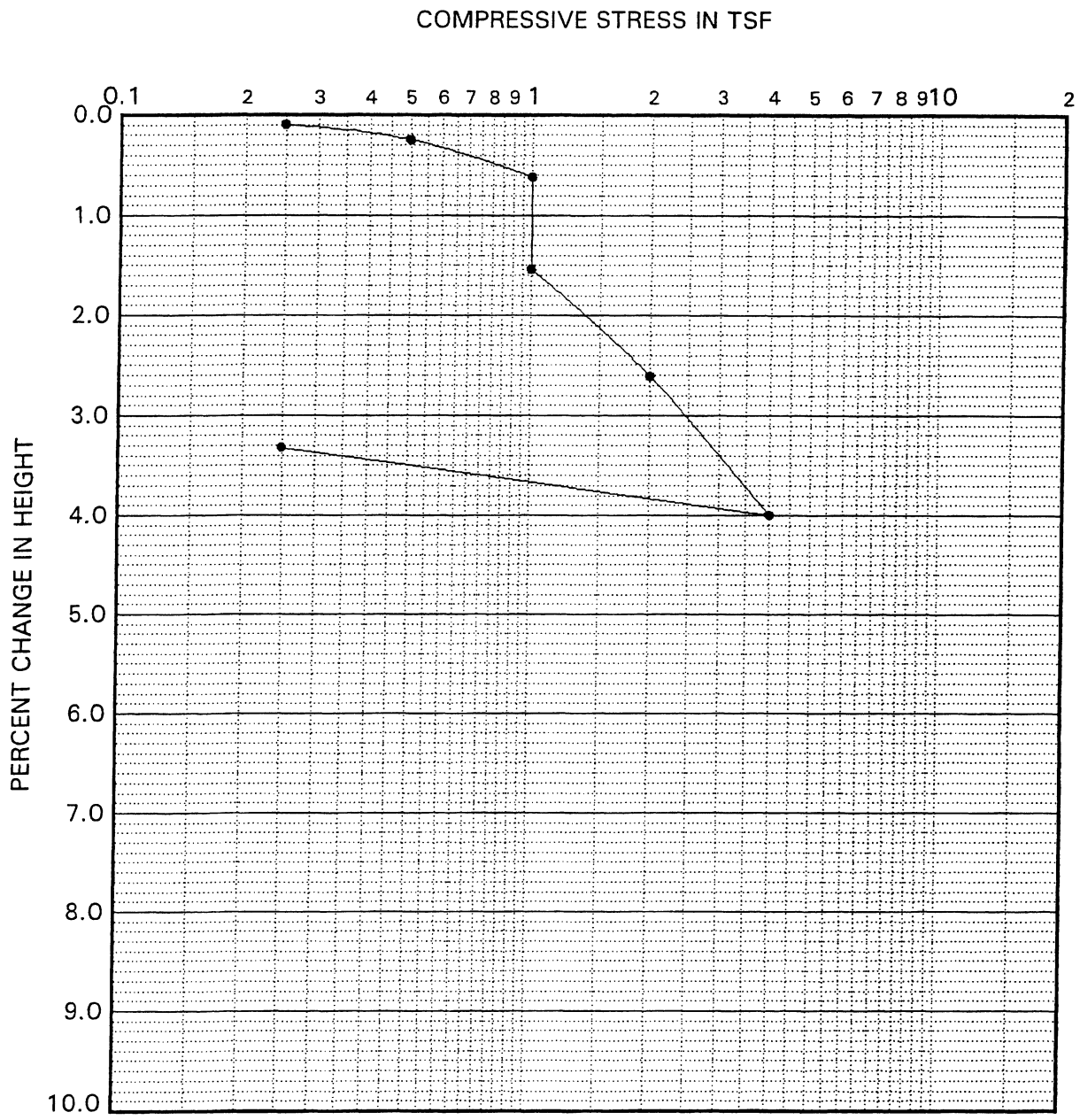

| Boring | Depth(ft.) | Dry Density | in situ Moist. | -200 sieve | Group Symbol | Typical Names |
|---|---|---|---|---|---|---|
| B-104 | 30.0 | 91.0 | 27.1 | 38% | ML | CLAYEY SILT |

WATER ADDED AT 1 TSF.

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
10653 PROGRESS WY. CYPRESS, CA 90630 714-220-0770

W.O. 101568-MP PLATE C-2




| Boring | Depth(ft.) | Dry Density | in situ Moist. | -200 sieve | Group Symbol | Typical Names |
|---|---|---|---|---|---|---|
| B-108 | 10.0 | 97.0 | 9.3 | 80% | SM | SILTY SAND |

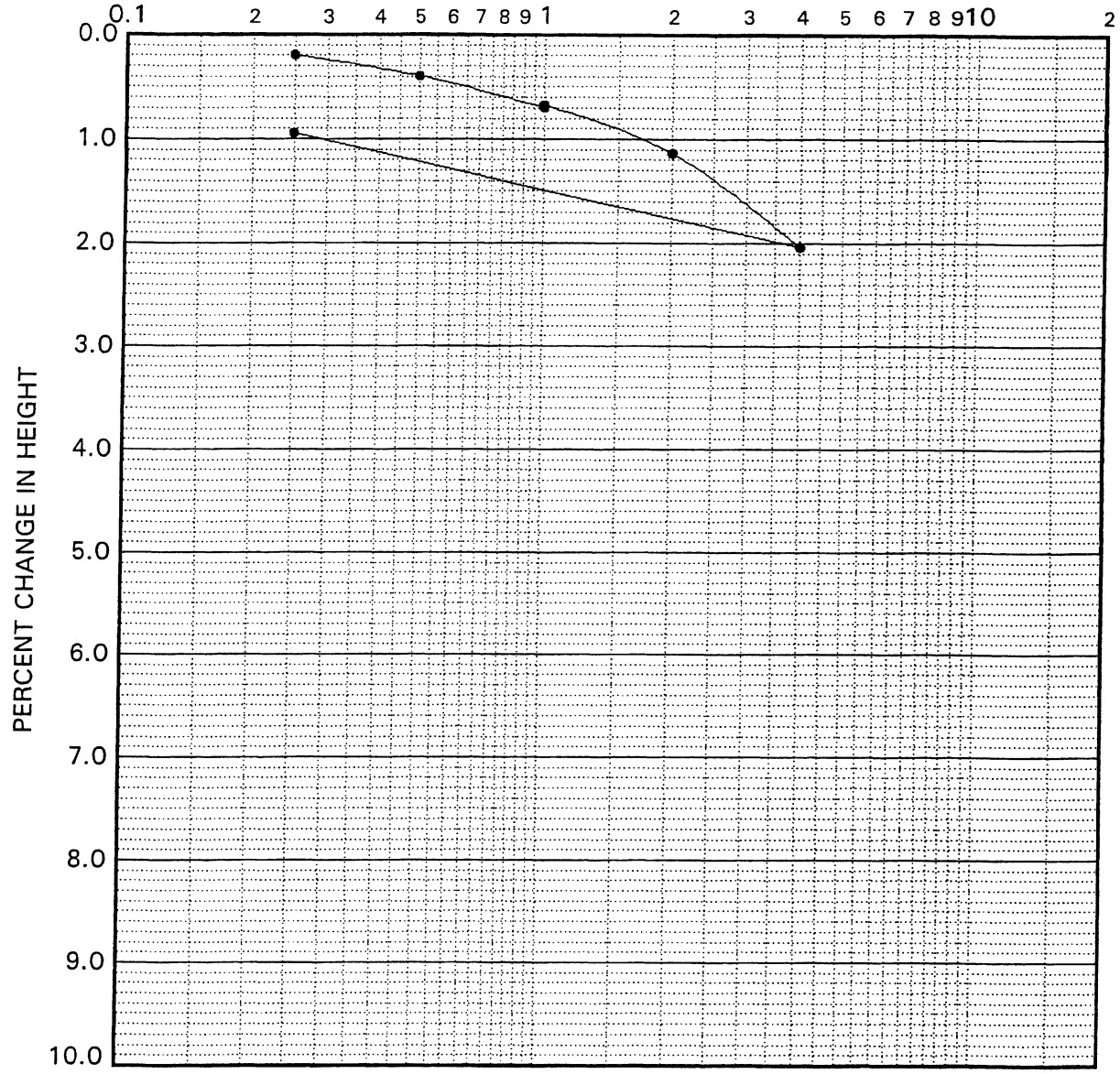
WATER ADDED AT 1 TSF.

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
10653 PROGRESS WY. CYPRESS, CA 90630 714-220-0770

W.O. 101568-MP PLATE C-3

COMPRESSIVE STRESS IN TSF




| Boring | Depth(ft.) | Dry Density | in situ Moist. | -200 sieve | Group Symbol | Typical Names |
|---|---|---|---|---|---|---|
| B-109 | 5.0 | 110.0 | 16.6 | 90% | SP | GRAVELLY SAND |

WATER ADDED AT 1 TSF.

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
10653 PROGRESS WY. CYPRESS, CA 90630 714-220-0770

W.O. 101568-MP PLATE C-4

# **KYH** Co. Analytical Laboratory

*3621 W. MacArthur Blvd., #118, Santa Ana, CA 92704  Tel: (714) 549-5824  Fax: (714) 549-8375*

## ANALYTICAL REPORT

| | | | |
|---|---|---|---|
| Client Name: | Pacific Soils Engineering, Inc. | Report #: | 201355R |
| Address: | 10653 Progress Way<br>Cypress, CA 90630 | PSE W.O. No. | 101568mP |
| Contact Person: | Mr. Keeney Van Horn | P.O. Number: | Verbal |

## Sample Analysis Report

| Client ID | Lab ID | Requested Date | Analysis | Method | Result (% wt) | MDL (% wt) |
|---|---|---|---|---|---|---|
| B-102 (10') | 10084 | 05-02-00 | Sulfate Content | CalTrans 417 | 0.001 | 0.001 |
| B-108 (10') | 10085 | 05-02-00 | Sulfate Content | CalTrans 417 | <0.001 | 0.001 |
| B-108 (10') | 10085 | 05-02-00 | Chloride Content | EPA 9252 | 0.003 | 0.001 |

Authorized Signature

May 4, 2000
Report Date



PLATE D

```
**********************************************
* ****************************************** *
* *                                        * *
* * Design Professionals Management Systems * *
* *          Kirkland,  Washington         * *
* *                                        * *
* *          ----------------------        * *
* *          STABL5M Slope Stability       * *
* *          ----------------------        * *
* *                                        * *
* *     IBM PC & 8086/8088 MS-DOS Version  * *
* *          Revision 5M.1 - 6/22/90       * *
* *                                        * *
* ****************************************** *
**********************************************
```

TABL5M run started: 05/10/00, 06:45:06
nput datafile name: 568MPB1S.DAT
nput file timestamp: 10-MAY-2000 6:44a

PROBLEM DESCRIPTION: CROSS-SECTION B-B'
NATURAL SLOPE
STATIC CASE
WORK ORDER: 101568-MP

BOUNDARY COORDINATES

15 Top Boundaries
15 Total Boundaries

| Boundary No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Soil Type Below Bnd |
|---|---|---|---|---|---|
| 1 | 0.00 | 50.00 | 24.00 | 50.00 | 1 |
| 2 | 24.00 | 50.00 | 25.00 | 70.00 | 1 |
| 3 | 25.00 | 70.00 | 80.00 | 88.00 | 1 |
| 4 | 80.00 | 88.00 | 188.00 | 113.00 | 1 |
| 5 | 188.00 | 113.00 | 212.00 | 130.00 | 1 |
| 6 | 212.00 | 130.00 | 292.00 | 138.00 | 1 |
| 7 | 292.00 | 138.00 | 340.00 | 152.00 | 1 |
| 8 | 340.00 | 152.00 | 448.00 | 202.00 | 1 |
| 9 | 448.00 | 202.00 | 632.00 | 287.00 | 1 |
| 10 | 632.00 | 287.00 | 687.00 | 300.00 | 1 |
| 11 | 687.00 | 300.00 | 733.00 | 302.00 | 1 |
| 12 | 733.00 | 302.00 | 795.00 | 313.00 | 1 |
| 13 | 795.00 | 313.00 | 900.00 | 368.00 | 1 |
| 14 | 900.00 | 368.00 | 925.00 | 370.00 | 1 |
| 15 | 925.00 | 370.00 | 940.00 | 360.00 | 1 |

ISOTROPIC SOIL PARAMETERS

1 Type of Soil

| Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Pore Pressure Param. | Pressure Constant (psf) | Piez. Surface No. |
|---|---|---|---|---|---|---|---|
| 1 | 130.0 | 130.0 | 300.0 | 43.0 | 0.00 | 0.0 | 0 |

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 24.00 ft.
and X = 24.00 ft.

Each Surface Terminates Between X = 212.00 ft.
and X = 938.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00 ft.

80.00 ft. Line Segments Define Each Trial Failure Surface.

Following Is Displayed The Surface Examined.

* * Safety Factor Is Calculated By The Modified Bishop Method * *

Failure Surface Specified By 11 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|---|---|---|
| 1 | 24.00 | 50.02 |
| 2 | 103.31 | 60.52 |
| 3 | 181.89 | 75.50 |
| 4 | 259.51 | 94.90 |
| 5 | 335.89 | 118.67 |
| 6 | 410.81 | 146.73 |
| 7 | 484.02 | 178.99 |
| 8 | 555.28 | 215.35 |
| 9 | 624.37 | 255.69 |
| 10 | 691.06 | 299.87 |
| 11 | 691.49 | 300.20 |

Circle Center At X = -121.5 ; Y = 1454.0 and Radius, 1411.5

*** STATIC FACTOR OF SAFETY = 2.91 ***

Individual data on the 19 slices

| lice No. | Width Ft(m) | Weight Lbs(kg) | Water Force Top Lbs(kg) | Water Force Bot Lbs(kg) | Tie Force Norm Lbs(kg) | Tie Force Tan Lbs(kg) | Earthquake Force Hor Lbs(kg) | Earthquake Force Ver Lbs(kg) | Surcharge Load Lbs(kg) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.0 | 1288.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2 | 55.0 | 180227.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3 | 23.3 | 96116.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4 | 78.6 | 352270.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5 | 6.1 | 28599.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 6 | 24.0 | 129402.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7 | 47.5 | 268093.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 8 | 32.5 | 153833.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 9 | 43.9 | 185764.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 10 | 4.1 | 17066.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 11 | 70.8 | 321419.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 12 | 37.2 | 185955.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 13 | 36.0 | 183819.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 14 | 71.3 | 351341.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 15 | 69.1 | 287385.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 16 | 7.6 | 26817.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7 | 55.0 | 103947.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 8 | 4.1 | 824.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 19 | 0.4 | 8.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

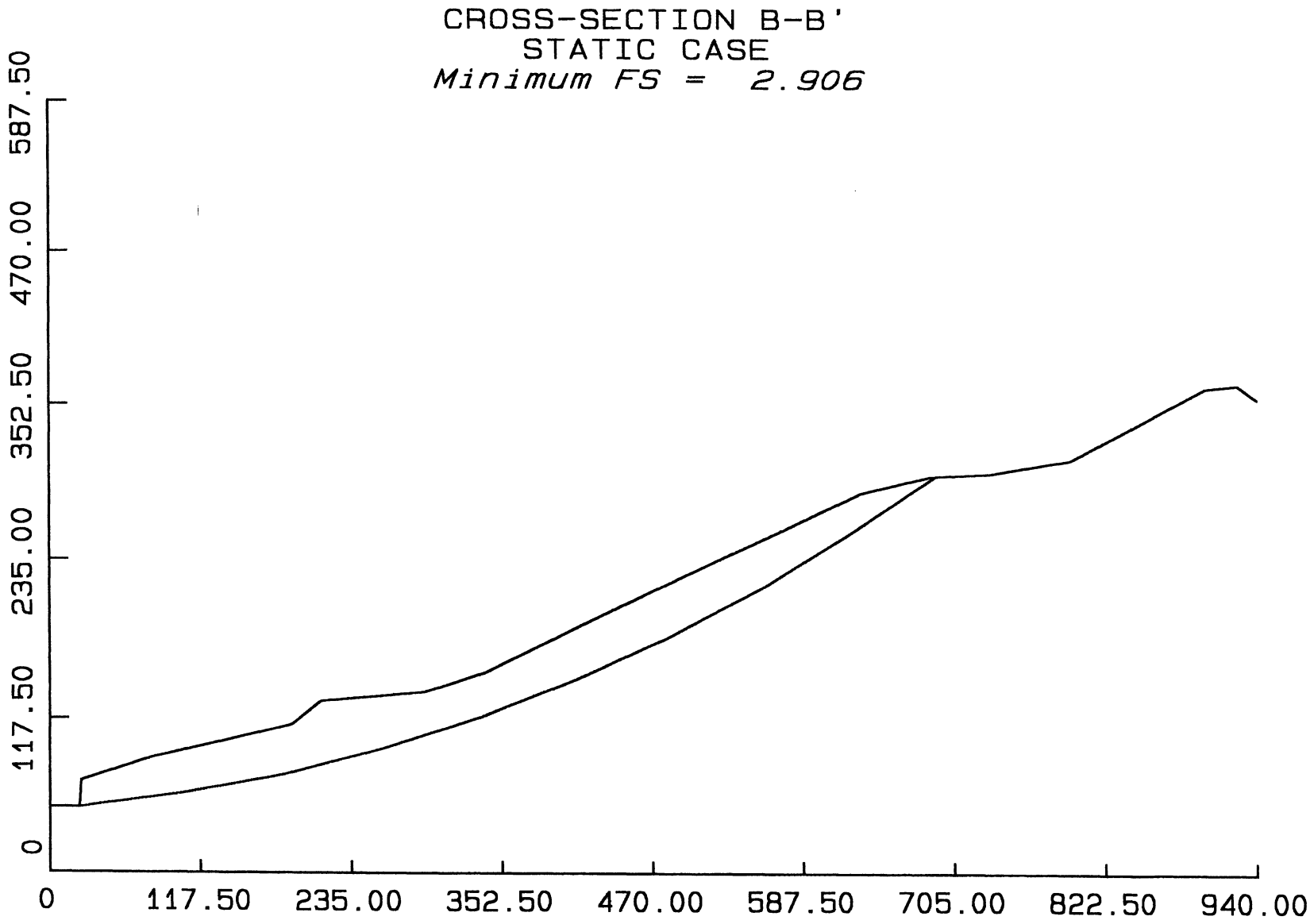

CROSS-SECTION B-B'
STATIC CASE
Minimum FS = 2.906
0
117.50
235.00
352.50
470.00
587.50
0
117.50
235.00
352.50
470.00
587.50
705.00
822.50
940.00

PLATE E-4

```
*********************************************
* ***************************************** *
* *                                       * *
* * Design Professionals Management Systems * *
* *          Kirkland,  Washington        * *
* *                                       * *
* *         ----------------------        * *
* *         STABL5M Slope Stability       * *
* *         ----------------------        * *
* *                                       * *
* *    IBM PC & 8086/8088 MS-DOS Version  * *
* *         Revision 5M.1 - 6/22/90       * *
* *                                       * *
* ***************************************** *
*********************************************
```

TABL5M run started: 05/10/00, 06:36:03
nput datafile name: 568MPB1S.DAT
nput file timestamp: 10-MAY-2000 6:35a

PROBLEM DESCRIPTION: CROSS-SECTION B-B'
NATURAL SLOPE
PSEUDOSTATIC CASE
WORK ORDER: 101568-MP

BOUNDARY COORDINATES

15 Top Boundaries
15 Total Boundaries

| Boundary No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Soil Type Below Bnd |
|---|---|---|---|---|---|
| 1 | 0.00 | 50.00 | 24.00 | 50.00 | 1 |
| 2 | 24.00 | 50.00 | 25.00 | 70.00 | 1 |
| 3 | 25.00 | 70.00 | 80.00 | 88.00 | 1 |
| 4 | 80.00 | 88.00 | 188.00 | 113.00 | 1 |
| 5 | 188.00 | 113.00 | 212.00 | 130.00 | 1 |
| 6 | 212.00 | 130.00 | 292.00 | 138.00 | 1 |
| 7 | 292.00 | 138.00 | 340.00 | 152.00 | 1 |
| 8 | 340.00 | 152.00 | 448.00 | 202.00 | 1 |
| 9 | 448.00 | 202.00 | 632.00 | 287.00 | 1 |
| 10 | 632.00 | 287.00 | 687.00 | 300.00 | 1 |
| 11 | 687.00 | 300.00 | 733.00 | 302.00 | 1 |
| 12 | 733.00 | 302.00 | 795.00 | 313.00 | 1 |
| 13 | 795.00 | 313.00 | 900.00 | 368.00 | 1 |
| 14 | 900.00 | 368.00 | 925.00 | 370.00 | 1 |
| 15 | 925.00 | 370.00 | 940.00 | 360.00 | 1 |

ISOTROPIC SOIL PARAMETERS

1 Type of Soil

| Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Pore Pressure Param. | Pressure Constant (psf) | Piez. Surface No. |
|---|---|---|---|---|---|---|---|
| 1 | 130.0 | 130.0 | 300.0 | 43.0 | 0.00 | 0.0 | 0 |

A Horizontal Earthquake Loading Coefficient
Of 0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of 0.000 Has Been Assigned

Cavitation Pressure = 0.0 psf

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 24.00 ft.
and X = 24.00 ft.

Each Surface Terminates Between X = 212.00 ft.
and X = 938.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

80.00 ft. Line Segments Define Each Trial Failure Surface.

Following Is Displayed The Surface Examined.
* * Safety Factor Is Calculated By The Modified Bishop Method * *

Failure Surface Specified By 11 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|---|---|---|
| 1 | 24.00 | 50.02 |
| 2 | 103.31 | 60.52 |
| 3 | 181.89 | 75.50 |
| 4 | 259.51 | 94.90 |
| 5 | 335.89 | 118.67 |
| 6 | 410.81 | 146.73 |
| 7 | 484.02 | 178.99 |
| 8 | 555.28 | 215.35 |
| 9 | 624.37 | 255.69 |
| 10 | 691.06 | 299.87 |
| 11 | 691.49 | 300.20 |

Circle Center At X = -121.5 ; Y = 1454.0 and Radius, 1411.5

*** PSEUDOSTATIC FACTOR OF SAFETY = 1.95 ***

Individual data on the 19 slices

| lice No. | Width Ft(m) | Weight Lbs(kg) | Water Force Top Lbs(kg) | Water Force Bot Lbs(kg) | Tie Force Norm Lbs(kg) | Tie Force Tan Lbs(kg) | Earthquake Force Hor Lbs(kg) | Earthquake Force Ver Lbs(kg) | Surcharge Load Lbs(kg) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.0 | 1288.8 | 0.0 | 0.0 | 0.0 | 0.0 | 193.3 | 0.0 | 0.0 |
| 2 | 55.0 | 180227.2 | 0.0 | 0.0 | 0.0 | 0.0 | 27034.1 | 0.0 | 0.0 |
| 3 | 23.3 | 96116.8 | 0.0 | 0.0 | 0.0 | 0.0 | 14417.5 | 0.0 | 0.0 |
| 4 | 78.6 | 352270.9 | 0.0 | 0.0 | 0.0 | 0.0 | 52840.6 | 0.0 | 0.0 |
| 5 | 6.1 | 28599.8 | 0.0 | 0.0 | 0.0 | 0.0 | 4290.0 | 0.0 | 0.0 |
| 6 | 24.0 | 129402.7 | 0.0 | 0.0 | 0.0 | 0.0 | 19410.4 | 0.0 | 0.0 |
| 7 | 47.5 | 268093.1 | 0.0 | 0.0 | 0.0 | 0.0 | 40214.0 | 0.0 | 0.0 |
| 8 | 32.5 | 153833.6 | 0.0 | 0.0 | 0.0 | 0.0 | 23075.0 | 0.0 | 0.0 |
| 9 | 43.9 | 185764.1 | 0.0 | 0.0 | 0.0 | 0.0 | 27864.6 | 0.0 | 0.0 |
| 10 | 4.1 | 17066.8 | 0.0 | 0.0 | 0.0 | 0.0 | 2560.0 | 0.0 | 0.0 |
| 11 | 70.8 | 321419.7 | 0.0 | 0.0 | 0.0 | 0.0 | 48213.0 | 0.0 | 0.0 |
| 12 | 37.2 | 185955.3 | 0.0 | 0.0 | 0.0 | 0.0 | 27893.3 | 0.0 | 0.0 |
| 13 | 36.0 | 183819.9 | 0.0 | 0.0 | 0.0 | 0.0 | 27573.0 | 0.0 | 0.0 |
| 14 | 71.3 | 351341.8 | 0.0 | 0.0 | 0.0 | 0.0 | 52701.3 | 0.0 | 0.0 |
| 15 | 69.1 | 287385.4 | 0.0 | 0.0 | 0.0 | 0.0 | 43107.8 | 0.0 | 0.0 |
| 16 | 7.6 | 26817.8 | 0.0 | 0.0 | 0.0 | 0.0 | 4022.7 | 0.0 | 0.0 |
| 17 | 55.0 | 103947.3 | 0.0 | 0.0 | 0.0 | 0.0 | 15592.1 | 0.0 | 0.0 |
| 18 | 4.1 | 824.5 | 0.0 | 0.0 | 0.0 | 0.0 | 123.7 | 0.0 | 0.0 |
| 19 | 0.4 | 8.7 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 0.0 | 0.0 |

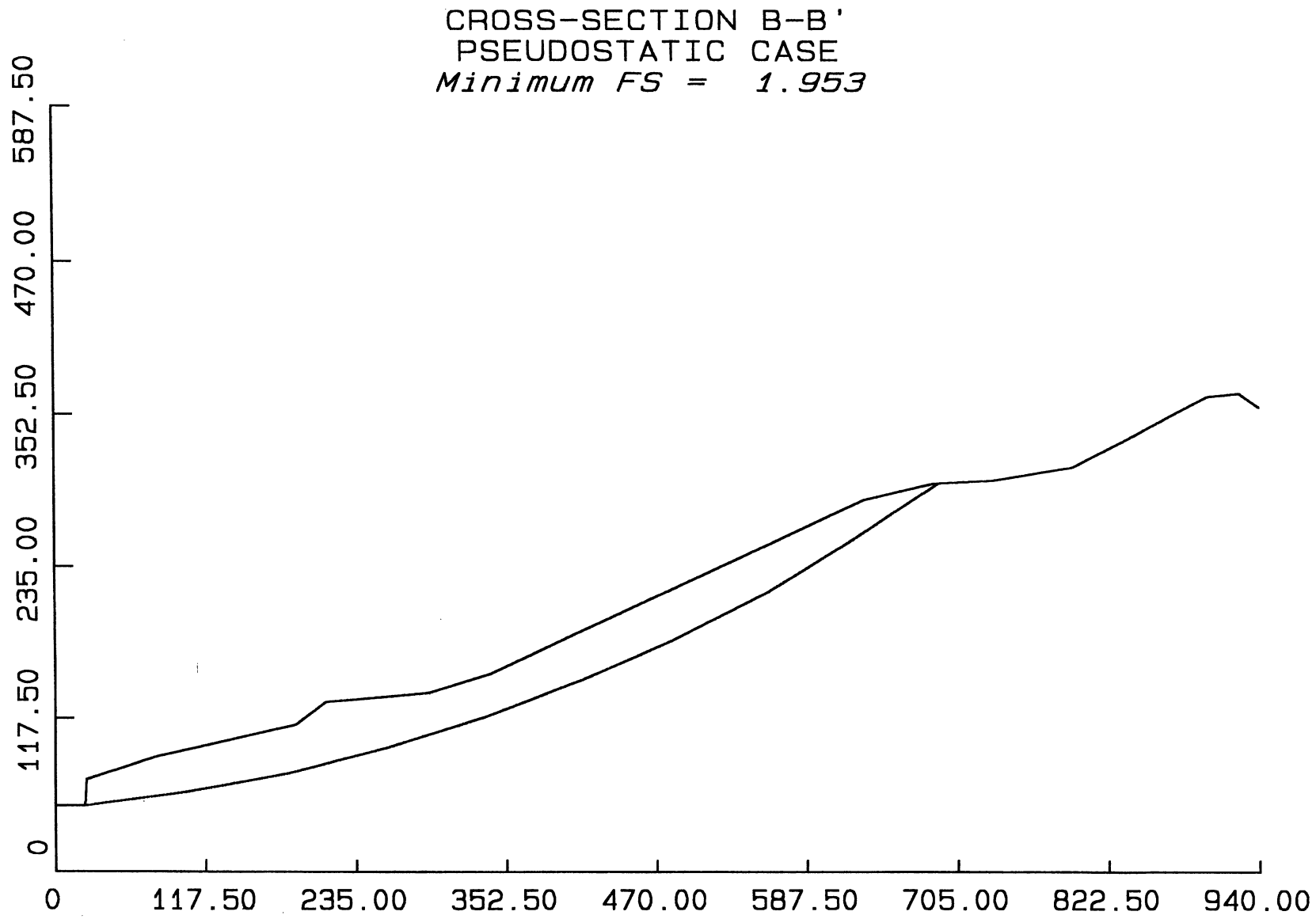

CROSS-SECTION B-B'
PSEUDOSTATIC CASE
Minimum FS = 1.953
0
117.50
235.00
352.50
470.00
587.50
0
117.50
235.00
352.50
470.00
587.50
705.00
822.50
940.00

PLATE E-8

```
**********************************************
* ****************************************** *
* *                                        * *
* * Design Professionals Management Systems * *
* *          Kirkland,  Washington         * *
* *                                        * *
* *         ----------------------         * *
* *         STABL5M Slope Stability        * *
* *         ----------------------         * *
* *                                        * *
* *    IBM PC & 8086/8088 MS-DOS Version   * *
* *         Revision 5M.1 - 6/22/90        * *
* *                                        * *
* ****************************************** *
**********************************************
```

TABL5M run started: 05/09/00, 10:55:35
nput datafile name: 568MPD1S.DAT
nput file timestamp: 09-MAY-2000 10:55a

PROBLEM DESCRIPTION: CROSS-SECTION D-D'
2:1 FILL SLOPE
STATIC CASE
WORK ORDER: 101568-MP

BOUNDARY COORDINATES

7 Top Boundaries
7 Total Boundaries

| Boundary No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Soil Type Below Bnd |
|---|---|---|---|---|---|
| 1 | 0.00 | 30.00 | 20.00 | 30.00 | 1 |
| 2 | 20.00 | 30.00 | 21.00 | 47.00 | 1 |
| 3 | 21.00 | 47.00 | 38.00 | 47.00 | 1 |
| 4 | 38.00 | 47.00 | 90.00 | 75.00 | 1 |
| 5 | 90.00 | 75.00 | 100.00 | 75.00 | 1 |
| 6 | 100.00 | 75.00 | 168.00 | 102.00 | 1 |
| 7 | 168.00 | 102.00 | 242.00 | 102.00 | 1 |

ISOTROPIC SOIL PARAMETERS

1 Type of Soil

| Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Pore Pressure Param. | Pressure Constant (psf) | Piez. Surface No. |
|---|---|---|---|---|---|---|---|
| 1 | 120.0 | 120.0 | 400.0 | 28.0 | 0.00 | 0.0 | 0 |

Searching Routine Will Be Limited To An Area Defined By 3 Boundaries Of Which The First 3 Boundaries Will Deflect Surfaces Upward

| Boundary No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) |
|---|---|---|---|---|
| 1 | 0.00 | 15.00 | 30.00 | 22.00 |
| 2 | 30.00 | 22.00 | 80.00 | 32.00 |
| 3 | 80.00 | 32.00 | 242.00 | 102.00 |

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 20.00 ft.
and X = 20.00 ft.

Each Surface Terminates Between X = 160.00 ft.
and X = 240.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00 ft.

18.00 ft. Line Segments Define Each Trial Failure Surface.

Following Is Displayed The Surface Examined.

* * Safety Factor Is Calculated By The Modified Bishop Method * *

Failure Surface Specified By 11 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|---|---|---|
| 1 | 20.00 | 30.02 |
| 2 | 37.93 | 31.59 |
| 3 | 55.69 | 34.55 |
| 4 | 73.16 | 38.87 |
| 5 | 90.24 | 44.54 |
| 6 | 106.83 | 51.52 |
| 7 | 122.84 | 59.77 |
| 8 | 138.15 | 69.23 |
| 9 | 152.68 | 79.86 |
| 10 | 166.34 | 91.57 |
| 11 | 176.74 | 102.00 |

Circle Center At X = 8.8 ; Y = 261.5 and Radius, 231.7

*** STATIC FACTOR OF SAFETY = 1.86 ***

Individual data on the 15 slices

| lice No. | Width Ft (m) | Weight Lbs (kg) | Water Force Top Lbs (kg) | Water Force Bot Lbs (kg) | Tie Force Norm Lbs (kg) | Tie Force Tan Lbs (kg) | Earthquake Force Hor Lbs (kg) | Earthquake Force Ver Lbs (kg) | Surcharge Load Lbs (kg) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.0 | 1012.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2 | 16.9 | 32822.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3 | 0.1 | 125.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4 | 17.7 | 39668.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5 | 17.5 | 51406.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 6 | 16.8 | 58195.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7 | 0.2 | 889.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 8 | 9.8 | 33255.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 9 | 6.8 | 21547.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 10 | 16.0 | 48468.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 11 | 15.3 | 41535.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 12 | 14.5 | 32236.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 13 | 13.7 | 21172.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 14 | 1.7 | 1844.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 8.7 | 4594.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

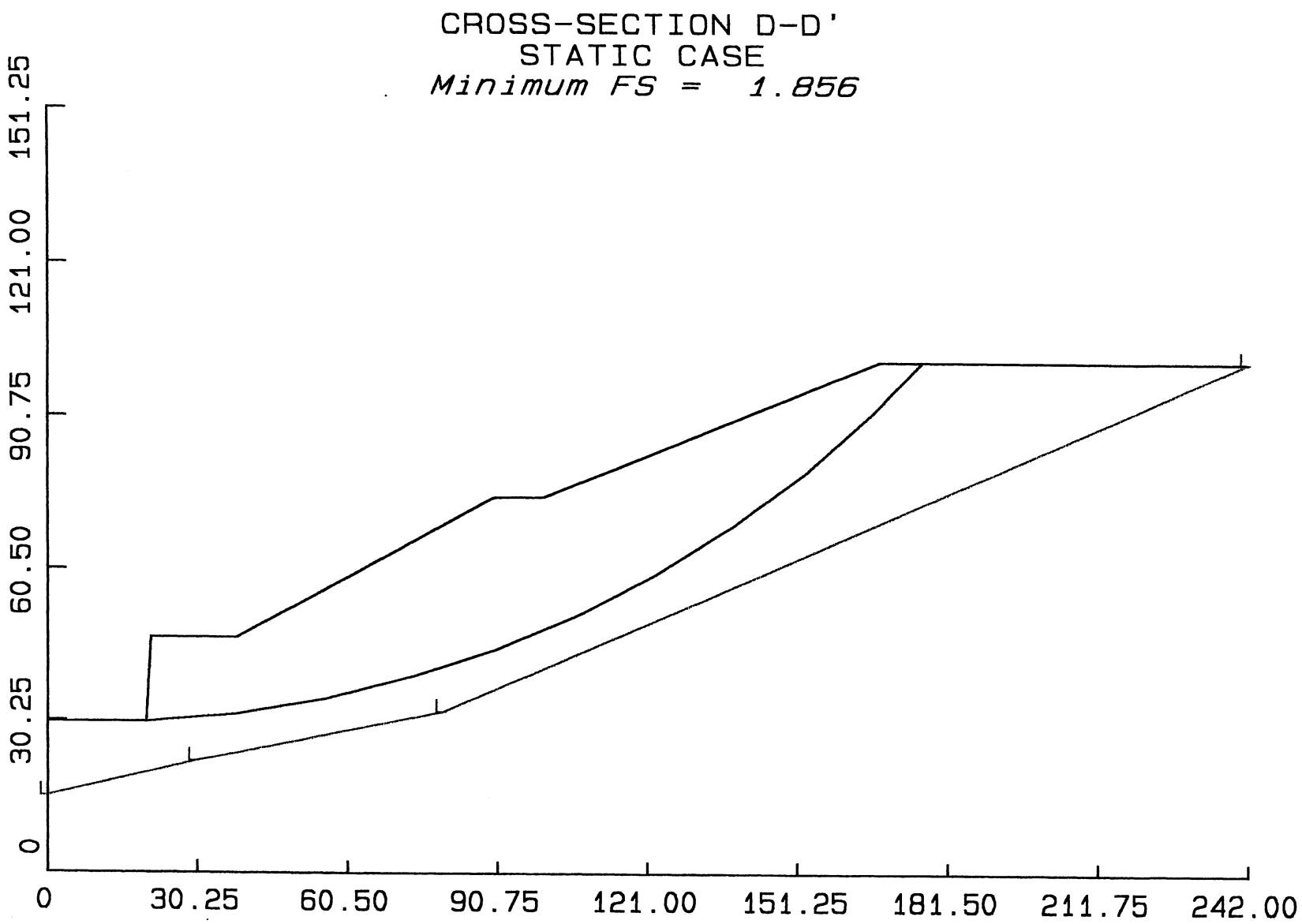

CROSS-SECTION D-D'
STATIC CASE
Minimum FS = 1.856
151.25
121.00
90.75
60.50
30.25
0
0
30.25
60.50
90.75
121.00
151.25
181.50
211.75
242.00

PLATE E-12

```
*********************************************
* ***************************************** *
* *                                       * *
* * Design Professionals Management Systems * *
* *          Kirkland,  Washington        * *
* *                                       * *
* *         ----------------------        * *
* *         STABL5M Slope Stability       * *
* *         ----------------------        * *
* *                                       * *
* *    IBM PC & 8086/8088 MS-DOS Version  * *
* *         Revision 5M.1 - 6/22/90       * *
* *                                       * *
* ***************************************** *
*********************************************
```

STABL5M run started: 05/09/00, 11:00:54
Input datafile name: 568MPD1S.DAT
Input file timestamp: 09-MAY-2000 11:00a

PROBLEM DESCRIPTION: CROSS-SECTION D-D'
2:1 FILL SLOPE
PSEUDOSTATIC CASE
WORK ORDER: 101568-MP

BOUNDARY COORDINATES

7 Top Boundaries
7 Total Boundaries

| Boundary No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Soil Type Below Bnd |
|---|---|---|---|---|---|
| 1 | 0.00 | 30.00 | 20.00 | 30.00 | 1 |
| 2 | 20.00 | 30.00 | 21.00 | 47.00 | 1 |
| 3 | 21.00 | 47.00 | 38.00 | 47.00 | 1 |
| 4 | 38.00 | 47.00 | 90.00 | 75.00 | 1 |
| 5 | 90.00 | 75.00 | 100.00 | 75.00 | 1 |
| 6 | 100.00 | 75.00 | 168.00 | 102.00 | 1 |
| 7 | 168.00 | 102.00 | 242.00 | 102.00 | 1 |

ISOTROPIC SOIL PARAMETERS

1 Type of Soil

| Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Pore Pressure Param. | Pressure Constant (psf) | Piez. Surface No. |
|---|---|---|---|---|---|---|---|
| 1 | 120.0 | 120.0 | 400.0 | 28.0 | 0.00 | 0.0 | 0 |

Searching Routine Will Be Limited To An Area Defined By 3 Boundaries Of Which The First 3 Boundaries Will Deflect Surfaces Upward

| Boundary No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) |
|---|---|---|---|---|
| 1 | 0.00 | 15.00 | 30.00 | 22.00 |
| 2 | 30.00 | 22.00 | 80.00 | 32.00 |
| 3 | 80.00 | 32.00 | 242.00 | 102.00 |

A Horizontal Earthquake Loading Coefficient
Of 0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of 0.000 Has Been Assigned

Cavitation Pressure = 0.0 psf

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 20.00 ft.
and X = 20.00 ft.

Each Surface Terminates Between X = 160.00 ft.
and X = 240.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

18.00 ft. Line Segments Define Each Trial Failure Surface.

Following Is Displayed The Surface Examined.

* * Safety Factor Is Calculated By The Modified Bishop Method * *

Failure Surface Specified By 12 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|---|---|---|
| 1 | 20.00 | 30.02 |
| 2 | 37.85 | 32.35 |
| 3 | 55.52 | 35.77 |
| 4 | 72.95 | 40.29 |
| 5 | 90.06 | 45.87 |
| 6 | 106.79 | 52.50 |
| 7 | 123.08 | 60.15 |
| 8 | 138.87 | 68.80 |
| 9 | 154.10 | 78.40 |
| 10 | 168.70 | 88.93 |
| 11 | 182.62 | 100.34 |
| 12 | 184.41 | 102.00 |

Circle Center At X = -8.5 ; Y = 319.0 and Radius, 290.3

*** PSEUDOSTATIC FACTOR OF SAFETY = 1.32 ***

Individual data on the 16 slices

| lice No. | Width Ft(m) | Weight Lbs(kg) | Water Force Top Lbs(kg) | Water Force Bot Lbs(kg) | Tie Force Norm Lbs(kg) | Tie Force Tan Lbs(kg) | Earthquake Force Hor Lbs(kg) | Earthquake Force Ver Lbs(kg) | Surcharge Load Lbs(kg) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.0 | 1010.1 | 0.0 | 0.0 | 0.0 | 0.0 | 151.5 | 0.0 | 0.0 |
| 2 | 16.8 | 31852.8 | 0.0 | 0.0 | 0.0 | 0.0 | 4777.9 | 0.0 | 0.0 |
| 3 | 0.2 | 264.0 | 0.0 | 0.0 | 0.0 | 0.0 | 39.6 | 0.0 | 0.0 |
| 4 | 17.5 | 37092.3 | 0.0 | 0.0 | 0.0 | 0.0 | 5563.8 | 0.0 | 0.0 |
| 5 | 17.4 | 48290.2 | 0.0 | 0.0 | 0.0 | 0.0 | 7243.5 | 0.0 | 0.0 |
| 6 | 17.1 | 55951.0 | 0.0 | 0.0 | 0.0 | 0.0 | 8392.7 | 0.0 | 0.0 |
| 7 | 0.1 | 201.2 | 0.0 | 0.0 | 0.0 | 0.0 | 30.2 | 0.0 | 0.0 |
| 8 | 9.9 | 32404.8 | 0.0 | 0.0 | 0.0 | 0.0 | 4860.7 | 0.0 | 0.0 |
| 9 | 6.8 | 20534.2 | 0.0 | 0.0 | 0.0 | 0.0 | 3080.1 | 0.0 | 0.0 |
| 10 | 16.3 | 48106.5 | 0.0 | 0.0 | 0.0 | 0.0 | 7216.0 | 0.0 | 0.0 |
| 11 | 15.8 | 43247.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6487.0 | 0.0 | 0.0 |
| 12 | 15.2 | 36279.3 | 0.0 | 0.0 | 0.0 | 0.0 | 5441.9 | 0.0 | 0.0 |
| 13 | 13.9 | 26406.3 | 0.0 | 0.0 | 0.0 | 0.0 | 3960.9 | 0.0 | 0.0 |
|  | 0.7 | 1115.6 | 0.0 | 0.0 | 0.0 | 0.0 | 167.3 | 0.0 | 0.0 |
| 15 | 13.9 | 12309.5 | 0.0 | 0.0 | 0.0 | 0.0 | 1846.4 | 0.0 | 0.0 |
| 16 | 1.8 | 178.8 | 0.0 | 0.0 | 0.0 | 0.0 | 26.8 | 0.0 | 0.0 |

CROSS-SECTION D-D'
PSEUDOSTATIC CASE
*Minimum FS = 1.315*

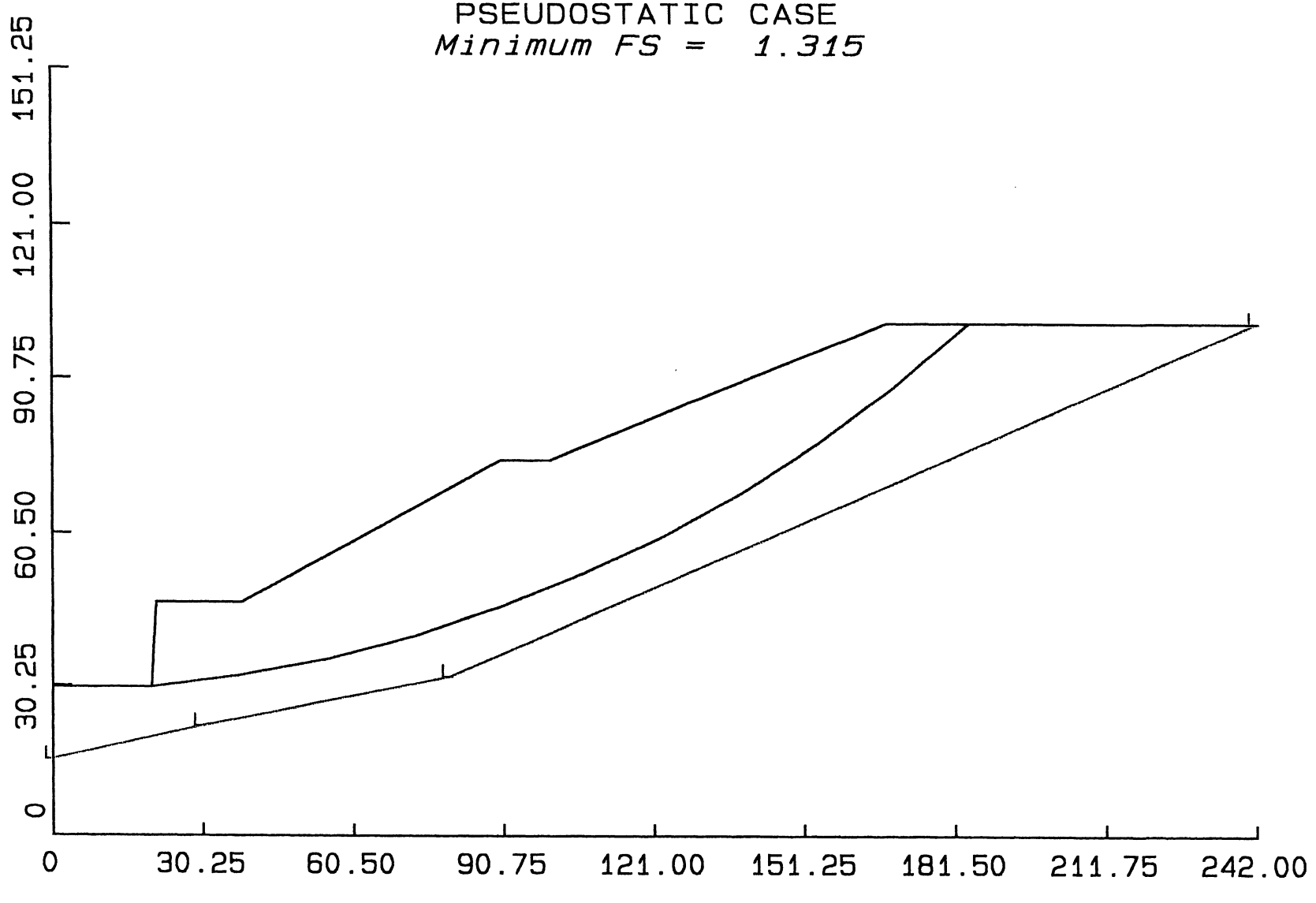



PLATE E-16

```
**********************************************
* ****************************************** *
* *                                        * *
* * Design Professionals Management Systems * *
* *          Kirkland,  Washington         * *
* *                                        * *
* *         ----------------------         * *
* *         STABL5M Slope Stability        * *
* *         ----------------------         * *
* *                                        * *
* *    IBM PC & 8086/8088 MS-DOS Version   * *
* *         Revision 5M.1 - 6/22/90        * *
* *                                        * *
* ****************************************** *
**********************************************
```

STABL5M run started: 05/09/00, 11:48:12
Input datafile name: 568MPG1S.DAT
Input file timestamp: 09-MAY-2000 11:47a

PROBLEM DESCRIPTION: CROSS-SECTION G-G'
1 1/2:1 CUT SLOPE
STATIC CASE
WORK ORDER: 101568-MP

BOUNDARY COORDINATES

12 Top Boundaries
12 Total Boundaries

| Boundary No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Soil Type Below Bnd |
|---|---|---|---|---|---|
| 1 | 0.00 | 21.00 | 30.00 | 22.00 | 1 |
| 2 | 30.00 | 22.00 | 85.00 | 58.00 | 1 |
| 3 | 85.00 | 58.00 | 93.00 | 58.00 | 1 |
| 4 | 93.00 | 58.00 | 140.00 | 90.00 | 1 |
| 5 | 140.00 | 90.00 | 160.00 | 90.00 | 1 |
| 6 | 160.00 | 90.00 | 193.00 | 110.00 | 1 |
| 7 | 193.00 | 110.00 | 203.00 | 110.00 | 1 |
| 8 | 203.00 | 110.00 | 245.00 | 138.00 | 1 |
| 9 | 245.00 | 138.00 | 255.00 | 138.00 | 1 |
| 10 | 255.00 | 138.00 | 305.00 | 170.00 | 1 |
| 11 | 305.00 | 170.00 | 350.00 | 178.00 | 1 |
| 12 | 350.00 | 178.00 | 480.00 | 170.00 | 1 |

ISOTROPIC SOIL PARAMETERS

1 Type of Soil

| Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Pore Pressure Param. | Pressure Constant (psf) | Piez. Surface No. |
|---|---|---|---|---|---|---|---|
| 1 | 130.0 | 130.0 | 300.0 | 43.0 | 0.00 | 0.0 | 0 |

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 30.00 ft.
and X = 30.00 ft.

Each Surface Terminates Between X = 305.00 ft.
and X = 450.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00 ft.

30.00 ft. Line Segments Define Each Trial Failure Surface.

Following Is Displayed The Surface Examined.
* * Safety Factor Is Calculated By The Modified Bishop Method * *

Failure Surface Specified By 13 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|---|---|---|
| 1 | 30.00 | 22.00 |
| 2 | 59.85 | 24.97 |
| 3 | 89.44 | 29.95 |
| 4 | 118.61 | 36.93 |
| 5 | 147.25 | 45.87 |
| 6 | 175.22 | 56.72 |
| 7 | 202.39 | 69.45 |
| 8 | 228.63 | 83.99 |
| 9 | 253.83 | 100.27 |
| 10 | 277.86 | 118.22 |
| 11 | 300.63 | 137.76 |
| 12 | 322.02 | 158.80 |
| 13 | 337.01 | 175.69 |

Circle Center At X = 1.2 ; Y = 463.6 and Radius, 442.6

*** STATIC FACTOR OF SAFETY = 2.22 ***

Individual data on the 21 slices

| Slice No. | Width Ft(m) | Weight Lbs(kg) | Water Force Top Lbs(kg) | Water Force Bot Lbs(kg) | Tie Force Norm Lbs(kg) | Tie Force Tan Lbs(kg) | Earthquake Force Hor Lbs(kg) | Earthquake Force Ver Lbs(kg) | Surcharge Load Lbs(kg) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 29.9 | 32651.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2 | 25.1 | 75292.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3 | 4.4 | 16645.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4 | 3.6 | 12991.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5 | 25.6 | 111079.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 6 | 21.4 | 119842.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7 | 7.3 | 43332.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 8 | 12.7 | 70099.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 9 | 15.2 | 82049.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 10 | 17.8 | 102624.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 11 | 9.4 | 52963.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 12 | 0.6 | 3273.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 13 | 25.6 | 140913.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 14 | 16.4 | 93501.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 15 | 8.8 | 47276.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 16 | 1.2 | 5782.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 17 | 22.9 | 107529.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 18 | 22.8 | 95937.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 19 | 4.4 | 16563.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 20 | 17.0 | 47357.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 21 | 15.0 | 14084.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

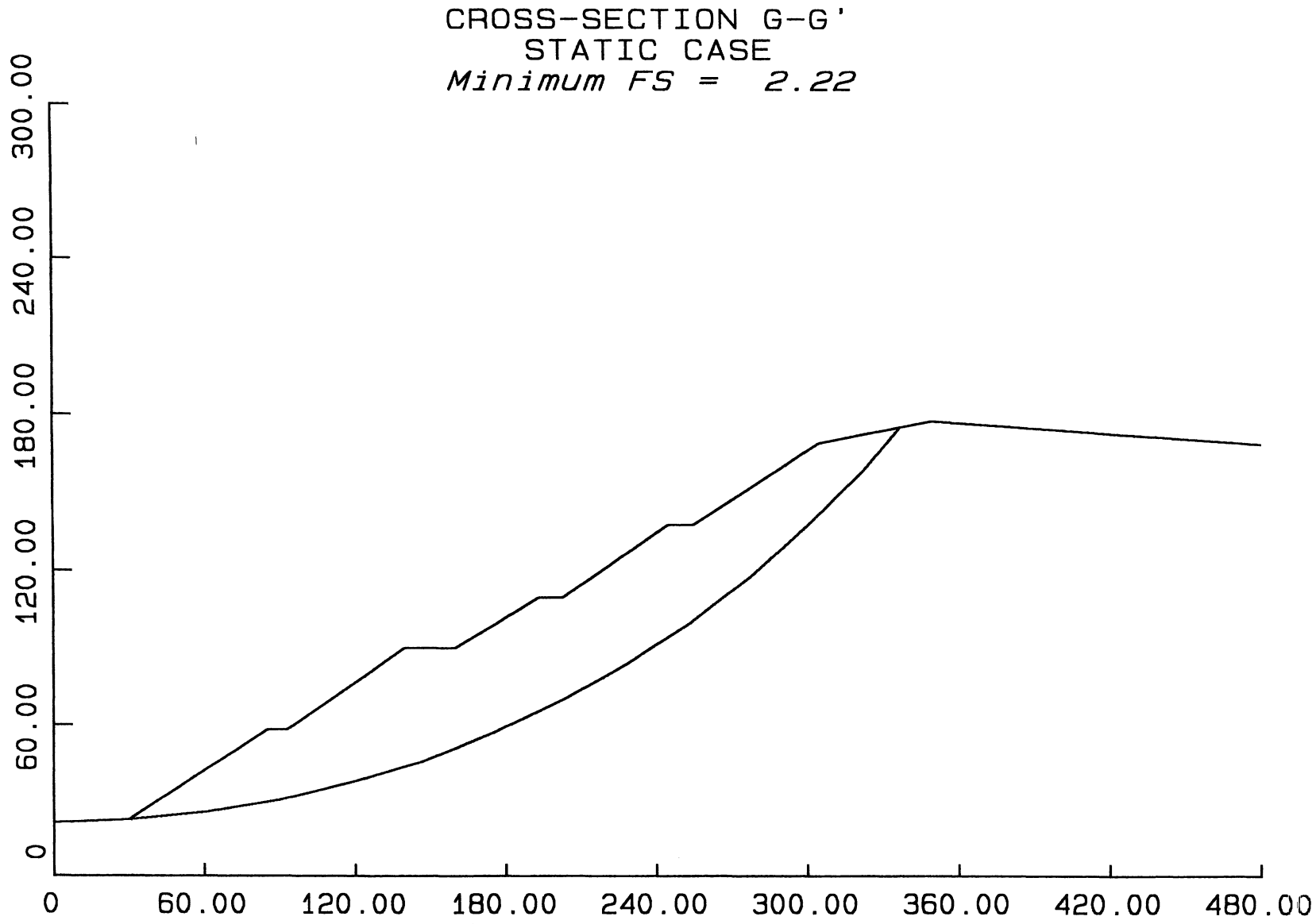

CROSS-SECTION G-G'
STATIC CASE
Minimum FS = 2.22
300.00
240.00
180.00
120.00
60.00
0
0
60.00
120.00
180.00
240.00
300.00
360.00
420.00
480.00

PLATE E-20

```
*********************************************
* ***************************************** *
* *                                       * *
* * Design Professionals Management Systems * *
* *          Kirkland,  Washington        * *
* *                                       * *
* *         -----------------------       * *
* *         STABL5M Slope Stability       * *
* *         -----------------------       * *
* *                                       * *
* *    IBM PC & 8086/8088 MS-DOS Version  * *
* *         Revision 5M.1 - 6/22/90       * *
* *                                       * *
* ***************************************** *
*********************************************
```

STABL5M run started: 05/10/00, 07:17:07
Input datafile name: 568MPG1S.DAT
Input file timestamp: 10-MAY-2000 7:16a

PROBLEM DESCRIPTION: CROSS-SECTION G-G'
1 1/2:1 CUT SLOPE
PSEUDOSTATIC CASE
WORK ORDER: 101568-MP

BOUNDARY COORDINATES

12 Top Boundaries
12 Total Boundaries

| Boundary No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Soil Type Below Bnd |
|---|---|---|---|---|---|
| 1 | 0.00 | 21.00 | 30.00 | 22.00 | 1 |
| 2 | 30.00 | 22.00 | 85.00 | 58.00 | 1 |
| 3 | 85.00 | 58.00 | 93.00 | 58.00 | 1 |
| 4 | 93.00 | 58.00 | 140.00 | 90.00 | 1 |
| 5 | 140.00 | 90.00 | 160.00 | 90.00 | 1 |
| 6 | 160.00 | 90.00 | 193.00 | 110.00 | 1 |
| 7 | 193.00 | 110.00 | 203.00 | 110.00 | 1 |
| 8 | 203.00 | 110.00 | 245.00 | 138.00 | 1 |
| 9 | 245.00 | 138.00 | 255.00 | 138.00 | 1 |
| 10 | 255.00 | 138.00 | 305.00 | 170.00 | 1 |
| 11 | 305.00 | 170.00 | 350.00 | 178.00 | 1 |
| 12 | 350.00 | 178.00 | 480.00 | 170.00 | 1 |

ISOTROPIC SOIL PARAMETERS

1 Type of Soil

| Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Pore Pressure Param. | Pressure Constant (psf) | Piez. Surface No. |
|---|---|---|---|---|---|---|---|
| 1 | 130.0 | 130.0 | 300.0 | 43.0 | 0.00 | 0.0 | 0 |

A Horizontal Earthquake Loading Coefficient
Of 0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of 0.000 Has Been Assigned

Cavitation Pressure = 0.0 psf

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 30.00 ft.
and X = 30.00 ft.

Each Surface Terminates Between X = 305.00 ft.
and X = 450.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

30.00 ft. Line Segments Define Each Trial Failure Surface.

Following Is Displayed The Surface Examined.
* * Safety Factor Is Calculated By The Modified Bishop Method * *

Failure Surface Specified By 14 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|---|---|---|
| 1 | 30.00 | 22.00 |
| 2 | 59.78 | 25.64 |
| 3 | 89.29 | 31.02 |
| 4 | 118.44 | 38.12 |
| 5 | 147.12 | 46.91 |
| 6 | 175.24 | 57.36 |
| 7 | 202.70 | 69.44 |
| 8 | 229.41 | 83.11 |
| 9 | 255.27 | 98.32 |
| 10 | 280.20 | 115.01 |
| 11 | 304.10 | 133.14 |
| 12 | 326.90 | 152.63 |
| 13 | 348.53 | 173.43 |
| 14 | 352.61 | 177.84 |

Circle Center At X = -17.0 ; Y = 531.1 and Radius, 511.3

*** PSEUDOSTATIC FACTOR OF SAFETY = 1.61 ***

Individual data on the 23 slices

| Slice No. | Width Ft(m) | Weight Lbs(kg) | Water Force Top Lbs(kg) | Water Force Bot Lbs(kg) | Tie Force Norm Lbs(kg) | Tie Force Tan Lbs(kg) | Earthquake Force Hor Lbs(kg) | Earthquake Force Ver Lbs(kg) | Surcharge Load Lbs(kg) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 29.8 | 30677.5 | 0.0 | 0.0 | 0.0 | 0.0 | 4601.6 | 0.0 | 0.0 |
| 2 | 25.2 | 71493.4 | 0.0 | 0.0 | 0.0 | 0.0 | 10724.0 | 0.0 | 0.0 |
| 3 | 4.3 | 15275.3 | 0.0 | 0.0 | 0.0 | 0.0 | 2291.3 | 0.0 | 0.0 |
| 4 | 3.7 | 12783.8 | 0.0 | 0.0 | 0.0 | 0.0 | 1917.6 | 0.0 | 0.0 |
| 5 | 25.4 | 104648.5 | 0.0 | 0.0 | 0.0 | 0.0 | 15697.3 | 0.0 | 0.0 |
| 6 | 21.6 | 115579.2 | 0.0 | 0.0 | 0.0 | 0.0 | 17336.9 | 0.0 | 0.0 |
| 7 | 7.1 | 40925.3 | 0.0 | 0.0 | 0.0 | 0.0 | 6138.8 | 0.0 | 0.0 |
| 8 | 12.9 | 68120.4 | 0.0 | 0.0 | 0.0 | 0.0 | 10218.1 | 0.0 | 0.0 |
| 9 | 15.2 | 79454.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11918.1 | 0.0 | 0.0 |
| 10 | 17.8 | 100065.2 | 0.0 | 0.0 | 0.0 | 0.0 | 15009.8 | 0.0 | 0.0 |
| 11 | 9.7 | 53858.3 | 0.0 | 0.0 | 0.0 | 0.0 | 8078.7 | 0.0 | 0.0 |
| 12 | 0.3 | 1556.0 | 0.0 | 0.0 | 0.0 | 0.0 | 233.4 | 0.0 | 0.0 |
| 13 | 26.4 | 145744.5 | 0.0 | 0.0 | 0.0 | 0.0 | 21861.7 | 0.0 | 0.0 |
| 14 | 15.6 | 91421.3 | 0.0 | 0.0 | 0.0 | 0.0 | 13713.2 | 0.0 | 0.0 |
| 15 | 10.0 | 55614.4 | 0.0 | 0.0 | 0.0 | 0.0 | 8342.2 | 0.0 | 0.0 |
| 16 | 0.3 | 1397.1 | 0.0 | 0.0 | 0.0 | 0.0 | 209.6 | 0.0 | 0.0 |
| 17 | 24.9 | 127936.4 | 0.0 | 0.0 | 0.0 | 0.0 | 19190.5 | 0.0 | 0.0 |
| 18 | 23.9 | 117158.1 | 0.0 | 0.0 | 0.0 | 0.0 | 17573.7 | 0.0 | 0.0 |
| 19 | 0.9 | 4229.7 | 0.0 | 0.0 | 0.0 | 0.0 | 634.5 | 0.0 | 0.0 |
| 20 | 21.9 | 81664.0 | 0.0 | 0.0 | 0.0 | 0.0 | 12249.6 | 0.0 | 0.0 |
| 21 | 21.6 | 35947.7 | 0.0 | 0.0 | 0.0 | 0.0 | 5392.2 | 0.0 | 0.0 |
| | 1.5 | 697.7 | 0.0 | 0.0 | 0.0 | 0.0 | 104.6 | 0.0 | 0.0 |
| 23 | 2.6 | 506.4 | 0.0 | 0.0 | 0.0 | 0.0 | 76.0 | 0.0 | 0.0 |

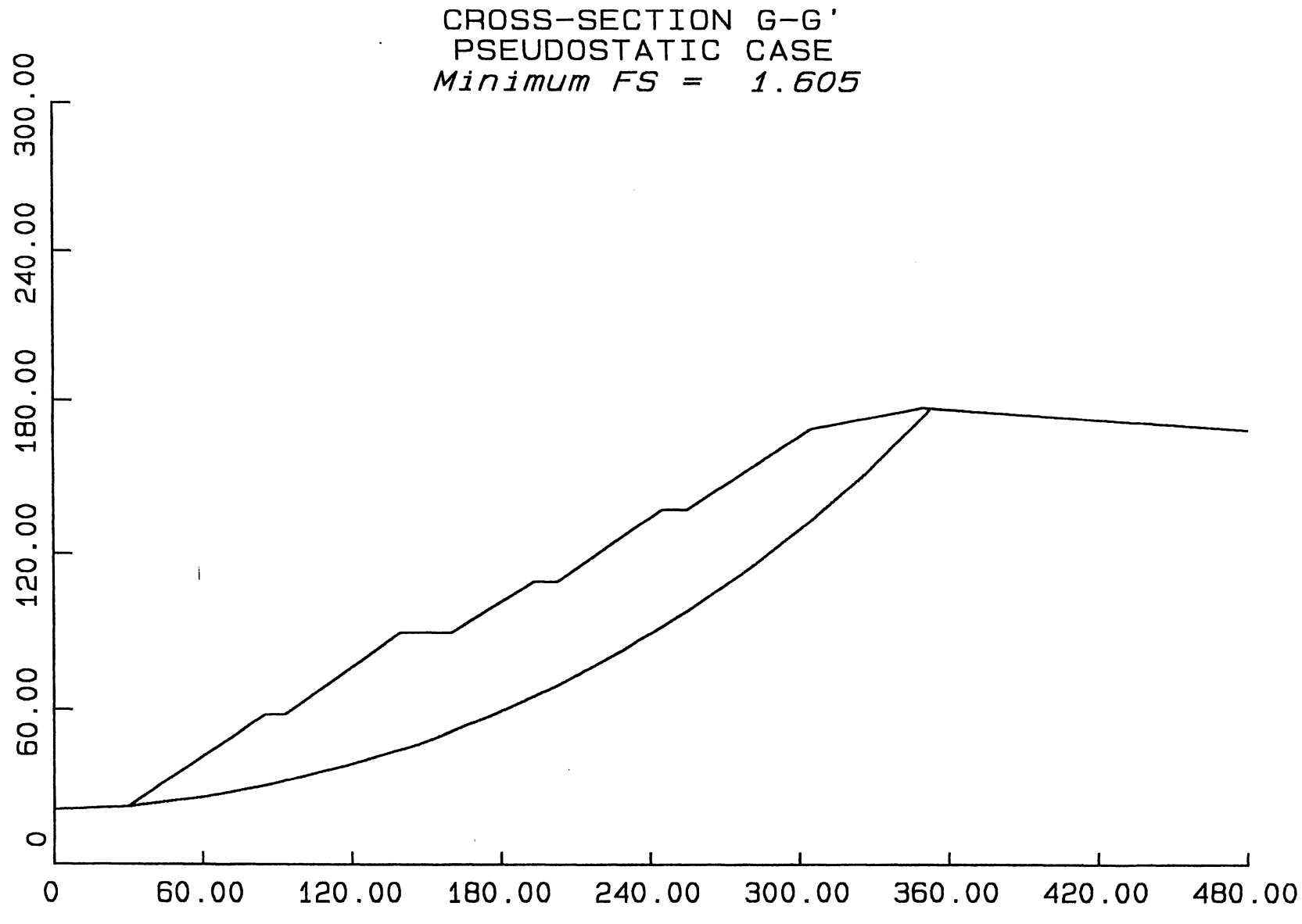

CROSS-SECTION G-G'
PSEUDOSTATIC CASE
Minimum FS = 1.605
0
60.00
120.00
180.00
240.00
300.00
0
60.00
120.00
180.00
240.00
300.00
360.00
420.00
480.00

PLATE E-24

```
*********************************************
* ***************************************** *
* *                                       * *
* * Design Professionals Management Systems * *
* *          Kirkland,  Washington        * *
* *                                       * *
* *         -----------------------       * *
* *         STABL5M Slope Stability       * *
* *         -----------------------       * *
* *                                       * *
* *    IBM PC & 8086/8088 MS-DOS Version  * *
* *         Revision 5M.1 - 6/22/90       * *
* *                                       * *
* ***************************************** *
*********************************************
```

STABL5M run started: 05/09/00, 14:01:03
Input datafile name: 568MPJ1S.DAT
Input file timestamp: 09-MAY-2000 2:00p

PROBLEM DESCRIPTION: CROSS-SECTION J-J'
NATURAL SLOPE
STATIC CASE
WORK ORDER: 101568-MP

BOUNDARY COORDINATES

17 Top Boundaries
19 Total Boundaries

| Boundary No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Soil Type Below Bnd |
|---|---|---|---|---|---|
| 1 | 0.00 | 90.00 | 92.00 | 90.00 | 2 |
| 2 | 92.00 | 90.00 | 125.00 | 108.00 | 1 |
| 3 | 125.00 | 108.00 | 158.00 | 130.00 | 1 |
| 4 | 158.00 | 130.00 | 205.00 | 153.00 | 1 |
| 5 | 205.00 | 153.00 | 210.00 | 162.00 | 1 |
| 6 | 210.00 | 162.00 | 250.00 | 170.00 | 1 |
| 7 | 250.00 | 170.00 | 300.00 | 195.00 | 1 |
| 8 | 300.00 | 195.00 | 325.00 | 210.00 | 1 |
| 9 | 325.00 | 210.00 | 428.00 | 230.00 | 1 |
| 10 | 428.00 | 230.00 | 510.00 | 248.00 | 1 |
| 11 | 510.00 | 248.00 | 562.00 | 266.00 | 1 |
| 12 | 562.00 | 266.00 | 665.00 | 315.00 | 1 |
| 13 | 665.00 | 315.00 | 742.00 | 360.00 | 1 |
| 14 | 742.00 | 360.00 | 771.00 | 363.00 | 1 |
| 15 | 771.00 | 363.00 | 790.00 | 360.00 | 1 |
| 16 | 790.00 | 360.00 | 822.00 | 345.00 | 1 |
| 17 | 822.00 | 345.00 | 840.00 | 321.00 | 1 |
| 18 | 0.00 | 55.00 | 40.00 | 60.00 | 1 |
| 19 | 40.00 | 60.00 | 92.00 | 90.00 | 1 |

ISOTROPIC SOIL PARAMETERS

2 Types of Soil

| Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Pore Pressure Param. | Pressure Constant (psf) | Piez. Surface No. |
|---|---|---|---|---|---|---|---|
| 1 | 130.0 | 130.0 | 300.0 | 43.0 | 0.00 | 0.0 | 0 |
| 2 | 120.0 | 120.0 | 400.0 | 28.0 | 0.00 | 0.0 | 0 |

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 92.00 ft.
and X = 92.00 ft.

Each Surface Terminates Between X = 210.00 ft.
and X = 825.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00 ft.

60.00 ft. Line Segments Define Each Trial Failure Surface.

Following Is Displayed The Surface Examined.

* * Safety Factor Is Calculated By The Modified Bishop Method * *

Failure Surface Specified By 4 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|---|---|---|
| 1 | 92.00 | 90.00 |
| 2 | 150.07 | 105.11 |
| 3 | 202.70 | 133.91 |
| 4 | 239.40 | 167.88 |

Circle Center At X = 61.6 ; Y = 326.0 and Radius, 237.9

*** STATIC FACTOR OF SAFETY = 2.23 ***

Individual data on the 7 slices

| Slice No. | Width Ft(m) | Weight Lbs(kg) | Water Force Top Lbs(kg) | Water Force Bot Lbs(kg) | Tie Force Norm Lbs(kg) | Tie Force Tan Lbs(kg) | Earthquake Force Hor Lbs(kg) | Earthquake Force Ver Lbs(kg) | Surcharge Load Lbs(kg) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 33.0 | 20499.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2 | 25.1 | 47998.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3 | 7.9 | 21020.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4 | 44.7 | 113622.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5 | 2.3 | 5295.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 6 | 5.0 | 12637.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7 | 29.4 | 41395.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

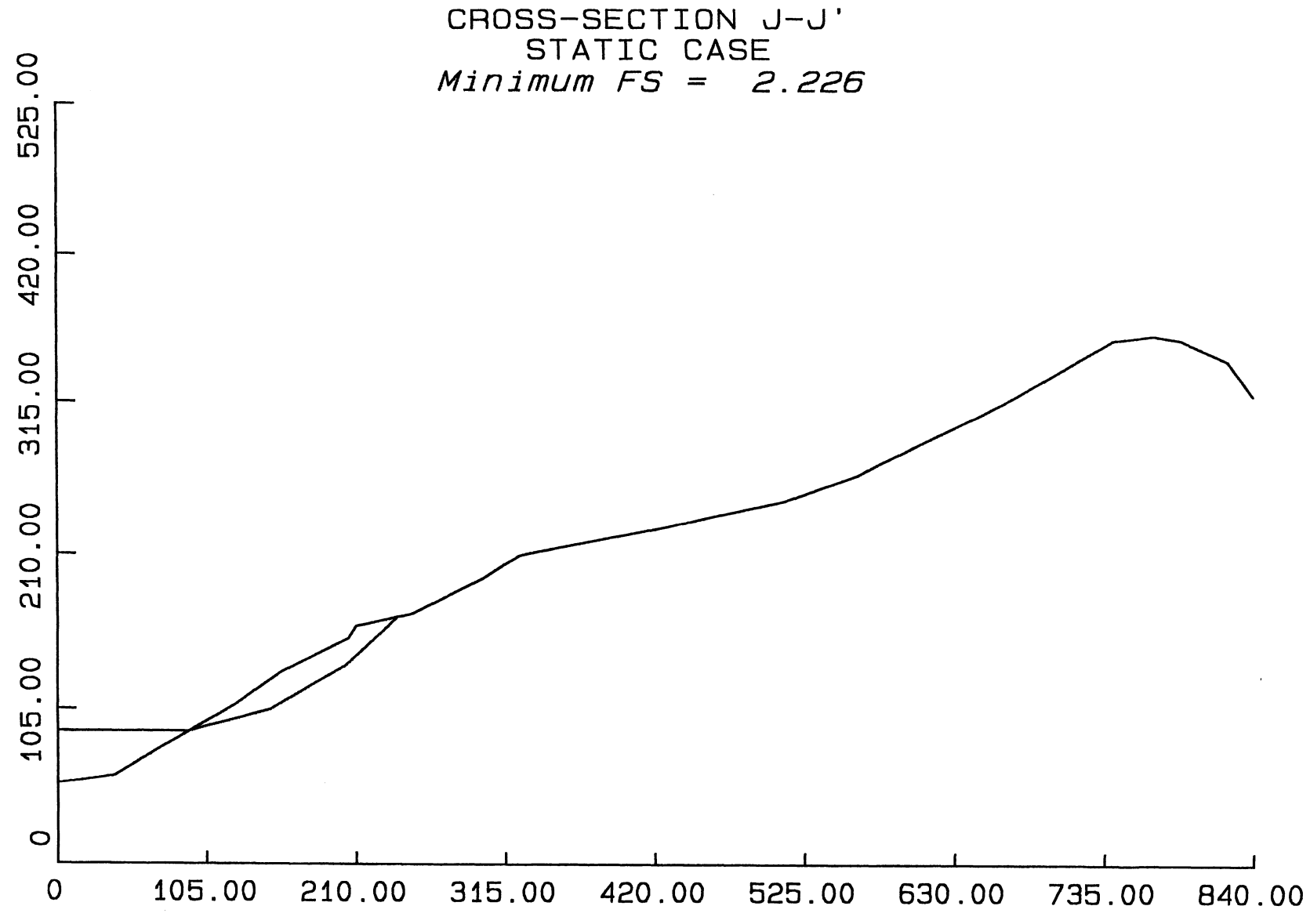

CROSS-SECTION J-J'
STATIC CASE
Minimum FS = 2.226
0
105.00
210.00
315.00
420.00
525.00
0
105.00
210.00
315.00
420.00
525.00
630.00
735.00
840.00

PLATE E-28

```
**********************************************
* ****************************************** *
* *                                        * *
* * Design Professionals Management Systems * *
* *          Kirkland,  Washington         * *
* *                                        * *
* *         ----------------------         * *
* *         STABL5M Slope Stability        * *
* *         ----------------------         * *
* *                                        * *
* *    IBM PC & 8086/8088 MS-DOS Version   * *
* *         Revision 5M.1 - 6/22/90        * *
* *                                        * *
* ****************************************** *
**********************************************
```

STABL5M run started: 05/10/00, 07:31:00
Input datafile name: 568MPJ1S.DAT
Input file timestamp: 10-MAY-2000 7:30a

PROBLEM DESCRIPTION: CROSS-SECTION J-J'
NATURAL SLOPE
PSEUDOSTATIC CASE
WORK ORDER: 101568-MP

BOUNDARY COORDINATES

17 Top Boundaries
19 Total Boundaries

| Boundary No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Soil Type Below Bnd |
|---|---|---|---|---|---|
| 1 | 0.00 | 90.00 | 92.00 | 90.00 | 2 |
| 2 | 92.00 | 90.00 | 125.00 | 108.00 | 1 |
| 3 | 125.00 | 108.00 | 158.00 | 130.00 | 1 |
| 4 | 158.00 | 130.00 | 205.00 | 153.00 | 1 |
| 5 | 205.00 | 153.00 | 210.00 | 162.00 | 1 |
| 6 | 210.00 | 162.00 | 250.00 | 170.00 | 1 |
| 7 | 250.00 | 170.00 | 300.00 | 195.00 | 1 |
| 8 | 300.00 | 195.00 | 325.00 | 210.00 | 1 |
| 9 | 325.00 | 210.00 | 428.00 | 230.00 | 1 |
| 10 | 428.00 | 230.00 | 510.00 | 248.00 | 1 |
| 11 | 510.00 | 248.00 | 562.00 | 266.00 | 1 |
| 12 | 562.00 | 266.00 | 665.00 | 315.00 | 1 |
| 13 | 665.00 | 315.00 | 742.00 | 360.00 | 1 |
| 14 | 742.00 | 360.00 | 771.00 | 363.00 | 1 |
| 15 | 771.00 | 363.00 | 790.00 | 360.00 | 1 |
| 16 | 790.00 | 360.00 | 822.00 | 345.00 | 1 |
| 17 | 822.00 | 345.00 | 840.00 | 321.00 | 1 |
| 18 | 0.00 | 55.00 | 40.00 | 60.00 | 1 |
| 19 | 40.00 | 60.00 | 92.00 | 90.00 | 1 |

ISOTROPIC SOIL PARAMETERS

2 Types of Soil

| Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Pore Pressure Param. | Pressure Constant (psf) | Piez. Surface No. |
|---|---|---|---|---|---|---|---|
| 1 | 130.0 | 130.0 | 300.0 | 43.0 | 0.00 | 0.0 | 0 |
| 2 | 120.0 | 120.0 | 400.0 | 28.0 | 0.00 | 0.0 | 0 |

A Horizontal Earthquake Loading Coefficient
Of 0.150 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of 0.000 Has Been Assigned

Cavitation Pressure = 0.0 psf

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 92.00 ft.
and X = 92.00 ft.

Each Surface Terminates Between X = 210.00 ft.
and X = 825.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00 ft.

60.00 ft. Line Segments Define Each Trial Failure Surface.

Following Is Displayed The Surface Examined.

* * Safety Factor Is Calculated By The Modified Bishop Method * *

Failure Surface Specified By 4 Coordinate Points

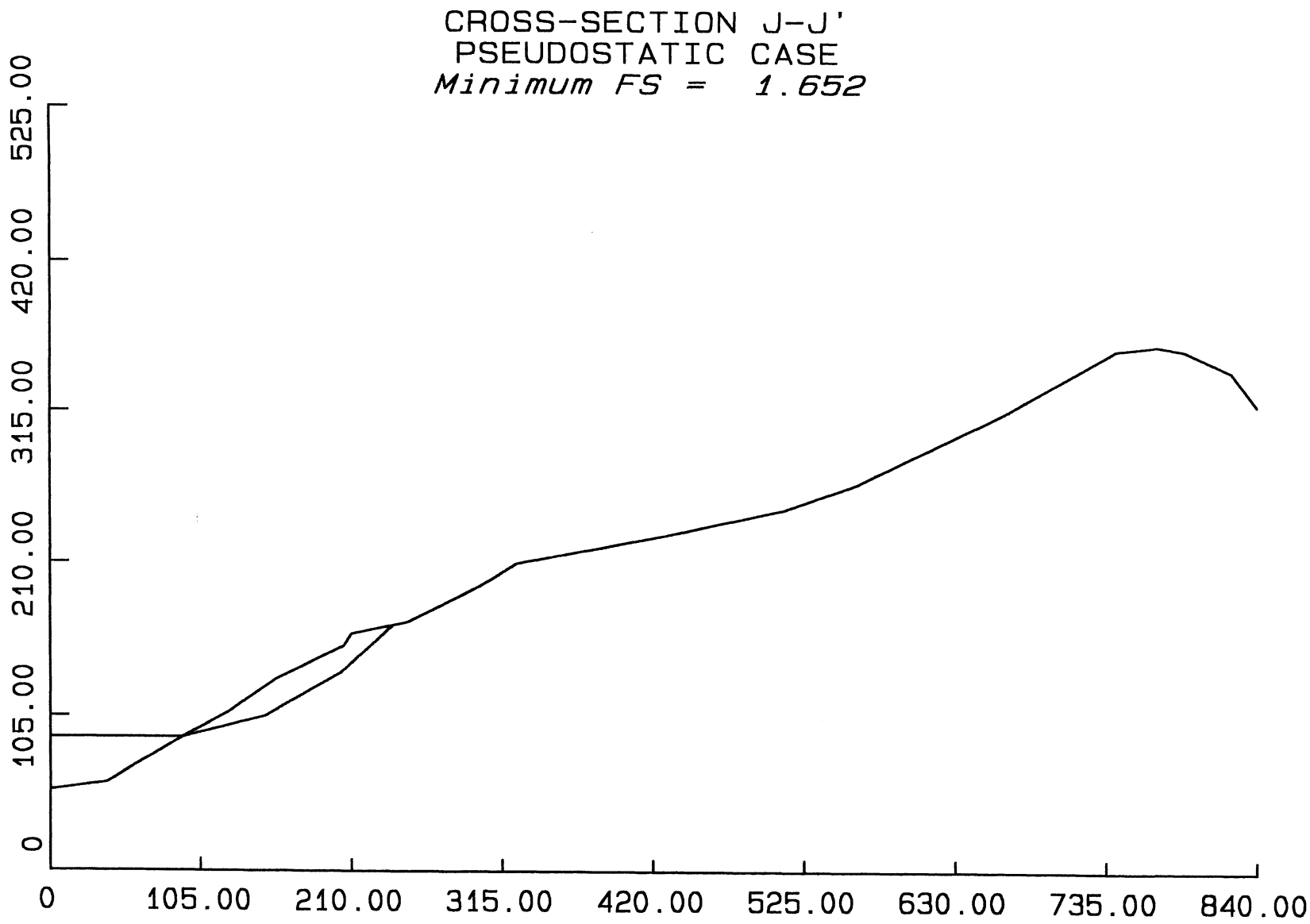
| Point No. | X-Surf (ft) | Y-Surf (ft) |
|---|---|---|
| 1 | 92.00 | 90.00 |
| 2 | 150.07 | 105.11 |
| 3 | 202.70 | 133.91 |
| 4 | 239.40 | 167.88 |

Circle Center At X = 61.6 ; Y = 326.0 and Radius, 237.9

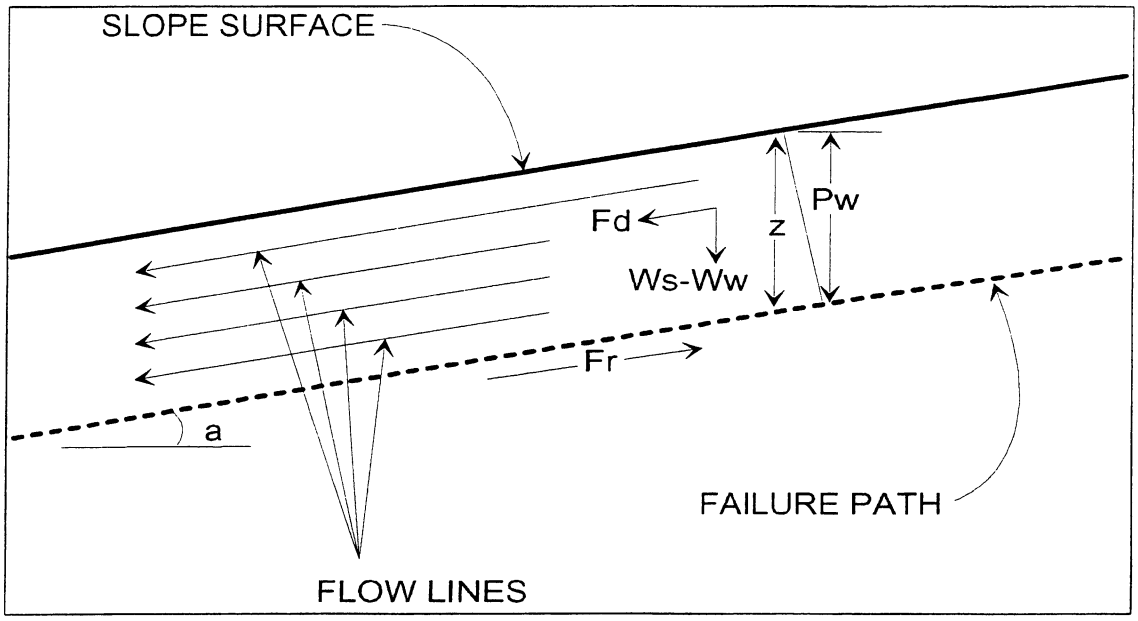
*** PSEUDOSTATIC FACTOR OF SAFETY = 1.65 ***

Individual data on the 7 slices

| Slice No. | Width Ft(m) | Weight Lbs(kg) | Water Force Top Lbs(kg) | Water Force Bot Lbs(kg) | Tie Force Norm Lbs(kg) | Tie Force Tan Lbs(kg) | Earthquake Force Hor Lbs(kg) | Earthquake Force Ver Lbs(kg) | Surcharge Load Lbs(kg) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 33.0 | 20188.4 | 0.0 | 0.0 | 0.0 | 0.0 | 3028.3 | 0.0 | 0.0 |
| 2 | 25.1 | 47271.7 | 0.0 | 0.0 | 0.0 | 0.0 | 7090.8 | 0.0 | 0.0 |
| 3 | 7.9 | 20702.1 | 0.0 | 0.0 | 0.0 | 0.0 | 3105.3 | 0.0 | 0.0 |
| 4 | 44.7 | 111900.9 | 0.0 | 0.0 | 0.0 | 0.0 | 16785.1 | 0.0 | 0.0 |
| 5 | 2.3 | 5215.6 | 0.0 | 0.0 | 0.0 | 0.0 | 782.3 | 0.0 | 0.0 |
| 6 | 5.0 | 12445.5 | 0.0 | 0.0 | 0.0 | 0.0 | 1866.8 | 0.0 | 0.0 |
| 7 | 29.4 | 40768.5 | 0.0 | 0.0 | 0.0 | 0.0 | 6115.3 | 0.0 | 0.0 |


CROSS-SECTION J-J'
PSEUDOSTATIC CASE
Minimum FS = 1.652
525.00
420.00
315.00
210.00
105.00
0
0
105.00
210.00
315.00
420.00
525.00
630.00
735.00
840.00

# SURFICIAL STABILITY ANALYSIS




Assume: (1) Saturation To Slope Surface
(2) Sufficient Permeability To Establish Water Flow

Pw = Water Pressure Head = (z)(cos^2(a))
Ws = Saturated Soil Unit Weight
Ww = Unit Weight of Water (62.4 lb/cu.ft.)
u = Pore Water Pressure = (Ww)(z)(cos^2(a))
z = Layer Thickness
a = Angle of Slope
phi = Angle of Friction
c = Cohesion
Fd = (0.5)(z)(Ws)(sin(2a))
Fr = (z)(Ws-Ww)(cos^2(a))(tan(phi)) + c
Factor of Safety (FS) = Fr/Fd

**1 1/2:1 CUT SLOPE**

Given:

| Ws (pcf) | z (ft) | a (degrees) | a (radians) | phi (degrees) | phi (radians) | c (psf) |
|---|---|---|---|---|---|---|
| 130 | 4 | 33.3 | 0.581196 | 43 | 0.750493 | 300 |

Calculations:

| Pw | u | Fd | Fr | **FS** |
|---|---|---|---|---|
| 2.79 | 174.36 | 238.62 | 476.15 | **2.00** |

May 15, 2000
Work Order 101568-MP

# APPENDIX IV

## SEISMIC REFRACTION SURVEYS

## AND

## ROCK RIPPABILITY ASSESSMENT

# APPENDIX IV

## SEISMIC REFRACTION SURVEYS AND ROCK RIPPABILITY ASSESSMENT

Twenty-five shallow seismic refraction traverses were conducted during the 1988 and 1998 field exploration phases; and eight additional traverses was completed for the current study. The primary purpose of the refraction seismic surveys were to provide guidelines to the excavatability of bedrock. As discussed in the geologic section of this report, the Conejo Volcanics bedrock is dense below relatively shallow weathered zones that range from a few to a few tens of feet deep. In a general sense, the higher the velocity of the P-wave (compressional) transmitted through bedrock, the more difficult excavation will be. Based on our experience in the region, P-wave velocities of 6000± to 7000± feet per second are the upper limits for efficient ripping with a Caterpillar D-9L or the equivalent, the grading industry standard machine for ripping. Bedrock transmitting velocities higher than these numbers usually requires blasting for efficient dislodgment. Additionally, rock exhibiting velocities on the order of 5000 feet per second requires heavy to very heavy ripping to local blasting for dislodgment. It should be emphasized that the measurement of P-wave velocities with seismographs provides only a guideline for rippability. Factors such as fractures, joints, bedding plane and/or flow spacing and orientation, "best fit" interpretation of seismic data in rocks with heterogeneous fabric, and even grading equipment condition and operator skill all play important roles that inhibit a precise determination of the rippable depths of rock.

All velocity survey lines were performed with either a Southwest Industrial Electronics 24-channel or Geometrics 12-channel seismographs with photographic recorders. Geophone spreads were a maximum of 400 lineal feet with a spacing of 10 or 20 feet between geophones. A special design gun using 12-gauge shotgun shells or a sledge hammer were the energy sources for the surveys.

Included herein are the seismic profiles from the 1988 and 1998 studies by E.R. Browne and Associates, Inc., showing velocities and their depths as interpreted by Mr. E.R. Browne, Registered Geophysicist (see Plates S-5 through S-30). The profiles delineate the various velocity horizons only. They do not specifically indicate the geologic formations on-site. It should be

noted that the seismic lines start at number S-5. Lines S-1 through S-4 were accomplished during a concurrent survey of adjoining property.

Also included herein are seismic profiles (Plates 1 through 8) generated by Advanced Geoscience, Inc. The field work for these lines was accomplished in March 2000. The locations are based on the current Tentative Tract Map, and are thus located in areas where cut areas were not proposed at the time of the earlier geophysical investigations. Mr. Mark Olsen, a California Registered Geophysicist, constructed the seismic profiles.

Following is a brief assessment of individual seismic lines relative to rippability.

**1988 and 1998 Traverses**

Line S-5 : A mantle of relatively low to moderate velocity (2000 feet per second) was interpreted as being less than 10 feet deep. Below this approximate depth, a velocity horizon of greater than 9000 feet per second apparently exists. Thus, based on the seismic data, it is anticipated that the bedrock along line S-5 will probably require blasting or jackhammering below 10± feet. Localized near-surface hard zones, however, may also be difficult to dislodge. Up to 33 feet of cut are planned in this area.

Line S-6: An 8- to 10-feet-thick mantle of weathered bedrock (?) with a velocity of about 2000-feet-per-second was indicated by the seismic data. Below this depth, an 8000 feet per second zone exists. Thus, based on the seismic data, blasting or jackhammering may be required below 8 to 10± feet. As stated in the discussion of line S-5, localized hard zones that may require blasting may be encountered in the upper horizon.

Line S-7 (Near Lot 38): This line suggests variability in excavation characteristics. An upper horizon of about 3250 feet per second material exists. It varies from about 6 to 33 feet deep. Below that horizon, 9100 feet per second material is present. In sum, it appears blasting will be necessary below about 6 feet in the west and below 33 feet in the east. Cuts on the order of 10 feet deep are planned in this area. The 3250 feet per second material may provide at least local zones of very difficult excavation and most likely will inhibit trenching with conventional equipment.

Line S-8: As interpreted by Mr. Browne, a "cap" of 2317 feet per second material exists to 13± feet (west) to 42± feet (east). Beneath this cap, 8660 feet per second material appears to be present. Thus, the upper horizon appears rippable with local difficulty; and blasting appears necessary with depth. Twenty feet of cut are planned here.

Line S-9: A veneer of several feet of low velocity (1436 feet per second) material mantles the area. Below that, a 5200-feet-per-second horizon to 45 to 60 feet deep exists. Very high velocity material apparently exists below the 5200 feet per second horizon. Thus, marginally rippable material to material requiring blasting exists very near the surface to depths of 45± to 60± feet. Below those depths, extensive blasting probably will be required. Planned cuts to about 60 feet deep, not counting overexcavation, are planned.

Line S-10: As interpreted by Mr. Browne, a "cap" of 2100 feet per second material is about 5 to 10 feet thick. Based on the probable occurrence of 6900 feet per second material, blasting may be encountered below that cap. Below elevation 910 (west) and 860 (east), blasting appears certain.

Line S-11: Based on the attached seismic profile moderate to heavy ripping and possible local blasting will be necessary from the surface. At shallow depths, 20± feet in the south and 4 feet in the north, blasting appears necessary.

Line S-12: Except for thin mantles at either end of the line, marginally rippable to non-rippable material exists at the surface. Below 15± feet, blasting will likely be necessary in the west.

Line S-13: As interpreted by Mr. Browne, rippable material exists to depths of about 15 to 25 feet. Below those depths, blasting appears certain.

Line S-101: A mantle of low velocity (<1000 feet per second) was interpreted as being 5 to 10 feet deep. Below this approximate depth, an irregular velocity horizon of about 3900 feet per second apparently exists from about the above depths to about 13 to 55 feet below ground surface. Below those depths rock with a velocity greater than 10,000 feet per second is indicated. Thus, based on the seismic data, it is anticipated that the bedrock along line S-101 will probably require blasting or jackhammering below 13 to 55± feet. Localized near-surface hard zones, however,

may also be difficult to dislodge; and difficulty with trenching with standard equipment may be locally difficult below 5 to 10 feet. Up to 20 feet of cut is planned in this area.

Line S-102: A 5- to 15-foot thick mantle of soil/weathered bedrock (?) with a velocity of about 1600 feet per second was indicated by the seismic data. Below this depth, a 5683 feet per second zone exists to depths of about 35 to 50 feet. Below this horizon, 20,000 feet per second material is indicated. Thus, based on the seismic data, hard ripping with possible occasional blasting or jackhammering to dislodge rocks may be required below 5 to 15± feet; and blasting will generally be required below 35 to 50 feet.

Line S-103: An upper horizon of about 1360 feet per second material exists. It varies from about 5 to 12 feet deep. Below that horizon, 7000 feet per second material is present to depths of about 15 to 20 feet. That horizon is underlain by 8290 feet per second rock. In sum, it appears that difficult ripping or blasting will be required below the upper horizon.

Line S-104: As interpreted by Mr. Browne, a "cap" of 1159 feet per second material exists to 8± feet to 12± feet . Beneath this cap, 2993 feet per second material appears to be present to 20 to 40 feet below ground surface. Below the intermediate layer, 6829 feet per second rock is interpreted. Thus, the upper two horizons appear rippable to 20 to 40 feet, and the basal horizon may very well require at least local blasting or jackhammering; and blasting appears necessary with depth. About 20 feet of cut is planned in this area.

Line S-105: A veneer of several feet of low velocity (1450 feet per second) material mantles the area. Below that, a 3117 feet per second horizon to 25 to 35 feet deep exists. Very high velocity material apparently exists below the 3117 feet per second horizon. Thus, rippable material seemingly exists to depths of 25± to 35± feet. Below those depths, extensive blasting probably will be required. Up to about 38 feet of cut are planned in this area.

Line S-106: As interpreted by Mr. Browne, a "cap" of 1214 to 1368 feet-per-second material is about 5 to 10 feet thick. Based on the probable occurrence of 5333 to 6708 feet per second material, heavy ripping and possible blasting or jackhammering may be encountered below that

cap. Below about elevation 970 in the north and 960 in the south, blasting appears to be required. About 50 feet of cut (to elevation 933) are planned here.

Line S-107: Not a part of this study.

Line S-108: Not a part of this study.

Line S-109: Not a part of this study.

Line S-110: A mantle of low velocity (1540 feet per second) was interpreted as being about 10 feet deep. Below this approximate depth, an irregular velocity horizon of about 5300 feet per second apparently exists from about the above depths to about 25 to 30 feet below ground surface. Below those depths rock with a velocity greater than 10,000 feet per second is indicated. Thus, based on the seismic data, it is anticipated that the bedrock along line S-101 will probably require blasting or jackhammering below 25 to 30± feet. Localized near-surface hard zones, however, may also be difficult to dislodge; and difficulty with trenching with standard equipment may be locally difficult below 10 feet. Nearby, about 27 feet of cut are planned.

Line S-111: An 12 to 20 feet-thick mantle of soil/weathered bedrock (?) with a velocity of about 1242 feet-per-second was indicated by the seismic data. Below this depth, a 8410 feet-per-second zone exists. Thus, based on the seismic data, hard ripping and blasting/jackhammering may be required below 12 to 20± feet. About 25 feet of cut are planned here.

Line S-112: An upper horizon of about 1222 feet per second material exists. It varies from about 10 to 17 feet deep. Below that horizon, 9566 feet per second material is present. In sum, it appears that blasting may be required below the upper horizon. Up to about 20 feet of cut are planned.

Line S-113: As interpreted by Mr. Browne, a "cap" of 1015 feet per second material exists to 5± feet to 10± feet below ground surface. Beneath this cap, 6342 feet per second material appears to exist to at least 40 feet. Thus, the basal horizon may very well require at least local to extensive blasting or jackhammering. Up to 35 to 40 feet of cut are planned in this area.

Line S-114: About 10 feet of low velocity (1450 feet per second) material mantles the area. Below that, a 7679 feet per second horizon at least 40 feet deep exists. Thus, the basal horizon may very well require at least local to extensive blasting or jackhammering. Fifteen feet of cut are indicated.

Line S-115: As interpreted by Mr. Browne, a "cap" of 1853 feet-per-second material is about 12 to 20 feet thick. This is part of the borrow/disposal canyon fill. Based on the probable occurrence of 5484 feet per second rock below the fill, heavy ripping and possible blasting or jackhammering may be encountered if excavations are planned below the fill in this area. Only about 8 feet of cut are planned in this area.

Line S-116: A 1779 feet per second mantle is about 5 to 8 feet thick. A steeply north dipping 7342 feet per second zone that probably is related to north-dipping bedding ranges to about 7 to 45 feet below ground surface. An 11,921 feet per second zone underlies the second zone. Below 5± to 8 feet, blasting or special excavating techniques may be necessary; and most likely will be required below 7 to 45 feet. Fill is now programmed for this area.

Line S-117: As interpreted by Mr. Browne, easily rippable material exists to depths of about 30 feet. Below those depths, blasting or special techniques may be necessary.

**2000 Traverses**

Line SE-1: The seismic profile indicates an upper low velocity layer about 5 to 8 feet thick, and the south half of the line indicates a wedge of moderate velocity of 3500 feet per second varying in depth from about zero to about 35 feet. Near the south end of the line, velocities in excess of 10,000 feet per second are indicated. Thus blasting or special excavation techniques would be required below the moderate velocity material. In the north part of the line, velocities on the order of 8000 feet per second are indicated at depths varying from about 10 to 20 feet. Up to about 25 feet of cut are planned.

Line SE-2: This traverse indicates a low velocity surface layer about 5 to 10 feet thick, underlain by a moderate velocity (2820 to 3450 feet per second) layer about 12 to 25 feet thick. The moderate velocity layer in underlain by velocities greater than 10,000 feet per second. Thus, the

materials appear to be rippable to depths of about 25 to 35 feet, with possible blasting or special techniques required below those depths. Up to 30 feet of cut, exclusive of overexcavation, are shown on Plate II.

Line SE-3: As interpreted by Advanced Geoscience, Inc., A low velocity layer about 5 feet thick mantles an intermediate velocity (greater than 3500 feet per second) layer about 7 to 15 feet thick. Velocities on the order of 9000 to 10,000 feet per second were interpreted below those layers. In sum, it seems as if the materials are rippable by standard mass grading techniques to depths of about 10 to 20 feet. Trenching tools may experience difficulty in the intermediate velocity layer.

Line SE-4: A low velocity layer about 7 to 13 feet deep overlies about 8000 feet per second material. Thus special excavation techniques or blasting may be necessary below those depths.

Line SW-1: This line, near the proposed Kanan Road cut slope, indicates a thin (about 5 feet thick) low velocity surface layer, underlain by an intermediate layer with velocities on the order of 3000 to 5000 feet per second that is about 5 to 20 feet thick. Those layers mantle 7700 to 8400 feet per second bedrock. Thus below about 10 to 25 feet difficulty in ripping most likely will be required. Up to 70 feet of cut are planned at this cut.

Line SW-2: A 5 feet thick low velocity surface horizon mantles an irregularly shaped moderate velocity layer that is about 7 to 15 feet thick. Below the moderate (3000 to 3900 feet per second) material, velocities on the order of 10,000 feet per second were interpreted. Thus, special techniques or blasting may be required below about 12 to 20 feet. Forty feet of cut adre shown on Plate I.

Line SW-3: An about 1150 to 2100 feet per second surface layer mantles a 3000 to 4200 feet per second intermediate layer that is underlain by 7700 to 9900 feet per second material. The upper 30 feet, more or less, appear rippable by standard mass grading techniques, with possible special techniques or blasting required below those depths. Standard trenching equipment most likely will encounter difficulty below the 6 to 8 feet deep low velocity surface layer. About 30 feet of cut, exclusive of overexcavation, are planned.

Line SW-4: A 5 to 7 feet thick low velocity (1500 to 2000 feet per second) zone overlies an irregularly shaped 5000 feet per second zone about 3 to 20 feet thick. The deep velocity zone indicates greater than 8000 feet per second material. thus, trenching equipment will experience difficulty below 5 to 7 feet. Standard mass grading equipment may encounter local difficulty in the intermediate layer, and generally below about 10 to 25 feet. About 35 feet, maximum, cut is planned.

SEISMIC INTERPRETATION BY E.R. BROWNE AND ASSOCIATES

goura Hills; Pacific Soils Eng., Inc. LINE 5

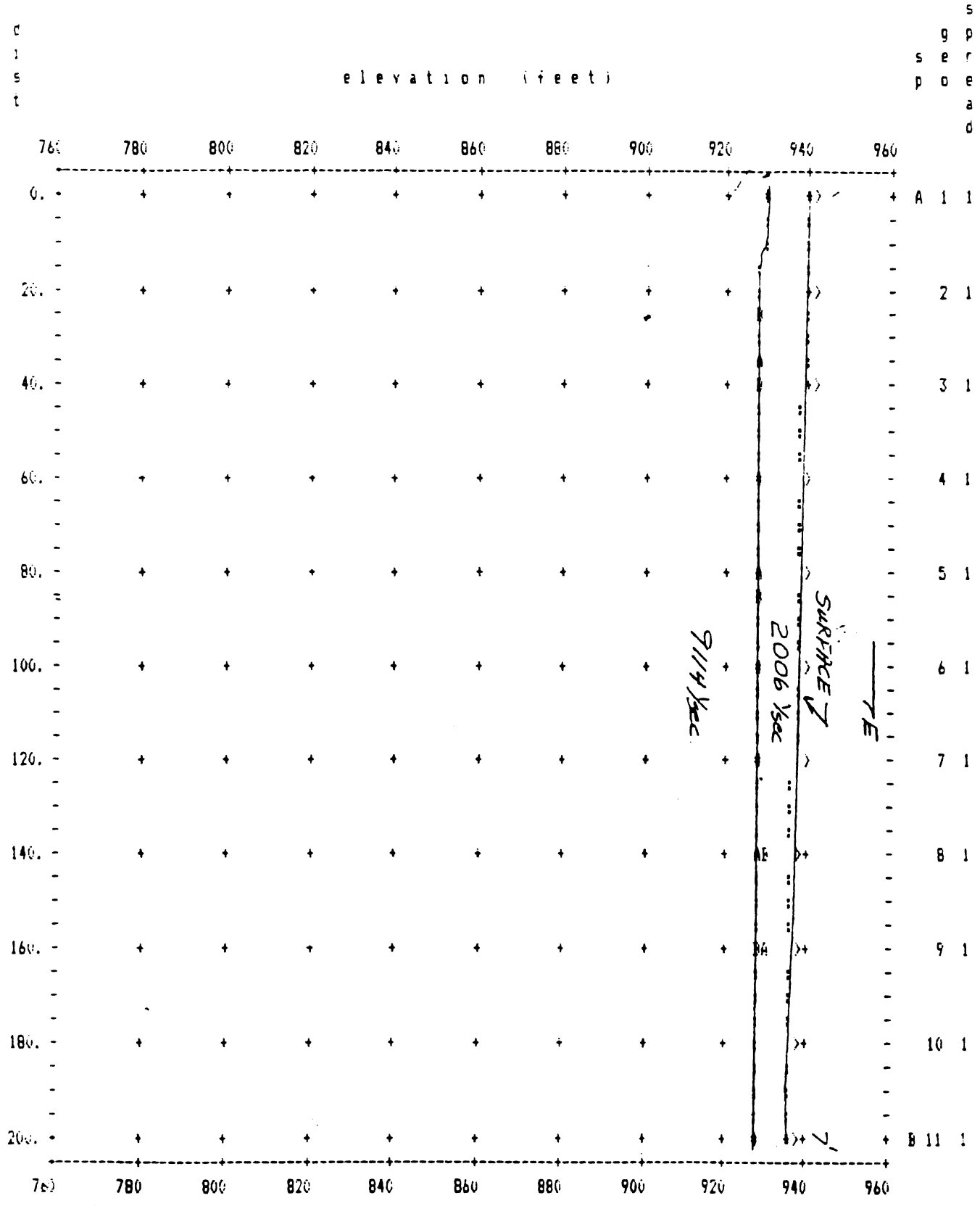



Plate S-5
W.O. 101568-A

SEISMIC INTERPRETATION BY E.R. BROWNE AND ASSOCIATES

goura Hills; Pacific Soils Eng., Inc. LINE 6

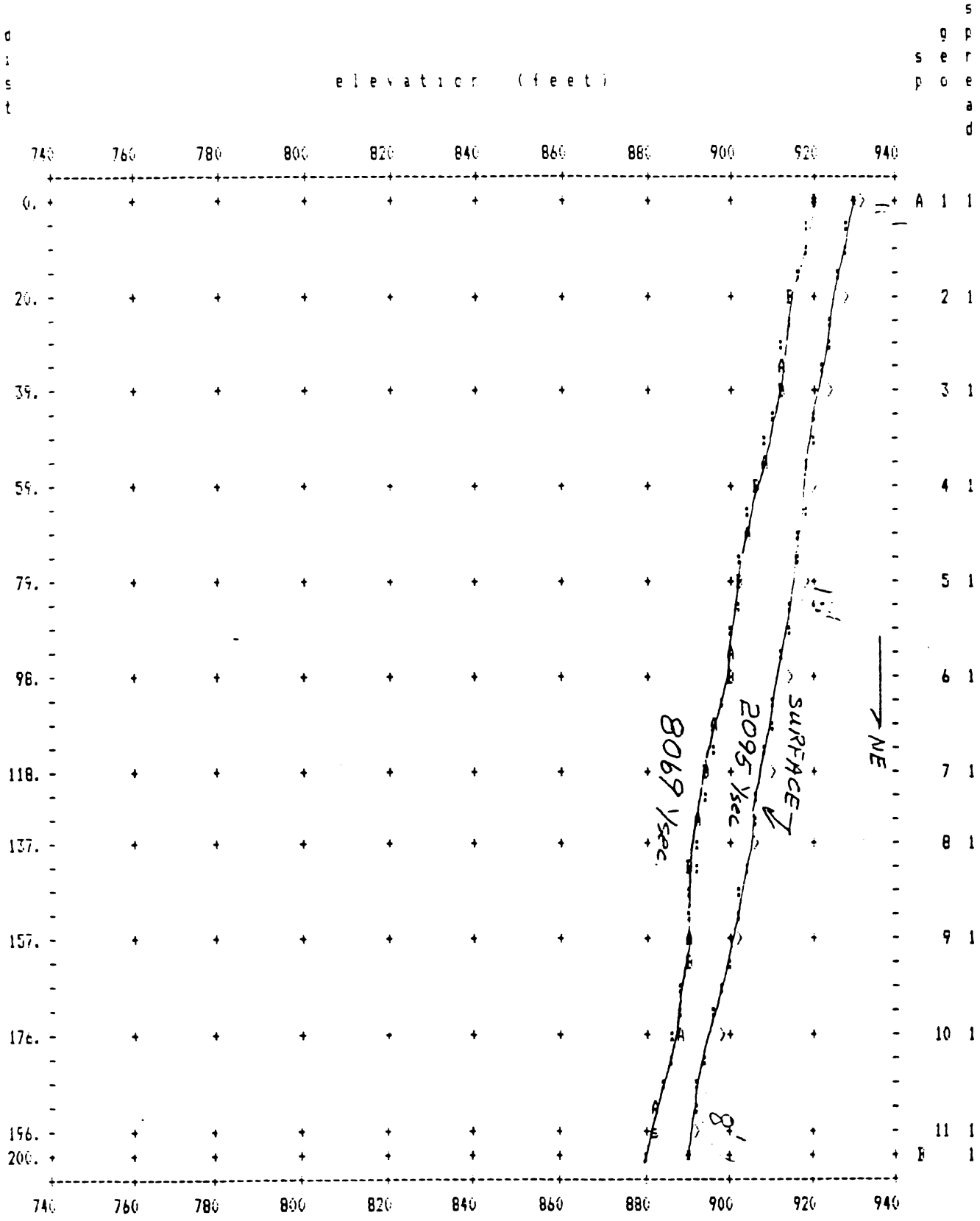



Plate S-6
WO 101568-A

SEISMIC INTERPRETATION BY E.R. BROWNE AND ASSOCIATES

goura Hills; Pacific Soils Eng., Inc. LINE 7

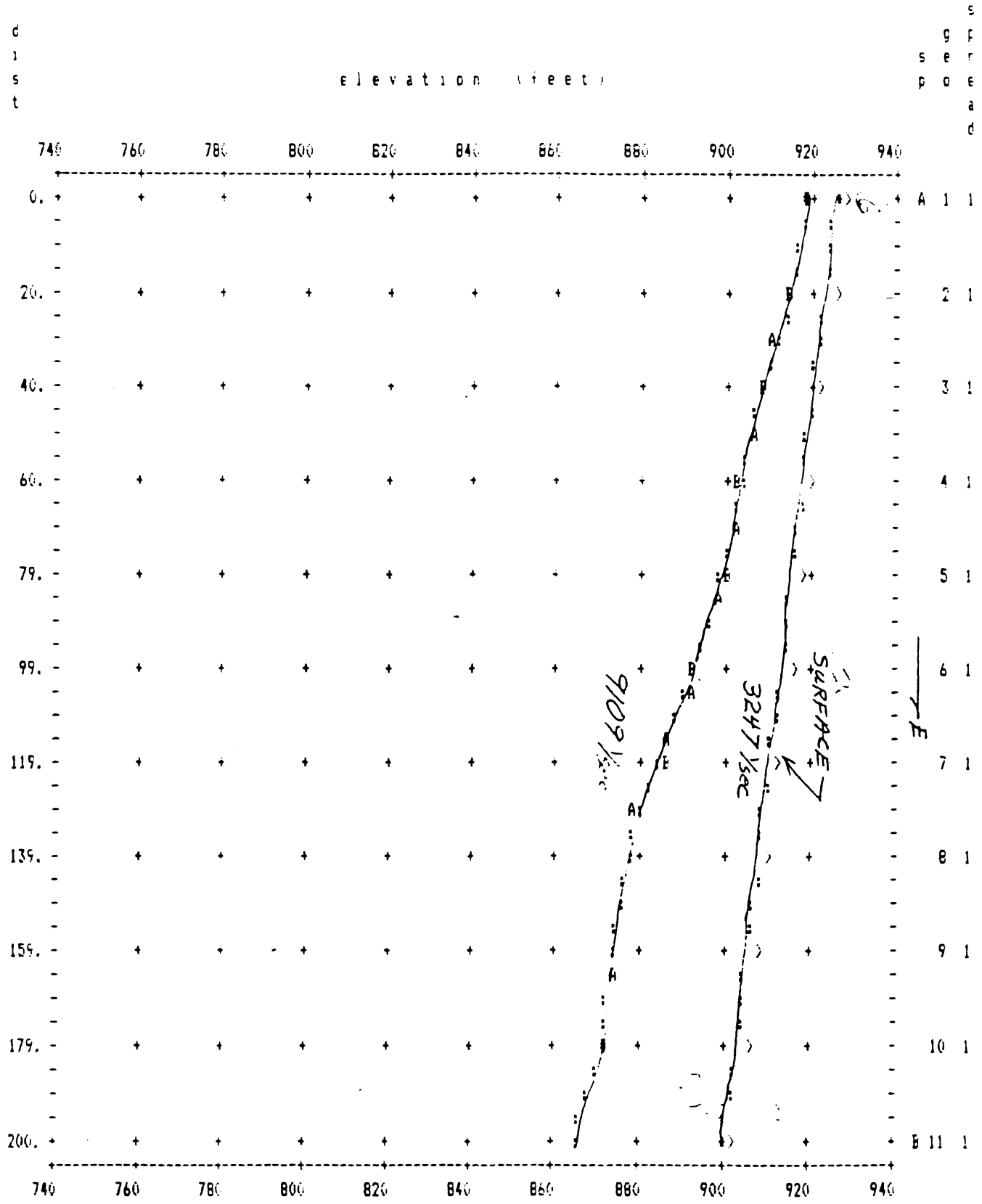



Plate 5-7

W.O. 101568-A

SEISMIC INTERPRETATION BY E.R. BROWNE AND ASSOCIATES

Agoura Hills; Pacific Soils Eng., Inc. LINE 8

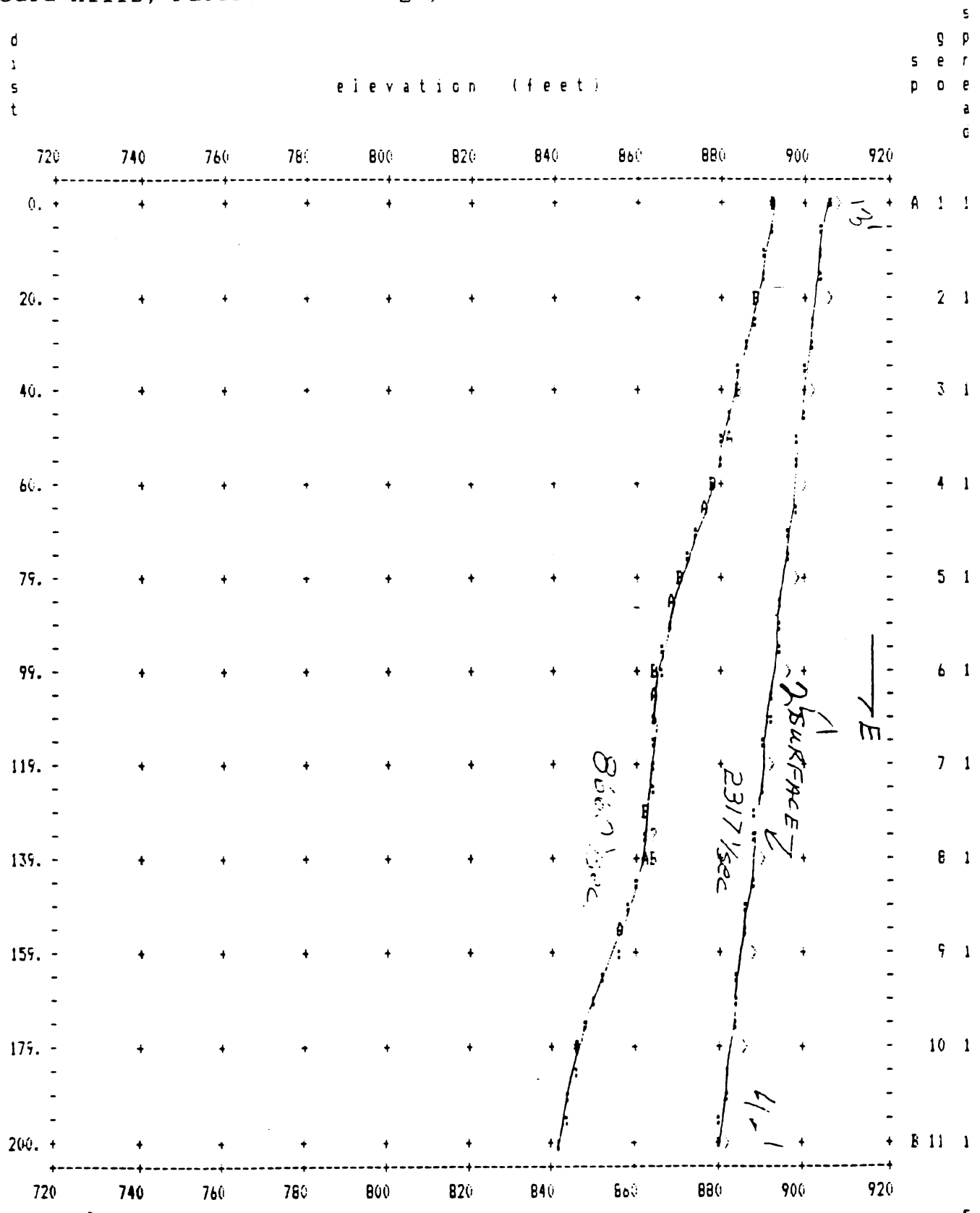



Plate S-8
W.O. 101568-A

SEISMIC INTERPRETATION BY E.R. BROWNE AND ASSOCIATES

goura Hills; Pacific Soils Eng., Inc. LINE 9

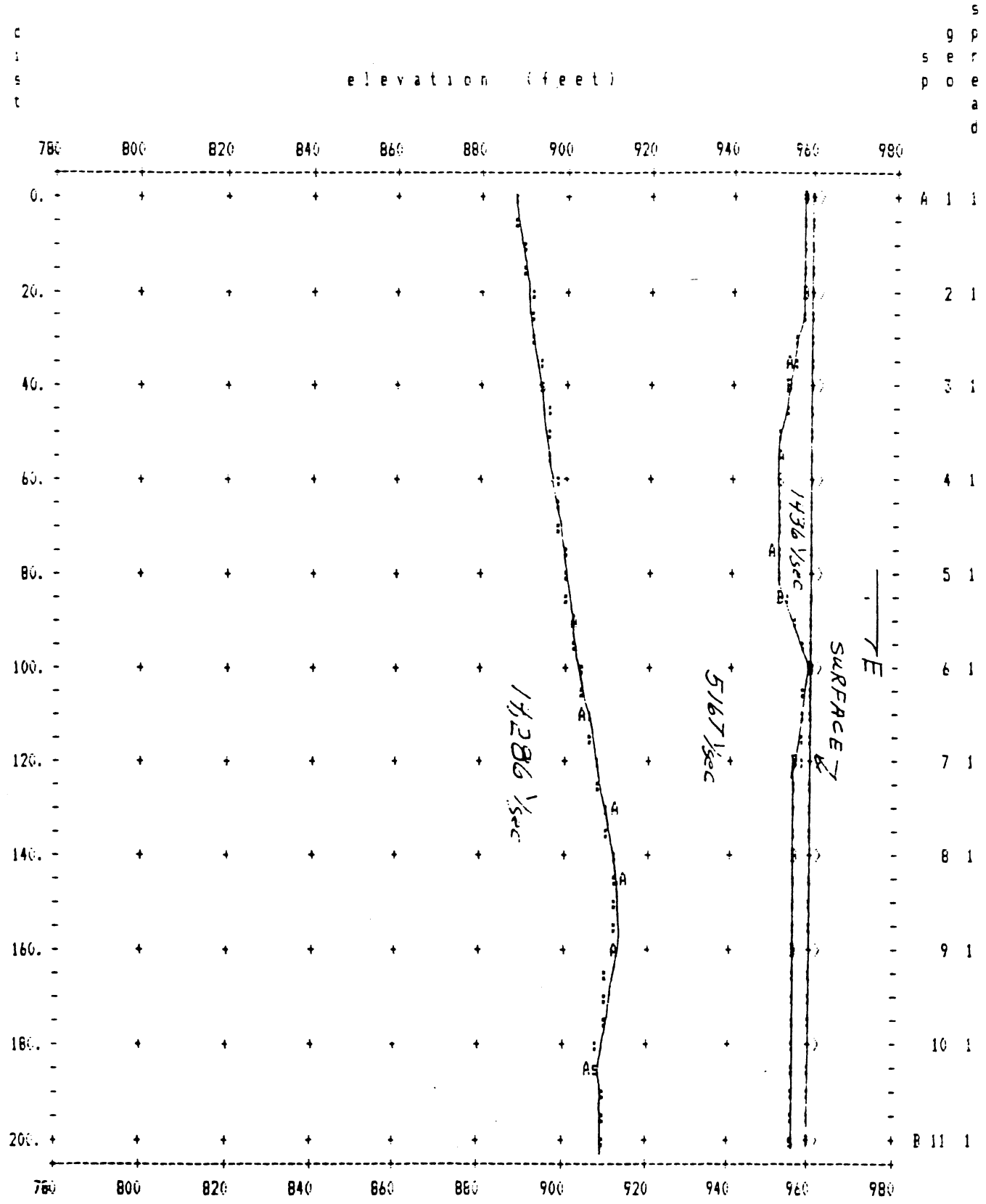



Plate S-9
WO 101568-A

SEISMIC INTERPRETATION BY E.R. BROWNE AND ASSOCIATES
Agoura Hills; Pacific Soils Eng., Inc. LINE 10

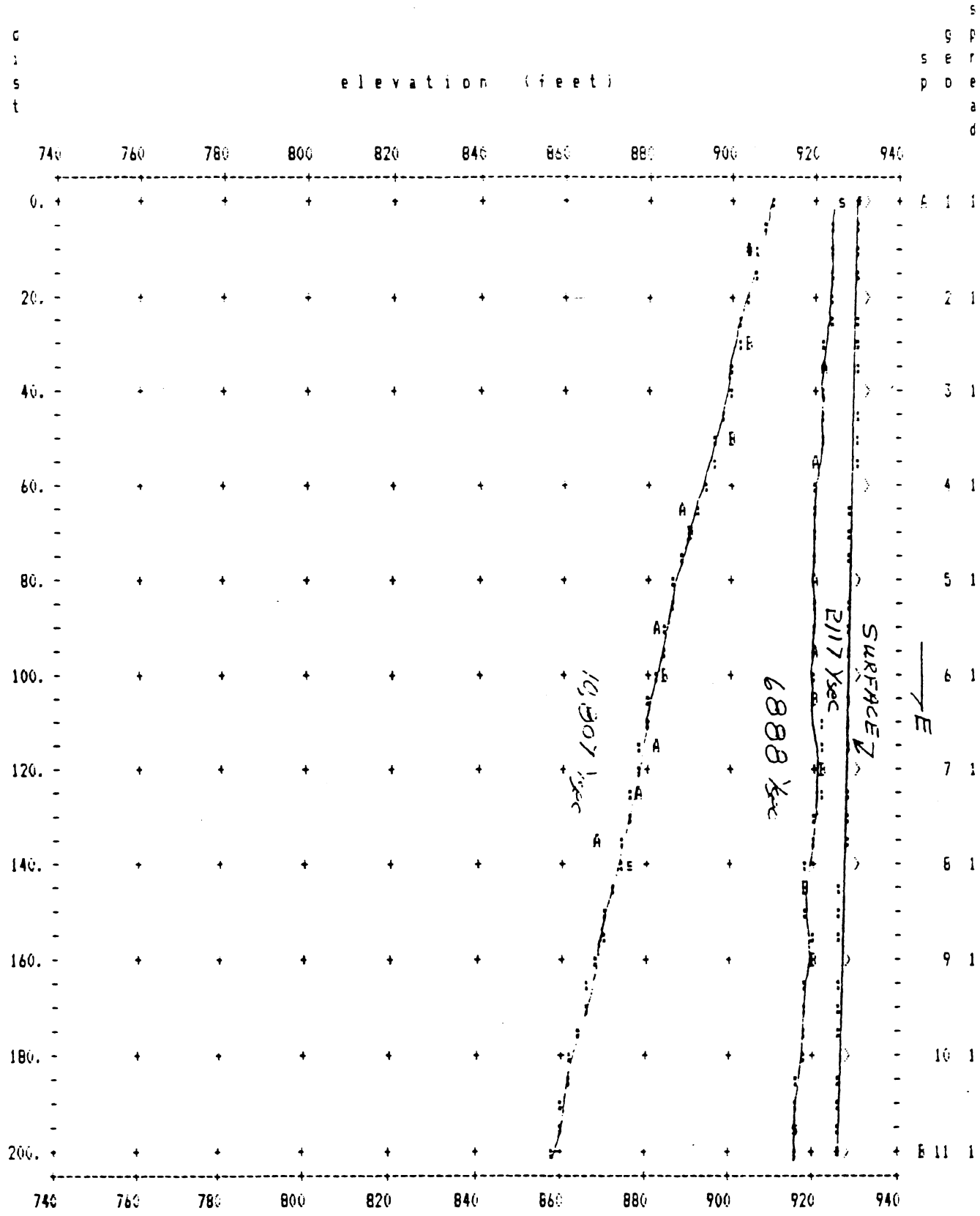



Plate S-10
WO 10568-A

SEISMIC INTERPRETATION BY E.R. BROWNE AND ASSOCIATES

goura Hills; Pacific Soils Eng., Inc. LINE 11

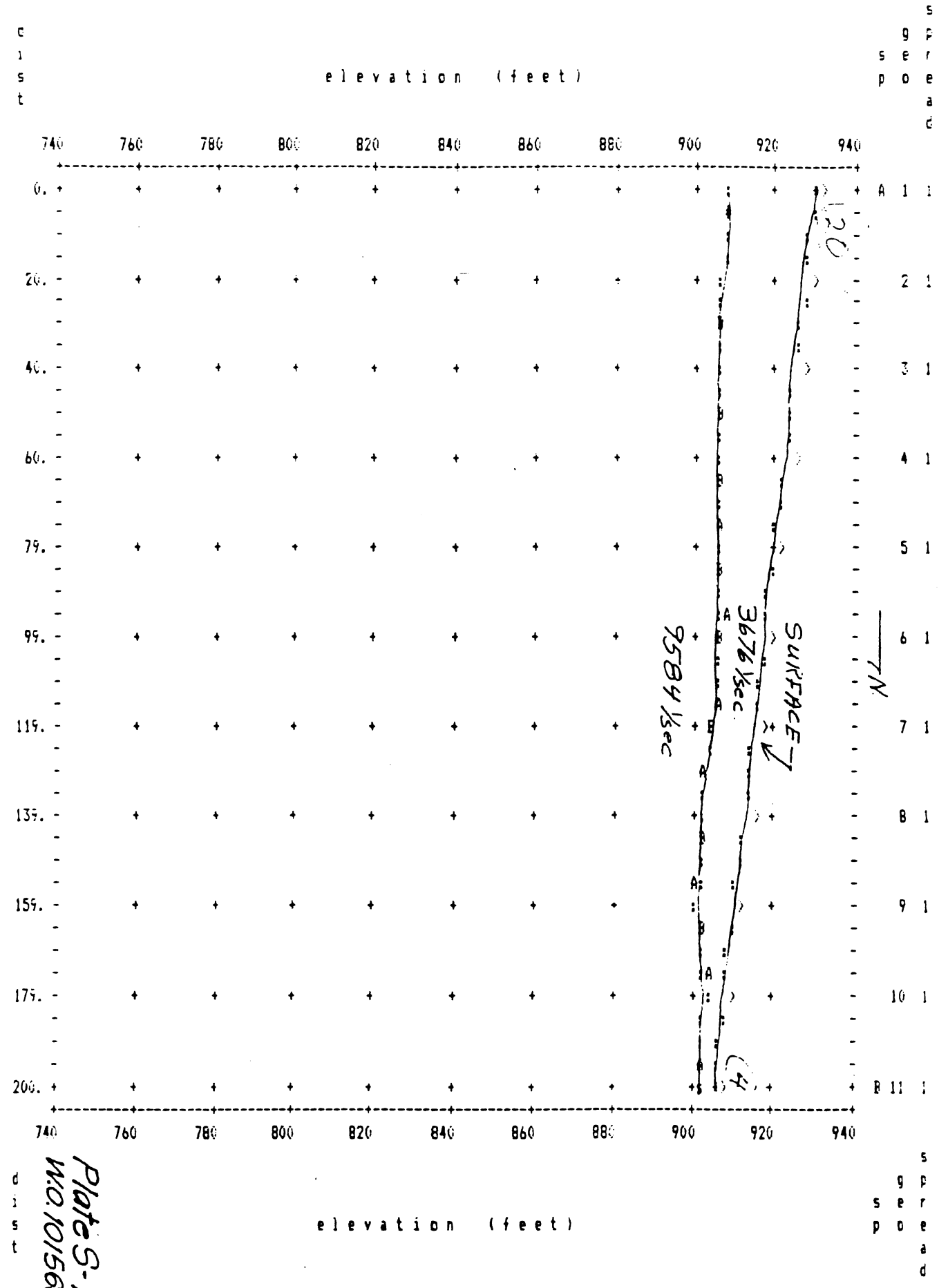



Plate S-11
WO 10156B-A

SEISMIC INTERPRETATION BY E.R. BROWNE AND ASSOCIATES

goura Hills; Pacific Soils Eng., Inc. LINE 12

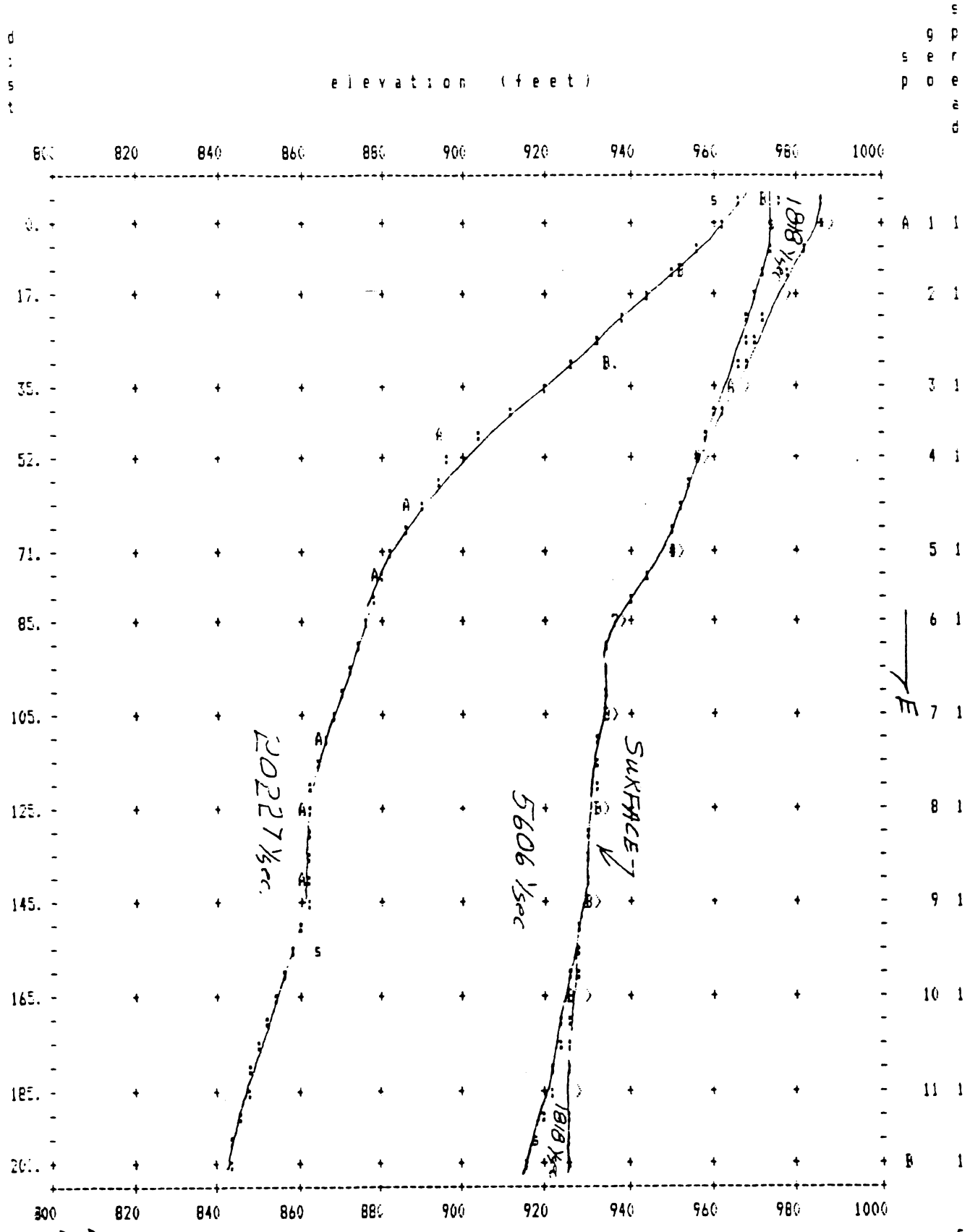



Plate S-12

W.O. 101568-A

SEISMIC INTERPRETATION BY E.R. BROWNE AND ASSOCIATES

goura Hills; Pacific Soils Eng., Inc. LINE 13

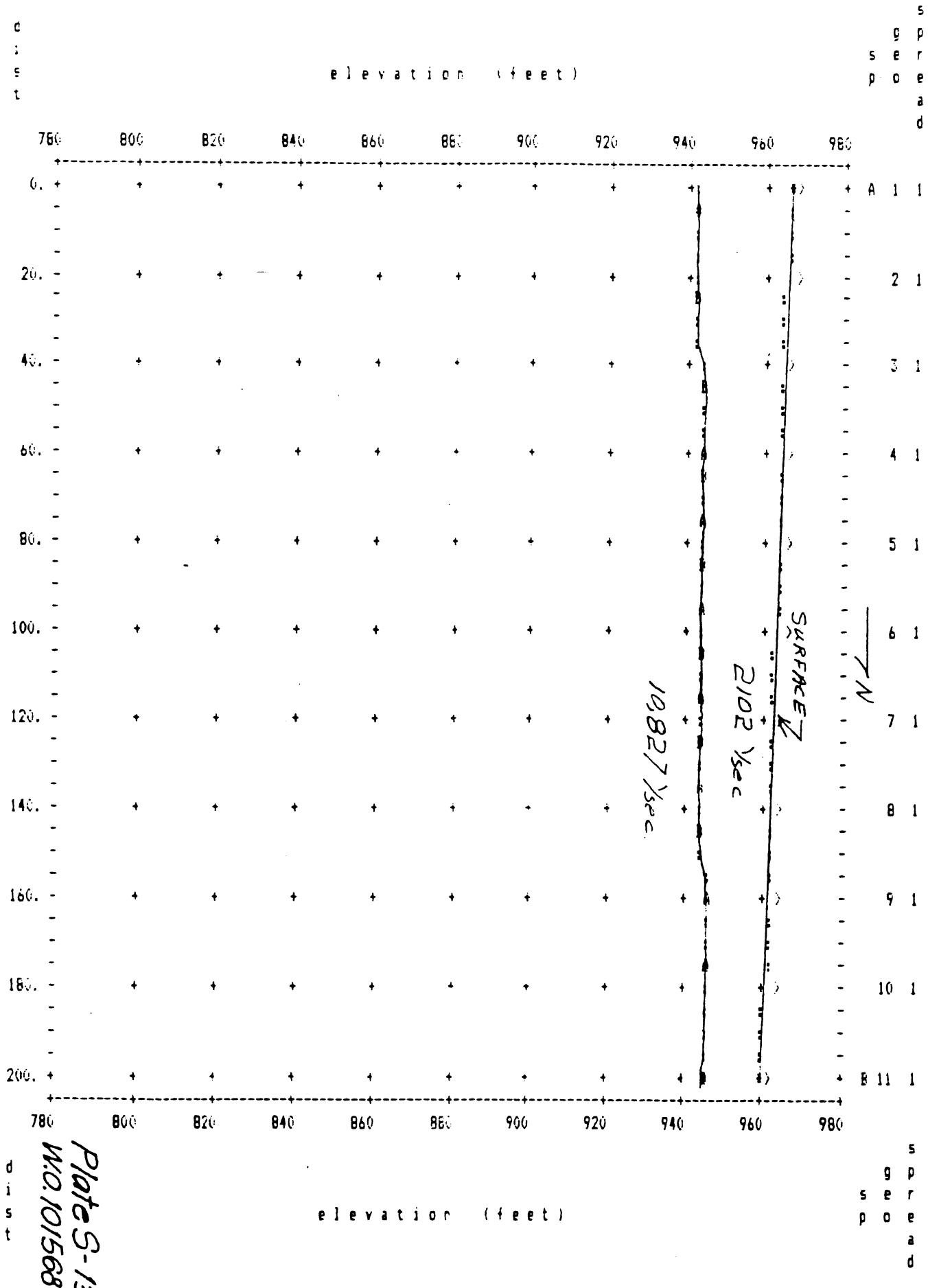
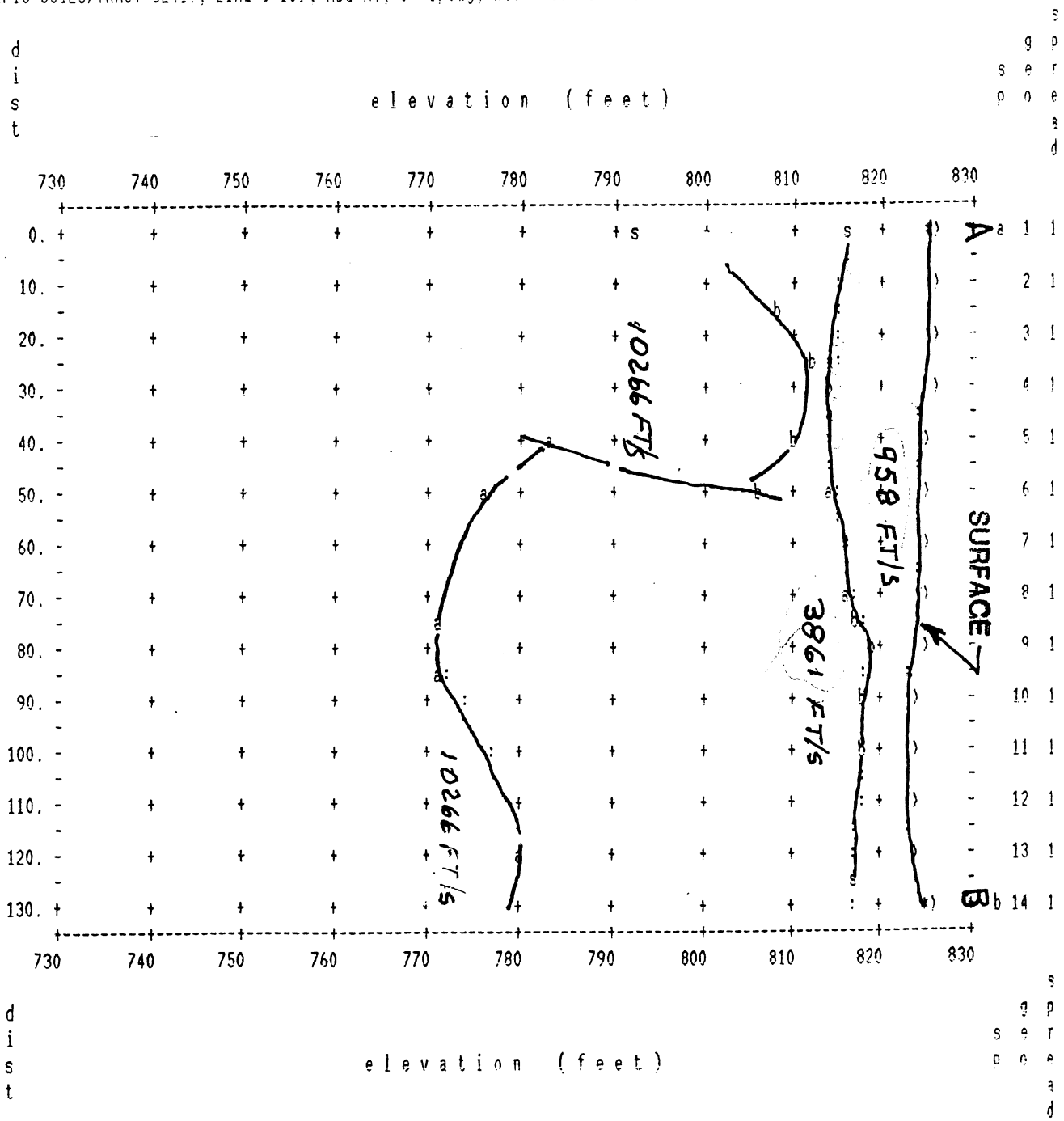



Plate S-13

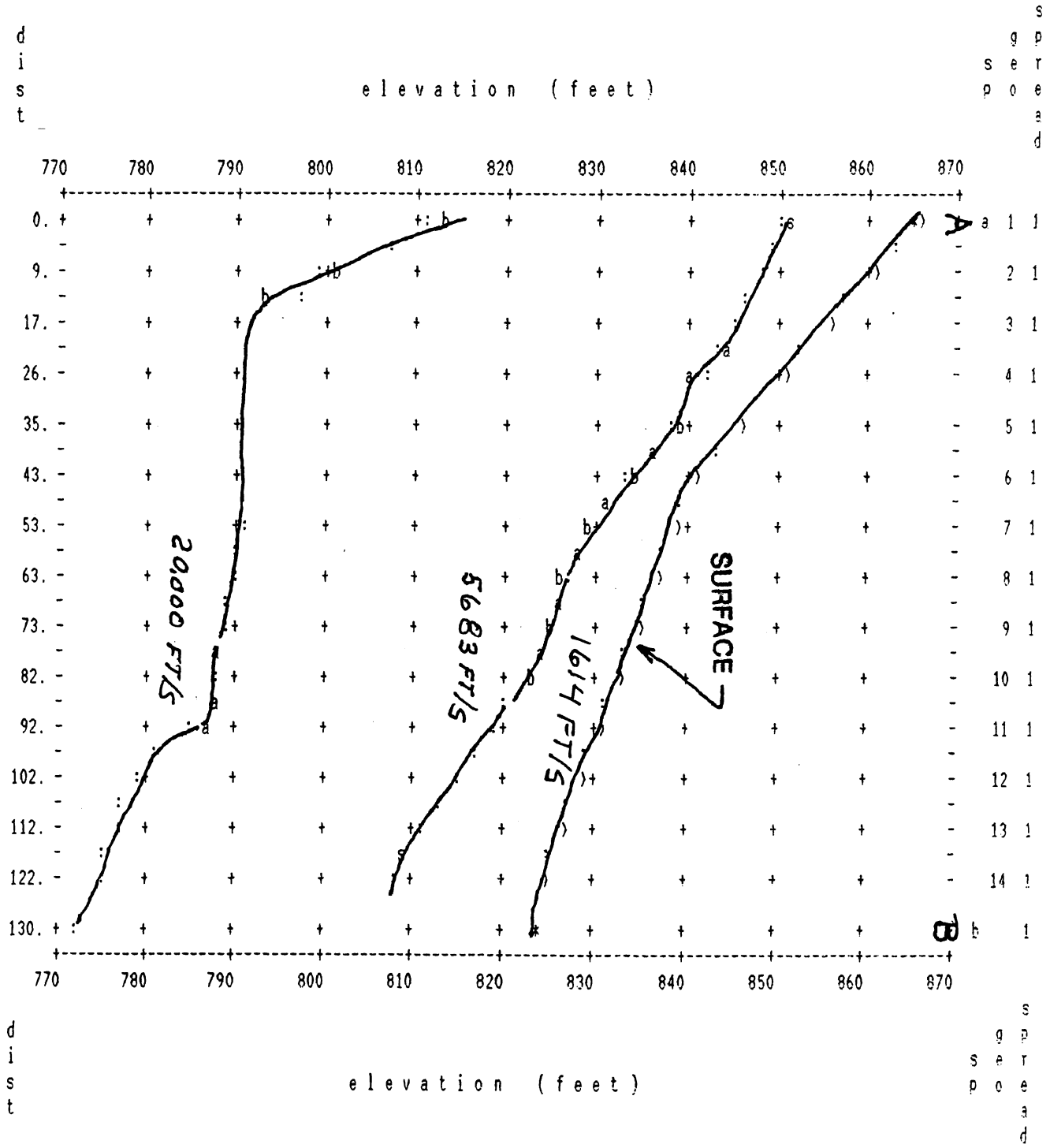
W.O. 101568-A

PACIFIC SOILS/TRACT 52419, LINE S-101, HDG N., 10'spcng, W.O: 0156 BH 4/10/98




LINE S-101 → N

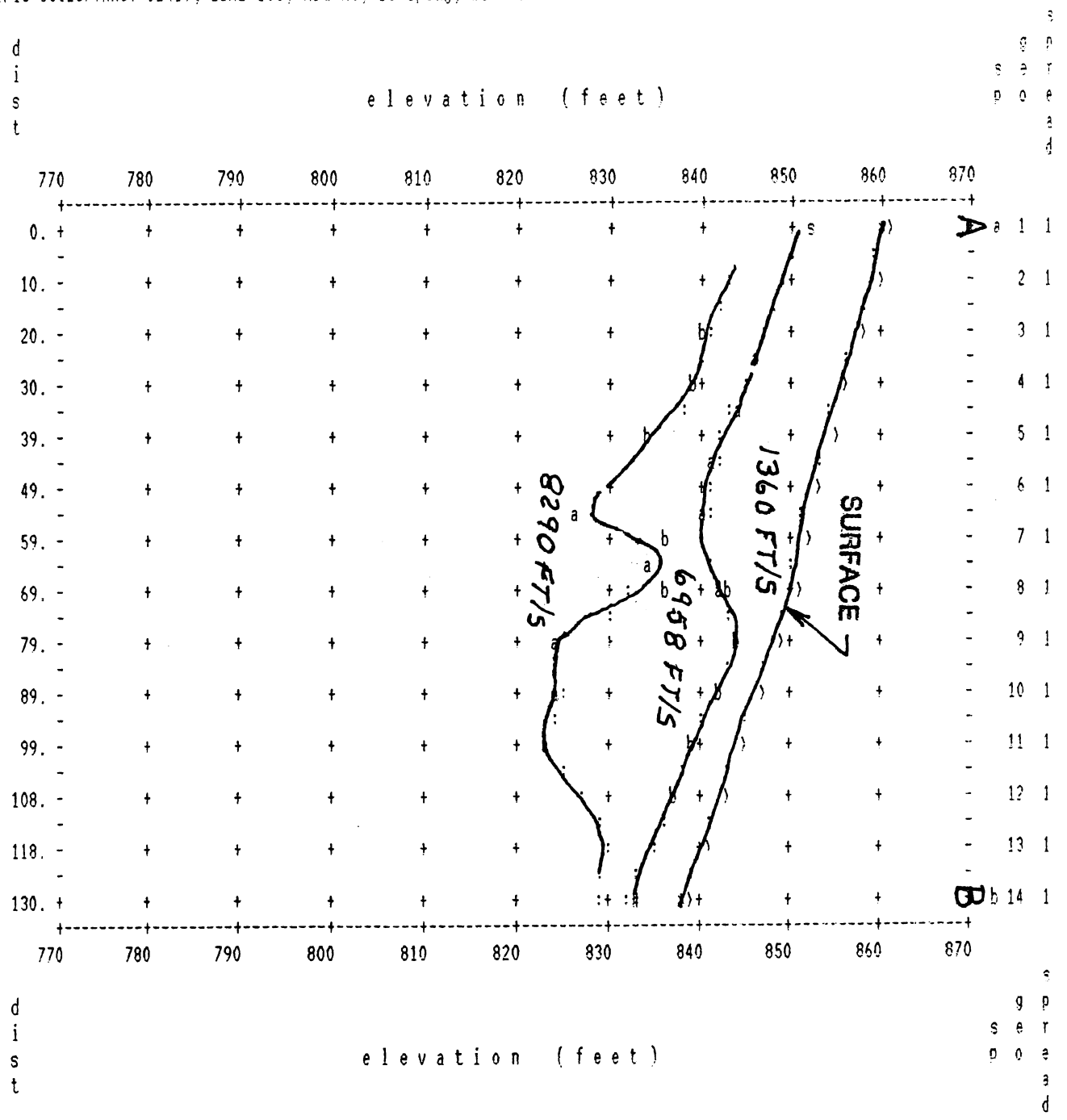
PACIFIC SOILS/TRACT 52419, LINE 102, HDG N., 10'spcng, W.O: 0156 BH 4/10/98




LINE S-102 → N

S-15

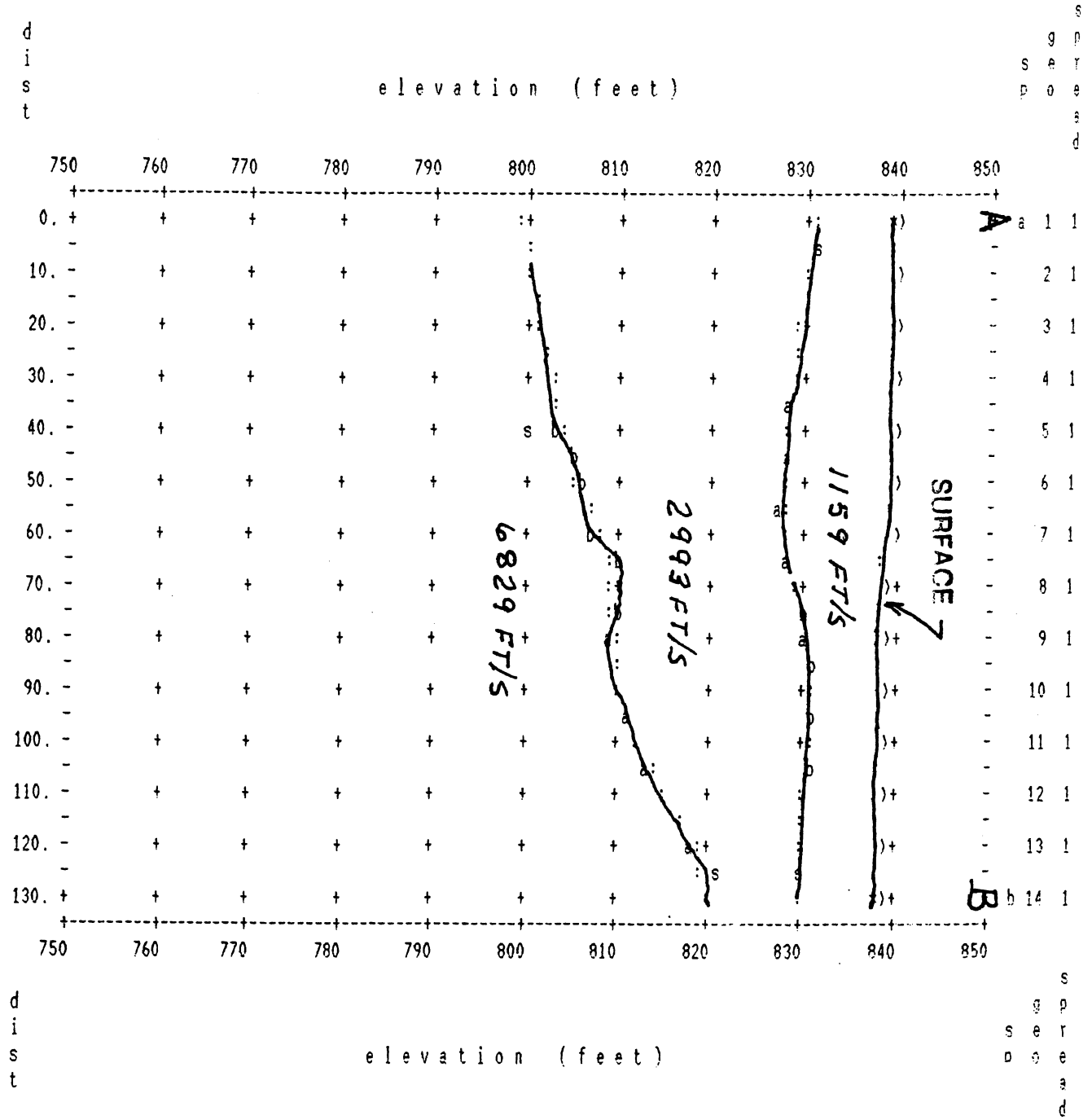
PACIFIC SOILS/TRACT 52419, LINE 103, HDG N., 10'spcng, W.O: 0156 BH 4/10/98




LINE S-103 → N

2-11

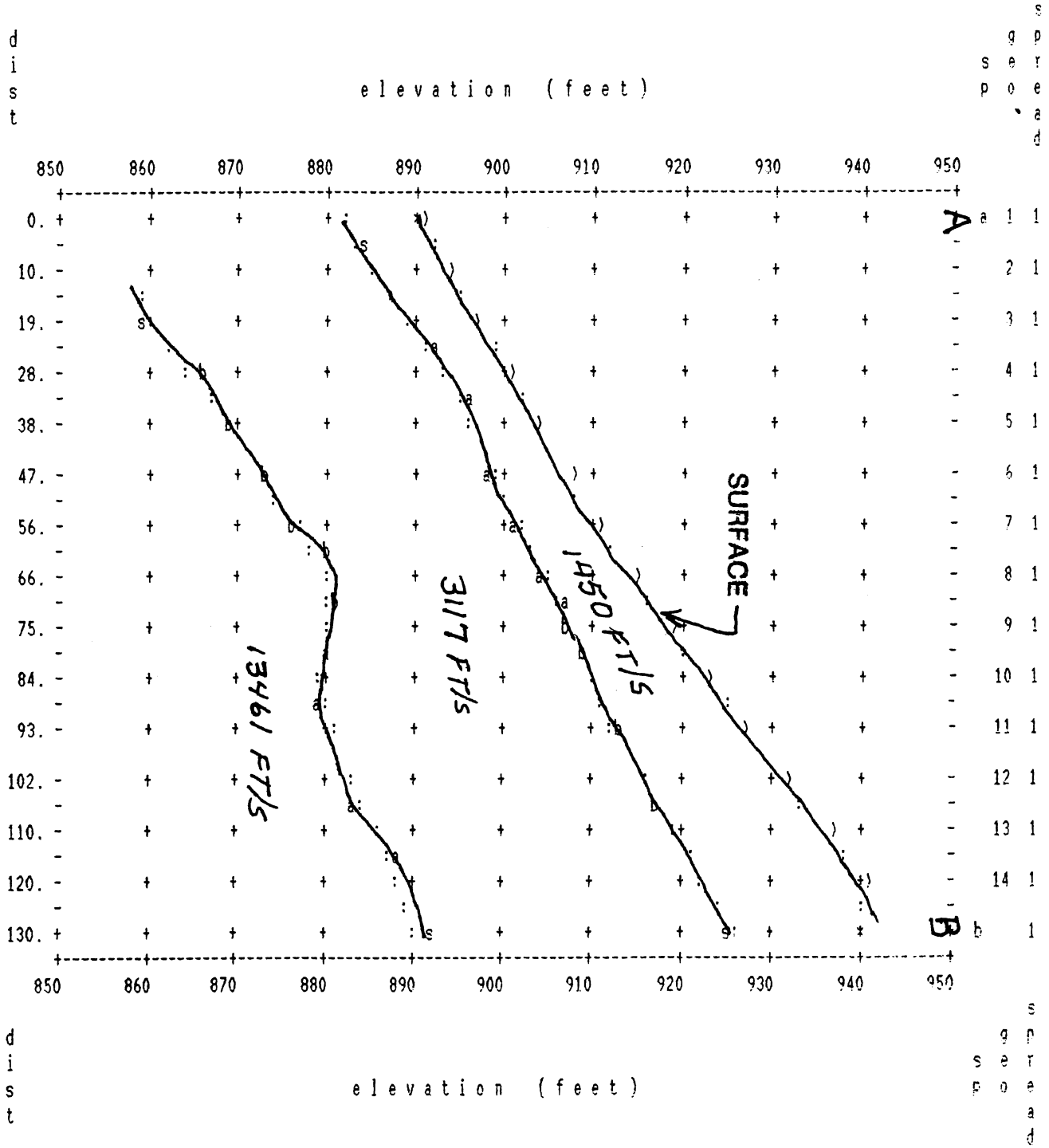
PACIFIC SOILS/TRACT 52419, LINE 104, HDG N.W., 10'spcng. W.O: 0156 BH 4/10/98




LINE S 104 → NW

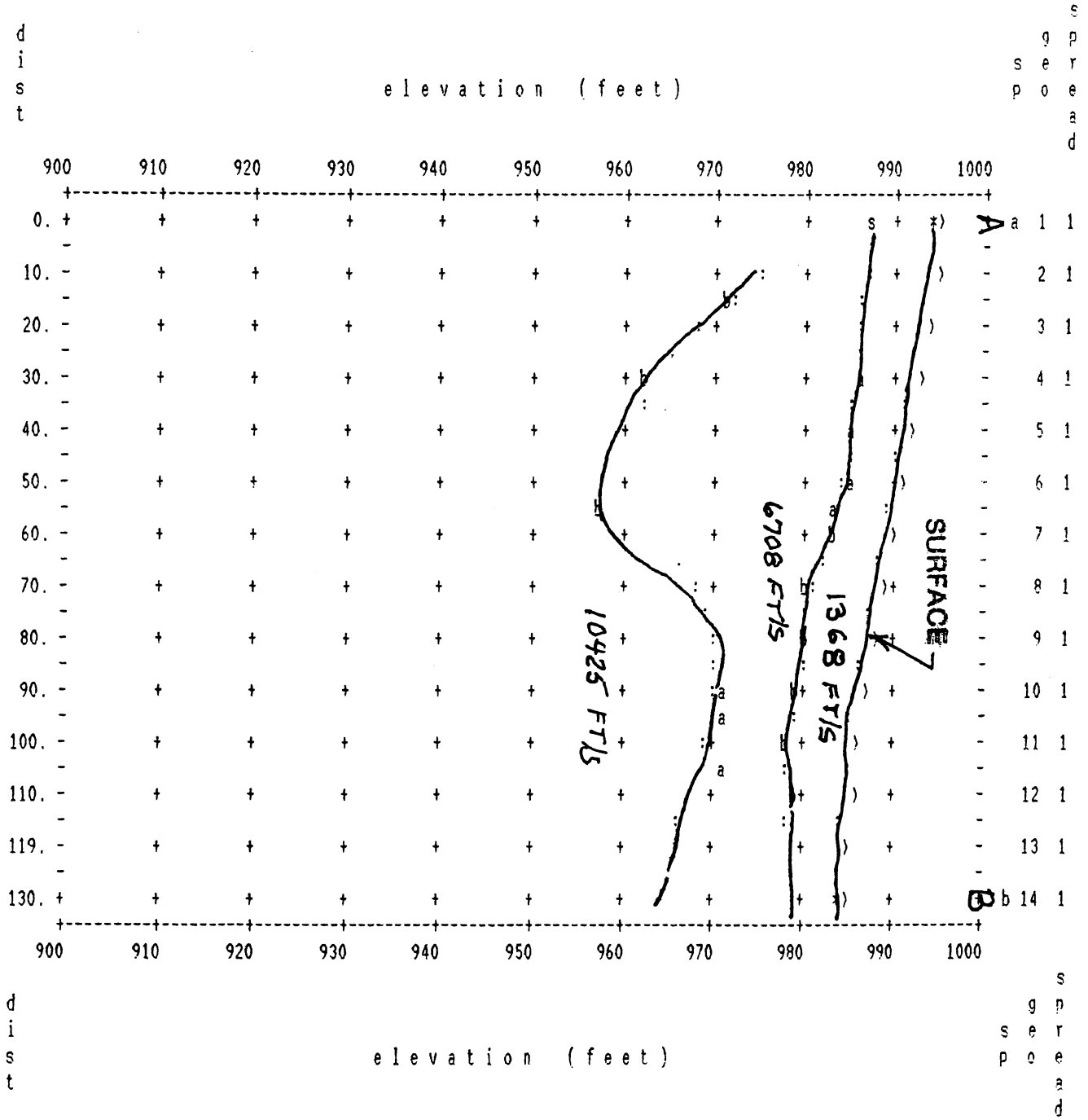
S-17

PACIFIC SOILS/TRACT 52419, LINE S105, HDG N., 10'spcng, W.O: 0156 BH 4/10/98




LINE S-105 → N

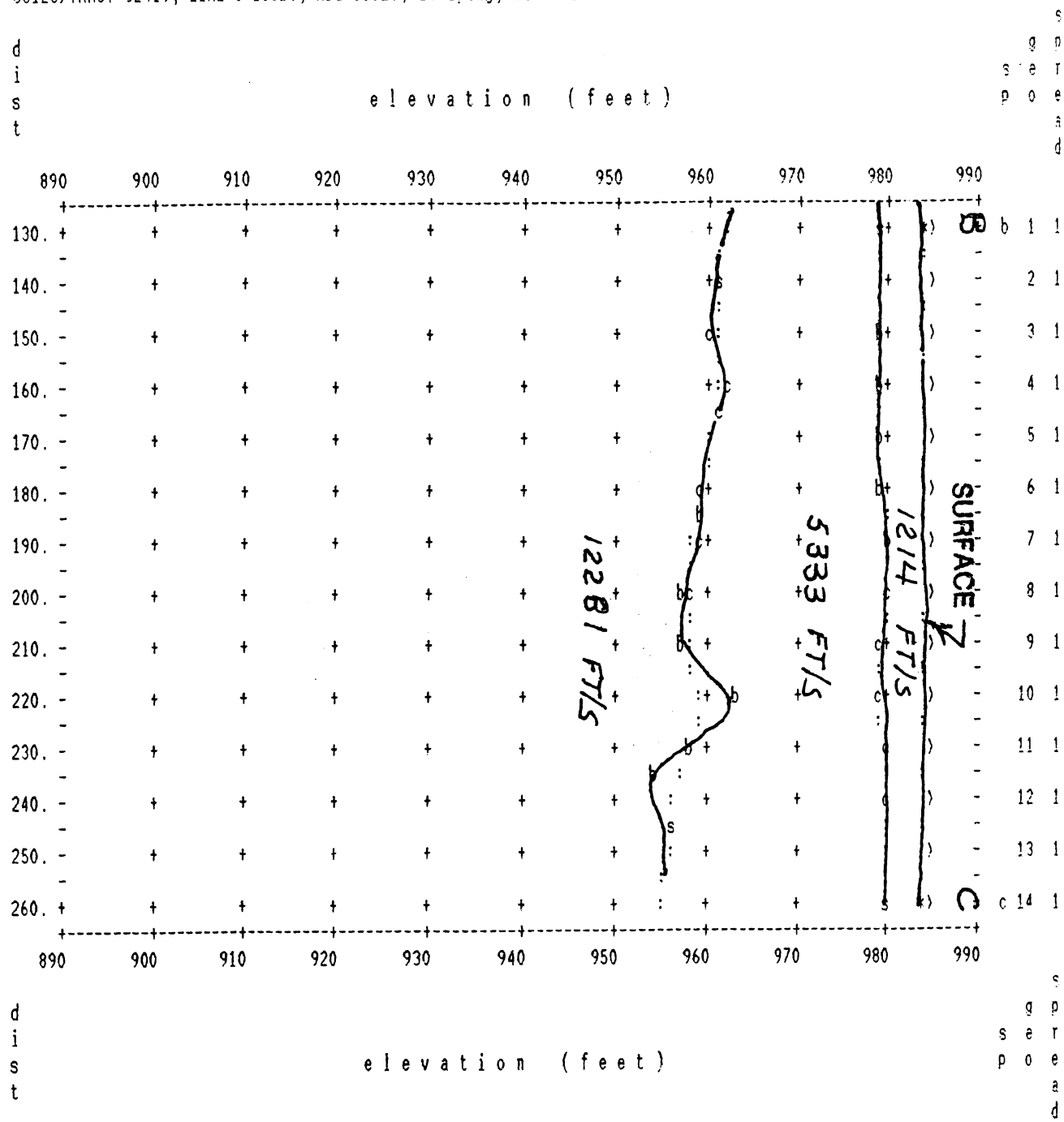
PAC.SOILS/TRACT 52419, LINE S-106AB, HDG S60E, 10'spcng, W.0: 0156 BH 4/10/98




LINE S106 A-B → S60E

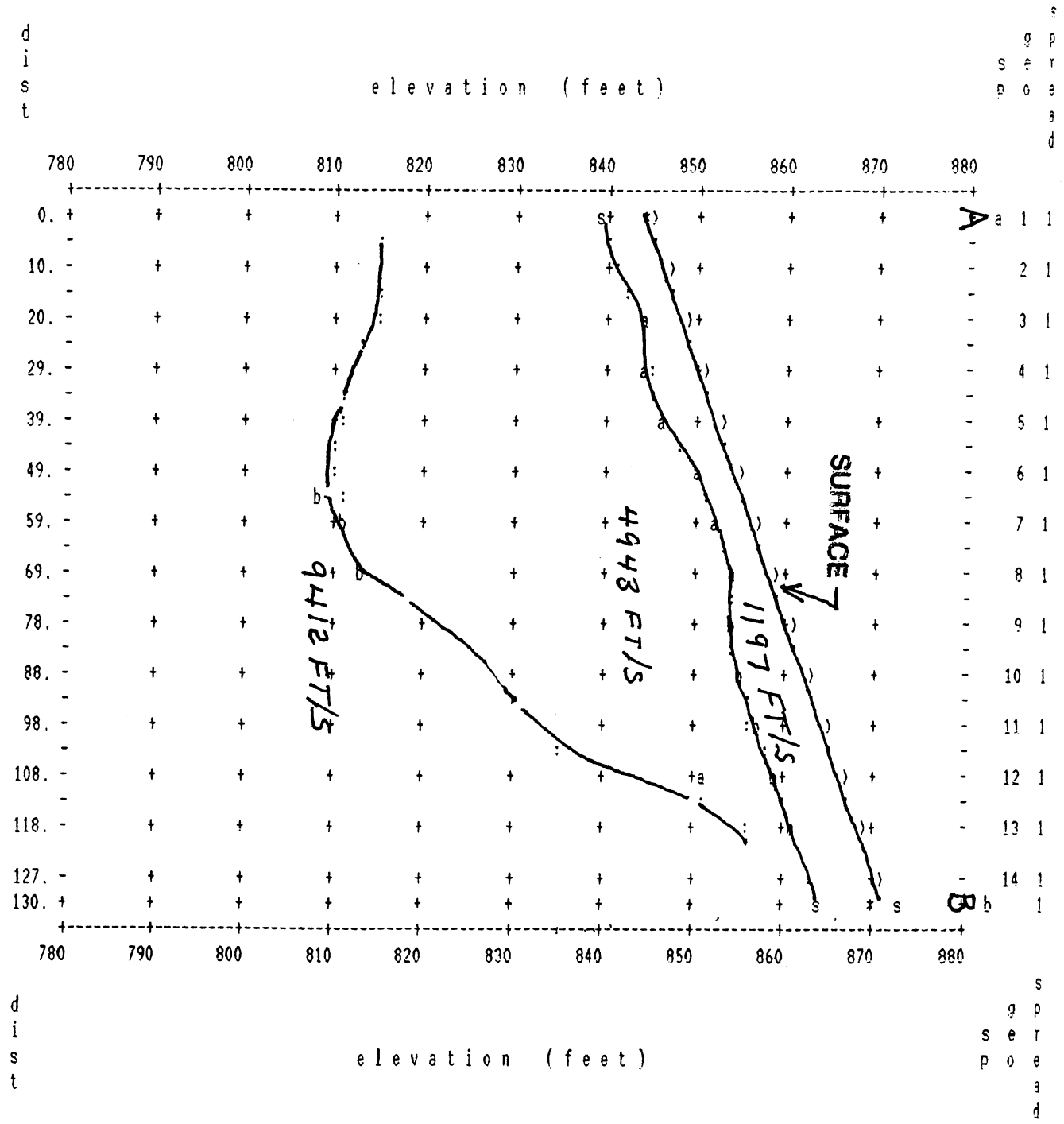
S-19

PAC. SOILS/TRACT 52419, LINE S-106BC, HDG S60E., 10'spcng, W.O: 0156 BH 4/10/98



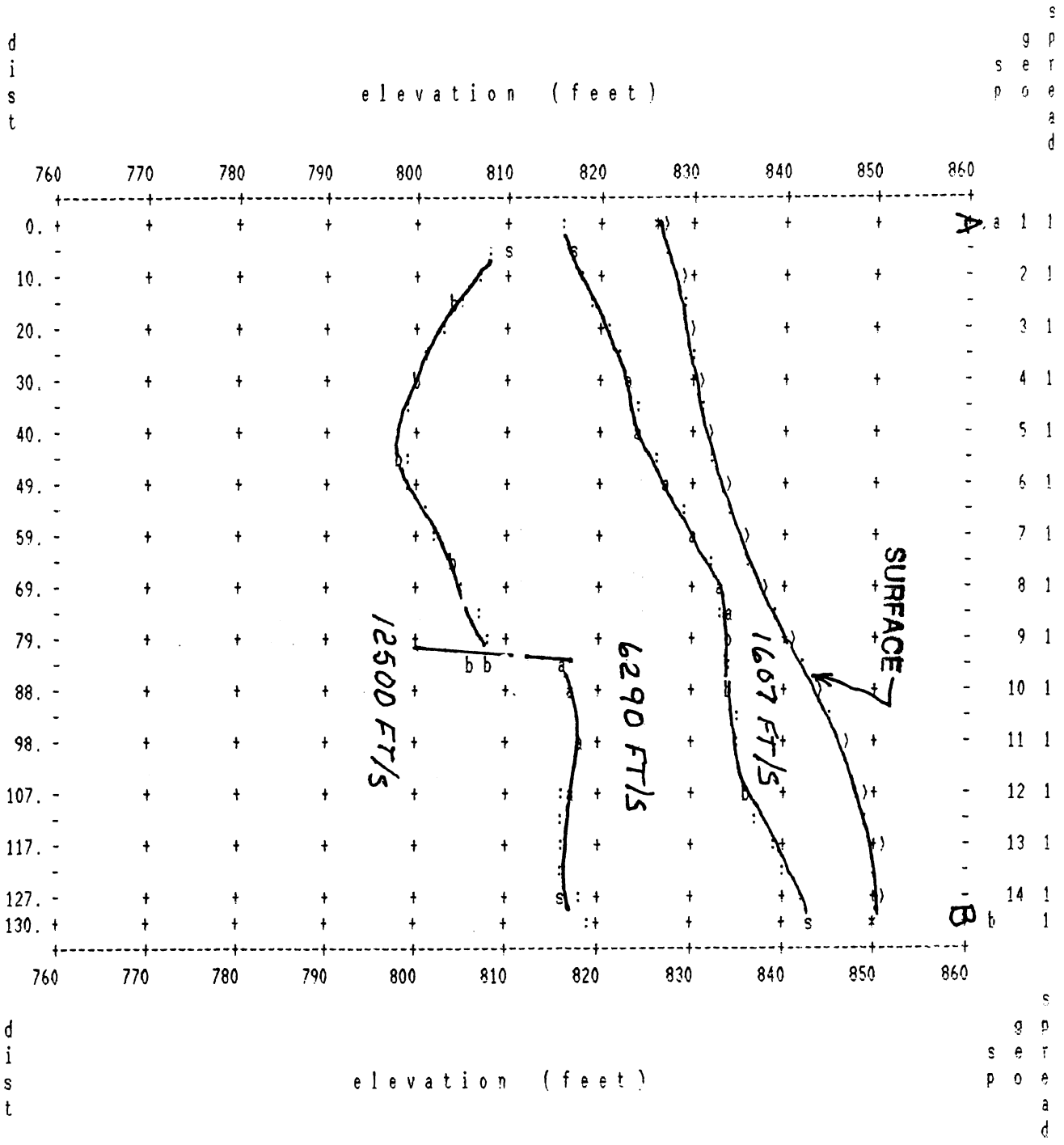

LINE S106 → S60E
B-C

PACIFIC SOILS/TRACT 52419, LINE S107, HDG N., 10'spcng, W.O: 0156 BH 4/10/98




LINE S107 → N

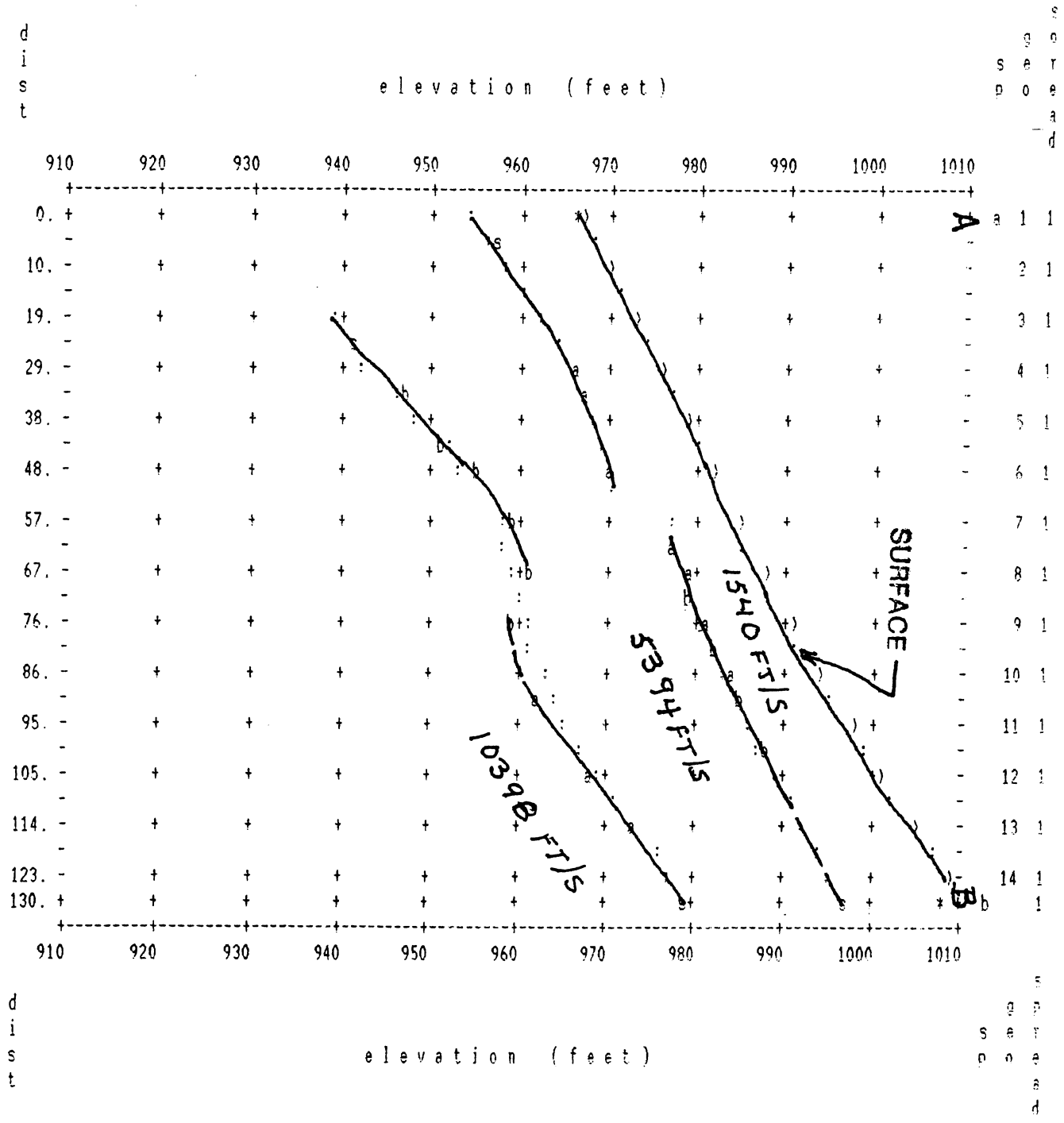
PACIFIC SOILS/TRACT 52419, LINE S-108, HDG N.E., 10'spcng, W.0: 0156 BH 4/10/98




LINE S-108 → NE

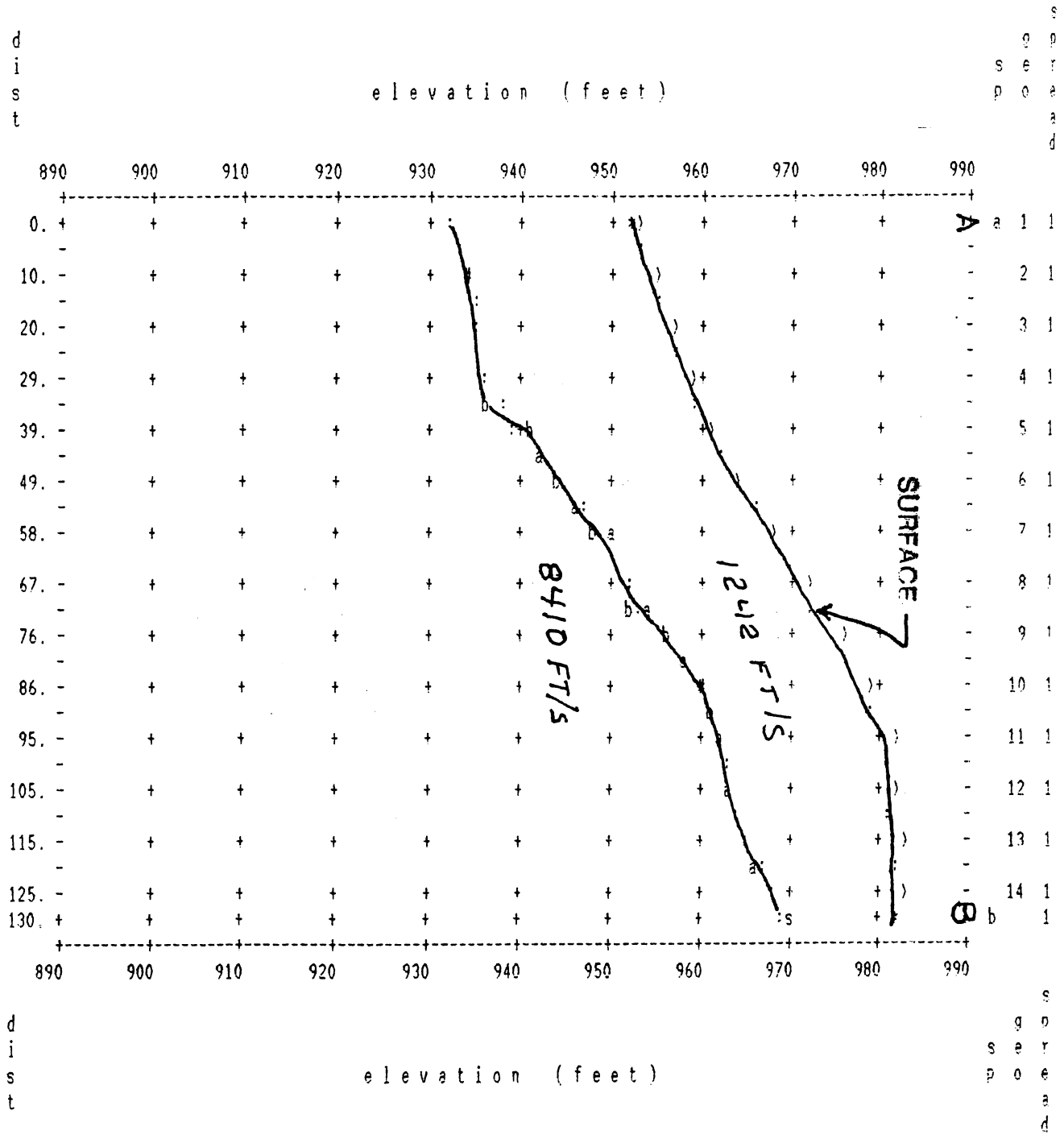
S-22

PACIFIC SOILS/TRACT 52419, LINE S110, HDG W., 10'spcng, W.O: 0156 BH 4/17/98




LINE S110 → W

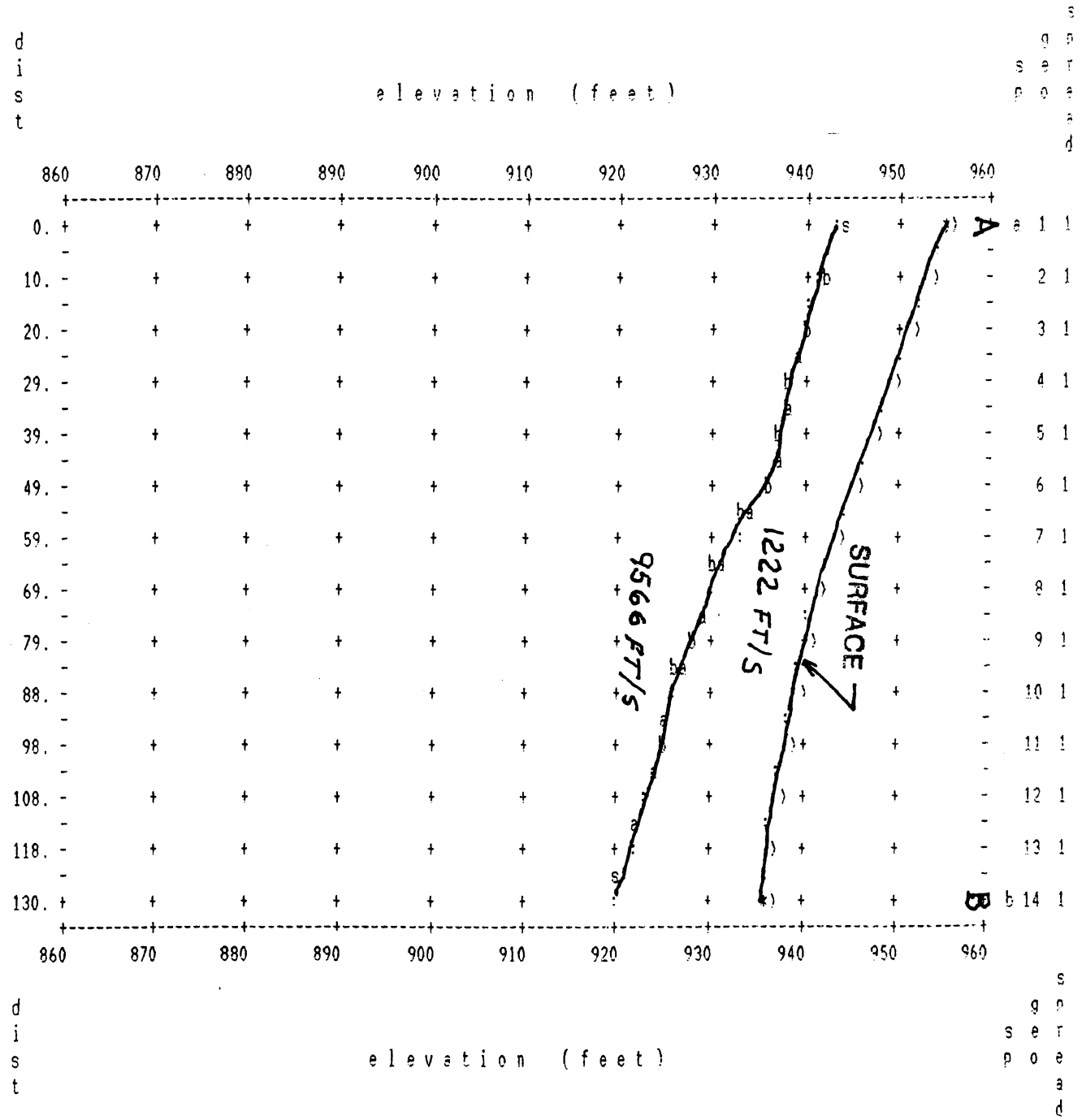
PACIFIC SOILS/TRACT 52419, LINE S111, HDG S., 10'spcng, W.O: 0156 BH 4/17/98




LINE S111 → S

S-24

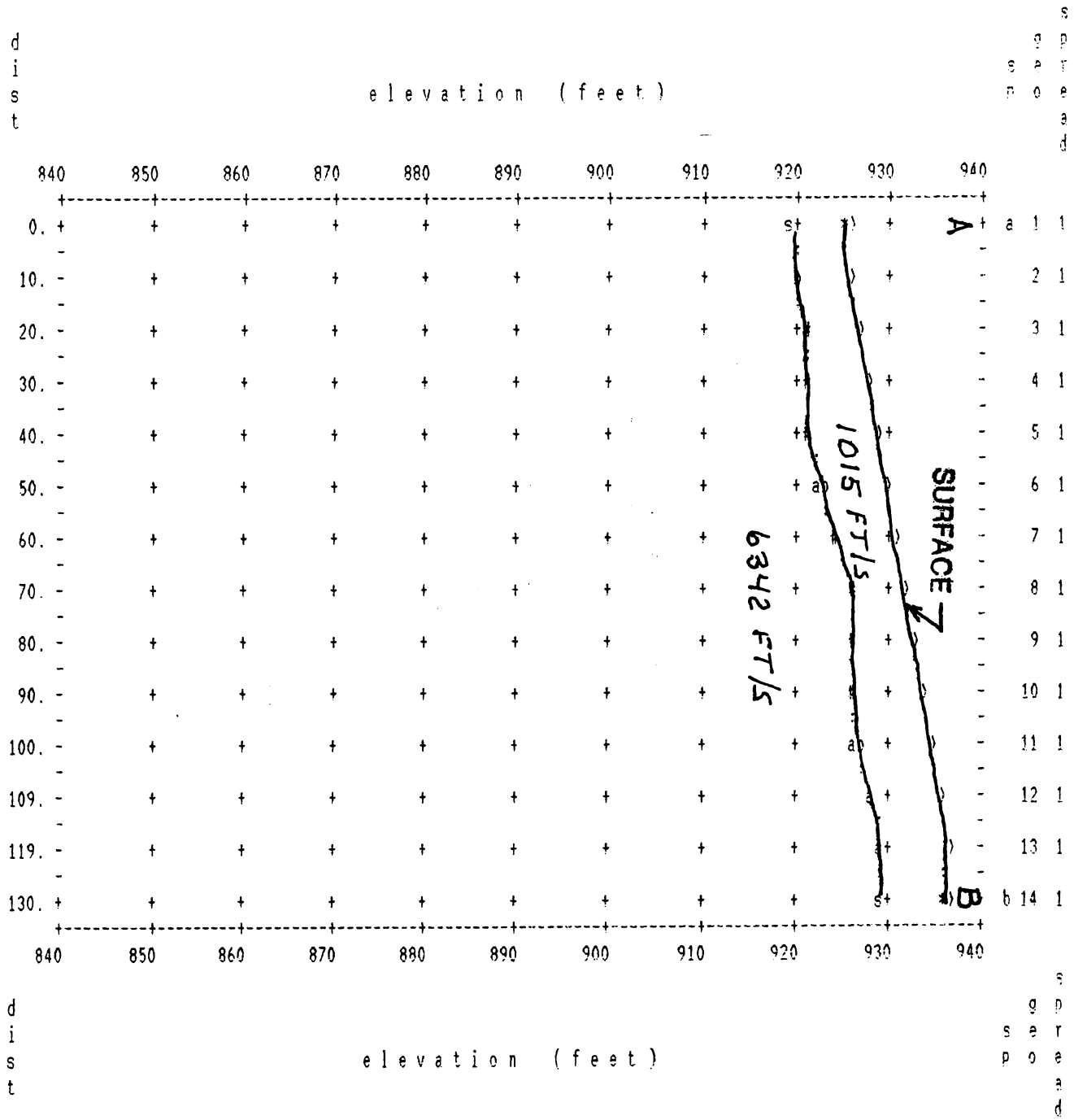
PACIFIC SOILS/TRACT 52419, LINE S112, HDG S.E., 10'spcng, W.O: 0156 BH 4/17/98




LINE S112 → SE

S-25

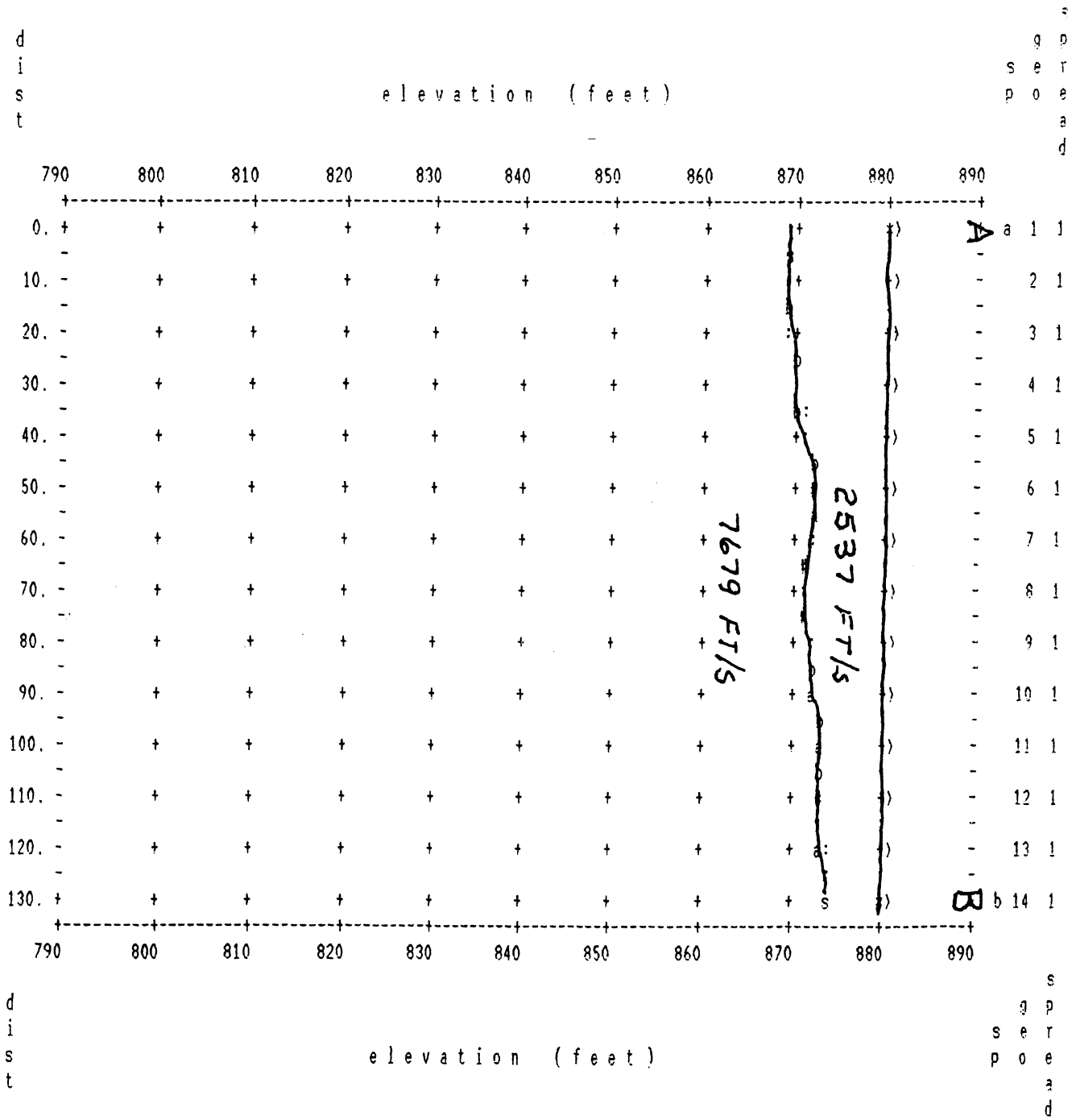
PACIFIC SOILS/TRACT 52419, LINE S113, HDG S.W., 10'spcng, W.O: 0156 BH 4/17/98




LINE S113 → SW

S-26

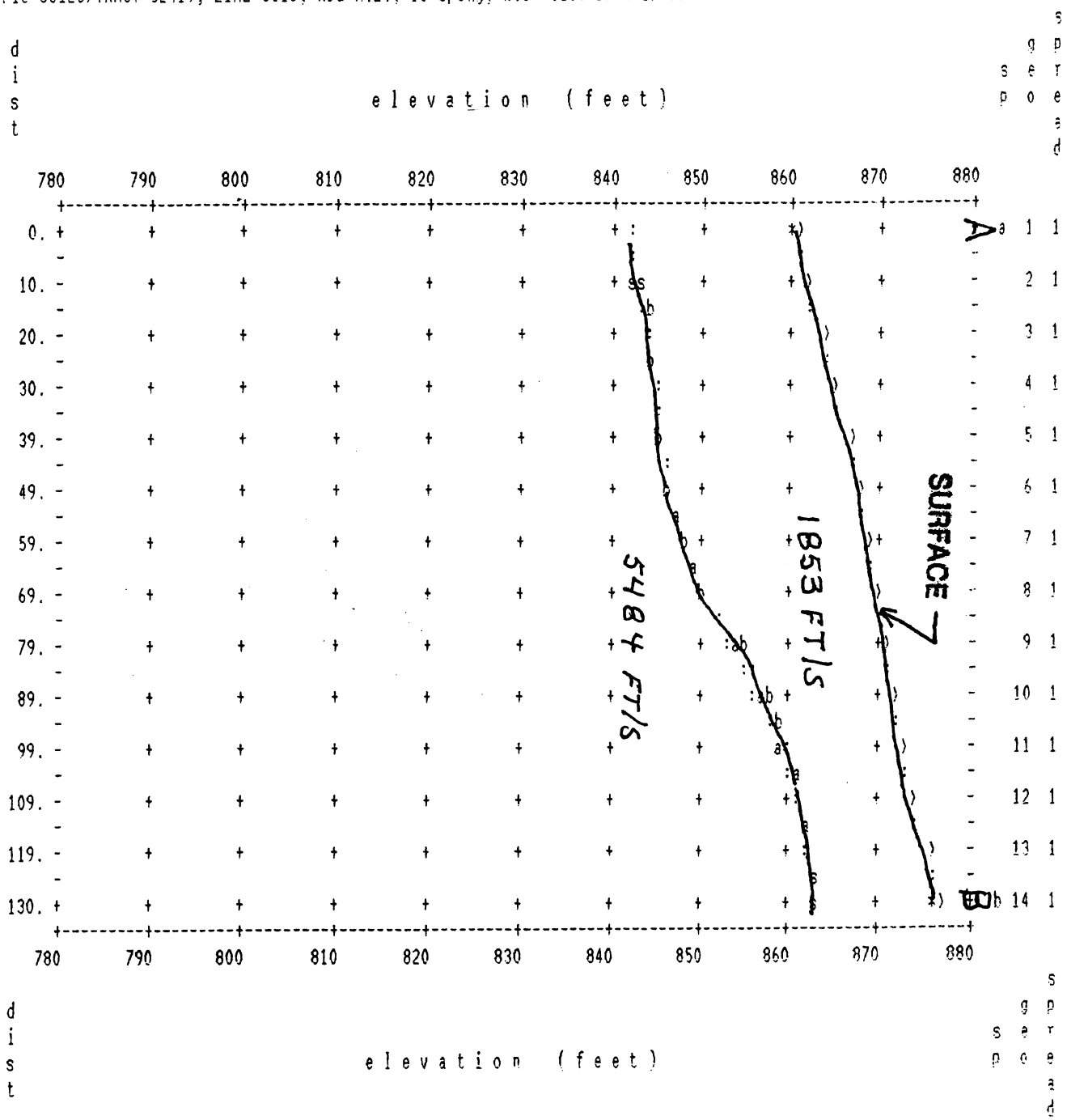
PACIFIC SOILS/TRACT 52419, LINE S114, HDG W., 10'spcng, W.O: 0156 BH 4/17/98




LINE S114 → W

S-27

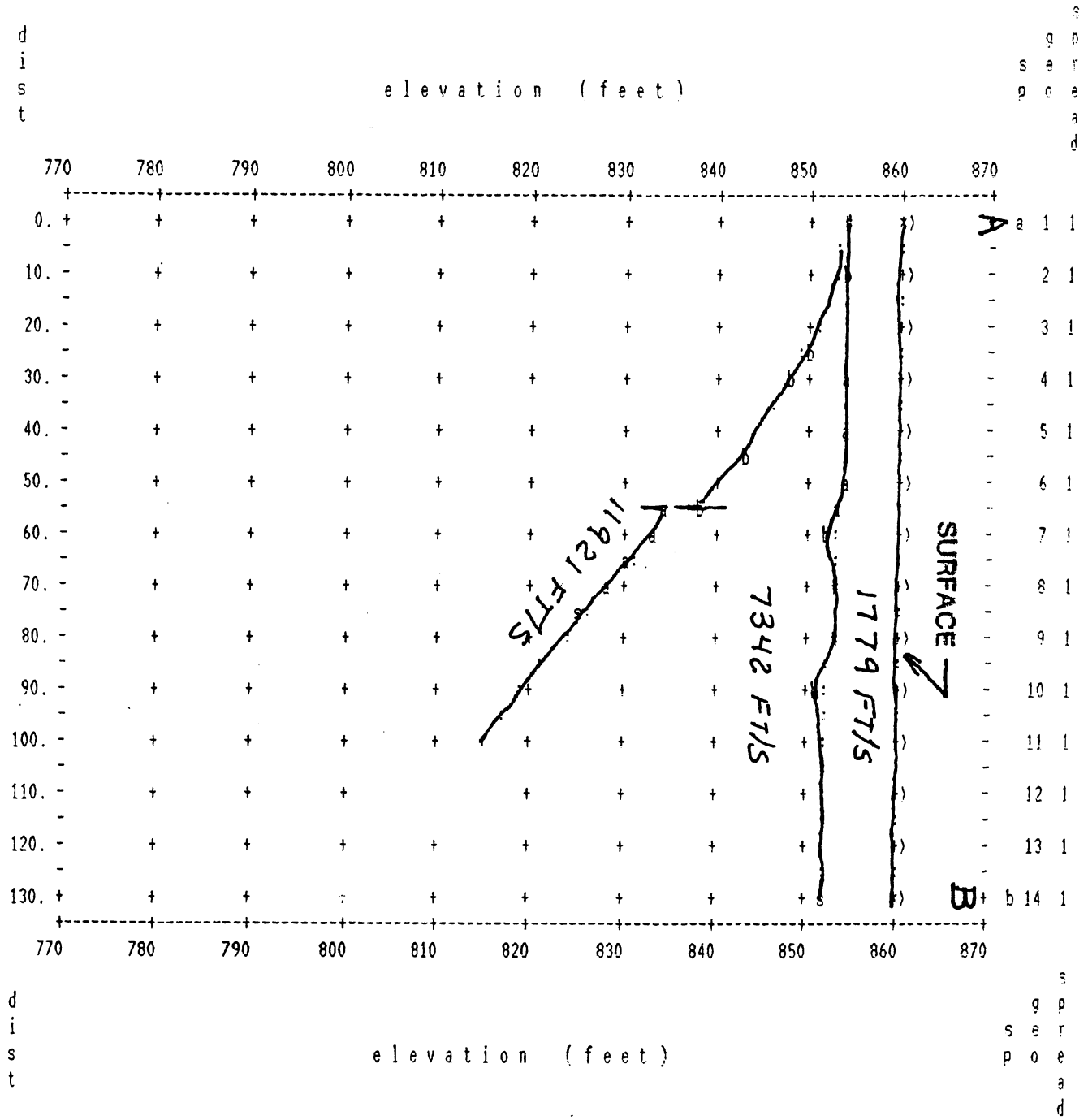
PACIFIC SOILS/TRACT 52419, LINE S115, HDG N.E., 10'spcng, W.O: 0156 BH 4/17/98




LINE S115 → NE

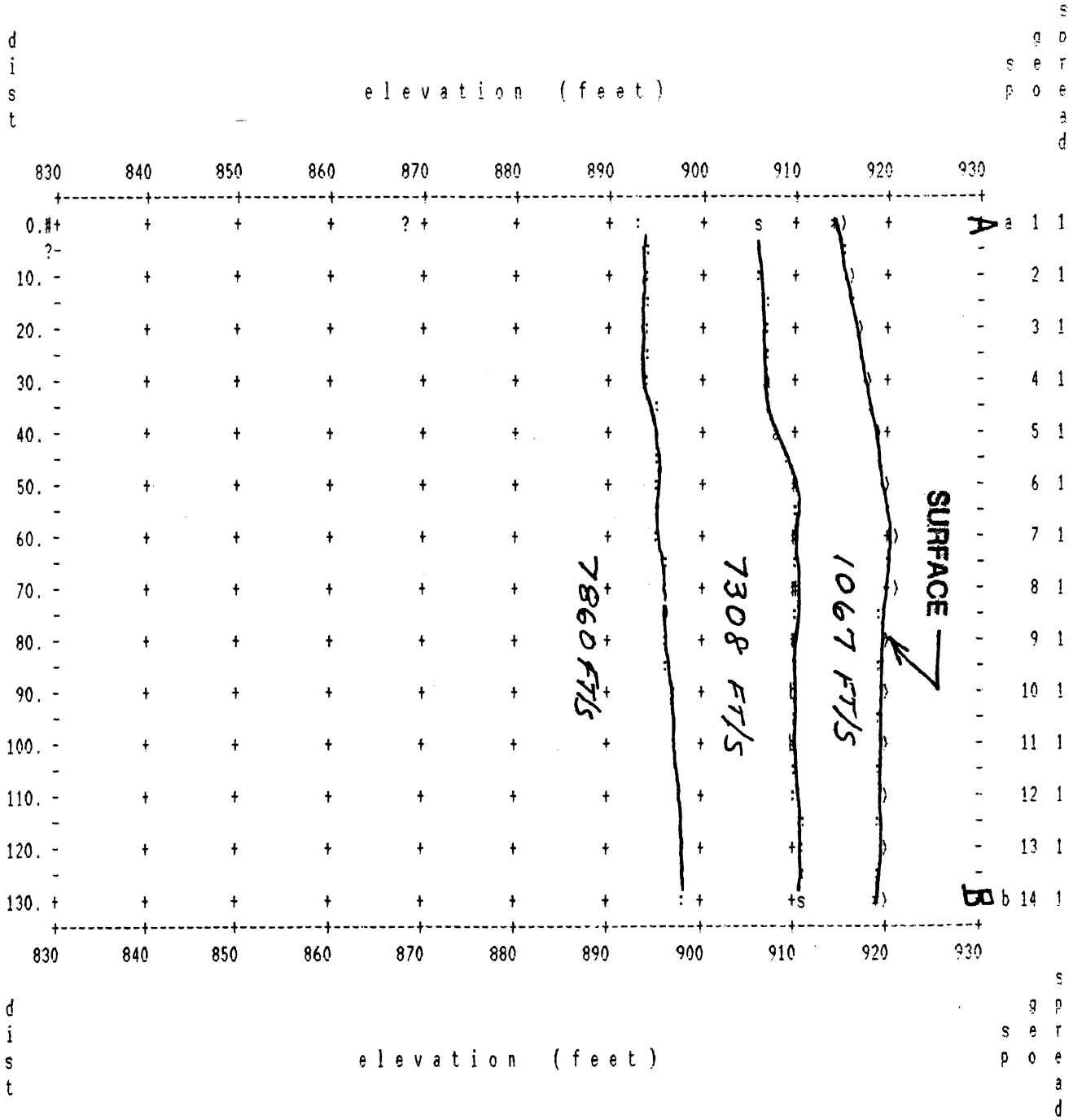
S-28

PACIFIC SOILS/TRACT 52419, LINE S116, HDG N., 10'spcng, W.O: 0156 BH 4/17/98




LINE S116 → N

PACIFIC SOILS/TRACT 52419, LINE S117, HDG N.W., 10'spcng, W.O: 0156 BH 4/17/98




LINE S117 → NW

S.30

SE1 North ➔

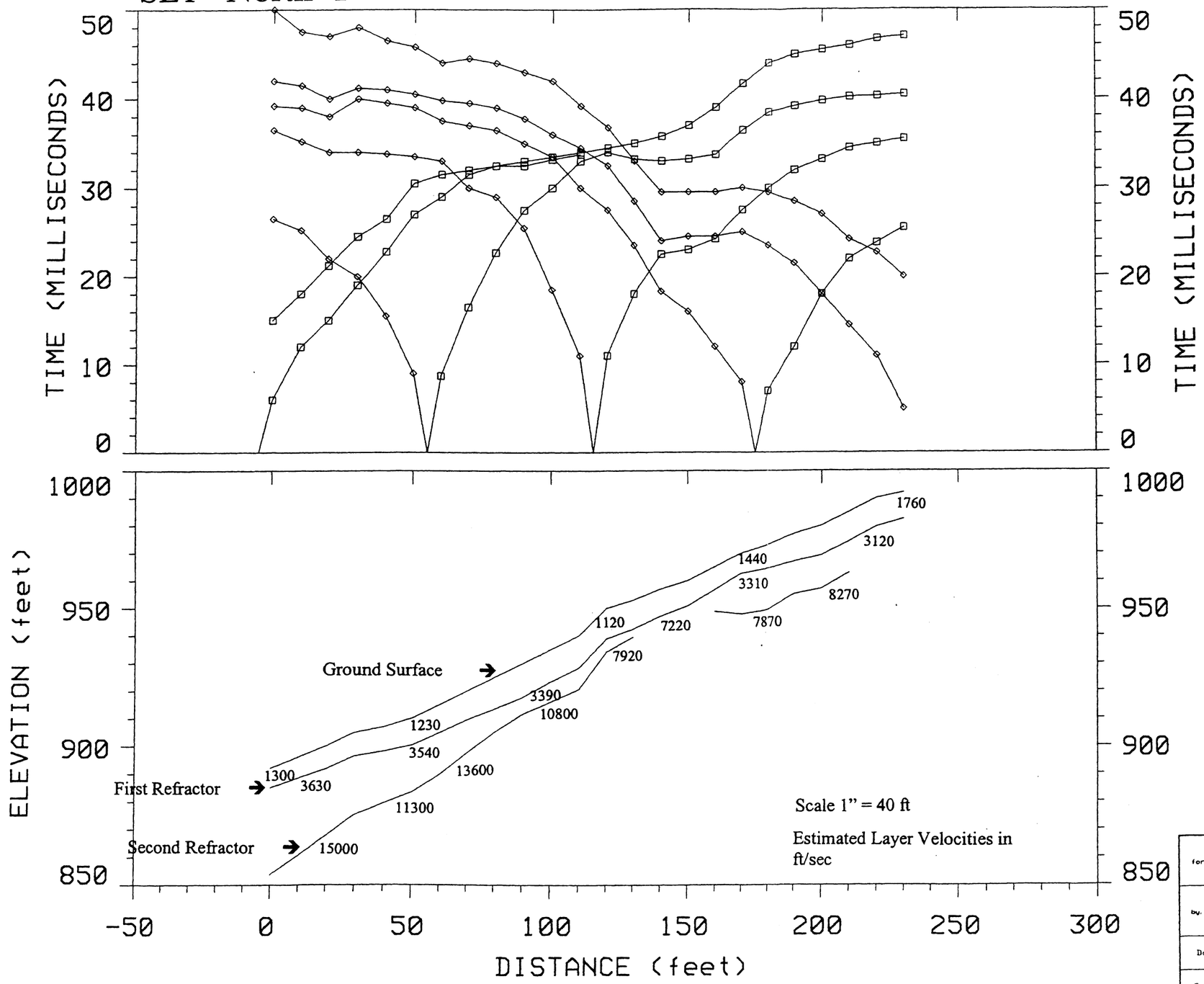



Plate: 1

| | | |
|---|---|---|
| for: Pacific Soils Engineering | | Bedrock Rippability Study |
| by: Advanced Geoscience, Inc. | | Live Oak Ranch<br>Augora, California |
| Data Set: AGRASE1 | Date: 4/00 | |
| Equipment: GEOMETRICS | Spread: SE1 | Azimuth: North |

SE2 NW →

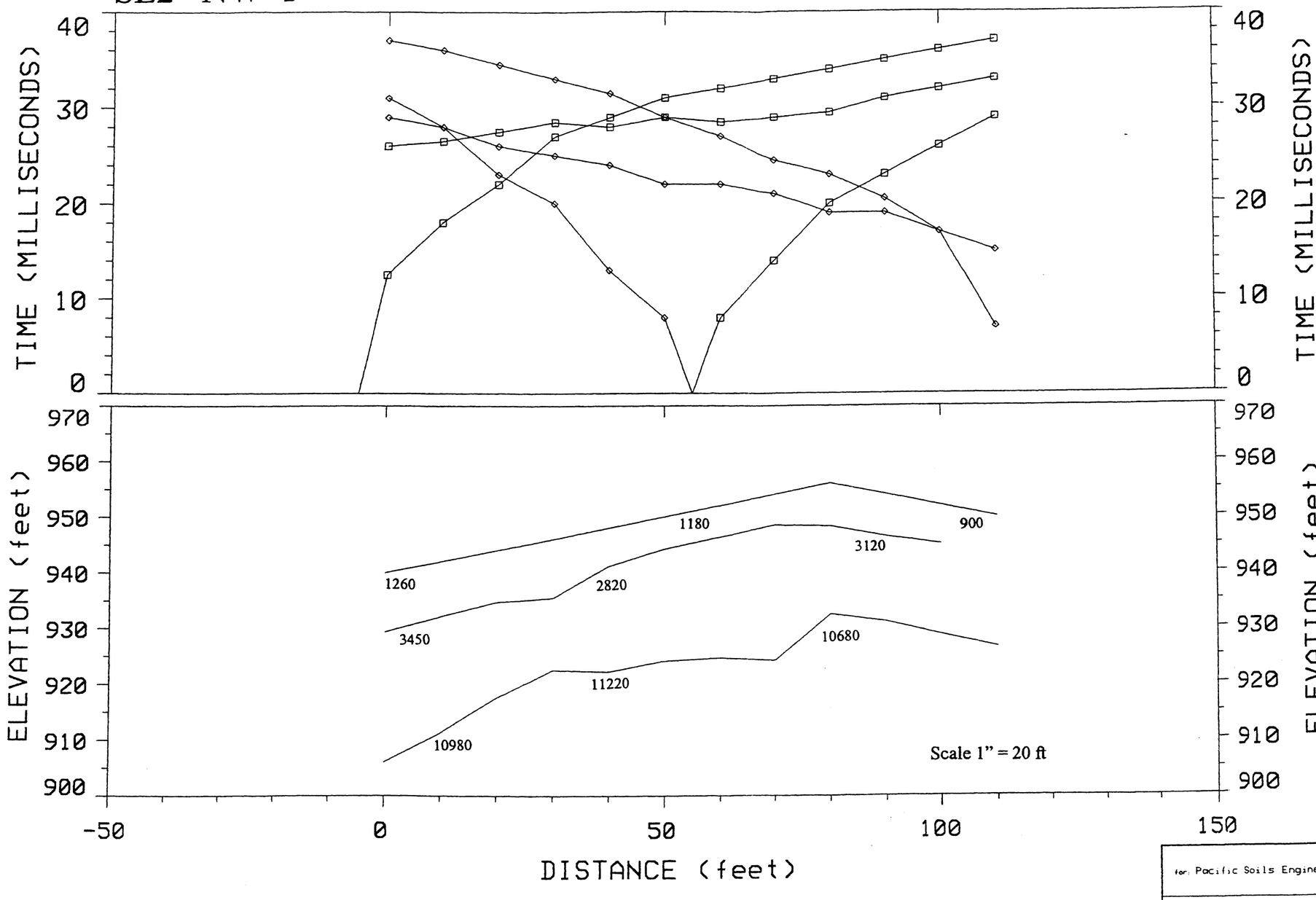



Plate: 2

| | |
|---|---|
| for: Pacific Soils Engineering | Bedrock Rippability Study |
| by: Advanced Geoscience, Inc. | Live Oak Ranch<br>Augora, California |
| Data Set:ACRASE2 / Date: 4/00 | |
| Equipment: GEOMETRICS / Spread: SE2 | Azimuth: NW |

SE3 North ➔

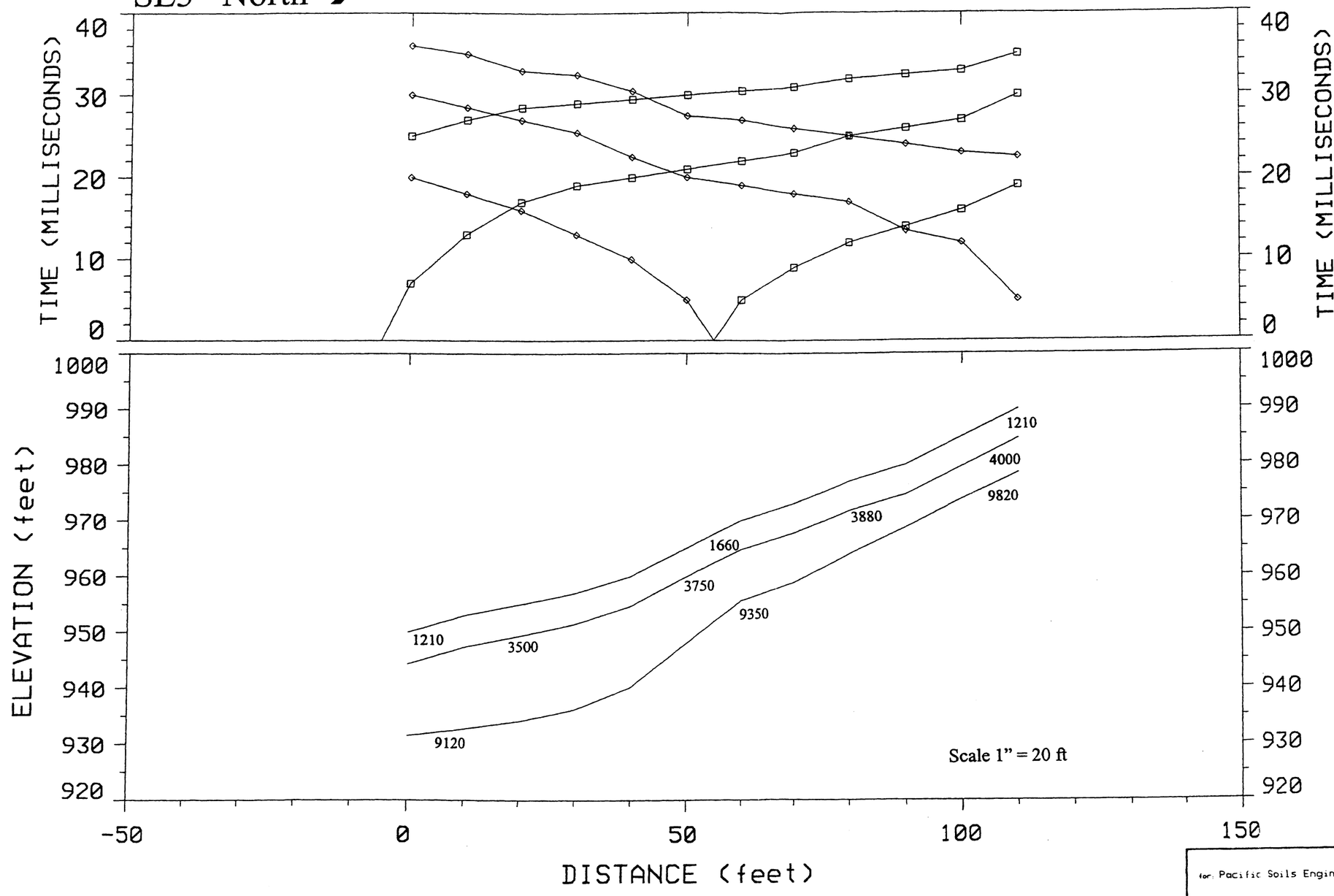



Plate: 3

| | |
|---|---|
| for: Pacific Soils Engineering | Bedrock Rippability Study |
| by: Advanced Geoscience, Inc. | Live Oak Ranch<br>Augora, California |
| Data Set:AGRASE3 / Date: 4/00 | |
| Equipment: GEOMETRICS / Spread: SE3 | Azimuth: North |

SE4 SW ➔

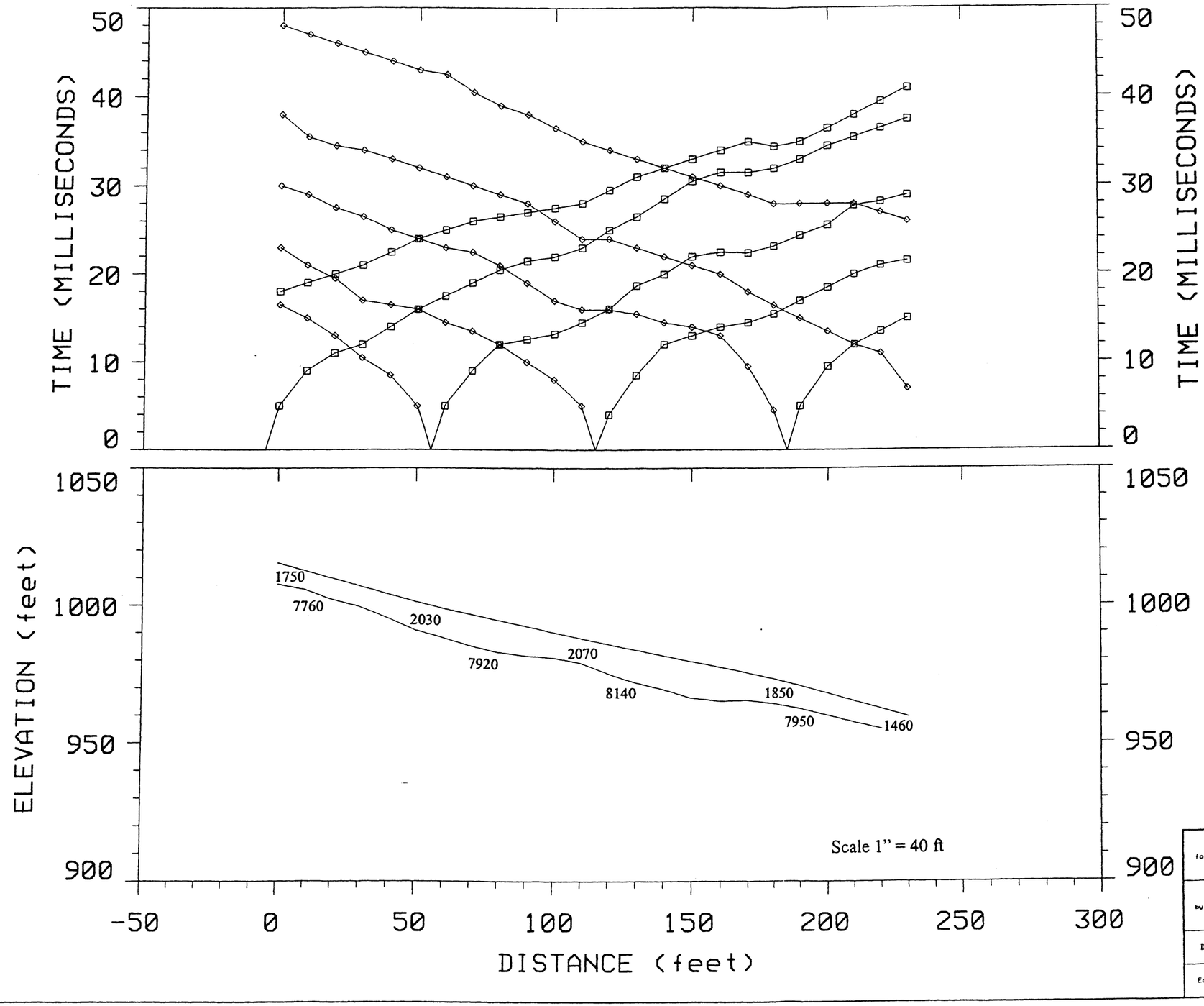



Plate: 4

| | |
|---|---|
| for Pacific Soils Engineering | Bedrock Ripability Study |
| by Advanced Geoscience, Inc. | Live Oak Ranch |
| Data Set:AGRASE4 / Date: 4/00 | Augora, California |
| Equipment: GEOMETRICS / Spread: SE4 | Azimuth: SW |

SW1 West ➔

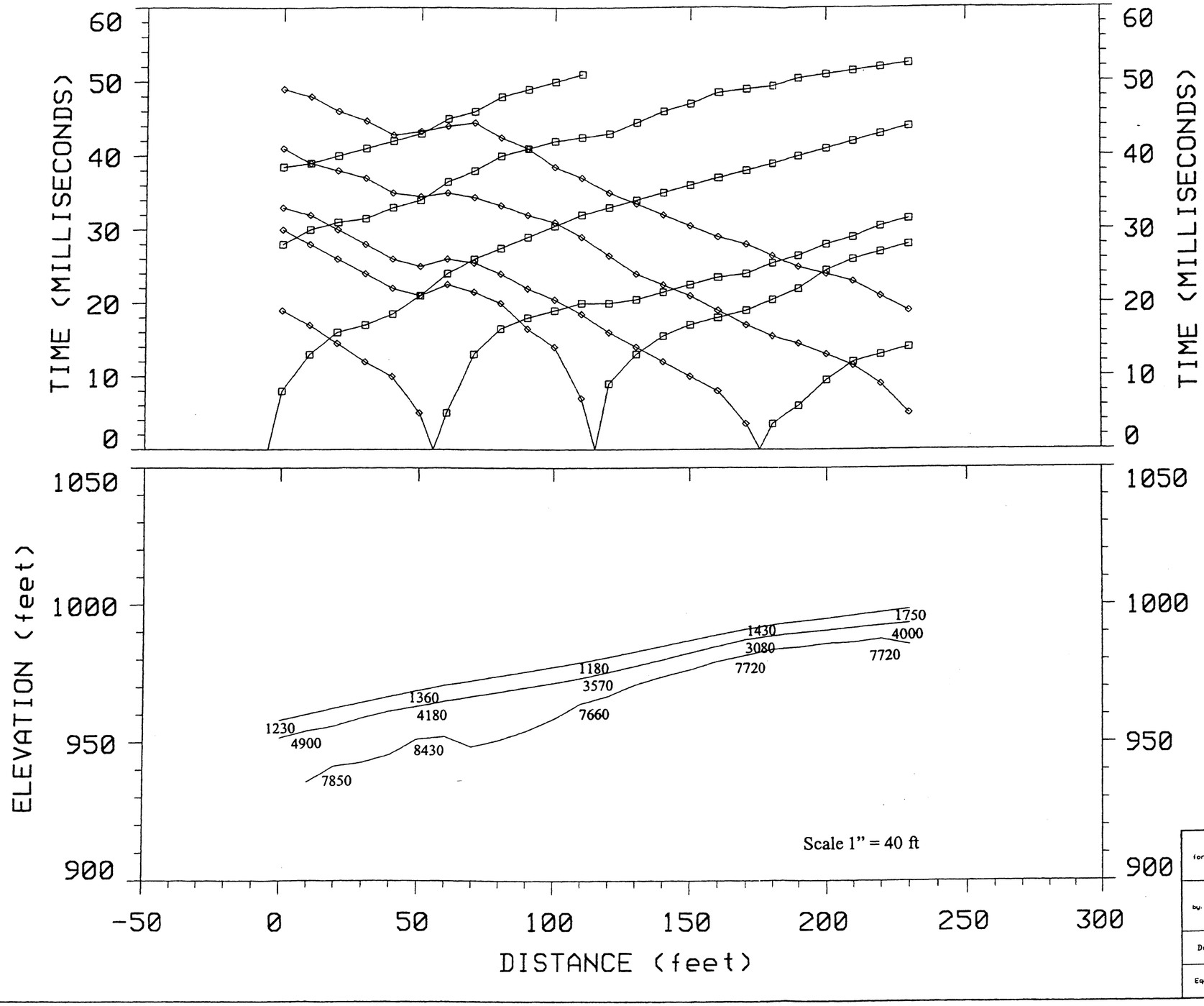



Plate: 5

| | | |
|---|---|---|
| for: Pacific Soils Engineering | | Bedrock Rippability Study |
| by: Advanced Geoscience, Inc. | | Live Oak Ranch<br>Augora, California |
| Data Set:AGRASW1 | Date: 4/00 | |
| Equipment: GEOMETRICS | Spread: SW1 | Azimuth: West |

SW2 NW →

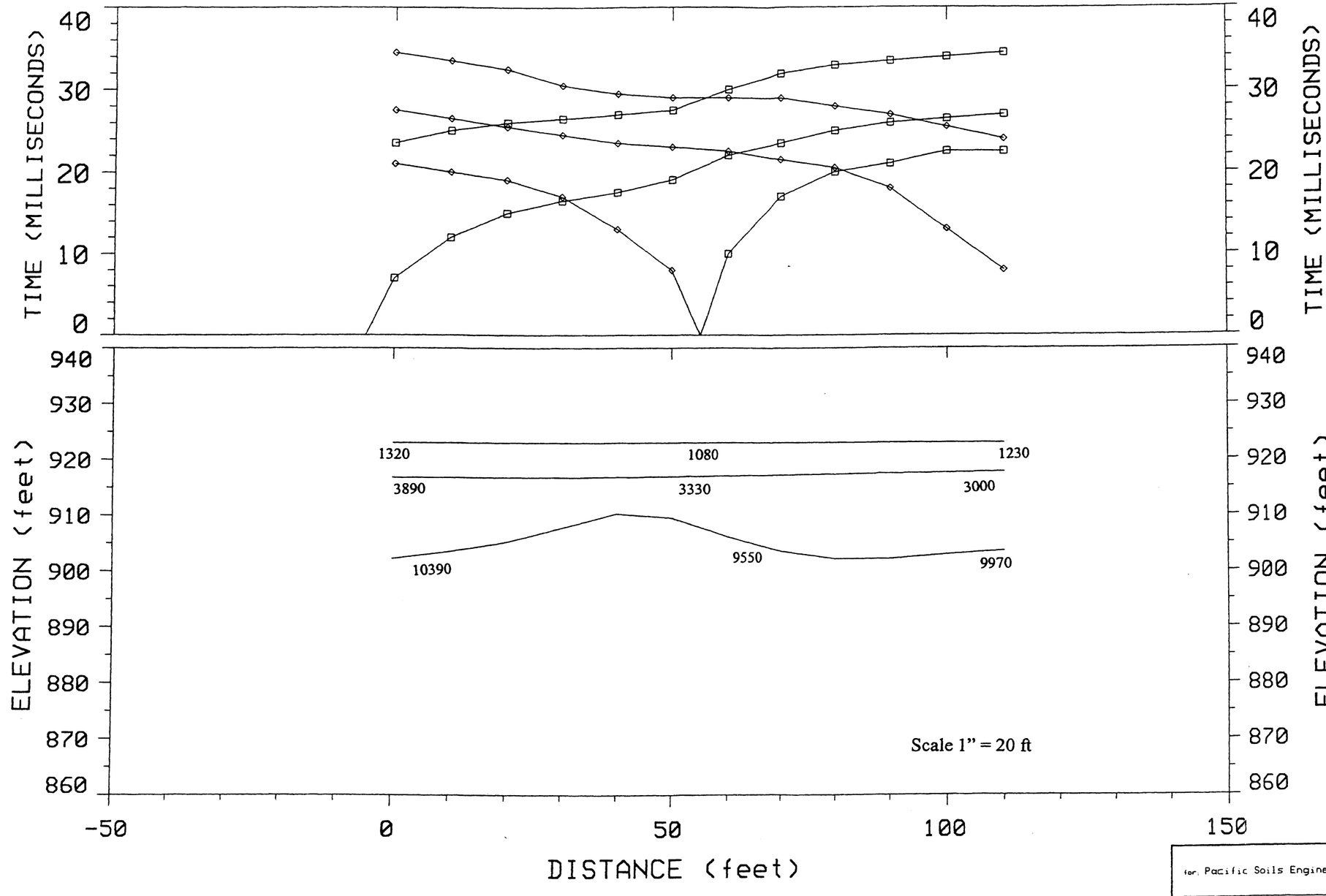



Plate: 6

| | |
|---|---|
| for: Pacific Soils Engineering | Bedrock Rippability Study |
| by: Advanced Geoscience, Inc | Live Oak Ranch<br>Augora, California |
| Data Set:AGRASW2 / Date: 4/00 | |
| Equipment: GEOMETRICS / Spread: SW2 | Azimuth: NW |

SW3 North ➔

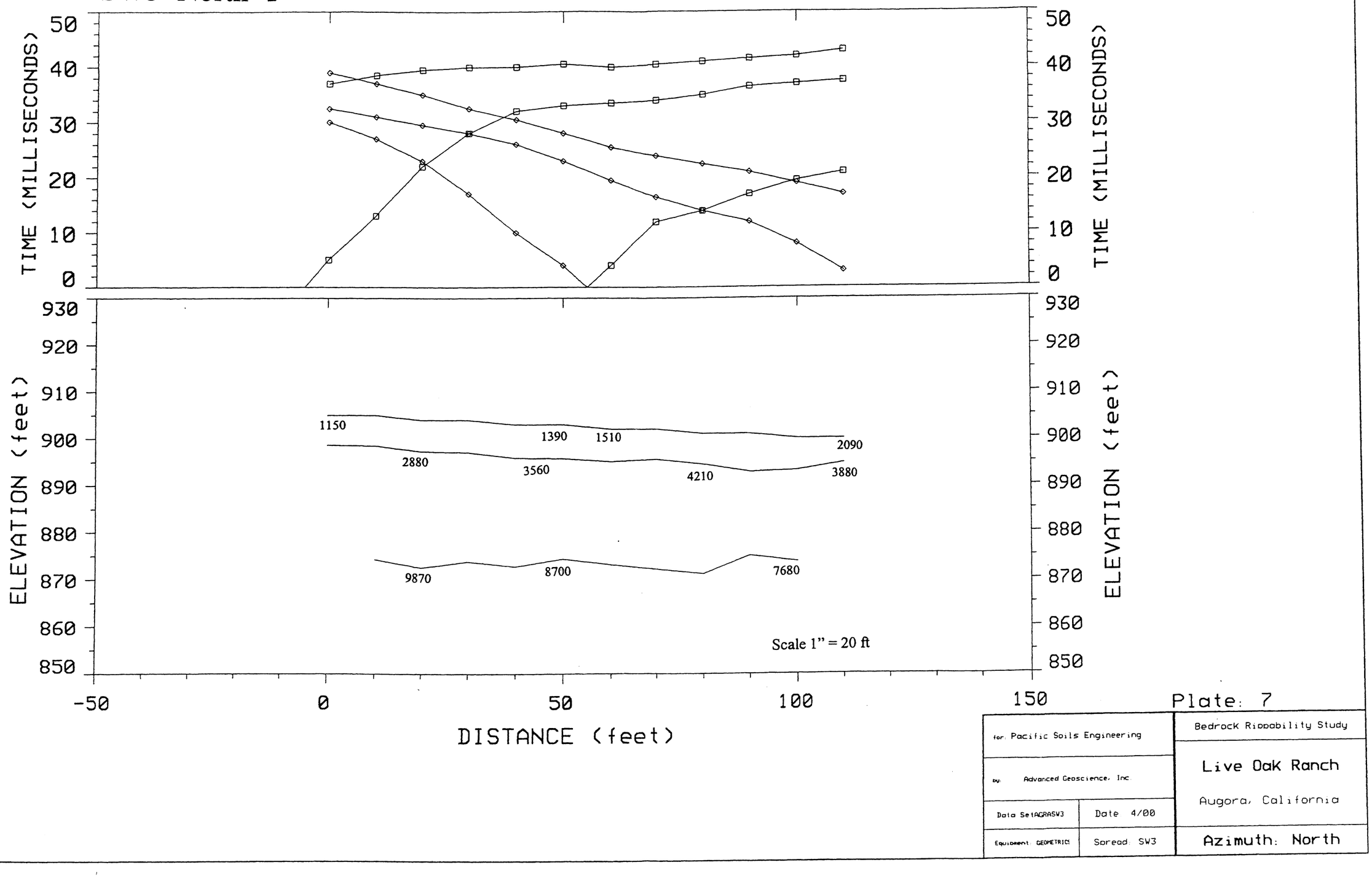



Plate: 7

| | |
|---|---|
| for: Pacific Soils Engineering | Bedrock Rippability Study |
| by: Advanced Geoscience, Inc. | Live Oak Ranch<br>Augora, California |
| Data Set:AGRASW3 / Date: 4/00 | |
| Equipment: GEOMETRICS / Spread: SW3 | Azimuth: North |

SW4 West ➔

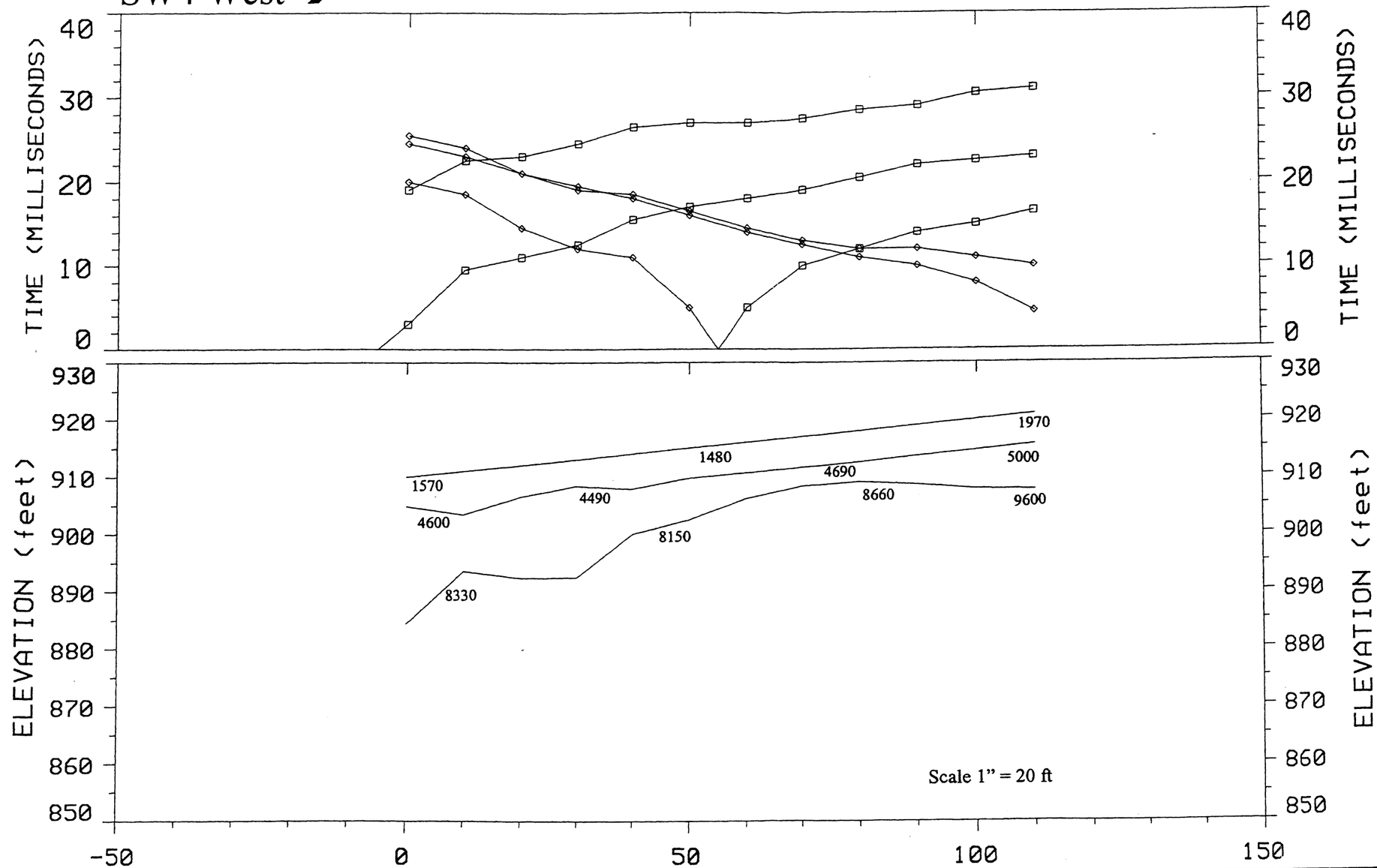



Plate: 8

| | |
|---|---|
| for: Pacific Soils Engineering | Bedrock Rippability Study |
| by: Advanced Geoscience, Inc. | Live Oak Ranch<br>Augora, California |
| Data Set:AGRASW4 / Date: 4/00 | |
| Equipment: GEOMETRICS / Spread: SW4 | Azimuth: West |

May 15, 2000
Work Order 101568-MP

# APPENDIX V

## SEISMIC HAZARD ASSESSMENT

# APPENDIX V

## SEISMIC HAZARD ASSESSMENT

### Introduction

The study site is within the seismically active Transverse Ranges of southern California, Los Angeles County, California. The recent 1971 San Fernando and 1994 Northridge earthquakes particularly illustrate both the seismic activity of the region and the need to incorporate seismic considerations into project design and construction. This Seismic Hazard Assessment (SHA) therefore sets forth estimates of on-site free-field ground accelerations that hypothetically could be generated by earthquakes along known regional active faults.

Three kinds of ground motion analyses are included in this narrative: 1) deterministic; 2) probabilistic; and 3) 1997 UBC methodologies. The latter is intended to be useful to the structural engineer for code-based designs. The PGA values may also be useful for the structural engineer. Selection of the appropriate design seismic parameters depends upon the kinds of geotechnical or structural analyses (for example, static or dynamic), the kind and sensitivity (critical vs. normal-risk) of proposed structures, and the level of "acceptable risk" deemed suitable for the project. Critical facilities usually include, but are not necessarily limited to dams, nuclear sites, emergency facilities, hazardous materials sites, hospitals, and schools, where any but the most superficial failure is intolerable (Krinitzsky, 1995). Normal-risk structures usually include those where the UBC (ICBO, 1997) concern is primarily to reduce safety consequences rather than economic consequences of an earthquake.

The classic deterministic approach to seismic hazard analysis usually begins with assignment of maximum probable (for design of most structures) and/or maximum credible (for high-risk structures) earthquakes to local active faults, followed by measurements of the shortest distance (site *radius*) between the subject site and each of those faults. Hypothetical design accelerations are then determined by using any of several dozen empirical ground acceleration attenuation equations that relate hypothetical site ground accelerations to postulated earthquake magnitudes and site *radii*.

Deterministic analyses of seismic hazards (PGA in this case) deal with absolutes, are not time-dependent, and assume a kind of "certainty". In essence, they assume that a very large earthquake will occur along a given fault at precisely its closest point to the subject site, and they do not consider the likelihood of that earthquake occurring within a specific exposure period (structure lifetime, for example), or along any other segment of that particular fault.

Probabilistic methods of seismic risk determination attempt to account for uncertainties in recurrence intervals, sizes, and locations of hypothetical earthquakes; and are increasingly used for engineering analyses (e.g., Blake, 1997; Joyner and Fumal, 1985). Probabilistic analyses thus seemingly provide levels of hypothetical free-field PGA for a finite exposure period. For example, a commonly accepted level of risk is the statistical chance that a certain acceleration will have a 10 percent probability of being exceeded within a 50-year period. The State of California (California Division of Mines and Geology, 1997) indicates that probabilistic analyses can supersede other methods, even if lower levels of ground motion estimates result. Probabilistic analyses are increasingly being used for "normal-risk" structure design and liquefaction evaluations (California Divisions of Mines and Geology, 1997).

To retain a much consistency as is reasonable between the probabilistic and deterministic methods used herein, the same acceleration (PGA) attenuation relationship, Boore, et al. (1997), was used for both. Also, rock (Boore, et al., Rock Site Condition) was considered to be the underlying earth material. Also, the probabilistic routine uses magnitudes similar to the Maximum Credible Earthquakes shown in Table A, with minor differences arising from inherent differences between the two analytical techniques. Because the rationale for each method is different, the deterministic approach necessarily considers only the nearest and largest of known active faults that could have the most impact on project design, whereas the probabilistic method searches a wide range of southern California (Figure 1) in order to retain statistical validity (Krinitzsky, 1995).

## DETERMINISTIC ASSESSMENT

This DSHA is based on review of geological and seismological literature about regional active faults, about possible magnitudes of future earthquakes along same, and about empirical relationships among fault dimensions, distances between the subject site and those faults and

hypothetical on-site ground acceleration. This firm judges that this DSHA is standard of practice for the subject area, but owing to abundant knowledge gained from each new earthquake, and from on-going geological and seismological investigations, the sciences, as well as legislative action, are expanding so rapidly that in some cases seismic guidelines can be obsolete after only a few years.

**Regional Active Faults**

The geological literature is replete with many definitions of an active fault (for example, Ziony and Yerkes, 1985). Major late Quaternary faults in general and Holocene (last ~11,000 years; Hart, 1994) faults in particular are among those faults considered seismogenic (that is, capable of producing moderate to large earthquakes). Because the site is located in a seismically active region, numerous active faults that hypothetically could generate moderate to large earthquakes have been mapped within about 50 miles of the study site (Figure 1, following text). Several known active faults, however, are sufficiently close to the site to dominate any deterministic seismic hazards assessment. Those faults, listed in Table A (following text), possess both proximity and the potential to give rise to large earthquakes which could include long-duration earthquakes that could induce strong ground acceleration at the subject site. Although large earthquakes could occur along faults other than those listed, the spatial distribution of the listed faults seemingly permits a representative assessment of regional seismicity.

Two kinds of faults are represented in Table A: 1) northwest-trending, right-lateral, strike-slip faults that occur in a belt that extends from the Mojave Desert on the east to beyond the Channel Islands on the west (Jennings, 1994); and 2) reverse or thrust faults produced by ongoing regional compression resultant from convergence of the North American and Pacific plates in southern California. The San Andreas, Whittier-Elsinore, San Jacinto, San Gabriel, and Newport-Inglewood faults typify the former, whereas the other faults listed in the table are regional examples of the latter (for example, Jennings, 1994; Working Group, 1995). The nearest known active faults are the system of reverse faults that have elevated the Santa Monica, Santa Susana, and San Gabriel Mountains ( all major components of the Transverse Ranges) relative to the lowlands.

The frontal fault system is composed of numerous individual fault strands generally about 10 to 20 miles long (Dolan, et al., 1995; Crook, et al., 1987); some of which reach the surface and some of which do not ("blind thrusts"). Some investigators (for example, Davis, 1988; Hauksson, 1992; Shaw and Suppe, 1995) infer that these faults are merely ramps tied to a deep decollement, possibly associated with the "Elysian Park Thrust". The particular faults proximal to the subject site (see Table A) include the Malibu Coast, Anacapa-Santa Monica, Verdugo, San Fernando faults, and the blind thrust fault that gave rise to the 1994 Northridge earthquake.

**Regional Historic Earthquakes**

The aforementioned San Fernando and Northridge earthquakes were centered about 25-miles and 15-miles northeast, respectively, of the study site. The epicenter of the M5.9 1987 "Whittier" was about 38-miles east of the site. And the San Andreas fault system produced the great 1857 "Fort Tejon" earthquake that may have been about 50 to 150 miles north of the site. Note that faults typically rupture along a two-dimensional surface rather that at one point source (Hauksson, 1992).

The 1925 M6.3 Santa Barbara and 1973 M6.0 Point Mugu earthquakes were centered about 60 and 20 miles , respectively, northwest of Agoura Hills. These two events may be associated with the Anacapa-Santa Monica fault system.

**Discussion**

Predictions of times of occurrence, locations and magnitudes of, as well as ground response to, future earthquakes are tenuous and subjective. Only probabilities and/or possibilities can be assessed on the basis of the existing geologic data, limited historical and seismic records; and empirical relationships among fault lengths, distances between the faults and the study site, and ground acceleration. However, enough seismic events of magnitude 6.0 or greater have occurred regionally to indicate that such events could recur within the life of the subject development. Table A) presents some general guides for hypothetical maximum credible and maximum probable earthquakes and associated free-field ground acceleration for local fault systems.

Predictions of times of occurrence, locations and magnitudes of as well as ground response to, future earthquakes are tenuous and subjective. Only probabilities and/or possibilities can be

assessed on the basis of the existing geologic data, limited historical and seismic records; and empirical relationships among fault lengths, distances between the faults and the study site, and ground acceleration. However, enough seismic events of magnitude 6.0 or greater have occurred regionally to indicate that such events could recur within the life of the subject development. Table A presents some general guides for deterministic maximum magnitude earthquakes and associated PGA for local fault systems.

The maximum earthquake listed in Table A for each fault was obtained from Petersen, et al. (1996). The authors' maximum magnitudes are considered by the regulating agencies (for example, California Division of Mines and Geology, 1997; Martin and Lew, 1999) to be current standard of practice.

From those maximum magnitudes, hypothetical accelerations (Boore, et. al., 1997) were speculated (Table A), using site soil conditions as described below.

***Site Soil Conditions***

Estimation of possible peak horizontal accelerations (PGA) depends partly on the underlying soil/rock types. Both Boore, et al. (1997) and the 1997 UBC prescribe various soil categories. The presence of the high velocity Conejo Volcanics in the upper 100 feet of the soil/rock column indicates that rock site conditions are applicable to the study site, despite the prisms of compacted fill that will cap the site after grading.

The Boore, et al., (1997) attenuation relationships used to hypothesize site accelerations are based upon recent data from western United States earthquakes, and thus are considered "standard of practice." The Boore et al. estimates account for the major earthquakes prior to Northridge. Yet the curves seemingly "fit" most acceleration data recorded on 17 January 1994. However, ground motions somewhat larger than what would have been predicted by any of the commonly used attenuation formulae were recorded locally (Shakal, et al., 1994). Uncertainty exists as to whether the anomalous Northridge accelerations were unusually high owing to local site effects, whether the accelerometers functioned properly, or whether the high accelerations were representative of

that earthquake. The one standard deviation acceleration captures the uncertainty associated with the Northridge event.

## Probabilistic Analysis

One probabilistic method particularly suitable for this study is FRISKSP, developed from United States Geological Survey software (FRISK) by Blake (1995, 1997). Various attenuation curves, including the Boore, et al. (1997) relationship selected for this study, can be employed. Also, various useful parameters of known regional and local faults are embedded in the source code. For complete discussion of the software and probabilistic methods, the reader is referred to Blake (1995, 1997).

PSE searched the FRISKSP data base of major known active faults within a 60-mile (100-km) radius; and then computed acceleration probabilities for 25-, 50-, 75-, and 100-year exposure periods, using the Boore, et al. (1997) attenuation FRISKSP found and analyzed input from 40 faults within a 60-mile radius from the subject site (Figure 1). Blake (1995, 1997) discusses each fault, including maximum earthquakes, slip rates, recurrence intervals and constants; and the reviewer is so referred. FRISKSP does not account for whether each fault is early, median or late in its recurrence interval, assuming that the fault does indeed have any sort of recurrence cycle.

Figure 2 used no magnitude weighting factor, where as Figure 3 includes the factor to account for possible magnified effects of increasing cycles of seismic loading by increasingly larger earthquakes. The 7.5 magnitude-weighting factor used herein means that the computer PGA produced by a postulated 7.5 magnitude earthquake is multiplied by one. For accelerations induced by lesser earthquakes, FRISKSP uses a multiplier slightly less than one; multipliers slightly greater than one are used for earthquakes larger than 7.5 magnitude. Blake (1995, 1997) further explains this concept and sets forth the specific multipliers.

## Possible Site Effects Calculated Peak Horizontal Ground Accelerations (PGA)

### *Deterministic Estimate*

The deterministic analysis of the mean of the random components of hypothetical free-*field* PGA yielded **.55g** for a maximum event and **.93g** for the one standard deviation (S.E.) calculation.

The maximum free-field PGA should not necessarily be used in empirical engineering formulas currently in use to determine earthquake-resistant structural engineering design. Page and others (1972) also noted that a single peak of intense motion (maximum or peak acceleration) may contribute less to cumulative damage potential than multiple cycles of less intense shaking. Further, the California Division of Mines and Geology (1997) cautions that the seismic coefficient "k" is not equivalent to peak ground acceleration, and that peak ground acceleration should not be used in pseudostatic analyses. Design of future improvements should be based on current design practices for similar works in the area. It is the purview of the structural engineer, based upon information presented herein, to select suitable seismic parameters. The 1997 UBC parameters follow this section.

Also, spectral characteristics of strong seismic surface motion display a dependence on many factors including possible subsoil effects, seismogenic mechanisms (Brune, 1970), the wave propagation pattern (Haskell, 1969) nature and geometry of geological discontinuities along the propagation path (Haskell, 1969), surface topography (Boore, 1972), and subsurface geometry (Wong and Trifunac, 1974).

***Probabilistic Estimate***

FRISKSP computed **.43g** as the median plus one standard deviation free-field horizontal acceleration that hypothetically has a UBC-consistent 10 percent chance of being exceeded in 50 years (the equivalent of a 475-year average return period) according to a generally accepted probabilistic (statistical) approach. An acceleration of .36g was computed. The curve second from the lowest is the UBC-consistent 50 year exposure, and the highest curve represents the 100 year exposure period.

***UBC Parameters***

Based on the 1997 UBC (ICBO, 1997), the following preliminary information is presented. The study site is within about 7.5 km of a Class B fault (the Malibu Coast). Preliminarily, soil profile SB may be used in lieu of specific site-by-site evaluations. The seismic zone factor (Z) is 0.4 and

the seismic coefficients are 0.40 Na and 0.44 Nv. Based on available information, Na is 1.0 and Nv is 1.1. Final soil profile typing should be based on as-graded conditions.

## Closure

These acceleration results are based upon many unavoidable geological and statistical uncertainties, but yet are consistent with current standard-of-practice (Petersen, et al., 1996). As engineering seismology evolves, as more fault-specific geological data are gathered; and as legislative action continues, more certainty and different methodologies may also evolve.

## REFERENCES

Blake, T.F., 1995 1997, A computer program for the probabilistic estimation of peak acceleration and uniform hazard spectra using 3-D faults as earthquake sources: Thomas F. Blake, Newbury Park, California, 199 p.

Boore, D.M., 1972, A note on the effect of simple topography on seismic SH waves: Seism. Soc. Am. Bull., v. 62, no. 1.

Boore, D.M., Joyner, W.B., and Fumal, T.E., 1993, Estimation of response spectra and peak accelerations from western North American earthquakes: An interim report: U.S. Geol. Surv. Open-File Rpt. 93-509, 72 p.

Brune, J.N., 1970, Tectonic stress and the spectra of seismic shear waves from earthquakes: Jour. Geophys. Res.

California Division of Mines and Geology, 1975, Recommended guidelines for determining the maximum credible and the maximum probable earthquakes: Calif. Div. Mines and Geol. Note 43.

California Division of Mines and Geology, 1997, Guidelines for evaluation and mitigating seismic hazards, Spec. Rpt. 117, 74 p.

Davis, T., 1988, Application of retrodeformable cross-sections to seismic risk evaluation of the Los Angeles Basin on the Whittier Narrows Earthquake (M = 5.9) of October 1, 1987: Monthly Mtg. Pacific Sec. Amer. Assoc. Pet. Geol.

dePolo, C.M., and Slemmons, D.B., 1990, Estimation of earthquake size for seismic hazards in Krinitzsky, and Slemmons, editors, Neotectonics in earthquake evaluation: Geol. Soc. Amer. Reviews in Engineering Geology, v. III.

Dolan, and seven others, 1995, Prospects for larger or more frequent earthquakes in the Los Angeles metropolitan region: Science, v.267, p. 199-205.

Everden, J.F., and Thomson, J.M., 1985, Predicting seismic intensities, in, Ziony, J.I., editor, Evaluating earthquake hazards in the Los Angeles region--An earth science perspective: U.S. Geol. Serv. Prof. Paper 1360, p. 151-203.

Haskell, N.A., 1969, Elastic displacements in the near-field of propagating fault: Seism. Soc. Am. Bull., v. 59.

Hart, E.W., 1994, Fault hazard zones in California--Alquist-Priolo Earthquake Zoning Act with index to Earthquake Fault Zones Maps, revised 1994: Calif. Div. Mines and Geol. Spec. Pub. 42, 34 p.

Hauksson, E., 1992, Seismicity, faults and earthquake potential in Los Angeles, southern California, in Pipkin, B.W., and Proctor, R.J., editors, Engineering geology practice in southern California: Assoc. Eng. Geol. Spec. Pub. no. 4.

Hauksson, E., and Jones, L., 1994, Earth science aspects, in Hall, J.F., editor, Northridge Earthquake, January 17, 1994, Preliminary reconnaissance report: Earthquake Engineering Research Institute Rpt. No. 94-01, p. 1-18.

Jennings, C.W., 1994, Fault activity map of California and adjacent areas, with locations and ages of volcanic eruptions: Calif. Div. Mines and Geol. Geologic Data Map No. 6.

Joyner, W.B., and Fumal, T.E., 1985, Predictive mapping of earthquake ground motion, in Ziony, J.I., editor, Evaluating earthquake hazards in the Los Angeles region--An Earth-Science perspective: U.S. Geol. Surv. Prof. Paper 1360.

Maulchin, L., 1996, California seismic hazard map: CalTrans, map scale: 1-in = 40-km.

Oakeshott, G.B., editor, 1975, San Fernando earthquake of 9 February, 1971: Calif. Div. Mines and Geol. Bull. 196.

Page, R.A., Boore, D.M., Joyner, W.B., and Coulter, H.W., 1972, Ground motion values for use in the seismic design of the trans-Alaska pipeline system: U.S. Geol. Survey Circular 672.

Petersen, M.D., and eight others, 1996, Probabilistic seismic hazard assessment for the State of California: Calif. Div. Mines and Geol. Open-File Rpt. 96-08, 33p.

Peterson, M.D., and Wesnousky, S.G., 1994, Fault slip rates and earthquake histories for active faults in southern California: Seism. Soc. Amer. Bull. v. 84. n. 5. p. 1608-1649.

Schwartz, D.P., and Coppersmith, K.J., 1986, Seismic hazards: New trends in analysis using geologic data, in R.E. Wallace, editor, active tectonics: National Academy of Sciences Press.

Shakal, A., Huang, M., Darragh, R. Cao, T., Sherburne, R., Malhotra, P., Cramer, C., Sydnor, R., Grazier, V., Maldonado, G., Peterson, and Wanpole, J., 1994, CSMIP Strong-motion records from the Northridge, California earthquake of 17 January 1994: Calif. Div. Mines and Geol. Open-File Report No. 94-07, 252 p.

Shaw, J.H, and Suppe, J., 1996, Earthquake hazards of active blind-thrust faults under the central Los Angeles basin, California: Jour. Geo. Res., v.101, n. B4, p. 8623-8642.

Weldon, R.J. II, and Sieh, K.E., 1985, Holocene rate of slip and tentative recurrence interval for large earthquakes on the San Andreas fault, Cajon Pass, southern California: Geol. Soc. Amer. Bull., v. 96.

Wesnousky, S.G., 1986, Earthquake, Quaternary faults, and seismic hazard in California: Jour. Geophys. Res., v. 91, n. B12.

Wong, H.L. and Trifunac, M.D., 1974, Surface motion of a semi-elliptical alluvial valley for incident plan SH waves: Seism. Soc. Am. Bull., v. 64, no. 5.

# TABLE A

## ESTIMATED RANDOM MEDIAN PEAK HORIZONTAL GROUND ACCELERATION

| FAULT SYSTEM | STYLE SS/DS=0 RS=1 | DISTANCE (mi) | MAXIMUM MAGNITUDE (MM) (a) | PGA IN g FOR MM (b) | PGA+1S.D. FOR MM |
|---|---|---|---|---|---|
| Malibu Coast | 1 | 4.5 | 6.7 | 0.43 | 0.73 |
| Anacapa-Santa Monica | 1 | 10.0 | 7.3 | 0.55 | 0.93 |
| Simi | 1 | 10.0 | 6.7 | 0.27 | 0.45 |
| Northridge B.T.Z. | 1 | 14.0 | 6.9 | 0.27 | 0.45 |
| Elysian Park Thrust | 1 | 15.0 | 6.7 | 0.20 | 0.34 |
| Santa Susana | 0 | 15.0 | 6.6 | 0.11 | 0.19 |
| Oak Ridge | 1 | 17.0 | 6.9 | 0.23 | 0.39 |
| San Fernando | 1 | 18.0 | 6.7 | 0.17 | 0.29 |
| Holser | 1 | 21.0 | 6.5 | 0.12 | 0.20 |
| Verdugo | 1 | 22.0 | 6.7 | 0.15 | 0.25 |
| San Gabriel | 0 | 23.0 | 6.8 | 0.10 | 0.18 |
| San Cayetano | 1 | 23.0 | 6.8 | 0.16 | 0.28 |
| Newport-Inglewood | 0 | 24.0 | 6.9 | 0.11 | 0.19 |
| Santa Ynez | 0 | 34.0 | 7.0 | 0.10 | 0.17 |
| San Andreas | 0 | 42.0 | 7.8 | 0.22 | 0.37 |

SS=Strike-Slip; DS=Normal-Slip; RS=Reverse-Slip

(c) Site Class: 1

**The nearest known active fault is about 5 mile(s) away.

*Calculated median peak horizontal acceleration (PGA) **0.55**

*PGA+1 standard deviation **0.93**

(a) Petersen, et al. (1996).

(b) Boore, Joyner and Fumal (1997); for Mw.

(c) Boore, Joyner and Fumal (1997); 1=Rock; 0=Soil.

W.O. 101568-MP

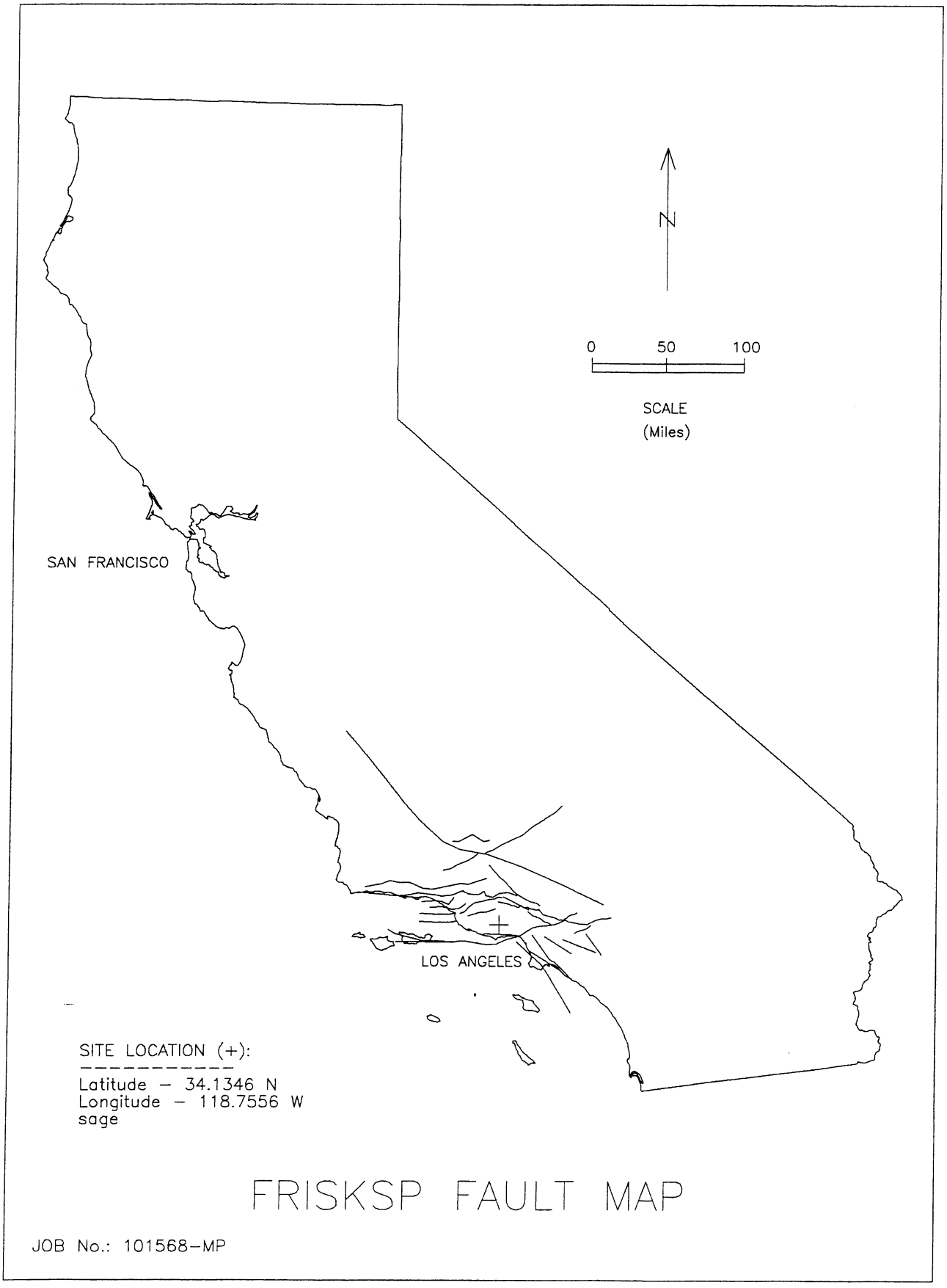

N
0
50
100
SCALE
(Miles)
SAN FRANCISCO
LOS ANGELES
SITE LOCATION (+):
Latitude – 34.1346 N
Longitude – 118.7556 W
sage
FRISKSP FAULT MAP
JOB No.: 101568-MP

**FIGURE 1**

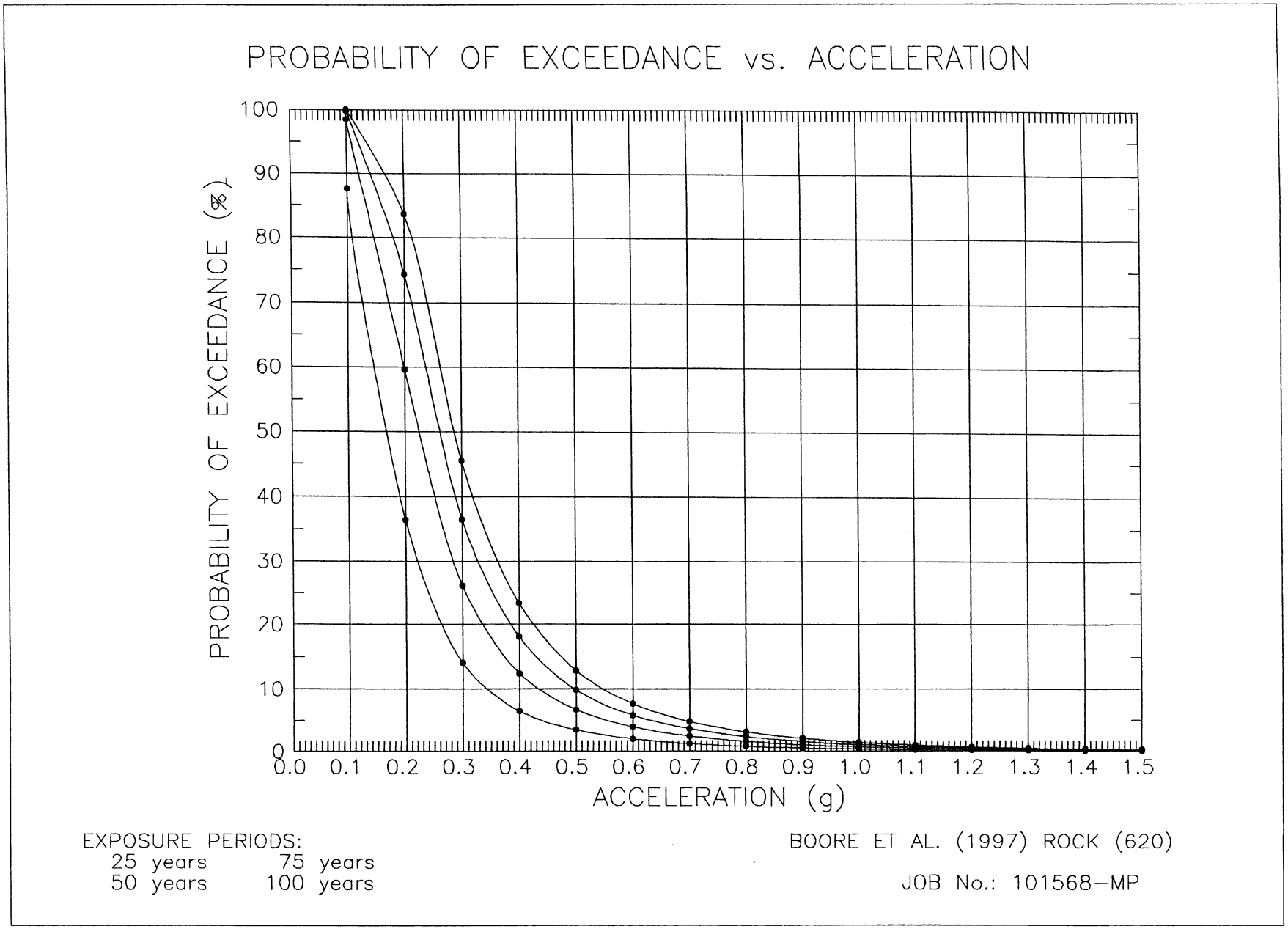

PROBABILITY OF EXCEEDANCE vs. ACCELERATION
PROBABILITY OF EXCEEDANCE (%)
100
90
80
70
60
50
40
30
20
10
0
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5
ACCELERATION (g)
EXPOSURE PERIODS:
25 years 75 years
50 years 100 years
BOORE ET AL. (1997) ROCK (620)
JOB No.: 101568-MP

FIGURE 2

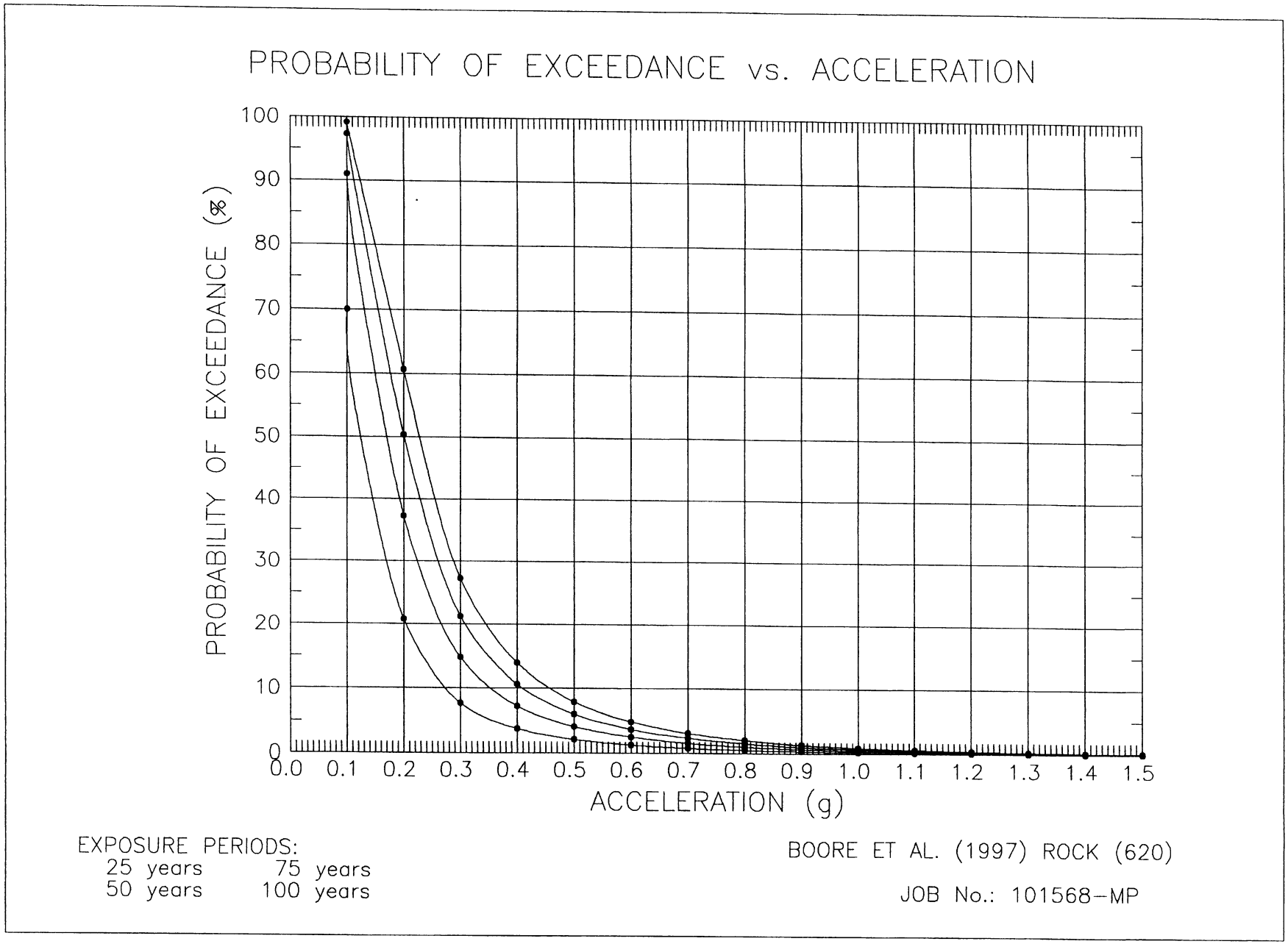

PROBABILITY OF EXCEEDANCE vs. ACCELERATION
PROBABILITY OF EXCEEDANCE (%)
100
90
80
70
60
50
40
30
20
10
0
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5
ACCELERATION (g)
EXPOSURE PERIODS:
25 years
50 years
75 years
100 years
BOORE ET AL. (1997) ROCK (620)
JOB No.: 101568-MP

FIGURE 3

May 15, 2000
Work Order 101568-MP

# APPENDIX VI

# EARTHWORK SPECIFICATIONS

# AND

# TYPICAL GRADING/CONSTRUCTION DETAILS

PACIFIC SOILS ENGINEERING, INC.

EARTHWORK SPECIFICATIONS

These specifications present generally accepted standards and minimum earthwork requirements for the development of the project. These specifications shall be the project guidelines for earthwork except where specifically superceded in preliminary geology and soils reports, grading plan review reports or by prevailing grading codes or ordinances of the controlling agency.

I. GENERAL

A. The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications.

B. The project Soils Engineer and Engineering Geologist or their representatives shall provide testing services and geotechnical consultation during the duration of the project.

C. All clearing, grubbing, stripping and site preparation for the project shall be accomplished by the Contractor to the satisfaction of the Soils Engineer.

D. It is the Contractor's responsibility to prepare the ground surface to receive the fills to the satisfaction of the Soils Engineer and to place, spread, mix and compact the fill in accordance with the job specifications and as required by the Soils Engineer. The Contractor shall also remove all material considered by the Soils Engineer to be unsuitable for use in the construction of compacted fill.

E. The Contractor shall have suitable and sufficient equipment in operation to handle the amount of fill being placed. When necessary, equipment will be shut down temporarily in order to permit proper compaction of fills.

II. SITE PREPARATION

A. Excessive vegetation and all deleterious material shall be disposed of offsite as required by the Soils Engineer. Existing fill, soil, alluvium or rock materials determined by the Soils Engineer as being unsuitable for placement in compacted fills shall be removed and wasted from the site. Where applicable, the Contractor may obtain the approval of the Soils Engineer and the controlling authorities for the project to dispose of the above described materials, or a portion thereof, in designated areas onsite.

After removals as described above have been accomplished, excavation of earth materials deemed unsuitable in their natural, in-place condition, shall be removed as recommended by the Soils Engineer/Engineering Geologist.

B. After the removals as delineated in Item II, A above, the exposed surfaces shall be disced or bladed by the Contractor to the satisfaction of the Soils Engineer. The prepared ground surfaces shall then be brought to the specified moisture condition, mixed as required, and compacted and tested as specified. In areas where it is necessary to obtain the approval of the controlling agency, prior to placing fill, it will be the Contractor's responsibility to notify the proper authorities.

C. Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines or others not located prior to grading are to be removed or treated in a manner prescribed by the Soils Engineer and/or the controlling agency for the project.

III. COMPACTED FILLS

A. Any material imported or excavated on the property may be utilized in the fill, provided each material has been determined to be suitable by the Soils Engineer. Deleterious material not disposed of during clearing or demolition shall be removed from the fill as directed by the Soils Engineer.

B. Rock or rock fragments less than eight inches in the largest dimension may be utilized in the fill, provided they are not placed in concentrated pockets and the distribution of the rocks is approved by the Soils Engineer.

C. Rocks greater than eight inches in the largest dimension shall be taken offsite, or placed in accordance with the recommendations of the Soils Engineer in areas designated as suitable for rock disposal.

D. All fills, including onsite and import materials to be used for fill, shall be tested in the laboratory by the Soils Engineer. Proposed import materials shall be approved prior to importation.

E. The fill materials shall be placed by the Contractor in layers that when compacted shall not exceed six inches. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain a near uniform moisture condition and a uniform blend of materials.

All compaction shall be achieved at optimum moisture content or above, as determined by the applicable laboratory standard. No upper limit on the moisture content is necessary; however, the Contractor must achieve the necessary compaction and will be alerted when the material is too wet and compaction cannot be attained.

F. Where the moisture content of the fill material is below the limit specified by the Soils Engineer, water shall be added and the materials shall be blended until a uniform moisture content, within specified limits, is achieved. Where the moisture content of the fill material is above the limits specified by the Soils Engineer, the fill materials shall be aerated by discing, blading or other satisfactory methods until the moisture content is within the limits specified.

G. Each fill layer shall be compacted to minimum project standards, in compliance with the testing methods specified by the controlling governmental agency and in accordance with the recommendations of the Soils Engineer.

In the absence of specific recommendations by the Soils Engineer to the contrary, the compaction standard shall be ASTM:D 1557-91.

H. Where a slope receiving fill exceeds a ratio of five-horizontal to one-vertical, the fill shall be keyed and benched through all unsuitable topsoil, colluvium, alluvium, or creep material, into sound bedrock or firm material, in accordance with the recommendations and approval of the Soils Engineer.

I. Side hill fills shall have a <u>minimum key width</u> of 15 feet into bedrock or firm materials, unless otherwise specified in the soils report and approved by the Soils Engineer in the field.

J. Drainage terraces and subdrainage devices shall be constructed in compliance with the ordinances of the controlling governmental agency and/or with the recommendations of the Soils Engineer and Engineering Geologist.

K. The Contractor shall be required to maintain the specified minimum relative compaction out to the finish slope face of the fill slopes, buttresses, and stabilization fills as directed by the Soils Engineer and/or the governing agency for the project. This may be achieved by either overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment, or by any other procedure which produces the designated result.

L. Fill-over-cut slopes shall be properly keyed through topsoil, colluvium or creep material into rock or firm material; and the transition shall be stripped of all soil or unsuitable materials prior to placing fill.

The cut portion should be made and evaluated by the Engineering Geologist prior to placement of fill above.

M. Pad areas in natural ground and cut shall be approved by the Soils Engineer. Finished surfaces of these pads may require scarification and recompaction.

IV. CUT SLOPES

A. The Engineering Geologist shall inspect all cut slopes and shall be notified by the Contractor when cut slopes are started.

B. If, during the course of grading, unforeseen adverse or potentially adverse geologic conditions are encountered, the Engineering Geologist and Soils Engineer shall investigate, analyze and make recommendations to treat these problems.

C. Non-erodible interceptor swales shall be placed at the top of cut slopes that face the same direction as the prevailing drainage.

D. Unless other specified in the soils or geological reports, no cut slope shall be excavated higher or steeper than that allowed by the ordinances of the controlling governmental agencies.

E. Drainage terraces shall be constructed in compliance with the ordinances of the controlling governmental agencies, and/or in accordance with the recommendations of the Soils Engineer or Engineering Geologist.

V. GRADING CONTROL

A. Fill placement shall be observed by the Soils Engineer and/or his representative during the progress of grading.

Field density tests shall be made by the Soils Engineer or his representative to evaluate the compaction and moisture compliance of each layer of fill. Density tests shall be performed at intervals not to exceed two feet of fill height. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density determinations shall be taken in the compacted material below the disturbed surface at a depth determined by the Soils Engineer or his representative.

B. Where tests indicate that the density of any layer of fill, or portion thereof, is below the required relative compaction, or improper moisture is in evidence, the particular layer or portion shall be reworked until the required density and/or moisture content has been attained. No addi-

tional fill shall be placed over an area until the last placed lift of fill has been tested and found to meet the density and moisture requirements and that lift approved by the Soils Engineer.

C. Where the work is interrupted by heavy rains, fill operations shall not be resumed until field observations and tests by the Soils Engineer indicate the moisture content and density of the fill are within the limits previously specified.

D. During construction, the Contractor shall properly grade all surfaces to maintain good drainage and prevent ponding of water. The Contractor shall take remedial measures to control surface water and to prevent erosion of graded areas until such time as permanent drainage and erosion control measures have been installed.

E. Observation and testing by the Soils Engineer shall be conducted during the filling and compacting operations in order that he will be able to state in his opinion all cut and filled areas are graded in accordance with the approved specifications.

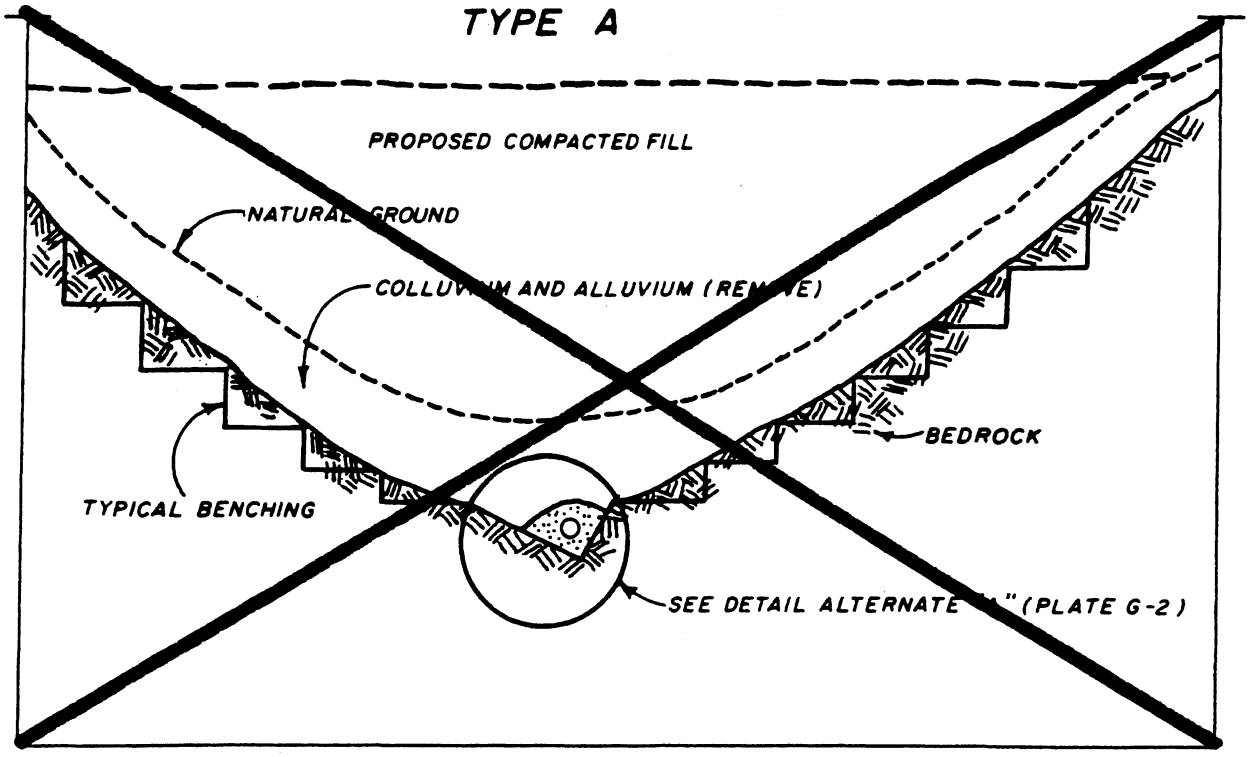
F. After completion of grading and after the Soils Engineer and Engineering Geologist have finished their observations of the work, final reports shall be submitted. No further excavation or filling shall be undertaken without prior notification of the Soils Engineer and/or Engineering Geologist.

VI. SLOPE PROTECTION

All finished cut and fill slopes shall be planted and/or protected from erosion in accordance with the project specifications and/or as recommended by a landscape architect.

# CANYON SUBDRAIN DETAIL

## TYPE A




## TYPE B

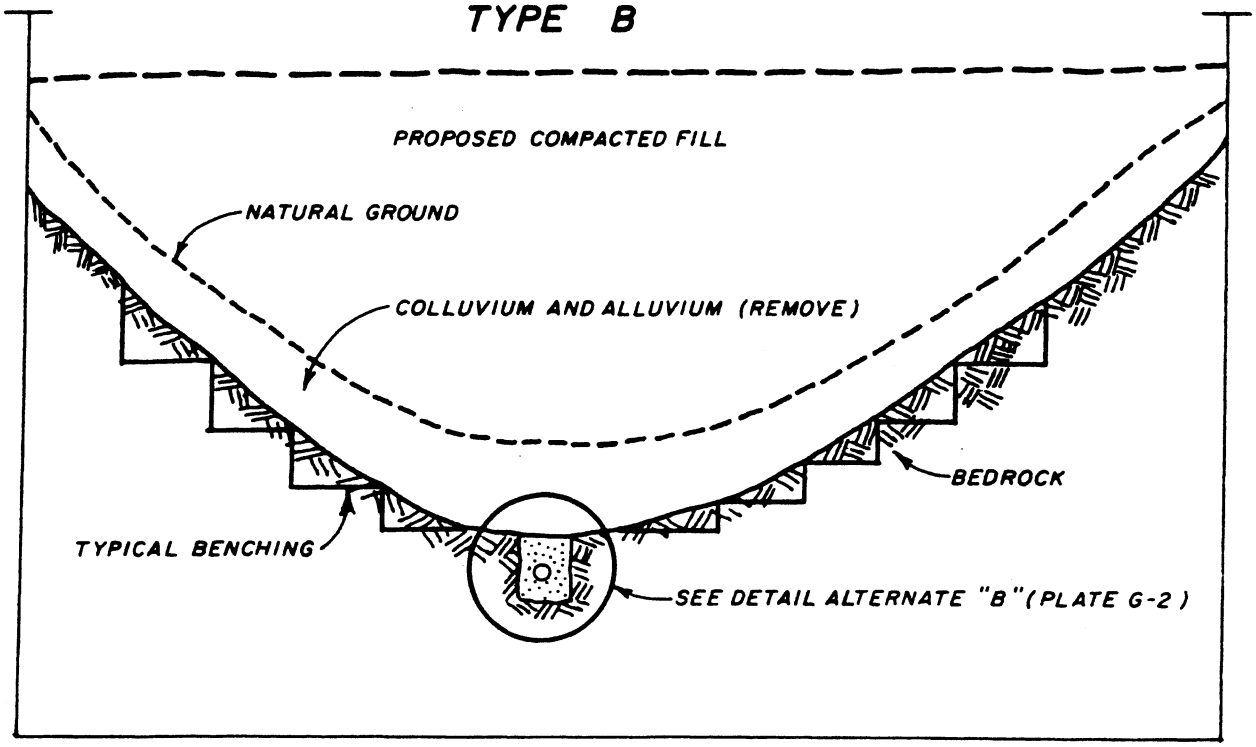
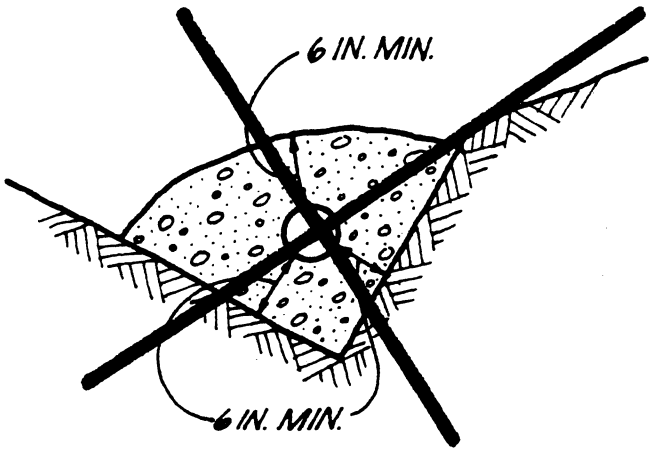
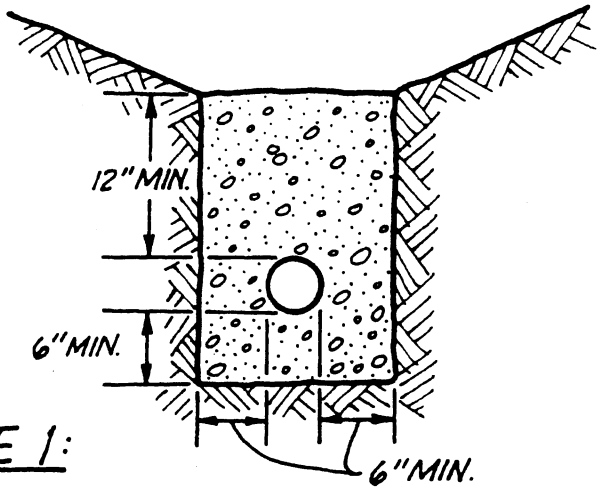



PLATE G-1

PACIFIC SOILS ENGINEERING, INC.

W.O. _____ DATE _____




## ALTERNATIVE 1:

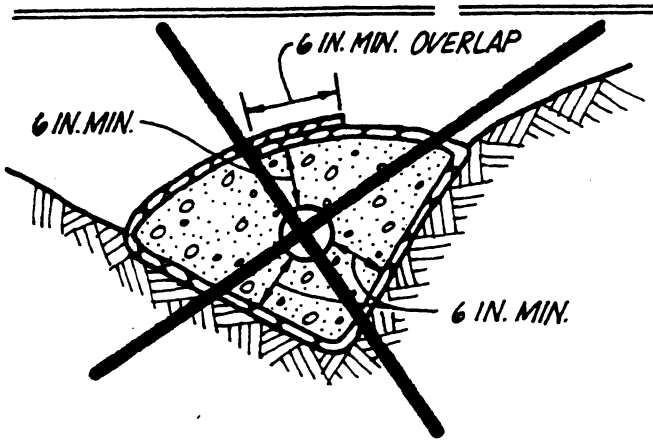
PIPE AND FILTER MATERIAL

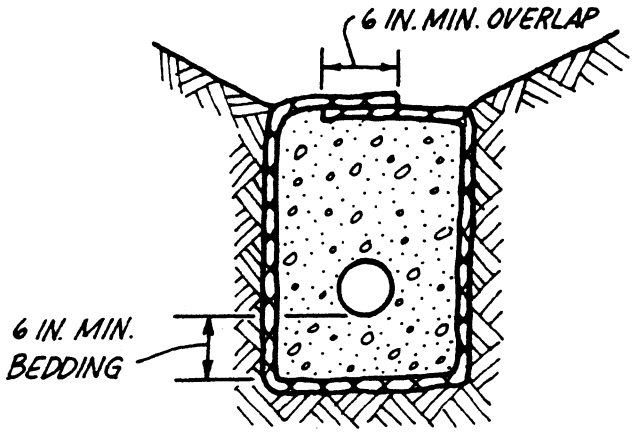
FILTER MATERIAL: MIN. VOLUME OF 9 FT.$^3$/LIN. FT. OF EQUAL MIXTURE OF NO. 2 AND NO. 3 ROCK. PIPE: 6 IN. ABS OR PVC PIPE OR APPROVED SUBSTITUTE WITH A MIN. OF 8 1/4 IN. PERFORATIONS PER LINEAL FT. IN BOTTOM HALF OF PIPE.

ASTM D2751, SDR 35 OR
ASTM D1527, SCHD. 40

ASTM D3034, SDR 35 OR
ASTM D1785, SCHD. 40

NOTE: FOR CONTINUOUS RUN IN EXCESS OF 500 FT. USE 8 IN. DIA. PIPE




## ALTERNATIVE 2:

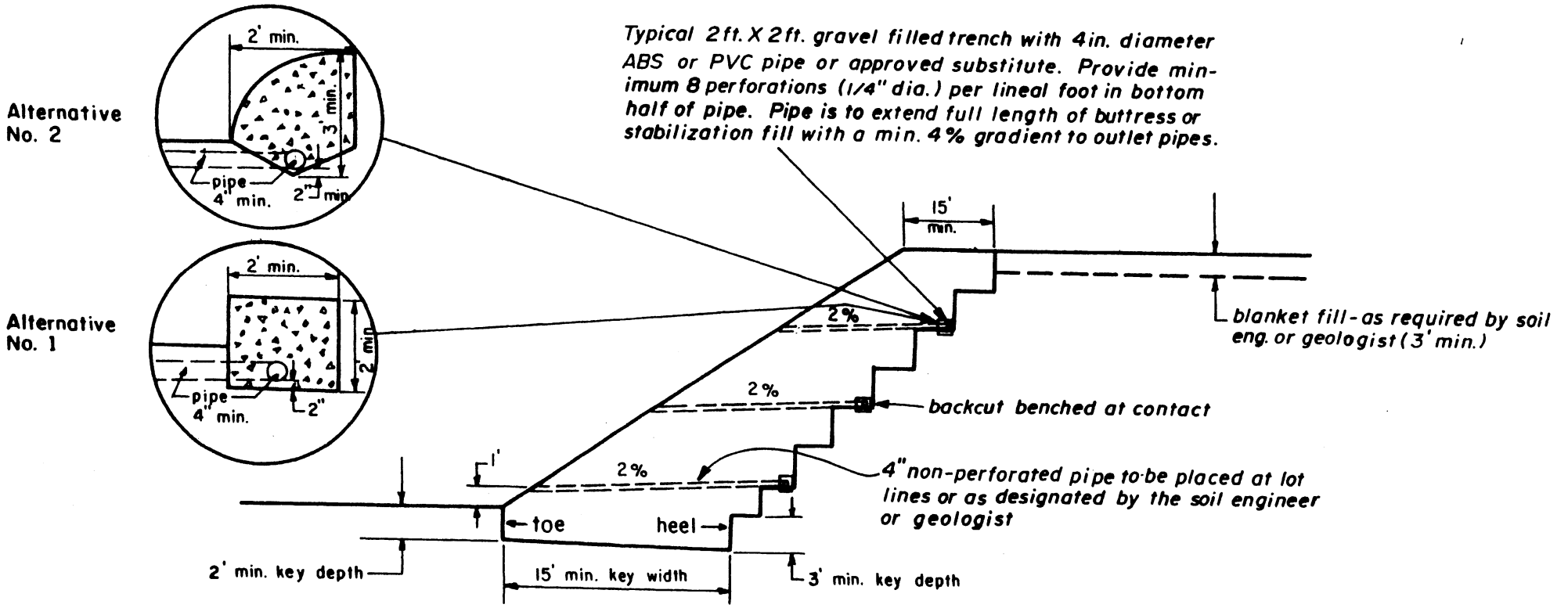
PERFORATED PIPE SURROUNDED WITH ROCK & FILTER FABRIC

FILTER MATERIAL: MIN. VOLUME OF 9 FT$^3$/LIN. FT. OF 3/4 IN. MAX. ROCK
PIPE: 6 IN. DIA. ABS OR PVC PIPE OR APPROVED SUBSTITUTE WITH A MIN. OF 8 1/4 IN. DIA. PERFORATIONS PER LINEAL FT. IN BOTTOM HALF OF PIPE
FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT

Plate G-2

PACIFIC SOILS ENGINEERING, INC.
10653 PROGRESS WAY CYPRESS, CALIFORNIA (714) 220-0770

W.O. DATE




NOTES:

1. ABS - ASTM D 2751, SDR 35 or ASTM D1527 Sched. 40
   PVC - ASTM D 3034, SDR 35 or ASTM D1785 Sched. 40
2. Outlets to be provided every 100 ft. and joined to perf. backdrain pipe by L or T's. Min. 2% gradient.
3. Gravel trench to be filled with approximately equal mixture of no. 2 and no. 3 rock.
4. The necessity for upper stages of backdrains shall be determined in the field by the soil engineer or geologist. Upper stage outlets should be emptied onto paved terrace drains

# STABILIZATION / BUTTRESS FILL DETAIL

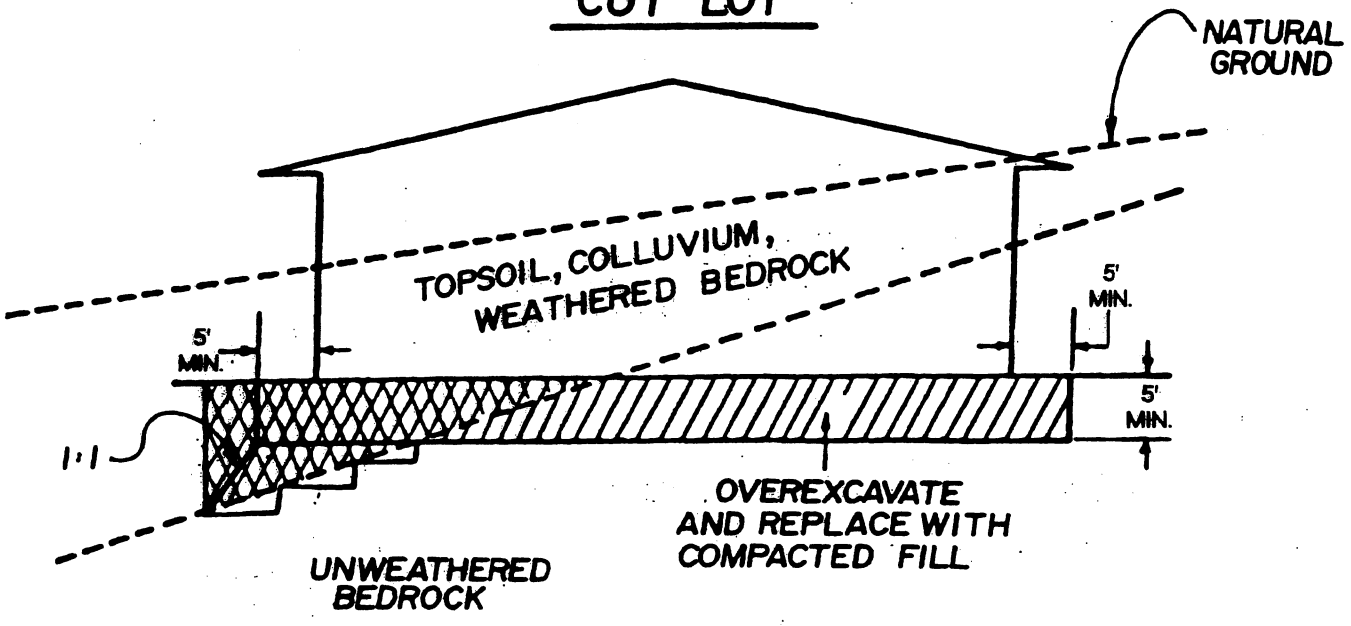
PLATE G-3

PACIFIC SOILS ENGINEERING, INC.

W.O. _____ DATE _____

# TYPICAL TRANSITION LOT DETAIL

## CUT LOT




## CUT-FILL LOT (TRANSITION)

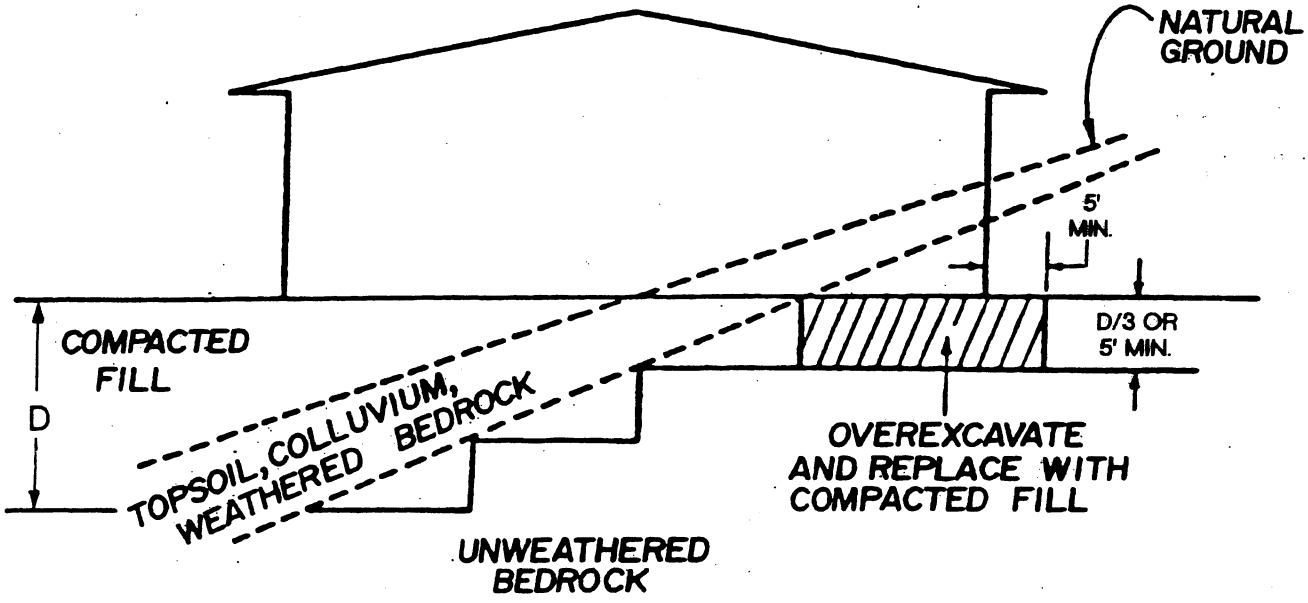


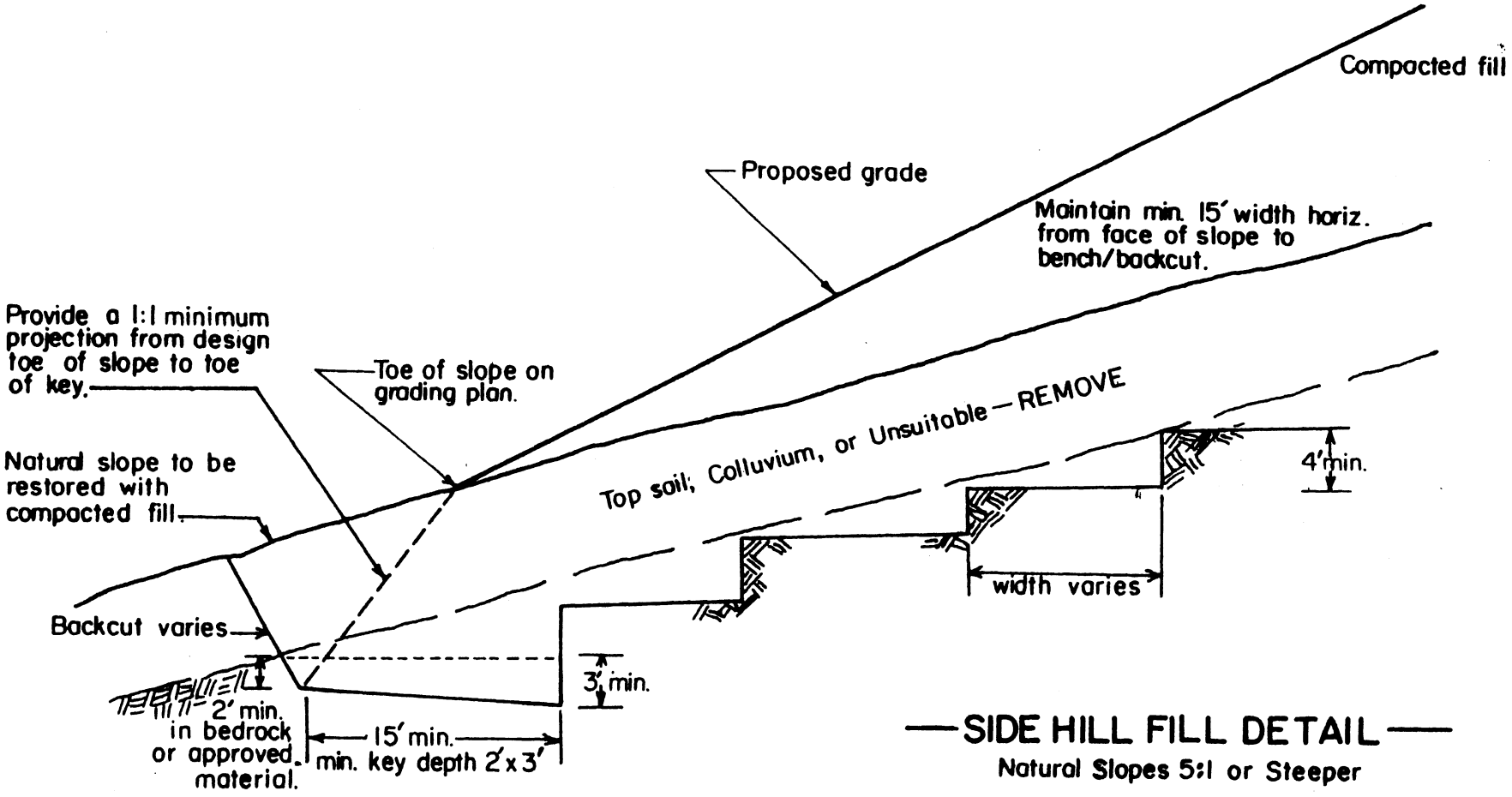

PLATE G-4


PACIFIC SOILS ENGINEERING, INC.
10653 PROGRESS WAY CYPRESS, CALIFORNIA (714)220-0770


W.O. DATE

NOTE: 1) Where natural slope gradient is 5:1 or less, see Plate G-6. Where the natural slope approaches or exceeds the design slope ratio, special recommendations will be provided by the soil engineer.

2) The need for and disposition of drains will be determined by the soil engineer based upon exposed conditions.




## SIDE HILL FILL DETAIL

Natural Slopes 5:1 or Steeper

PLATE G-5

PACIFIC SOILS ENGINEERING, INC.

W.O. _____ DATE _____

# —— Detail for Fill Slope Toeing Out on Flat Alluviated Canyon ——

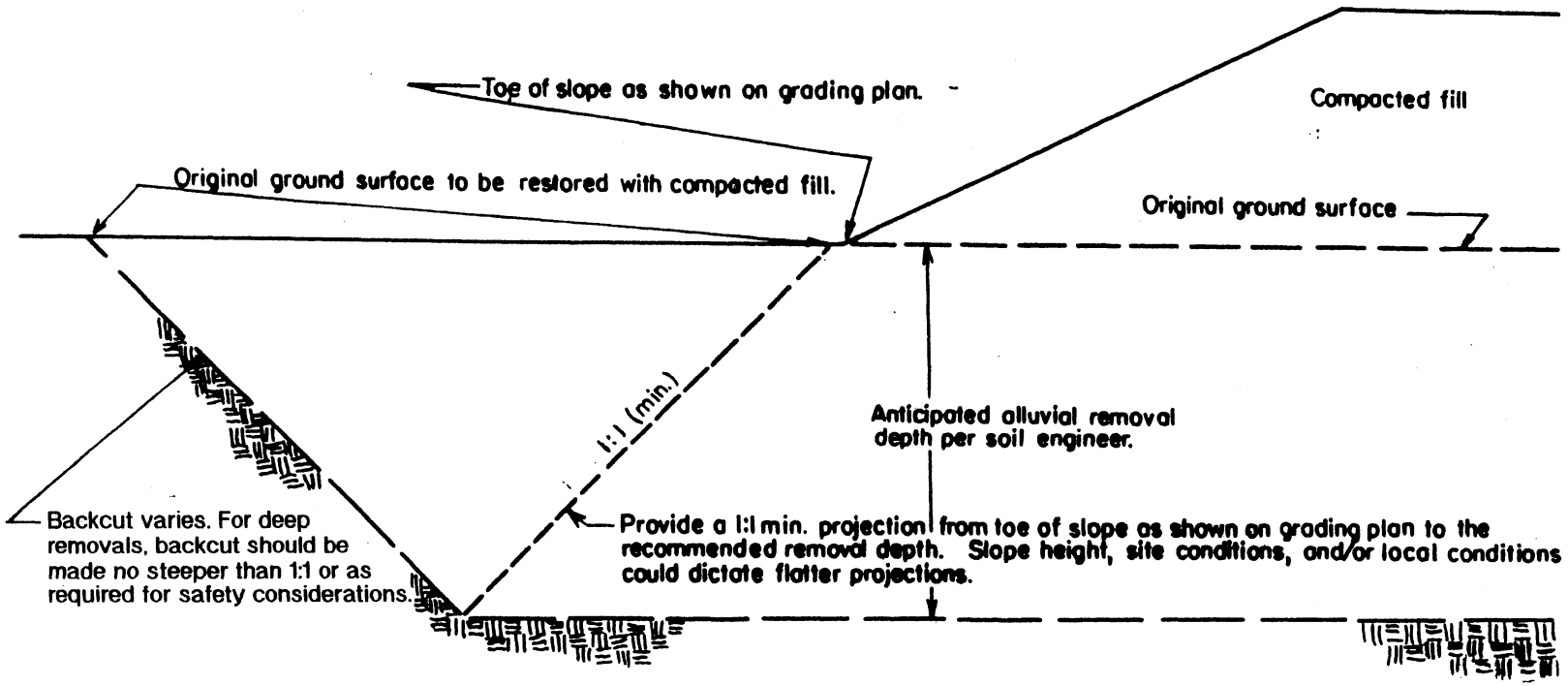
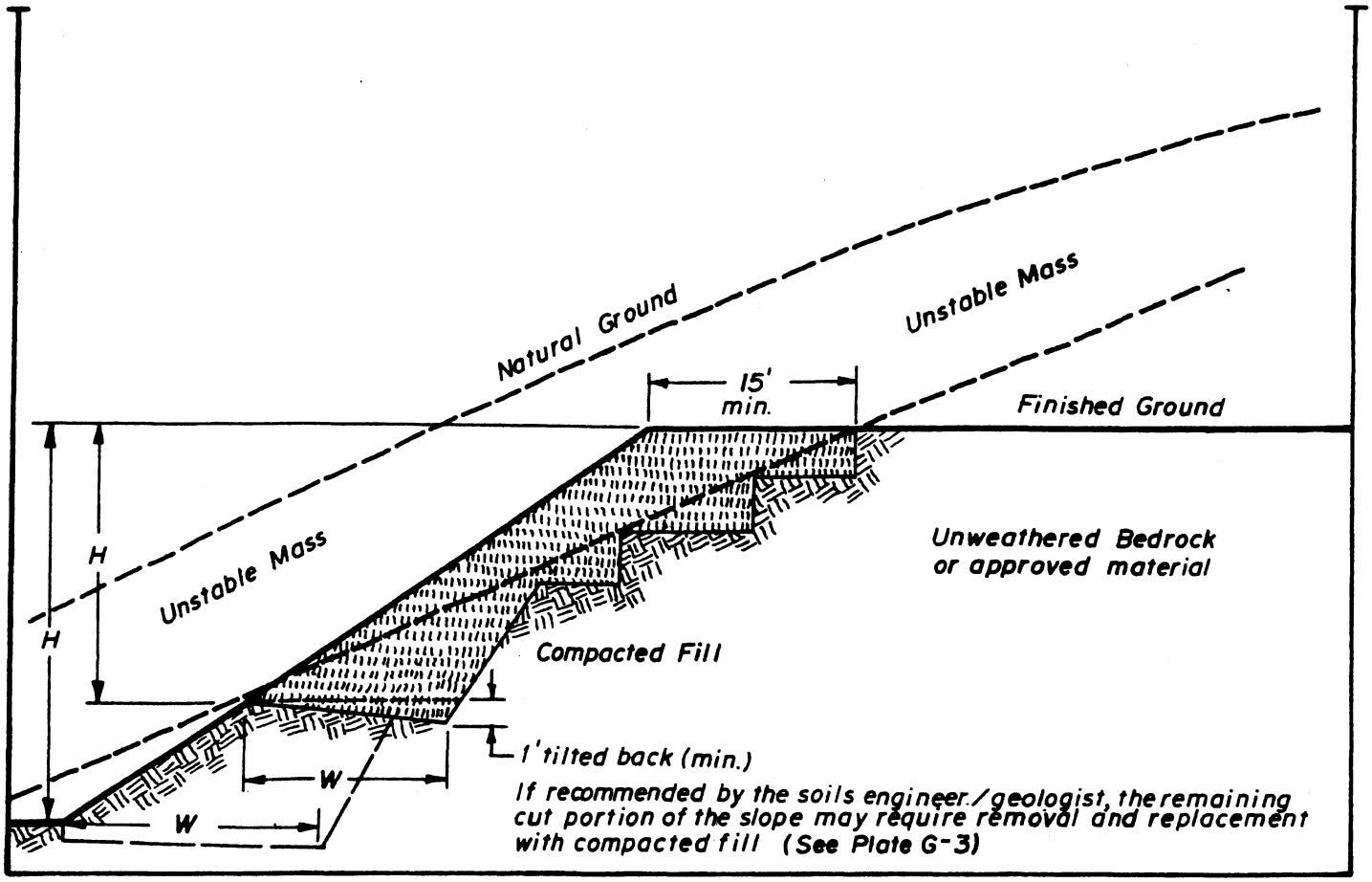



Plate G-6

PACIFIC SOILS ENGINEERING, INC.

W.O. —————— DATE ——————

# Selective Grading Detail for Stabilization Fill
## Unstable Material Exposed in Portion of Cut Slope




NOTE:

1. Subdrains are not required unless specified.
2. "W" shall be equipment width (15') for slope heights less than 25 feet. For slopes greater than 25 feet "W" shall be determined by the project soils engineer/geologist. At no time shall "W" be less than H/2.

PLATE G-7

PACIFIC SOILS ENGINEERING, INC.

W.O. _____ DATE _____

# Skin Fill On Natural Ground

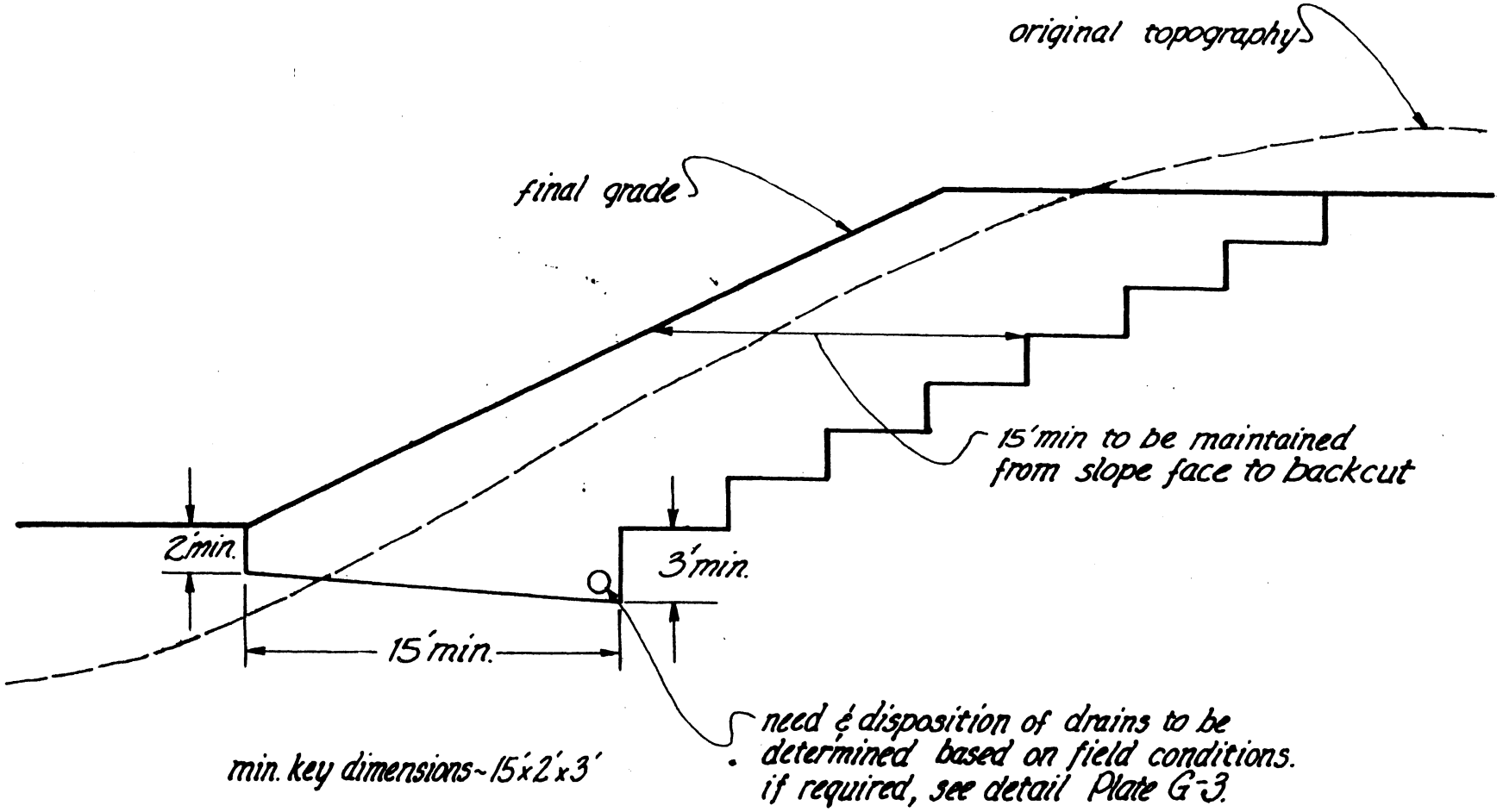


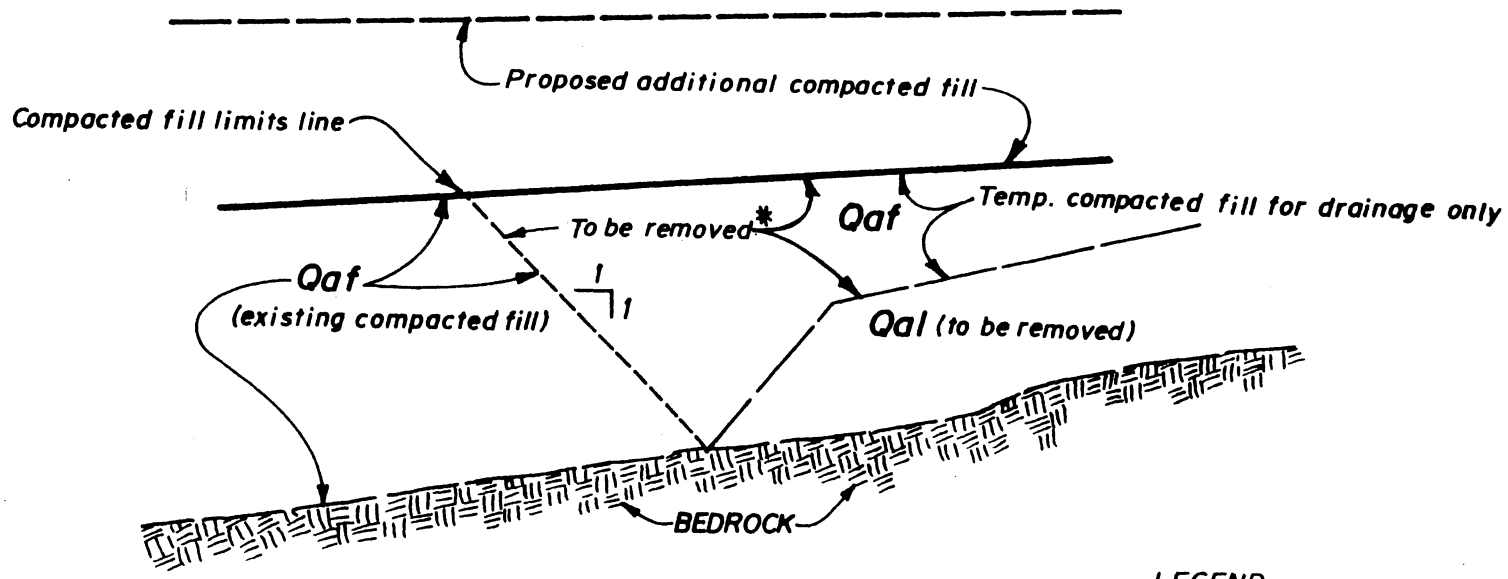

PLATE G-8


**PACIFIC SOILS ENGINEERING, INC.**
10653 PROGRESS WAY CYPRESS, CALIFORNIA (714) 220-0770


**W.O.** **DATE**

# REMOVAL ADJACENT TO EXISTING FILL

## ADJOINING CANYON FILL




LEGEND

Qaf Artificial fill

Qal Alluvium

*before placing additional compacted fill

## CROSS-SECTION B-B'

(Typ. up-canyon)

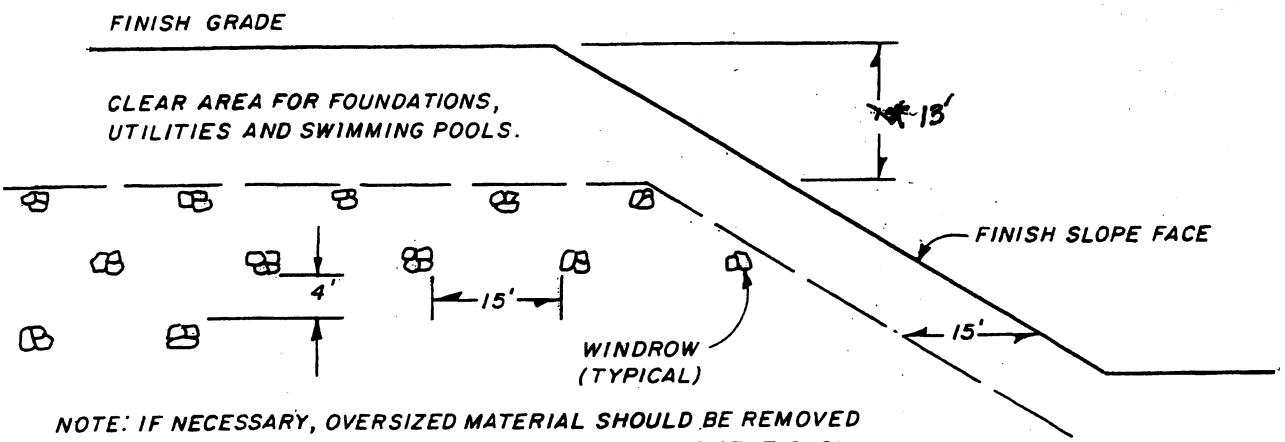
Not to scale

PLATE G-9

PACIFIC SOILS ENGINEERING, INC.

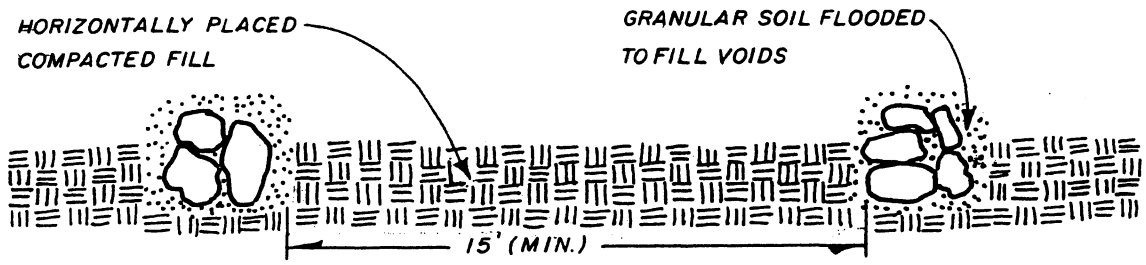
W.O. _____ DATE _____

# ROCK DISPOSAL DETAIL




NOTE: IF NECESSARY, OVERSIZED MATERIAL SHOULD BE REMOVED FROM THE 15 FOOT ZONE WITH SPECIAL EQUIPMENT, SUCH AS A ROCK RAKE, PRIOR TO PLACING THE NEXT FILL LIFT.

# TYPICAL WINDROW DETAIL (END VIEW)




NOTE: COMPACTED FILL SHALL BE BROUGHT UP AT A HIGHER ELEVATION ALONG WINDROW SO GRANULAR SOIL CAN BE FLOODED IN A "TRENCH CONDITION".

# PROFILE VIEW

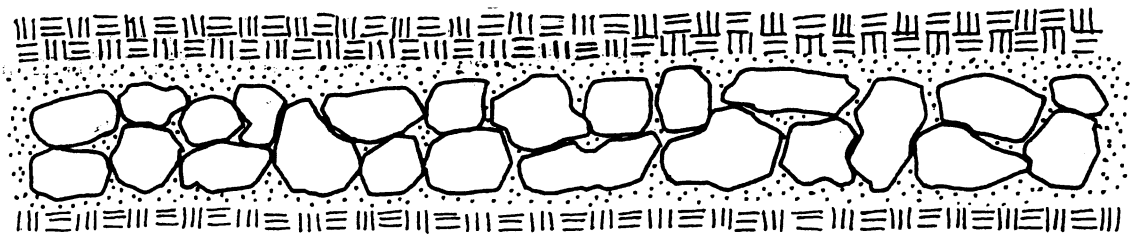
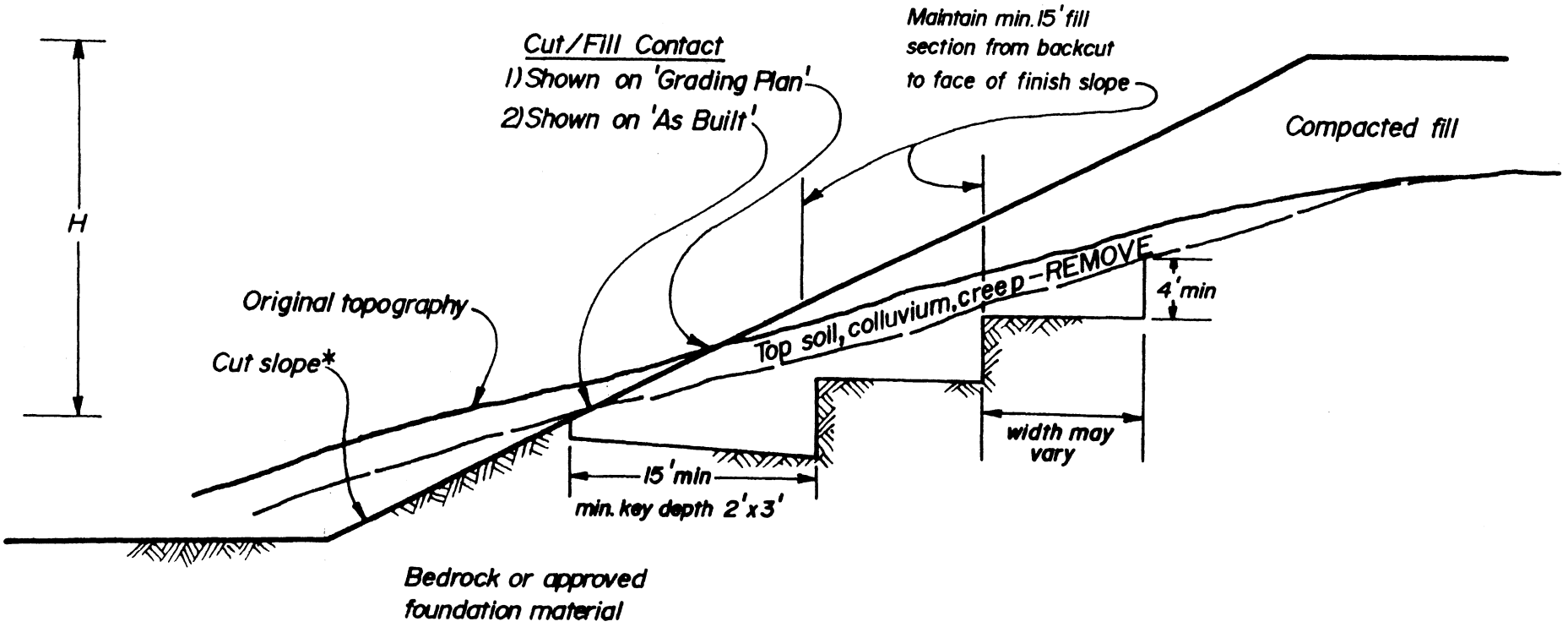


PLATE G-10

PACIFIC SOILS ENGINEERING, INC.

W.O._____ DATE_____




* The cut portion of the slope should be excavated and evaluated by the Engineering Geologist/Soils Engineer prior to constructing the fill portion.

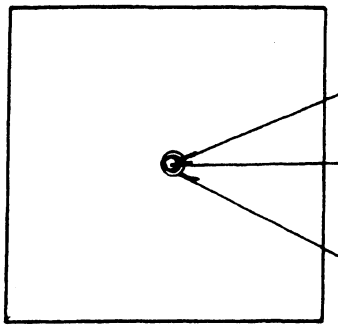
# FILL OVER CUT DETAIL

PLATE G-11

PACIFIC SOILS ENGINEERING, INC.

W.O. _____ DATE _____

# SETTLEMENT PLATE DETAIL

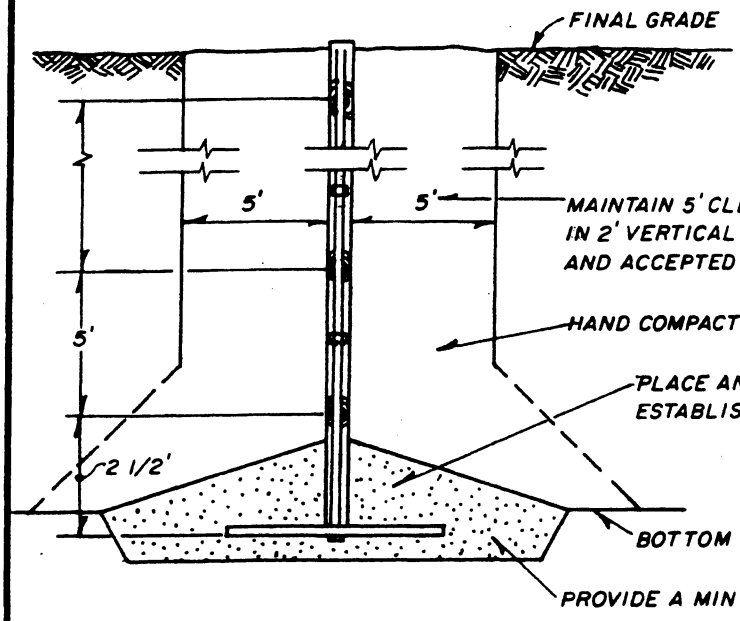


2' X 2' X 1/4" STEEL PLATE

STANDARD 3/4" PIPE NIPPLE, WELDED TOP AND UNDERSIDE OF PLATE.

3/4" Ø X 5' LONG GALVANIZED PIPE, STANDARD PIPE THREADS TOP AND BOTTOM. EXTENSIONS THREADED BOTH ENDS AND ADDED IN 5' INCREMENTS.

3" Ø SCHEDULE 40 PVC, ADD IN 5' INCREMENTS WITH GLUE JOINTS.




MAINTAIN 5' CLEARANCE OF HEAVY EQUIPMENT. HAND COMPACT IN 2' VERTICAL INCREMENTS OR ALTERNATIVE SUITABLE TO AND ACCEPTED BY SOILS ENGINEER.

HAND COMPACT INITIAL 5' (VERTICAL) WITHIN 10' HORIZONTAL.

PLACE AND HAND COMPACT INITIAL 2' OF FILL PRIOR TO ESTABLISHING INITIAL READING.

BOTTOM OF CLEANOUT

PROVIDE A MIN. 1' THICKNESS OF SAND/GRAVEL BEDDING.

## NOTE

1) LOCATIONS OF SETTLEMENT PLATES SHALL BE CLEARLY MARKED AND READILY VISIBLE (RED FLAGGED) TO EQUIPMENT OPERATORS.

2) CONTRACTOR SHALL MAINTAIN 10' HORIZONTAL CLEARANCE FOR HEAVY EQUIPMENT WITHIN 5' (VERTICAL) OF PLATE BASE. FILL WITHIN CLEARANCE AREA SHALL BE HAND COMPACTED TO PROJECT SPECIFICATIONS OR COMPACTED BY ALTERNATIVE APPROVED SOILS ENGINEER.

3) AFTER 5' (VERTICAL) OF FILL IS IN PLACE, CONTRACTOR SHALL MAINTAIN 5' HORIZONTAL EQUIPMENT CLEARANCE. FILL IN CLEARANCE AREA SHALL BE HAND COMPACTED (OR APPROVED ALTERNATIVE) IN VERTICAL INCREMENTS NOT TO EXCEED 2 FEET.

4) IN THE EVENT OF DAMAGE TO SETTLEMENT PLATE OR EXTENSION RESULTING FROM EQUIPMENT OPERATING WITHIN PRESCRIBED CLEARANCE AREA, CONTRACTOR SHALL IMMEDIATELY NOTIFY SOILS ENGINEER AND SHALL BE RESPONSIBLE FOR RESTORING THE SETTLEMENT PLATES TO WORKING ORDER.

PLATE G-12

PACIFIC SOILS ENGINEERING, INC.

W.O. _____ DATE _____

# SURFACE SETTLEMENT MONUMENT DETAIL

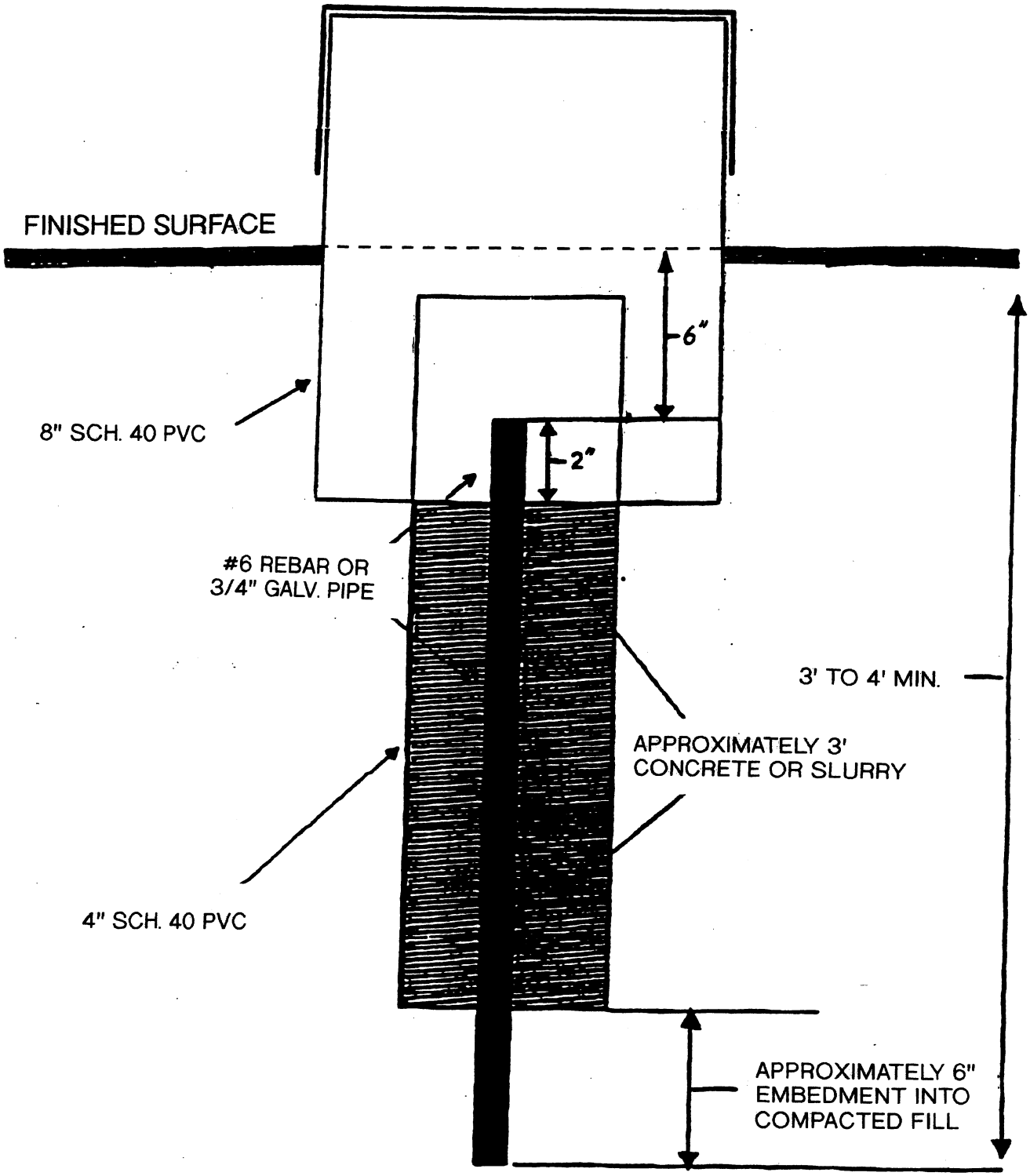


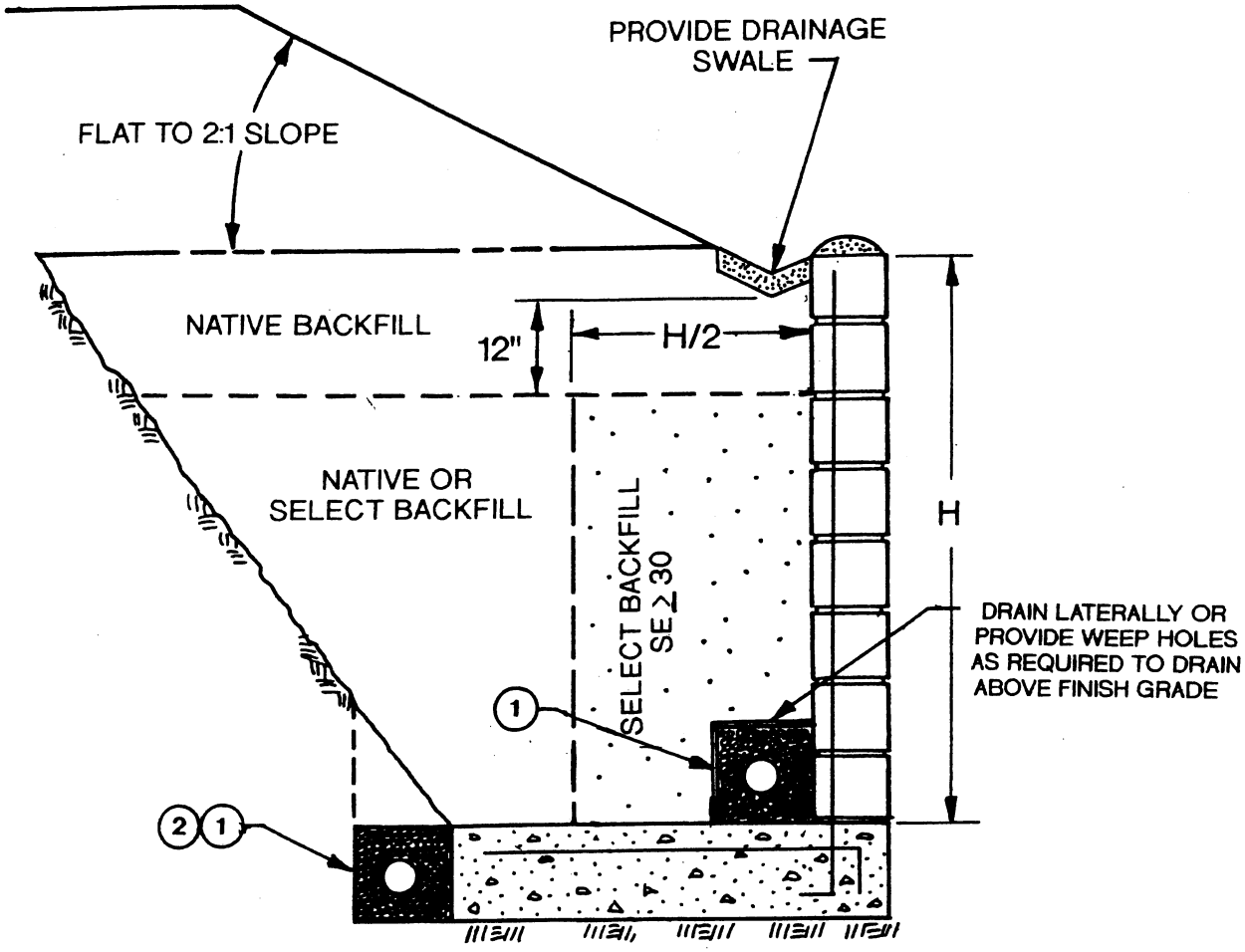

PLATE G-12a


**PACIFIC SOILS ENGINEERING, INC.**
10663 PROGRESS WAY CYPRESS, CALIFORNIA (714) 220-0770


**W.O.** **DATE**

TYPICAL

# RETAINING WALL BACKFILL



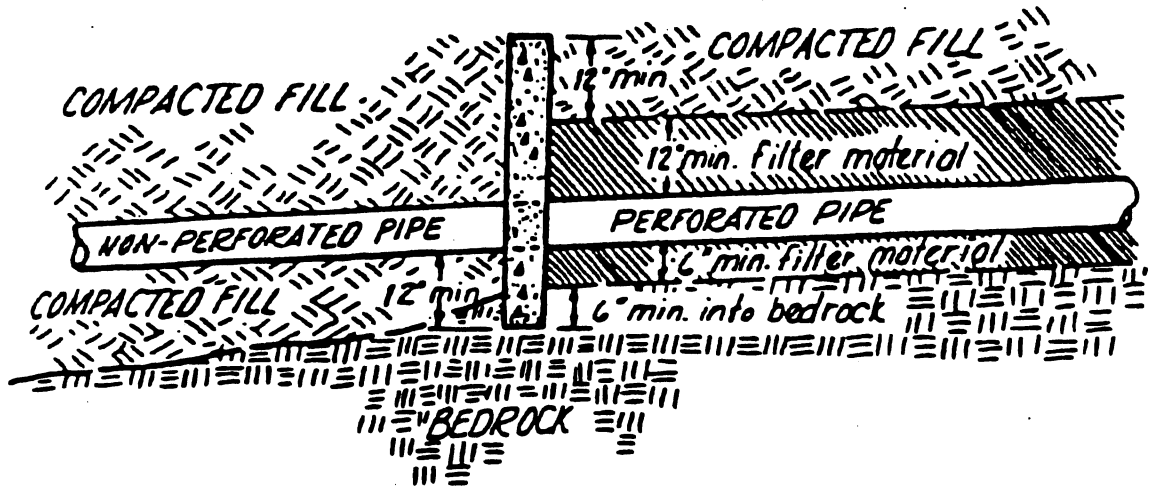

(1) 4-INCH PERFORATED PVC, SCHEDULE 40 OR APPROVED ALTERNATE. PLACE PERFORATION DOWN AND SURROUND WITH A MINIMUM OF 1 CUBIC FOOT PER LINEAL FOOT OF 3/4 INCH ROCK OR APPROVED ALTERNATE. ENCAPSULATE IN MIRAFI 140, OR EQUIVALENT

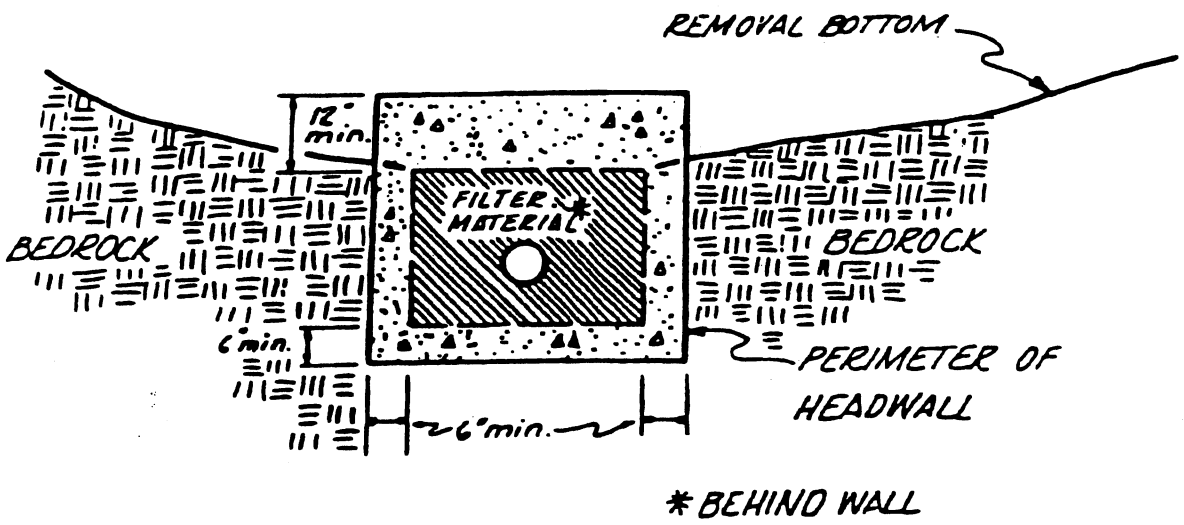
(2) PLACE DRAIN AS SHOWN WHERE PROVISIONS FOR DRAINAGE THROUGH THE WALL CANNOT BE ACCOMMODATED

PLATE G-13 NOT TO SCALE


**PACIFIC SOILS ENGINEERING, INC.**
10853 PROGRESS WAY CYPRESS, CALIFORNIA (714) 220-0770


**W.O.** **DATE**




# TYPICAL
# CONCRETE HEADWALL
# DETAIL

PLATE G-14

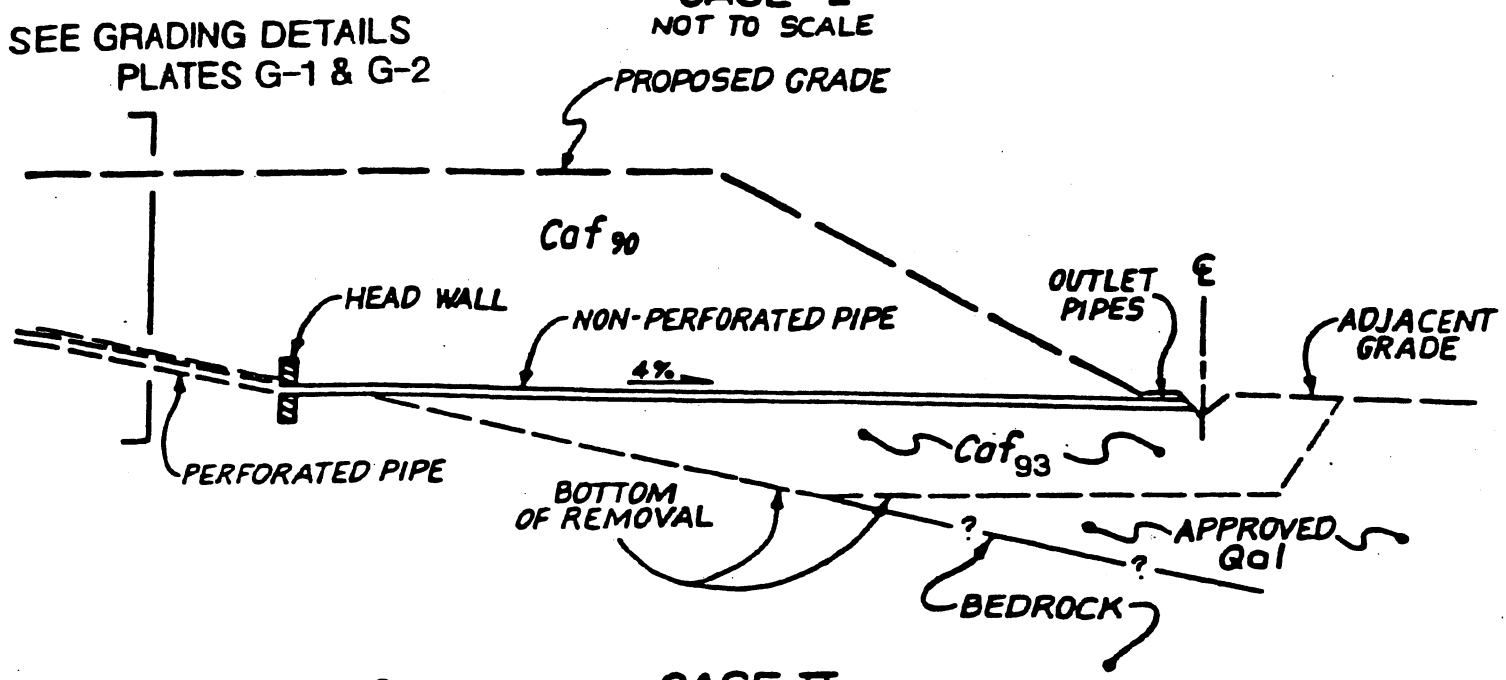
PACIFIC SOILS ENGINEERING, INC.
10853 PROGRESS WAY CYPRESS, CALIFORNIA (714) 220-0770

W.O. DATE

# TYPICAL CANYON SUBDRAIN OUTLET DETAIL

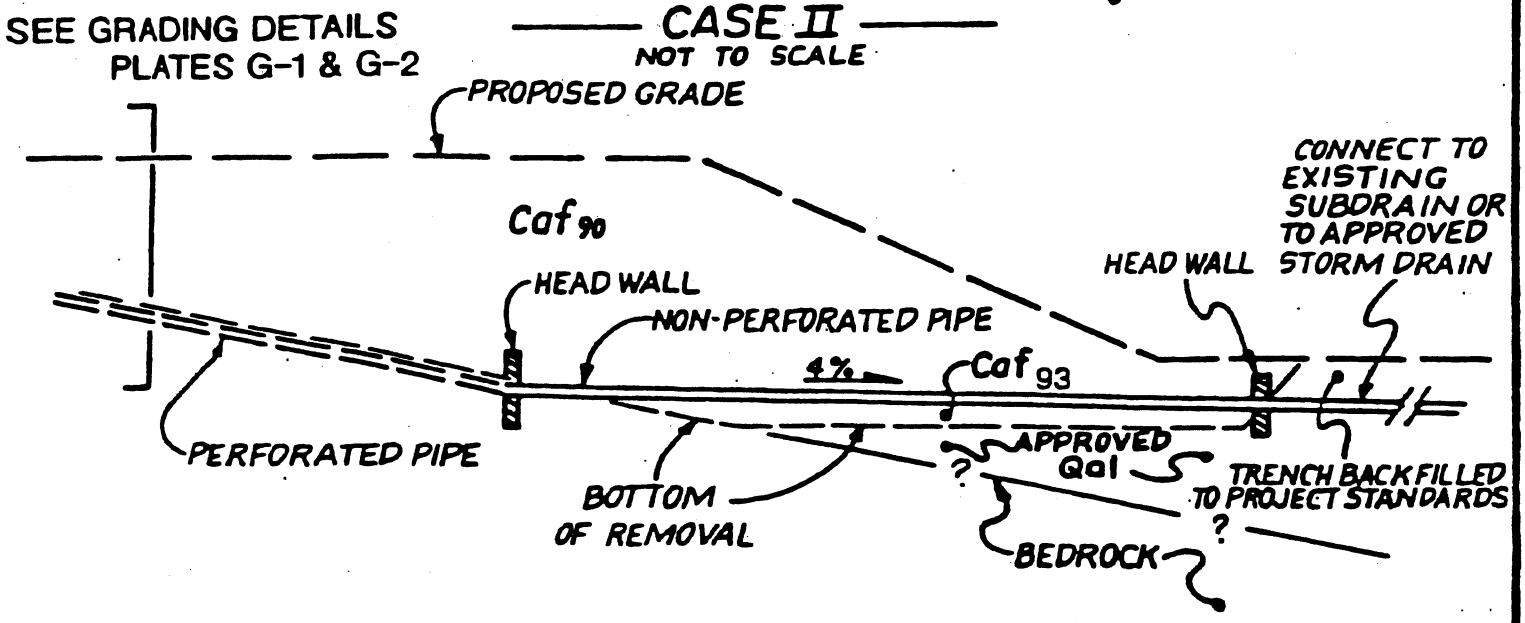
## CASE I

NOT TO SCALE




## CASE II

NOT TO SCALE




LEGEND:

$Caf_{90}$ COMPACTED FILL TO 90% OF LABORATORY MAXIMUM

$Caf_{93}$ COMPACTED FILL TO 93% OF LABORATORY MAXIMUM

PLATE G-15


PACIFIC SOILS ENGINEERING, INC.
10883 PROGRESS WAY CYPRESS, CALIFORNIA (714) 220-0770


W.O. DATE

May 15, 2000
Work Order 101568-MP

# APPENDIX VII

# HOMEOWNER MAINTENANCE

# AND

# IMPROVEMENT CONSIDERATIONS

# APPENDIX VII

## HOMEOWNERS MAINTENANCE AND IMPROVEMENTS CONSIDERATIONS

### Expansive Soils

Some of the earth materials, which may be moved as part of the site grading, may be identified as being expansive in nature. As such, these materials are susceptible to large volume changes upon variations in their moisture content. These soils will swell upon the introduction of water and shrink upon drying. The forces associated with these volume changes can have significant negative impacts (in the form of differential movement) on foundations, walkways, and other lot improvements.

Homeowners purchasing property and living in an area containing expansive soils must assume a certain degree of responsibility for homeowner improvements and for maintaining conditions around their home. Provisions should be incorporated into the design and construction of homeowner improvements to account for the expansive nature of the onsite soils material. Lot maintenance and landscaping should also be conducted in consideration of expansive soil characteristics. Of primary importance is minimizing the moisture variation below all lot improvements. Such design, construction and homeowner maintenance provisions may include:

- Employing contractors for homeowner improvements who design and build in recognition of local building code and specific site soils conditions.
- Establishing and maintaining positive drainage away from all foundations, walkways, driveways, patios, and other hardscape improvements.
- Avoiding the construction of raised planters adjacent to structural improvements. Alternatively, planter sides/bottoms can be sealed with an impermeable membrane and drained away from the improvements via subdrains into approved disposal areas.
- Sealing and maintaining construction/control joints within concrete slabs and walkways to reduce the potential for moisture infiltration into the subgrade soils.

- Utilizing landscaping schemes with vegetation that requires minimal watering. Alternatively, watering should be done in a uniform manner as equally as possible on all sides of the foundation, keeping the soil "moist" but not allowing the soil to become saturated.
- Maintaining positive drainage away from structures.
- Roof gutters are considered an effective means of drainage. The roof gutters, if installed, should be outletted in such a way that positive drainage away from all structures and planters is maintained.
- Avoiding the placement of trees closer to the proposed structures than a distance of one-half the mature height of the tree.
- Observation of the soil conditions around the perimeter of the structure during extremely hot/dry or unusually wet weather conditions so that modifications can be made in irrigation programs to maintain relatively constant moisture conditions.

**Sulfates**

During the preliminary geotechnical investigation for the project, selected soil samples were tested for the presence of soluble sulfates. The samples were found to have sulfate concentrations, which were in the "negligible" range of sulfate exposure as classified in accordance with Table 19-A-3 of the UBC.

Homeowners should be cautioned against the import and use of certain inorganic fertilizers, soil amendments, and/or other soils from offsite sources in the absence of specific information relating to their chemical composition. Some fertilizers have been known to leach sulfate compounds into soils otherwise containing "negligible" sulfate concentrations and increase the sulfate concentrations in near-surface soils to significant levels. In some cases, concrete improvements constructed in soils containing high levels of soluble sulfates may be affected by deterioration and loss of strength.

**Site Drainage**

- The homeowners should be made aware of the potential problems which may develop when drainage is altered through construction of retaining walls, swimming pools, paved walkways and patios. Ponded water, drainage over the slope face, leaking irrigation

systems, overwatering or other conditions which could lead to ground saturation must be avoided.

- No water should be allowed to flow over the slopes. No alteration of pad gradients should be allowed which will prevent pad and roof runoff from being directed to approved disposal areas.
- As part of site maintenance by the resident, all roof and pad drainage should be directed away from slopes and around structures to approved disposal areas. All berms constructed and compacted as part of fine grading should be maintained by the resident. The recommended drainage patterns established at the time of the fine grading should be maintained throughout the life of the structure. No alterations to these drainage patterns should be made unless designed by qualified professionals in compliance with local code requirements.

**Slope Drainage**

- Residents should be made aware of the importance of maintaining and cleaning all interceptors ditches, drainage terraces, downdrains and any other drainage devices installed to promote slope stability.
- Backdrain and subdrain outlet pipes, which may protrude through slope surfaces, are designed to conduct subsurface water away from compacted fill sections and buttress/ stabilization fills. These pipes, in conjunction with the graded features, are designed to promote project stability and must be protected in-place and not altered or damaged in any way.

**Planting and Irrigation**

- Seeding and planting of the slopes should be planned to achieve, as rapidly as possible, a well-established and deep-rooted vegetal cover requiring minimal watering.
- It should be the responsibility of the landscape architect to provide such plants initially and of the residents to maintain such planting. Alteration of such a planting scheme is at the resident's risk.
- The resident is responsible for proper irrigation and for maintenance and repair of properly installed irrigation systems. Leaks should be fixed immediately.

- Sprinklers should be adjusted to provide maximum uniform coverage with a minimum of water usage and overlap. Overwatering with consequent wasteful runoff and serious ground saturation must be avoided.
- If automatic sprinkler systems are installed, their use must be adjusted to account for natural rainfall conditions.

**Burrowing Animals**

Residents must undertake a program to eliminate burrowing animals. This must be an ongoing program in order to promote slope stability. The burrowing animal control program should be conducted by a licensed exterminator and/or landscape professional with expertise in hillside maintenance.

# APPENDIX A-3

**Update Geotechnical Report, Revised Tentative Tract Map, Alternate Site Plan "B" - 81 Lots, Tentative Tract No. 52419, Triangle Ranch, Agoura Area, County of Los Angeles, California, prepared by Pacific Soils Engineering, Inc., June 30, 2003**

**PACIFIC SOILS ENGINEERING, INC.**
10653 PROGRESS WAY, P.O. BOX 2249, CYPRESS, CALIFORNIA 90630
TELEPHONE: (714) 220-0770, FAX: (714) 220-9589
*(Corporate Headquarters)*

**SAGE COMMUNITIES GROUP**
3 Corporate Plaza, Suite 102
Newport Beach, CA 92660

June 30, 2003

**Work Order 101568-MP**

Attention: Mrs. Diane Fradkin

Subject: **UPDATED GEOTECHNICAL REPORT**
Revised Tentative Tract Map
Alternate Site Plan "B" – 81 Lots
Tentative Tract No. 52419
Triangle Ranch
Agoura Area
COUNTY OF LOS ANGELES, CALIFORNIA

References:

1. County of Los Angeles Department of Public Works, Land Development Division, Geologic (10/18/00) and Soils Engineering (11/2/00) Review Sheets, Tentative Tract 52419, Kanan Road and Cornell Road, Agoura, County of Los Angeles, California.
2. Response to County of Los Angeles, Materials Engineering Division, Geologic (6-29-00) and Geotechnical Engineering (7-12-00) Review Sheets, Vesting Tentative Tract 52419, Agoura Area, County of Los Angeles, California; dated September 25, 2000, by Pacific Soils Engineering, Inc. (W.O. 101568-MP).
3. Supplemental Geotechnical Investigation and Revision Received Vesting Tentative Tract Map Geotechnical Review, Vesting Tentative Tract 52419, Near Kanan and Cornell Roads, Agoura Area, County of Los Angeles, California; dated May 15, 2000, by Pacific Soils Engineering, Inc. (W.O. 101568-MP).

Gentlemen:

An earlier version of the Tentative Map for Tract 52419 was evaluated by this firm in the Reference 2 and 3 reports. The previous Tentative Map, dated 8-29-00, was reviewed in the referenced transmittals and conditionally approved for feasibility by the Materials Engineering Division of the County of Los Angeles Department of Public Works in the Reference 1 transmittals (copies attached). Subsequent to this conditional approval, revisions have been made to the Tentative Map. Presented below is a summary of the changes/revisions and a discussion as to the impact on the geotechnical conclusions and recommendations presented in the previous technical reports.

The previous Tentative Map included 108 lots. Seventy (70) lots were planned on the western portion of the project in the vicinity of Kanan Road and 38 lots were planned on the eastern portion of the property in the vicinity of Cornell Road. The revised Tentative Map includes 81 lots, of which 54 lots are in the western portion and 27 lots in the eastern portion of the site. For the most part, this reduction in lot count was the result of increasing the average lot size rather reducing the limits of grading. There are three areas where the grading limits have been revised. The cut slope behind Lots 63 through 65 has moved in approximately 100 feet and the cut slopes behind Lots 18 through 20 have been moved in and reduced in height and, in areas, totally eliminated. In addition, the toe of the fill slope below Lots 67 and 68 has been moved in approximately 50 feet and erosion protection walls have been correspondingly reduced. Both pad and street grades have remained essentially unchanged with minor variations on the order of 5± feet.

In the eastern portion of the project, northerly of Lots 69 through 70, an approximately 20 to 30± foot-high retaining wall has been deleted from the Tentative Map and replaced with a 1.5:1 cut slope that has a maximum height on the order of 70 feet. This area is underlain by bedrock classified as the basalt member of the Conejo Volcanics. This southerly facing cut slope is situated in a favorable direction in relation to geologic structure. Gross stability calculations for a 135± foot-high cut slope in similar bedrock materials were presented in the Reference 3 report. These calculations exceeded the minimum, code required factors of safety. Therefore, this newly proposed 70 foot-high cut slope is considered acceptable from a geotechnical/geologic view-point.

Based upon our field investigations, laboratory tests and geotechnical analyses and review of the referenced reports, development of the subject property as displayed on the enclosed Tentative Map is feasible from a geotechnical viewpoint. Furthermore, conclusions and recommendations presented in the referenced reports are considered applicable. Much of the proposed plan is compatible with the indicated geologic and soils engineering conditions and may be developed as planned with conventional cut and fill procedures. Areas where unusual or adverse geologic/ geotechnical conditions exist have been identified in this firm's referenced reports, together with appropriate recommendations intended to result in a safe and stable residential development.

Continuous observation by the soils technician and periodic observations by the soils engineer and engineering geologist will be conducted during grading to verify anticipated conditions and provide modified recommendations as necessary. The in-grading conditions will be monitored and reported monthly in grading progress reports prepared by this firm. Any unusual conditions will be discussed.

The building sites will be free from the detrimental effects associated with landsliding, settlement and slippage, provided the grading construction is performed in an acceptable manner conforming to building Code requirements and recommendations contained in this and the referenced reports. Similarly, at the completion of grading, the proposed building and grading will not have an adverse effect on the geologic stability of neighboring off-site properties.

Pertinent recommendations contained in this and the referenced reports shall be incorporated into the project grading plans and project construction. To prevent the possible separation of such information, this and the referenced reports should be included as a referenced portion of all phases of the project development. When available, grading plans should be provided to the project geotechnical engineer for review, evaluation and comment.

This report is subject to review by the controlling authorities for the subject project.

We thank you for giving us the opportunity to be of service, and look forward to working with you through project completion.

Respectfully submitted,
PACIFIC SOILS ENGINEERING, INC.

By: _____
THEODORE M. WOLFE
CEG 1626/Reg. Exp.: 4-30-04
Manager of Geological Services

Reviewed by: _____
PAUL J. ERNST/RGE 2317
RCE 46394/Reg. Exp.: 3-31-07
Manager of Geotechnical Services

Distr.: (2) Addressee
(1) Wagner Halladay – Attn: Dana Halladay
(2) LACDPW
(1) Christopher A. Joseph & Assoc. - Attn: Marc Melinkoff

TMW/PJE-cp-jp-1568MP15

Sheet 1 of 1

REVIEWER CALLING HOURS
8-9 a.m. & 3-4 p.m. Mon.-Thurs.

**County of Los Angeles Department of Public Works**
**LAND DEVELOPMENT DIVISION**
**GEOLOGIC REVIEW SHEET**
**900 S. Fremont Ave., Alhambra, CA 91803**
**TEL. (626) 458-4925**

DISTRIBUTION
1 Geologist
__ Soils Engineer
1 LDMA/Proc. Center
1 Section File
1 Subdivision

**TENTATIVE TRACT** 52419
**SUBDIVIDER** Beautiful City Holding Co. and Sage Community Group, Inc.
**ENGINEER** Wagner Pacific
**GEOLOGIST** Pacific Soils Engineering, Inc. (WO 101568-MP)
**SOILS ENGINEER** Same as above

**TENTATIVE MAP DATED** 9/12/00
**ADDRESS** Kanan and Cornell Roads
**LOCATION** Agoura
**REPORT DATE** 9/25/00, 5/15/00
**REPORT DATE** 9/25/00, 5/15/00

[ X ] **TENTATIVE MAP FEASIBILITY IS RECOMMENDED FOR APPROVAL. PRIOR TO FILING THE FINAL LAND DIVISION MAP, THE FOLLOWING CONDITIONS MUST BE FULFILLED:**

[ X ] The final map must be approved by the Geology and Soils Sections to assure that all geotechnical (geology and soils) factors have been properly evaluated.

[ X ] A grading plan must be geotechnically approved by the Geology and Soils Sections. This grading plan must be based on a detailed engineering geology report and/or soils engineering report and show all recommendations submitted by them. It must also agree with the tentative map and conditions as approved by the Planning Commission. If the subdivision is to be recorded prior to the completion and acceptance of grading and completion of soils work, corrective grading bonds will be required.

[ X ] All geologic hazards associated with this proposed development must be eliminated,

or

delineate restricted use areas, approved by the consultant geologist and/or soils engineer, to the satisfaction of the Geology and Soils Sections, and dedicate to the County the right to prohibit the erection of buildings or other structures within the restricted use areas.

[ X ] Comply with remarks/conditions on the attached Soils Engineering Review Sheet dated 11/2/00.

**TENTATIVE MAP IS APPROVED FOR FEASIBILITY. THE FOLLOWING INFORMATION IS APPLICABLE TO THIS DIVISION OF LAND:**

[ X ] The subdivider is advised that approval of this division of land is contingent upon the installation and use of a sewer system.

[ X ] A geology and/or soils engineering report may be required prior to approval of building or grading plans.

[ X ] A deposit fee in the amount of $ 480.00 (6 hrs. @ $80.00/hr.) must be verified and is required to initiate review of the Final Map by the Geology and Geotechnical Engineering Sections.

RECEIVED
NOV 0 9 2000
PACIFIC SOILS

ared by _____ Date 10/18/00
Greg K. Johnson, RG 5987, CEG 2050

Manual for Preparation of Geotechnical Reports" prepared by County of Los Angeles, Department of Public Works is available on the Internet at the following address: dpw.co.la.ca.us/med/manual.pdf

ub\geology review\greg\tt52419.tma
/00

# COUNTY OF LOS ANGELES
# DEPARTMENT OF PUBLIC WORKS
# LAND DEVELOPMENT DIVISION

## SOILS ENGINEERING REVIEW SHEET

Address: 900 S. Fremont Ave.
Alhambra, CA 91803
Telephone: (626) 458-4925
Fax: (626) 458-4913
**Calling hours - Monday through Thursday 8-9 a.m. & 3-4 p.m.**

District Office 9.1

Sheet 1 of 1

Tentative Tract 52419
Location Kanan Road & Cornell Road, Agoura
Developer/Owner Beautiful City Holding & Sage Community Group
Engineer/Architect Wagner Pacific
Soils Engineer Pacific Soils (W. O. 101568-MP)
Geologist Same as above

Review of:

Tentative Tract Map Dated By Regional Planning 9/12/00

Previous review sheet dated 10/2/00

ACTION:

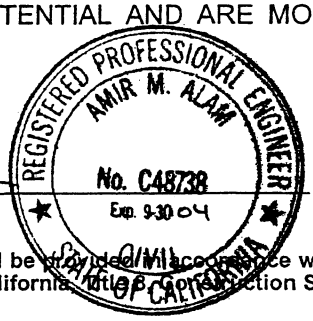
Tentative Map feasibility is recommended for approval, subject to conditions below:

REMARKS:

Submit two sets of grading plans to the Soils Section for verification of compliance with County codes and policies.

NOTE(S) TO THE PLAN CHECKER/BUILDING AND SAFETY DISTRICT ENGINEER:

ON-SITE SOILS HAVE A LOW TO MEDIUM EXPANSION POTENTIAL AND ARE MODERATELY TO SEVERELY CORROSIVE TO FERROUS METALS.




Prepared by _____ Date 11/2/00
Amir M. Alam

NOTICE: Public safety, relative to geotechnical subsurface exploration, shall be provided in accordance with current codes for excavations, inclusive of the Los Angeles County Code, Chapter 11.48, and the State of California, Title 8, Construction Safety Orders.
Amir:52419a

# Appendix A-4

**Updated Geotechnical Report, Revision Received Map, Vesting Tentative Tract No. 52419, Triangle Ranch, Agoura Area, County of Los Angeles, California, prepared by Pacific Soils Engineering, Inc., June 1, 2004**

**PACIFIC SOILS ENGINEERING, INC.**
10653 PROGRESS WAY, P.O. BOX 2249, CYPRESS, CALIFORNIA 90630
TELEPHONE: (714) 220-0770, FAX: (714) 220-9589
*(Corporate Headquarters)*

**SAGE COMMUNITIES GROUP**
3 Corporate Plaza, Suite 102
Newport Beach, CA 92660

June 1, 2004

**Work Order 101568-MP**

Attention: Mrs. Diane Fradkin

Subject: **UPDATED GEOTECHNICAL REPORT**
Revision Received Map
Vesting Tentative Tract No. 52419
Triangle Ranch
Agoura Area
COUNTY OF LOS ANGELES, CALIFORNIA

References: (See Appendix)

Gentlemen:

Earlier versions of the Tentative Map for Tract 52419 were evaluated by this firm in the Reference 1, 2 and 4 reports. The previous Tentative Map, dated 8-29-00, was reviewed in the referenced transmittals and conditionally approved for feasibility by the Materials Engineering Division of the County of Los Angeles Department of Public Works in the Reference 3 transmittals. Subsequent to this conditional approval, revisions have been made to the Tentative Map. We have now received the Revision Received Map, Vesting Tentative Tract No. 52419, Triangle Ranch, Agoura Hills, County of Los Angeles (dated May 10, 2004), which incorporates further changes. This report summarizes the changes/revisions reflected on this map and a discussion as to the impact on the geotechnical conclusions and recommendations presented in the previous technical reports. A copy of the revised Tentative Map accompanies this transmittal (Plates 1 and 2, in pocket). Geologic information, as well as pertinent remedial grading recommendations have been transferred to the latest plan.

The previous Tentative Map included 81 lots. 54 lots were planned on the western portion of the subject project in the vicinity of Kanan Road and 27 lots were planned on the eastern portion of the property, in the vicinity of Cornell Road. The present Revision Received Tentative Map shows no change in the number of lots. The lot sizes in the northwest corner of the project, near the desilting basin, have been reduced to accommodate an extra lot in this area (Lot 16). This

has resulted in minor variations in the pad and street grades on the order of ±2 feet in this area. The grading limits along the southwestern side of Kanan Road have been "pulled back" to the north approximately 600 feet and a proposed cut slope at the intersection of Silver Creek Road has been deleted. The present grading limits in this portion of the property extend up to what was shown as the southern boundary of Lot 24 on the previous Tentative Tract Map. As a result, "Street C" does not join Kanan Road as planned previously. Instead, "Street C" ends in a cul-de-sac in the vicinity of lots 26, 27 and 28. The present southwestern limit of grading is now delineated by a 14 feet high retaining wall, westerly of Lots 26 and 27, and a 25 (±) foot high fill slope south of Lots 27 and 28. The planned 2:1 fill slope running parallel to and along the western edge of Kanan Road has been redesigned to incorporate "contoured" grading concepts below Lots 29, 30, 31, 32 and 40.

In the eastern portion of the property, an approximately 10 foot high retaining wall southerly of Lot 67 has been deleted. The pad grade for Lot 67 has been lowered by about 10 (±) feet to match the top of the southerly descending fill slope. The pad grade for Lot 66 has been raised by approxi-mately 5 (±) feet and a 5 foot high retaining wall is now proposed between Lots 66 and 67.

The plan changes as described above are minor from a geotechnical perspective and therefore development of the subject property as displayed on the enclosed Revision Received Tentative Map is considered feasible. Conclusions and recommendations presented in the referenced reports are considered applicable. Much of the proposed plan is compatible with the indicated geologic and soils engineering conditions and may be developed as planned with conventional cut and fill procedures. Areas where unusual or adverse geologic/ geotechnical conditions exist have been identified in this firm's referenced reports, together with appropriate recommendations intended to result in a safe and stable residential development.

Continuous observation by the soils technician and periodic observations by the soils engineer and engineering geologist will be conducted during grading to verify anticipated conditions and provide modified recommendations as necessary. The in-grading conditions will be monitored and reported monthly in grading progress reports prepared by this firm. Any unusual conditions will be discussed.

The building sites will be free from the detrimental effects associated with landsliding, settlement and slippage, provided the grading construction is performed in an acceptable manner conforming to building Code requirements and recommendations contained in this and the referenced reports. Similarly, at the completion of grading, the proposed building and grading will not have an adverse effect on the geologic stability of neighboring off-site properties.

Pertinent recommendations contained in the referenced reports shall be incorporated into the project grading plans and project construction. To prevent the possible separation of such information, the referenced reports should be included as a referenced portion of all phases of the project development. When available, grading plans should be provided to the project geotechnical engineer for review, evaluation and comment.

This report is subject to review by the controlling authorities for the subject project.

We thank you for giving us the opportunity to be of service, and look forward to working with you through project completion.

Respectfully submitted,
PACIFIC SOILS ENGINEERING, INC.

By: _____
THEODORE M. WOLFE
CEG 1626/Reg. Exp.: 4-30-06
Manager of Geological Services

Reviewed by: _____
PAUL J. ERNST/RGE 2317
RCE 46394/Reg. Exp.: 3-31-07
Manager of Geotechnical Services

REGISTERED PROFESSIONAL ENGINEER
PAUL J. ERNST
No. GE2317
Exp. 3/31/07
GEOTECHNICAL
STATE OF CALIFORNIA

Distr.: (2) Addressee
(2) Christopher A. Joseph & Assoc. – Attn: Marc Melinkoff

TMW/PJE-jp-cp-1568MP17

# APPENDIX

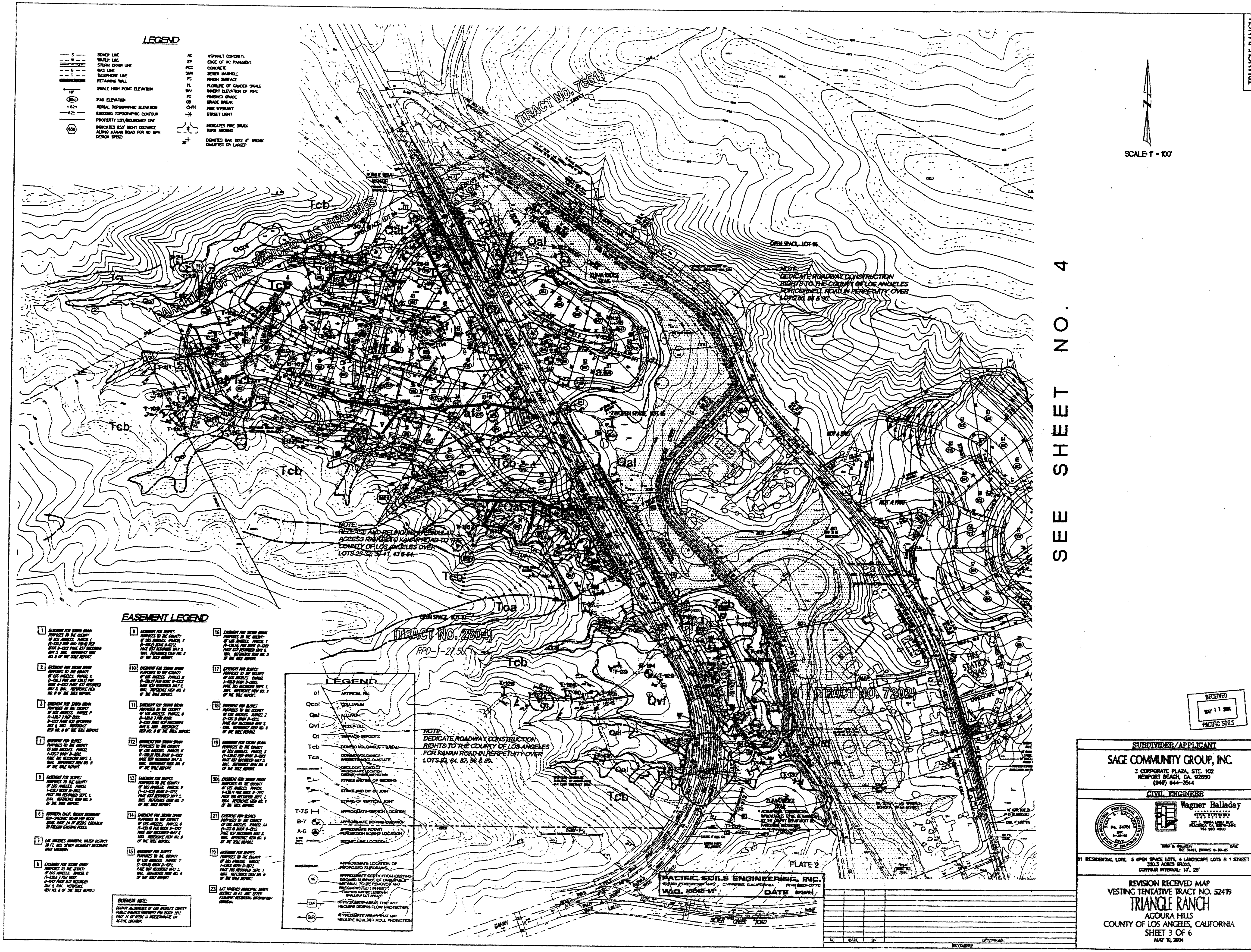
## References

1. Supplemental Geotechnical Investigation and Revision Received Vesting Tentative Tract Map Geotechnical Review, Vesting Tentative Tract 52419, Near Kanan and Cornell Roads, Agoura Area, County of Los Angeles, California; dated May 15, 2000, by Pacific Soils Engineering, Inc. (W.O. 101568-MP).

2. Response to County of Los Angeles, Materials Engineering Division, Geologic (6-29-00) and Geotechnical Engineering (7-12-00) Review Sheets, Vesting Tentative Tract 52419, Agoura Area, County of Los Angeles, California; dated September 25, 2000, by Pacific Soils Engineering, Inc. (W.O. 101568-MP).

3. County of Los Angeles Department of Public Works, Land Development Division, Geologic (10/18/00) and Soils Engineering (11/2/00) Review Sheets, Tentative Tract 52419, Kanan Road and Cornell Road, Agoura, County of Los Angeles, California.

4. Updated Geotechnical Report, Revised Tentative Tract Map, Alternate Site Plan "B" - 81 Lots, Tentative Tract No. 52419, Triangle Ranch, Agoura Area, County of Los Angeles, California; dated June 30, 2003, by Pacific Soils Engineering, Inc. (W.O, 101568-MP).


TRIANGLE RANCH
SCALE: 1" = 100'
LEGEND
EASEMENT LEGEND
(TRACT NO. 7661)
(TRACT NO. 2804)
(TRACT NO. 7202)
RPD-1-2F.5U
PARTITION OF THE RANCHO LAS VIRGENES
SEE SHEET NO. 4
NOTE:
DEDICATE ROADWAY CONSTRUCTION RIGHTS TO THE COUNTY OF LOS ANGELES FOR KANAN ROAD IN PERPETUITY OVER LOTS 83, 84, 87, 88 & 89.
NOTE:
RELEASE AND RELINQUISH VEHICULAR ACCESS RIGHTS TO KANAN ROAD TO THE COUNTY OF LOS ANGELES OVER LOTS 29-32, 39-41, 43 & 54.
OPEN SPACE, LOT 86
FIRE STATION MAP
PLATE 2
PACIFIC SOILS ENGINEERING, INC.
W.O. 105648-MP
DATE 5/04
RECEIVED
MAY 11 2004
PACIFIC SOILS
SUBDIVIDER/APPLICANT
SAGE COMMUNITY GROUP, INC.
3 CORPORATE PLAZA, STE. 102
NEWPORT BEACH, CA. 92660
(949) 644-3514
CIVIL ENGINEER
Wagner Halladay
81 RESIDENTIAL LOTS, 5 OPEN SPACE LOTS, 4 LANDSCAPE LOTS & 1 STREET LOT
320.5 ACRES GROSS.
CONTOUR INTERVAL: 10', 25'
REVISION RECEIVED MAP
VESTING TENTATIVE TRACT NO. 52419
TRIANGLE RANCH
AGOURA HILLS
COUNTY OF LOS ANGELES, CALIFORNIA
SHEET 3 OF 6
MAY 10, 2004

## LEGEND

| | | | |
|---|---|---|---|
| S | SEWER LINE | AC | ASPHALT CONCRETE |
| W | WATER LINE | EP | EDGE OF AC PAVEMENT |
| SD | STORM DRAIN LINE | PCC | CONCRETE |
| G | GAS LINE | SMH | SEWER MANHOLE |
| T | TELEPHONE LINE | FS | FINISH SURFACE |
| | RETAINING WALL | FL | FLOWLINE OF GROOVED CURB |
| 99 | SINGLE HIGH POINT ELEVATION | INV | INVERT ELEVATION OF PIPE |
| (640) | PAD ELEVATION | PG | FINISHED GRADE |
| + 624 | ASSOC. TOPOGRAPHIC ELEVATION | GB | GRADE BREAK |
| 625 | EXISTING TOPOGRAPHIC CONTOUR | PM | PARK MONUMENT |
| | PROPERTY LINE/BOUNDARY LINE | | STREET LIGHT |
| 310 | INDICATES 310' SEWER DISTANCE FOR 10 GPM SEWER SHED | | MOUNTED TYPE TRACK "MARC ANDERSON" |

## EASEMENT LEGEND

23 LOS ANGELES MUNICIPAL CODE SECTION 21.15, SEC. 21603 LANDMARK RECORDING INFORMATION UNKNOWN

EASEMENT NOTE:

COUNTY AUTHORITIES OF LOS ANGELES COUNTY PUBLIC WORKS EASEMENT PER BOOK D821 PAGE 94 OF DEEDS IS UNLOCATABLE BY ACCURE MAPPING

SEE SHEET NO. 3

TRIANGLE RANCH

SCALE: 1" = 100'

Tca

TRACT NO. 7691

Tcb

SCATTERED BOULDERS

ACCESS GRADED TO 20% MAX.

OPEN SPACE, LOT 5A

TRACT NO. 22054

RPD-1-27.5U

Qal

LOT 91 PRIVATE AND FUTURE STREET PURPOSES

FIRE STATION NO. 99

TRACT NO. 7202

TRACT NO. 5551

PLATE 1

PACIFIC SOILS ENGINEERING, INC.

W.O. 1668-MP DATE 9/03/04

RECEIVED
MAY 11 2004
PACIFIC SOILS

| NO. | DATE | BY | DESCRIPTION |
|---|---|---|---|
| | | | REVISIONS |

SUBDIVIDER/APPLICANT

SAGE COMMUNITY GROUP, INC.
3 CORPORATE PLAZA, STE. 102
NEWPORT BEACH, CA. 92660
(949) 644-3514

CIVIL ENGINEER

Wagner Halladay
CIVIL ENGINEERING
LAND SURVEYING
25152 SPRING MESA BLVD.
VALENCIA, CA. 91355-3410
714 583 0800

DANA E. HALLADAY RCE 34256, EXPIRES 9-30-05 DATE

81 RESIDENTIAL LOTS, 5 OPEN SPACE LOTS, 4 LANDSCAPE LOTS & 1 STREET LOT
33.5 ACRES GROSS
CONTOUR INTERVAL: 10', 25'

REVISION RECEIVED MAP
VESTING TENTATIVE TRACT NO. 52419
# TRAINGLE RANCH
AGOURA HILLS
COUNTY OF LOS ANGELES, CALIFORNIA
SHEET 4 OF 6
MAY 10, 2004

TRIANGLE RANCH

SEE SHEET NO. 4

## LEGEND

| | | | |
|---|---|---|---|
| S | SEWER LINE | AC | ASPHALT CONCRETE |
| W | WATER LINE | EP | EDGE OF AC PAVEMENT |
| SD | STORM DRAIN LINE | POC | CONCRETE |
| G | GAS LINE | SMH | SEWER MANHOLE |
| T | TELEPHONE LINE | FS | FINISH SURFACE |
| | RETAINING WALL | FL | FLOWLINE OF GRADED SWALE |
| HP | SWALE HIGH POINT ELEVATION | INV | INVERT ELEVATION OF PIPE |
| 888 | PAD ELEVATION | FG | FINISHED GRADE |
| × 624 | AERIAL TOPOGRAPHIC ELEVATION | GB | GRADE BREAK |
| 625 | EXISTING TOPOGRAPHIC CONTOUR | FH | FIRE HYDRANT |
| | PROPERTY LOT/BOUNDARY LINE | | STREET LIGHT |
| 650 | INDICATES 650' SIGHT DISTANCE ALONG KANAN ROAD FOR 60 MPH DESIGN SPEED | | INDICATES FIRE TRUCK TURN AROUND |
| 20" | | | DENOTES OAK TREE 8" TRUNK DIAMETER OR LARGER |

N

SCALE: 1" = 100'

(TRACT NO. 7661)

(TRACT NO. 2804)

(TRACT NO. 7202)

OPEN SPACE, LOT 86

OPEN SPACE, LOT 85

OPEN SPACE, LOT 83

LANDSCAPE LOT 90

NOTE:
DEDICATE ROADWAY CONSTRUCTION RIGHTS TO THE COUNTY OF LOS ANGELES FOR CORNELL ROAD IN PERPETUITY OVER LOTS 85, 86 & 90.

NOTE:
RELEASE AND RELINQUISH VEHICULAR ACCESS RIGHTS TO KANAN ROAD TO THE COUNTY OF LOS ANGELES OVER LOTS 29-32, 39-41, 43 & 54.

NOTE:
DEDICATE ROADWAY CONSTRUCTION RIGHTS TO THE COUNTY OF LOS ANGELES FOR KANAN ROAD IN PERPETUITY OVER LOTS 83, 84, 87, 88 & 89.

NOT A PART

FIRE STATION NAP

## EASEMENT LEGEND

1. EASEMENT FOR STORM DRAIN PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL L (1–133.2 POR AND 130.6) PER BOOK D–1312 PAGE 837 RECORDED MAY 5, 1981. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
2. EASEMENT FOR STORM DRAIN PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL K (1–130.9 POR AND 130.1) PER BOOK D–1312 PAGE 837 RECORDED MAY 5, 1981. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
3. EASEMENT FOR STORM DRAIN PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL P (1–130.1 ) PER BOOK D–1312 PAGE 837 RECORDED MAY 5, 1981. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
4. EASEMENT FOR SLOPES PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL 1–133.2 PER BOOK D–3912, PAGE 795 RECORDED SEPT. 1, 1994. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
5. EASEMENT FOR SLOPES PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL 1–133.7 BOOK D–3912, PAGE 795 RECORDED SEPT. 1, 1994. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
6. SOUTHERN CALIF. EDISON EASEMENT NON–SPECIFIC WIDTH PER BOOK 10581, PAGE 24 OF DEEDS. LOCATION TO FOLLOW EXISTING POLES.
7. LAS VIRGENES MUNICIPAL WATER DISTRICT 20 FT. WIDE SEWER EASEMENT RECORDING DATA UNKNOWN.
8. EASEMENT FOR STORM DRAIN PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL Q (1–133.4 ) PER BOOK D–1312 PAGE 837 RECORDED MAY 5, 1981. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
9. EASEMENT FOR SLOPES PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL V (1–135.1) BOOK D–1312, PAGE 837 RECORDED MAY 5, 1981. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
10. EASEMENT FOR STORM DRAIN PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL M (1–139.2) PER BOOK D–1312 PAGE 837 RECORDED MAY 5, 1981. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
11. EASEMENT FOR STORM DRAIN PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL O (1–139.8 ) PER BOOK D–1312 PAGE 837 RECORDED MAY 5, 1981. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
12. EASEMENT FOR STORM DRAIN PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL H (1–139.3) PER BOOK D–1312 PAGE 837 RECORDED MAY 5, 1981. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
13. EASEMENT FOR SLOPES PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL W (1–131.2,3) BOOK D–3912, PAGE 837 RECORDED MAY 5, 1994. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
14. EASEMENT FOR STORM DRAIN PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL O (1–130.4) PER BOOK D–1312 PAGE 837 RECORDED MAY 5, 1981. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
15. EASEMENT FOR SLOPES PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL Y (1–135.6) BOOK D–1312, PAGE 837 RECORDED MAY 5, 1981. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
16. EASEMENT FOR STORM DRAIN PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL T (1–139.10) PER BOOK D–1312 PAGE 837 RECORDED MAY 5, 1981. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
17. EASEMENT FOR SLOPES PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL 1–133.8 BOOK D–3912, PAGE 795 RECORDED SEPT. 1, 1994. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
18. EASEMENT FOR SLOPES PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL Z (1–133.9) BOOK D–1312, PAGE 837 RECORDED MAY 5, 1981. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
19. EASEMENT FOR STORM DRAIN PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL S (1–133.5) PER BOOK D–1312 PAGE 837 RECORDED MAY 5, 1981. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
20. EASEMENT FOR STORM DRAIN PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL 1–130.11 PER BOOK D–3912, PAGE 795 RECORDED SEPT. 1, 1994. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
21. EASEMENT FOR SLOPES PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL AA (1–135.9) BOOK D–3912, PAGE 837 RECORDED MAY 5, 1981. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
22. EASEMENT FOR SLOPES PURPOSES TO THE COUNTY OF LOS ANGELES. PARCEL 1–135.8 BOOK D–3912, PAGE 795 RECORDED SEPT. 1, 1994. REFERENCE ITEM NO. 9 OF THE TITLE REPORT.
23. LAS VIRGENES MUNICIPAL WATER DISTRICT 20 FT. WIDE SEWER EASEMENT RECORDING INFORMATION UNKNOWN.

EASEMENT NOTE:
COUNTY AUTHORITIES OF LOS ANGELES COUNTY PUBLIC UTILITIES EASEMENT PER BOOK 1312 PAGE 14 OF DEEDS IS INDETERMINATE ON ACTUAL LOCATION.

## LEGEND

| | |
|---|---|
| af | ARTIFICIAL FILL |
| Qcol | COLLUVIUM |
| Qal | ALLUVIUM |
| Qvf | VALLEY FILL |
| Qt | TERRACE DEPOSITS |
| Tcb | CONEJO VOLCANICS – BASALT |
| Tca | CONEJO VOLCANICS – ANDESITE AGGLOMERATE |
| | GEOLOGIC CONTACT (APPROXIMATE LOCATION, QUERIED WHERE UNCERTAIN) |
| 20 | STRIKE AND DIP OF BEDDING |
| 15 | STRIKE AND DIP OF JOINT |
| | STRIKE OF VERTICAL JOINT |
| T-75 | APPROXIMATE TRENCH LOCATION |
| B-7 | APPROXIMATE BORING LOCATION |
| A-6 | APPROXIMATE ROTARY PERCUSSION BORING LOCATION |
| S-12 SW-1 SW-4 | SEISMIC LINE LOCATION |
| | APPROXIMATE LOCATION OF PROPOSED SUBDRAINS |
| 15 | APPROXIMATE DEPTH FROM EXISTING GROUND SURFACE OF UNSUITABLE MATERIAL TO BE REMOVED AND RECOMPACTED (IN FEET) (DEPTHS MAY BE LESSER IN SHALLOW CUT AREAS) |
| DF | APPROXIMATE AREAS THAT MAY REQUIRE DEBRIS FLOW PROTECTION |
| BR | APPROXIMATE AREAS THAT MAY REQUIRE BOULDER ROLL PROTECTION |

PACIFIC SOILS ENGINEERING, INC.
10653 PROGRESS WAY CYPRESS, CALIFORNIA (714)220-0770
W.O. 101568-MP DATE 6/01/04

PLATE 2

| NO. | DATE | BY | DESCRIPTION |
|---|---|---|---|
| | | | REVISIONS |

RECEIVED
MAY 11 2004
PACIFIC SOILS

SUBDIVIDER/APPLICANT

SAGE COMMUNITY GROUP, INC.
3 CORPORATE PLAZA, STE. 102
NEWPORT BEACH, CA. 92660
(949) 644–3514

CIVIL ENGINEER

REGISTERED PROFESSIONAL ENGINEER DANA S. HALLADAY No. 34751 EXP. 9–30–05 CIVIL STATE OF CALIFORNIA

Wagner Halladay
INCORPORATED
CIVIL ENGINEERS
LAND SURVEYORS
201 E. YORBA LINDA BLVD.
PLACENTIA, CA. 92870–3418
714 993 4500

DANA S. HALLADAY RCE 34751, EXPIRES 9–30–05 DATE

81 RESIDENTIAL LOTS, 5 OPEN SPACE LOTS, 4 LANDSCAPE LOTS & 1 STREET LOT
320.3 ACRES GROSS,
CONTOUR INTERVAL: 10', 25'

REVISION RECEIVED MAP
VESTING TENTATIVE TRACT NO. 52419

# TRIANGLE RANCH

AGOURA HILLS
COUNTY OF LOS ANGELES, CALIFORNIA
SHEET 3 OF 6
MAY 10, 2004

PLOT DATE: 5/21/2004 | C:\Projects\TRI-MAP-SEC-2003\SHEET3.DWG

## LEGEND

| Symbol | Description | Abbr. | Description |
|---|---|---|---|
| — S — | SEWER LINE | AC | ASPHALT CONCRETE |
| — W — | WATER LINE | EP | EDGE OF AC PAVEMENT |
| | STORM DRAIN LINE | PCC | CONCRETE |
| — G — | GAS LINE | SMH | SEWER MANHOLE |
| — T — | TELEPHONE LINE | FS | FINISH SURFACE |
| | RETAINING WALL | FL | FLOWLINE OF GRADED SWALE |
| HP | SWALE HIGH POINT ELEVATION | INV | INVERT ELEVATION OF PIPE |
| | | FG | FINISHED GRADE |
| (886) | PAD ELEVATION | GB | GRADE BREAK |
| × 624 | AERIAL TOPOGRAPHIC ELEVATION | FH | FIRE HYDRANT |
| —625— | EXISTING TOPOGRAPHIC CONTOUR | | STREET LIGHT |
| | PROPERTY LOT/BOUNDARY LINE | | INDICATES FIRE TRUCK TURN AROUND |
| (310) | INDICATES 310' SIGHT DISTANCE FOR 30 MPH DESIGN SPEED | | |

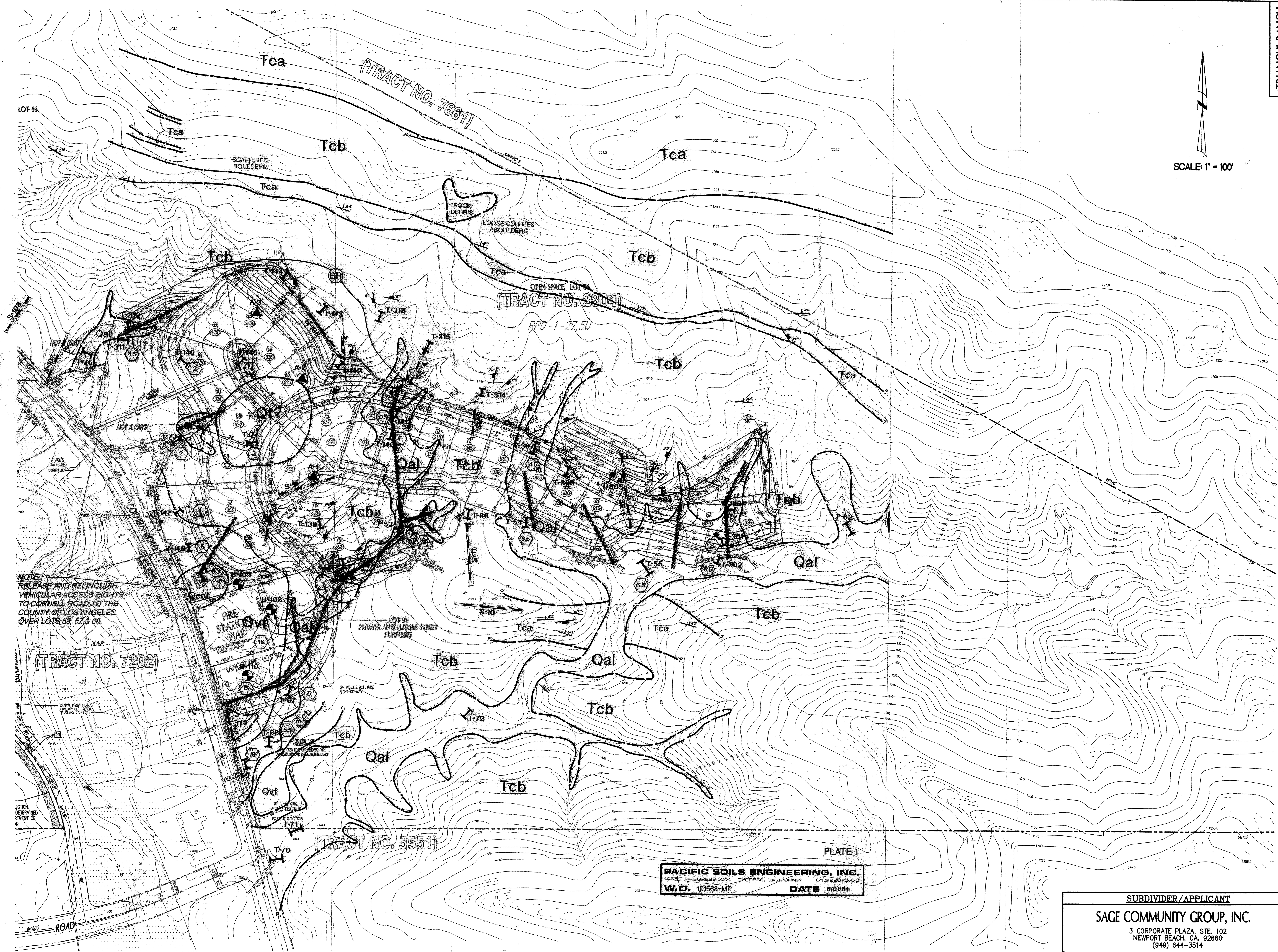
## EASEMENT LEGEND

23 LAS VIRGENES MUNICIPAL WATER DISTRICT 20 FT. WIDE SEWER EASEMENT RECORDING INFORMATION UNKNOWN.

EASEMENT NOTE:

COUNTY AUTHORITIES OF LOS ANGELES COUNTY PUBLIC UTILITIES EASEMENT PER BOOK 1212 PAGE 14 OF DEEDS IS INDETERMINATE ON ACTUAL LOCATION.

SEE SHEET NO. 3




RECEIVED
MAY 11 2004
PACIFIC SOILS

SUBDIVIDER/APPLICANT

SAGE COMMUNITY GROUP, INC.
3 CORPORATE PLAZA, STE. 102
NEWPORT BEACH, CA. 92660
(949) 644-3514

CIVIL ENGINEER

Wagner Halladay
201 E. YORBA LINDA BLVD.
PLACENTIA, CA. 92870-3418
714 993 4500

DANA S. HALLADAY RCE 34751, EXPIRES 9-30-05 DATE

81 RESIDENTIAL LOTS, 5 OPEN SPACE LOTS, 4 LANDSCAPE LOTS & 1 STREET LOT
320.3 ACRES GROSS,
CONTOUR INTERVAL: 10', 25'

| NO. | DATE | BY | DESCRIPTION |
|---|---|---|---|
| | | | |

REVISIONS

REVISION RECEIVED MAP
VESTING TENTATIVE TRACT NO. 52419
TRAINGLE RANCH
AGOURA HILLS
COUNTY OF LOS ANGELES, CALIFORNIA
SHEET 4 OF 6
MAY 10, 2004

# 1 SHEETS 3 OF 6

# 2 SHEETS 4 OF 6

# APPENDIX B

**Air Quality Impact Analysis, Triangle Ranch, Tract No. 52419, County of Los Angeles, California, prepared by Giroux and Associates Environmental Consultants, August 12, 2003**

**Giroux & Associates**
Environmental Consultants

# AIR QUALITY IMPACT ANALYSIS

## TRIANGLE RANCH
## TRACT NO. 52419

## COUNTY OF LOS ANGELES, CALIFORNIA

Prepared for:

Christopher A. Joseph and Associates
Attn: Marc Melinkoff
31255 Cedar Valley Drive, Suite 222
Westlake Village, California 91362

Date:

August 12, 2003

Project No.: P03-080

*17744 Sky Park Circle, Suite 210, Irvine, California 92614 - Phone (949) 851-8609 - Fax (949) 851-8612*

## SETTING

### Regional Climate

The North Pacific high-pressure cell is the dominant climatic influence over the eastern North Pacific Ocean, particularly during the summer. The high-pressure cell produces a predominantly northwesterly flow of maritime air over the California coastal waters. During winter, the Pacific High weakens and moves south, resulting in weaker and less persistent northwesterly winds along the California coast than in the warmer half of the year.

As the air mass approaches the coast of California, this large-scale circulation pattern is modified by local influences. The differential heating between the desert and the adjacent Pacific Ocean modifies the prevailing winds, enhancing them during the warmer half of the year and weakening them during the colder portion. On a local and sub-regional basis, the air flow in California is channeled by its mountain ranges and valley. The coastal mountain ranges limit the flow of maritime air into the interior of California. This transition from a cool and damp marine environment to a dry and warm continental climate therefore occurs over a fairly short distance.

### South Coast Air Basin

The South Coast Air Basin (SCAB) is a 6,600 square mile coastal plain bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto mountains to the north and east. The SCAB includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties. Basin-wide conditions are characterized by warm summers, mild winters, infrequent rainfall, moderate onshore daytime breezes, and moderate humidities.

All seasons generally exhibit onshore flows during the day and offshore flows at night, after the land cools below the temperature of the ocean. The likelihood of strong offshore flows, including Santa Ana winds, is greater during winter than during summer [California Air Resources Board (CARB) 1984].

The topography and climate of Southern California combine to produce generally poor air quality in the Air Basin. The combination of low temperature inversion heights; meteorological conditions such as light winds, limited turbulent mixing, and extensive sunlight; and topographical features such as adjacent mountain ranges, hinder dispersion of air pollutants. These factors all contribute to poor air quality, especially in inland valleys of the basin.

### Ambient Air Pollution Concentrations

The South Coast Air Quality Management District (SCAQMD) operates a regional air quality monitoring network that provides information on average concentrations of those air pollutants for which state or federal agencies have established ambient air quality standards. Table 1 is a 6-year summary of monitoring data for the major air pollutants, collected at the SCAQMD's Reseda monitoring station. This station is the nearest SCAQMD monitoring station to the project site and, among SCAQMD's current stations, is the one most representative of air quality conditions in the project area. Because there are no measurements of respirable particulate matter (PM-10) made in the western San Fernando Valley, Table 1 also includes PM-10 data from the Ventura County APCD monitoring station in Thousand Oaks.

## Table 1

### West San Fernando Valley Ambient Air Quality Monitoring Summary - 1996-2001
**(Days exceeding standards and maximum concentrations for criteria pollutants)**
**(Entries shown as ratios = samples exceeding standard/samples taken)**

| Pollutant/Standard | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|
| **Ozone** | | | | | | |
| 1-Hour > 0.09 ppm | 50 | 12 | 13 | 5 | 6 | 25 |
| 1-Hour > 0.12 ppm | 11 | 0 | 7 | 0 | 0 | 2 |
| 8- Hour > 0.09 ppm | 28 | 2 | 12 | 3 | 0 | 7 |
| Max 1-Hour Conc. (ppm) | 0.21 | 0.12 | 0.16 | 0.12 | 0.11 | 0.14 |
| **Carbon Monoxide** | | | | | | |
| 1-Hour > 20. ppm | 0 | 0 | 0 | 0 | 0 | 0 |
| 8- Hour > 9.0 ppm | 0 | 2 | 1 | 0 | 2 | 0 |
| Max 1-Hour Conc. (ppm) | 10 | 12 | 11 | 9 | 11 | 7 |
| Max 8-Hour Conc. (ppm) | 8.9 | 9.8 | 9.3 | 7.6 | 9.8 | 6.0 |
| **Nitrogen Dioxide** | | | | | | |
| 1-Hour > 0.25 ppm | 0 | 0 | 0 | 0 | 0 | 0 |
| Max 1-Hour Conc. (ppm) | 0.16 | 0.20 | 0.14 | 0.12 | 0.11 | 0.09 |
| **Inhalable Particulates (PM-10)** | | | | | | |
| 24-Hour > 50 $\mu g/m^3$ | 1/60 | 3/60 | 0/59 | 6/56 | 6/59 | 1/60 |
| 24-Hour > 150 $\mu g/m^3$ | 0/60 | 0/60 | 0/59 | 0/56 | 0/59 | 0/60 |
| Max. 24-Hr. Conc. ($\mu g/m^3$) | 55. | 62. | 50. | 84. | 100. | 54. |
| **Ultra-Fine Particulates (PM-2.5)** | | | | | | |
| 24-Hr. > 65 $\mu g/m^3$ | - | - | - | 1/71 | 2/108 | 1/109 |
| Max. 24-Hr. Conc. ($\mu g/m^3$) | - | - | - | 79. | 68. | 71. |

- = PM-2.5 monitoring initiated in 1999.

Source: SCAQMD Reseda Air Quality Monitoring Stations; VCAPCD Thousand Oaks Station for PM-10.

Over the last 15 years, air quality in the SCAB has improved substantially. Violations of the State and National standards for lead have been completely eliminated. The State and National SOx standards were met throughout the period. Second-stage smog alerts have disappeared and the number of first-stage alerts has dropped dramatically. The federal annual standard for NO2 is now met almost every year, as is the one-hour CO standard. The likelihood of meeting the federal 8-hour CO standard is a realistic expectation in the not-too-distant future. No significant trend, however, can be seen over the last decade for which respirable particulates (PM-10) have been monitored.

Monitoring for ultra-fine particulate matter (PM-2.5) was initiated in the West San Fernando Valley in 1999. A total of 4 days out of 288 measurement days have exceeded the federal PM-2.5 standard. Data have not been gathered for enough time for EPA to make a "non-attainment" designation for PM-2.5, but the project vicinity does exceed the federal PM-2.5 standard on a limited number of days. The much more stringent annual state PM-2.5 standard, to be phased in this year, has been exceeded in each monitoring year.

Airsheds where ambient air quality standards are exceeded are called "non-attainment" areas. If standards are met, they are designated as "attainment" areas. If there is inadequate or inconclusive data to make a definitive attainment designation, they are considered "unclassified." Federal "non-attainment" areas are considered extreme, serious or moderate as a function of deviation from standards. The current attainment designation for the Los Angeles County portion of the SCAB are as follows:

| **Pollutant** | **Avg. Time** | **State** | **Federal** |
|---|---|---|---|
| Ozone | 1-hour | Nonattainment | Extreme nonattainment |
| CO | 8-hour | Attainment | Serious nonattainment |
| $NO_2$ | 1-hour + Annual | Attainment | Attainment |
| PM-10 | Annual | Nonattainment | Serious nonattainment |
| All other | - | Attainment or unclassified | Attainment or unclassified |

**Air Quality Planning**

***Federal Agencies***

Regulatory control over air quality relative to meeting federal clean air standards rests with the U.S. Environmental Protection Agency (EPA). EPA derives its authority from the federal Clean Air Act.

The original federal Clean Air Act (CAA), enacted in 1970, was extensively revised in 1977. The 1977 CAA Amendments revised National Ambient Air Quality Standards (NAAQS) designed to protect public health and welfare. Standards were established for the following criteria air pollutants: O3, CO, NO2, SO2, and total suspended particulates (TSP). In later

years, the TSP standard was revised to address PM-10, and a lead standard was established. A PM-2.5 standard was added in 1997.

The 1977 CAA Amendments (CAAA) required each state to prepare a State Implementation Plan (SIP) describing its plans for attaining compliance with federal air quality goals. The 1977 CAAA also classified air basins as either "attainment" or "non-attainment" areas for each criteria air pollutant, based on whether or not the established standards have been achieved. The 1990 CAAAs reflect revised requirements and deadlines for attainment of NAAQS.

***State Agencies***

The California Air Resources Board (CARB) is responsible for state air quality programs. The ARB may delegate a portion of its responsibilities to local or sub-regional jurisdictions. The CARB generally retains authority over statewide programs such as motor vehicle emission standards while air quality monitoring, stationary source permitting and enforcement, or basin-wide air quality planning are subordinated to local air pollution control districts (APCD) or air quality management districts (AQMD).

California ambient air quality standards (CAAQS) predate the establishment of federal AAQS by several years. These standards are designed to protect those people most sensitive to adverse air pollution exposure (called "sensitive receptors")such as young children, the elderly, asthmatics, or persons weakened from other disease or illness. Existing state (CAAQS) and federal AAQS are shown in Table 2. CAAQS are seen to be equal, but are normally more stringent than national AAQS. The CAAA of 1990 required that EPA consider revising standards if health information warrants. Revisions to the national ozone standard and establishing a standard for PM-2.5 resulted from this review process. Implementation of these standards was stayed by a decision in the U.S. Court of Appeals.

The U.S. Supreme Court overturned the lower court decision in deciding that the EPA did not require a specific mandate to revise or adopt a health-based standard. Data collection for PM-2.5 is now ongoing, and attainment or non-attainment designations and plans will be adopted in the coming years.

California health agencies also reviewed the technical literature on PM-2.5, and found that a more stringent standard would be appropriate for health protection. A new annual state PM-2.5 standard has been adopted, and will become part of the state clean air planning process.

***South Coast Air Quality Management District***

SCAQMD is the regional agency charged with meeting state and federal air quality goals in the SCAB. SCAQMD has authority for reducing emissions from stationary sources and has limited authority over mobile sources and consumer products. In 1987, State Senate Bill 151 gave SCAQMD substantial new authority to develop transportation control measures and rules for indirect sources of air pollutants, such as shopping centers, stadiums, and other facilities that attract large volumes of motor vehicles. SCAQMD also is required to develop additional programs and regulations for increasing commuter ride sharing and limiting heavy truck traffic on urban freeways during peak commute hours.

# Table 2
# Ambient Air Quality Standards

| Pollutant | Averaging Time | California Standards | | Federal Standards | | |
|---|---|---|---|---|---|---|
| | | Concentration | Method | Primary | Secondary | Method |
| **Ozone ($O_3$)** | 1 Hour | 0.09 ppm (180 µg/m³) | Ultraviolet Photometry | 0.12 ppm (235 µg/m³) | Same as Primary Standard | Ultraviolet Photometry |
| | 8 Hour | – | | 0.08 ppm (157 µg/m³) | | |
| **Respirable Particulate Matter ($PM_{10}$)** | 24 Hour | 50 µg/m³ | Gravimetric or Beta Attenuation | 150 µg/m³ | Same as Primary Standard | Inertial Separation and Gravimetric Analysis |
| | Annual Arithmetic Mean | 20 µg/m³ | | 50 µg/m³ | | |
| **Fine Particulate Matter ($PM_{2.5}$)** | 24 Hour | No Separate State Standard | | 65 µg/m³ | Same as Primary Standard | Inertial Separation and Gravimetic Analysis |
| | Annual Arithmetic Mean | 12 µg/m³ | Gravimetric or Beta Attenuation | 15 µg/m³ | | |
| **Carbon Monoxide (CO)** | 8 Hour | 9.0 ppm (10 mg/m³) | Non-Dispersive Infrared Photometry (NDIR) | 9 ppm (10 mg/m³) | None | Non-Dispersive Infrared Photometry (NDIR) |
| | 1 Hour | 20 ppm (23 mg/m³) | | 35 ppm (40 mg/m³) | | |
| | 8 Hour (Lake Tahoe) | 6 ppm (7 mg/m³) | | – | – | – |
| **Nitrogen Dioxide ($NO_2$)** | Annual Arithmetic Mean | – | Gas Phase Chemiluminescence | 0.53 ppm (100 µg/m³) | Same as Primary Standard | Gas Phase Chemiluminescence |
| | 1 Hour | 0.25 ppm (470 µg/m³) | | – | | |
| **Lead** | 30-Day average | 1.5 µg/m³ | Atomic Absorption | – | – | – |
| | Calendar Quarter | – | | 1.5 µg/m³ | Same as Primary Standard | High Volume Sampler and Atomic Absorption |
| **Sulfur Dioxide ($SO_2$)** | Annual Arithmetic Mean | – | Ultraviolet Fluorescence | 0.030 ppm (80 µg/m³) | – | Spectrophotometry (Pararosaniline Method) |
| | 24 Hour | 0.04 ppm (105 µg/m³) | | 0.14 ppm (365 µg/m³) | – | |
| | 3 Hour | – | | – | 0.5 ppm (1,300 µg/m³) | |
| | 1 Hour | 0.25 ppm (655 µg/m³) | | – | – | |
| **Visibility Reducing Particles** | 8 Hour | Extinction coefficient of 0.23 per kilometer–visibility of 10 miles or more (0.07–30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape. | | **No Federal Standards** | | |
| **Sulfates** | 24 Hour | 25 µg/m³ | Ion Chromatography | | | |
| **Hydrogen Sulfide** | 1 Hour | 0.03 ppm (42 µg/m³) | Ultraviolet Fluorescence | | | |
| **Vinyl Chloride** | 24 Hour | 0.01 ppm (26 µg/m³) | Gas Chromatography | | | |

SCAQMD is required to prepare an Air Quality Management Plan (AQMP) that addresses attaining and maintaining compliance with NAAQS and SAAQS in SCAB. SCAQMD adopted a 1994 AQMP (SCAQMD and SCAG 1994) in September 1994. The 1994 AQMP contains air pollution control measures for stationary sources, and on- and off-road mobile sources. The 1994 AQMP was finally approved by EPA in 1996 as part of the State Implementation Plan (SIP).

The CAAA requires that clean air plans be updated periodically for all non-attainment areas. The California Clean Air Act (CCAA; Sher-AB-2595) similarly requires development and periodic revision of a plan to meet SAAQS. A revised AQMP for federal standards was prepared in February, 1997. The next CCAA plan update is due at the end of 2000. A revised AQMP was prepared early in 1997 designed to meet both federal and state planning requirements. It contains an attainment plan for PM-10 for the first time ever.

The timetable in the draft 1997 AQMP/SIP Revision was challenged by environmental organizations as not consistent with the 1990 CAAA. The 9th Circuit Court found for these organizations. SCAQMD thus revised the 1997 AQMP/SIP and has submitted the 1999 revisions for approval. The 1999 plan was certified as meeting the legal mandate in 2000, and is the currently adopted SCAB portion of the SIP.

An AQMP/SIP update is currently in final planning. The 2003 AQMP/SIP has been locally approved by the SCAQMD and SCAG governing boards. The plan was submitted to the CARB in July 2003, to be forwarded onto EPA for its consideration. The plan contains a number of assumed emissions reductions for which complete control technology does not yet exist. There is therefore some concern that the 2010 attainment target could be missed, particularly in light of very poor meteorology in 2001-02 that has given rise to ozone increases above previous "cleanest" years.

The proposed Triangle Ranch development relates to the AQMP through the land use and growth assumptions used to forecast automotive air pollution emissions. The SCAB AQMP is based on the designated land use for the project site contained in the Los Angeles County General Plan. The proposed project is in substantial conformance with that plan. To the extent that the proposed development is consistent with the growth assumptions in the general plan, it is, by inference, also consistent with the AQMP. Such consistency implies that the project will not create any significant regional air quality impacts because such impacts have already been anticipated within the framework of the regional air quality planning process. The SCAQMD acknowledges that the AQMP is a growth-accommodating document. However, the AQMD recommends that, while AQMP-incompatibility is a source of potentially significant impact, that compatibility is not a sufficient basis for a finding of a less-than-significant impact. Impact significance is therefore evaluated on a project-specific basis.

## AIR QUALITY IMPACT ANALYSIS

### Standards of Significance

Many air quality impacts from dispersed mobile sources, which are the dominant pollution generators from the proposed project, often occur hours later and miles away after photochemical processes have converted primary exhaust pollutants into secondary contaminants such as ozone. The incremental regional air quality impact of an individual source is generally immeasurably small. The SCAQMD has therefore developed suggested surrogate significance thresholds based on the volume of pollution emitted, rather than on actual ambient air quality because the direct air quality impact of a project is not quantifiable on a regional scale. The SCAQMD CEQA Air Quality Handbook (1993) states that any projects in the SCAB with daily emissions that exceed any of the following thresholds should be considered as having an individually and cumulatively significant air quality impact:

55 lb per day of ROC*
55 lb per day of NOx**
550 lb per day of CO
150 lb per day of PM-10
150 lb per day of SOx

*75 lb/day during construction.
**100 lb/day during construction.

Beyond emissions magnitude, the SCAQMD also recommends that any relevant secondary evaluation criteria be applied to a proposed project. These additional indicators are as follows:

- Project could interfere with the attainment of the federal or state ambient air quality standards by either violating or contributing to an existing or projected air quality violation.
- Project could result in population increases within the regional statistical area which would be in excess of that projected in the AQMP.
- Project could generate vehicle trips that cause a CO hot spot.
- Project might have the potential to create or be subjected to objectionable odors.
- Project could have hazardous materials on site and could result in an accidental release of air toxic emissions.
- Project could emit an air toxic contaminant regulated by District rules or one that is on a federal or state air toxic list.
- Project could involve disposal of hazardous waste.
- Project could be occupied by sensitive receptors located near a facility that emits air toxics or which are near CO hot spots.
- Project could emit carcinogenic air contaminants that could pose a cancer risk.

For a residential development whose primary source of potential air quality impact is from a limited number of vehicular sources, very few of these secondary impact indicators are likely applicable to the proposed project.

**Project-Related Sources of Potential Impact**

The impact from a residential project, even if it were to generate a substantial number of new vehicle trips, is very small on a regional scale. Vehicles themselves disperse their emissions over a wide geographic area. There is also a time delay from when pollutants are emitted and when they are converted into their most unhealthful form. Air quality impacts from "indirect" (mobile source-intensive) sources are thus immeasurably small on an individual project basis. Basin-wide air quality impacts are, therefore, addressed mainly in terms of project compatibility with regional air quality plans.

Locally, changes in the location of any collection of automotive sources, or changes in the number of vehicles or travel speeds may impact the micro-scale air quality around any given development site. Traffic increases not only contribute air pollutants indirect proportion to their cumulative percentage of traffic volume growth, but they slow all existing traffic to slower, more inefficient travel speeds. The development traffic/air quality impact is thus compounded. Such micro-scale impacts, in addition to numerous small miscellaneous sources associated with residential construction and operations, comprise the primary project related air quality concerns.

**Construction Activity Impacts**

Project development will entail construction activity to prepare the site and to build new structures and facilities. Construction is considered mainly a source of potential nuisance from dust or odors. Dust is normally the primary concern during construction. Because dust emissions from soil disturbance are not amenable to collection and discharge through a controlled source, they are called "fugitive emissions."

Dust (PM-10) emission rates vary as a function of many parameters (soil silt, soil moisture, wind speed, area disturbed, number of vehicles, depth of disturbance or excavation, etc.). Regulatory agencies generally use one universal factor based on the area disturbed, assuming that all other input parameters into emission rate prediction fall into mid-range average values. The South Coast AQMD, in its 1993 "CEQA Air Quality Handbook," estimates daily PM-10 emissions during construction to be 26.4 pounds per day per acre disturbed when "standard" dust control procedures required by SCAQMD Rule 403 are used. Recent studies have shown that enhanced dust control procedures can reduce the average daily PM-10 emission rate to as low as 10 pounds per day when a highly aggressive control program is implemented. The most recent measurements of construction PM-10 emissions using enhanced dust control required by SCAQMD Rule 403 is 10 pounds per acre per day (CARB, Documentation of Area Sources, 2000).

The California Air Resources Board, has developed the URBEMIS2002 urban emissions computer model which contains an algorithm that calculates the probable daily construction activity "footprint" for residential development. For 81 dwelling units the model predicts a 4.0-acre maximum daily grading activity area.

A simultaneous daily disturbance area of four (4) acres was therefore used to estimate daily PM-10 emissions. Calculated daily PM-10 emissions using the SCAQMD (pre-enhanced Rule 403) Handbook and the most current emissions estimates (post-enhanced Rule 403) are as follows:

| | Acres | EMFAC (pound/acre/day) | Emissions (pound/day) |
|---|---|---|---|
| 1993 SCAQMD Handbook | 4.0 | 26.4 | 105.6 |
| 2000 CARB Study | 4.0 | 10.0 | 40.0 |

Under either set of emissions assumptions, the SCAQMD significance threshold of 150 pounds per day will not be exceeded. In addition to PM-10 impact potential, the recent adoption of a new air quality standard for ultra-small diameter particulates (PM-2.5) also relates directly to project construction air quality impacts. This standard has implications of construction fugitive dust for two reasons, namely,

1. Human health effects from particulate inhalation are mainly related to very small diameter, chemically active material, and,

2. Construction fugitive dust contains almost no PM-2.5, and the material is comprised mainly of chemically inert silicates.

Regardless of the magnitude of PM-10 emissions from site grading, there is adequate rationale to support a finding of a less than significant impact because of the almost complete absence of any chemically active PM-2.5 within the construction dust PM-10 burden. Certainly from a human health perspective, project-related construction activity PM-10 generation has a less than significant impact. However, because of the non-attainment status of the air basin for PM-10, any temporary PM-10 increase would have an adverse impact. Any additional reasonable and feasible dust mitigation beyond minimum Rule 403 requirements is therefore recommended to be implemented even if the significance threshold is not exceeded.

Noticeable construction activity dust impacts derive almost exclusively from the largest diameter material that has a residence time of only a few seconds. These large particulates quickly settle on parked cars, landscaping, outdoor furniture and other horizontal surfaces. The USEPA states that the primary zone of impact is less than 100 feet from the source unless there are unusually strong winds that can keep large particles suspended for more than a few seconds. There are few homes in close proximity to the project site that might be affected by soiling nuisance from large particle deposition during typical daytime wind conditions. During Santa Ana winds from the northeast, there are no homes along the downwind trajectory for a considerable distance. Although enhanced dust control procedures are recommended for grading during strong wind events, soiling nuisance impacts during all wind conditions are anticipated to be less than significant.

In addition to PM-10 emissions, construction will entail the use of internal combustion engines to power on-road trucks and off-road mobile, semi-mobile and semi-stationary equipment. Such sources are mainly diesel-powered and are poorly regulated in terms of allowable emission levels. Off-road sources are sometimes not well maintained because there is no regulatory

mechanism to enforce efficient combustion as there is for on-road sources. Construction activities also include minor amounts of emissions from construction worker commuting.

The type of equipment, number of employees and daily activity scenario varies dramatically among contractors. Emissions estimates for construction activities have a high degree of uncertainty because equipment utilization varies from day to day and from one contractor to another. An equipment scenario consisting of four scrapers, one dozer, one grader, two backhoes and one water truck was used to calculate daily equipment exhaust emissions during a typical grading (cut and fill) scenario. Different types of construction activities would occur during actual pad preparation and building assembly (cement trucks, delivery trucks, etc.), but the grading activity was assumed to represent a worst-case condition.

Construction activity emissions from the above equipment fleet were calculated using the URBEMIS2002 model with the following daily emission (output in appendix):

| | Emissions (lb/day) | | | | |
|---|---|---|---|---|---|
| | **ROG** | **NOx** | **CO** | **$SO_2$** | **PM-10** |
| Grading-Equipment | 23.6 | 197.5 | 166.2 | 0.0 | 9.6 |
| Fugitive Dust | - | - | - | - | 40.0 |
| **TOTAL** | **23.6** | **197.5[a]** | **166.2** | **0.0** | **49.6** |
| Finish Construction | 331.8[b] | 0.4 | 9.6 | 0.0 | 0.1 |
| SCAQMD Threshold | 75. | 100. | 550. | 150. | 150. |

[a]Exceeds threshold from diesel exhaust.
[b]Exceeds threshold during application of paint.

Minor amounts of emissions reductions can be achieved by low-NOx tune-ups and by replacement of some internal combustion equipment with electrically (line-powered) systems. Feasible levels of mitigation are 10-20 percent. Possible "excess" NOx emissions can therefore not be reduced to achieve a less than significant daily NOx emissions level with the application of reasonable and feasible mitigation. Use of a longer construction schedule using less daily equipment is the only possible mitigation measure. Application of paints and coatings similarly would be exceeded if all 81 homes are presumed painted in 20 days as the computer model "default" assumption. Using lower volatility paint, more efficient applicators, and a longer paining schedule can reduce the ROG emissions to less-than-significant levels.

Construction activities are concentrated at the construction site, but they may also spill over into the adjacent community. Vehicles may track dirt off-site, lane closures may create congestion on public roadways and construction worker vehicles and supply trucks may compete with the general public for sometimes inadequate roadway capacity. Trucks may be left idling near off-site sensitive receptors while waiting to load or unload. Each of these small impacts may become substantial when summed over all basin-wide construction activities. As with the on-site impacts, a heightened level of impact mitigation will need to be implemented to minimize off-site spill-over effects during construction.

**Operational Impacts**

The primary source of project-related air quality impact will derive from site-related traffic. Minor amounts of air emissions will result from energy needs met by burning fossil fuels (electrical generation and in-home natural gas consumption), and from various miscellaneous homeowner emissions sources (mowers, paint, cleaning products, etc.). Single family residences generate slightly over ten (10) trips per dwelling unit. The average trip length is around ten (10) miles per trip, or 100 vehicle miles traveled (VMT) per dwelling unit per day. Air emissions associated with 854 daily project-related trips (81 D.U. X 10.54 trips/D.U = 854 ADT) plus area source emission from energy consumption and other household sources were calculated using the CARB'S URBEMIS2002 air quality computer model.

Data from these calculations are summarized in Table 3. Project operational activity emissions from each pollutant category are less than the SCAQMD threshold of significance. The project-specific air quality impact of the proposed project is less than significant.

While project-related regional (mainly mobile source) emissions would not have an individually significant impact on western Los Angeles County air quality, the incremental addition of growth-related traffic over a wide area may change micro-scale air quality distributions. To determine whether future traffic changes will create an adverse air quality impact, a micro-scale air quality impact analysis was performed for the traffic analysis grid around the project area. A Caltrans screening procedure based on the California line source roadway dispersion model CALINE4 was run for four traffic scenarios (Existing, 2006 Ambient Growth, 2006 With Project, and 2006 Cumulative) to evaluate any possible micro-scale air quality impacts due to changes in patterns of growth anticipated as part of the proposed project.

The model procedure that was followed combined the results of the traffic analysis with very restrictive dispersion conditions in order to generate a worst-case impact assessment. Light winds almost parallel to each roadway analyzed were used to estimate pollutant exposure adjacent to eight arterial intersections analyzed in the project traffic study. Carbon monoxide (CO) was used as an indicator of any "hot spot" potential because CO, unlike regional pollutants such as ozone, is directly related to source activity immediately adjacent to the receptor (a primary, unreacted pollutant impact).

The results of the micro-scale impact analysis are summarized in Table 4. The hourly CO exposures do not include the background (non-local) CO levels for existing (2001) conditions. An hourly background level of 7.0 ppm should be added to the entries in Table 4 if the worst-case one-hour local CO level were to coincide with the worst-case one-hour non-local CO background. The worst-case combination of maximum local plus regional CO levels would not exceed the most stringent California one-hour standard of 20 ppm. CO impacts are therefore not considered significant either individually or cumulative.

## Table 3

## Project Operations Air Pollution Emissions
**(pounds/day)**

| Source | CO | ROG | NOx | SOx | PM-10 |
|---|---|---|---|---|---|
| Mobile | 113.4 | 9.2 | 10.2 | 0.1 | 8.7 |
| Stationary | 1.4 | 4.2 | 1.0 | <0.1 | <0.1 |
| TOTAL | 114.8 | 13.4 | 11.2 | 0.1 | 8.7 |
| SCAQMD Signif. Threshold | 550. | 55. | 55. | 150. | 150. |
| Exceeds Threshold (?) | No | No | No | No | No |

Source: CARB URBEMIS2002 Air Quality Model; Output in Appendix.

**Table 4**
**County of Los Angeles**

Peak Hour CO Concentrations Above Local Background Levels

**AM Peak Hour**

| Intersection | | Existing | 2006 Ambient | 2006 + Project | 2006 Cumm. |
|---|---|---|---|---|---|
| Kanan Rd/ | Canwood St | 3.7 | 3.0 | 3.1 | 4.5 |
| | US 101 Interchange | 5.1 | 4.2 | 4.2 | DNE |
| | US 101 WB | DNE | DNE | DNE | 4.0 |
| | US 101 EB | DNE | DNE | DNE | 2.6 |
| | Agoura Rd | 1.2 | 1.0 | 1.2 | 2.0 |
| | Roadside Dr | 5.1 | 4.2 | 4.2 | DNE |
| | Cornell Rd | 1.5 | 1.2 | 1.3 | 1.3 |
| Agoura Rd/ | Cornell Rd | 0.3 | 0.3 | 0.3 | 0.5 |

**PM Peak Hour**

| Intersection | | Existing | 2006 Ambient | 2006 + Project | 2006 Cumm. |
|---|---|---|---|---|---|
| Kanan Rd/ | Canwood St | 6.6 | 2.6 | 5.4 | 6.5 |
| | US 101 Interchange | 3.9 | 2.6 | 3.3 | DNE |
| | US 101 WB | DNE | DNE | DNE | 5.3 |
| | US 101 EB | DNE | DNE | DNE | 4.7 |
| | Agoura Rd | 1.7 | 1.4 | 1.5 | 5.1 |
| | Roadside Dr | 5.1 | 6.7 | 4.2 | DNE |
| | Cornell Rd | 1.2 | 1.0 | 1.2 | 1.4 |
| Agoura Rd/ | Cornell Rd | 0.7 | 0.6 | 0.6 | 2.4 |

Note: Cumulative assumes Kanan/US101 interchange realignment, other scenarios presume existing configuration with the interchange treated as one single "intersection."
DNE=Does not exist.

## MITIGATION

Construction activity PM-10 emissions were shown to not likely have a significant air quality impact. Daily PM-10 emissions would be limited by project topography to less than significant levels. However, emissions at even less than significant levels have an adverse impact because of the non-attainment status of the air basin for PM-10. Average daily NOx emissions from heavy equipment would be above the SCAQMD daily threshold. Impacts from construction dust and heavy equipment exhaust and volatile organic emissions from paints and coatings should therefore be mitigated to the extent feasible.

Recommended construction activity mitigation includes:

### Dust Control

- Use enhanced dust control measures beyond those required by SCAQMD Rule 403. The menu of enhanced dust control measures includes the following:

  - Water all active construction areas at least twice daily.
  - Cover all haul trucks or maintain at least two feet of freeboard.
  - Pave or apply water four times daily to all unpaved parking or staging areas.
  - Sweep or wash any site access points within 30 minutes of any visible dirt deposition on any public roadway.
  - Cover or water twice daily any on-site stockpiles of debris, dirt or other dusty material.
  - Suspend all operations on any unpaved surface if winds exceed 25 mph.
  - Hydroseed or otherwise stabilize any cleared area which is to remain inactive for more than 96 hours after clearing is completed.

### Emissions

- Require 90-day low-NOx tune-ups for off-road equipment.
- Limit allowable idling to five (5) minutes for trucks and heavy equipment.

### Off-Site Impacts

- Encourage car pooling for construction workers.
- Limit lane closures to off-peak travel periods.
- Park construction vehicles off traveled roadways.
- Wet down or cover dirt hauled off-site.
- Wash or sweep access points daily.
- Encourage receipt of materials during non-peak traffic hours.
- Sandbag construction sites for erosion control.

**Architectural Coatings**

- Use pre-coated building materials.
- Use high pressure-low volume (HPLV) paint applicators with a 50% efficiency.
- Use lower volatility paint with 100 grams of ROG per liter or less.
- Spread out the application over a longer period of time (3-4 months).
- Use no more than 100 gallons of paint per day.

Implementation of these mitigation measures would reduce temporary PM-10 emissions from soil disturbance and ROG emissions from paints and coatings to less-than-significant levels with an adequate margin of safety. NOx emission from heavy equipment cannot be reduced to below the SCAQMD threshold. Extension of the construction schedule to use less daily equipment would be required to achieve a less-than-significant impact.

Operational activity emissions will not exceed SCAQMD thresholds. Any regional impacts are therefore cumulative in nature, deriving from overall growth, but they are individually less than significant. The proposed project represents a very small fraction of anticipated regional growth. As long as new overall regional development does not exceed the level of growth forecast in the Regional Comprehensive Plan (RCP), the basin will meet federal clean air standards by 2010. The proposed site development is consistent with the forecast demand for residential opportunities in western Los Angeles County. It will therefore not delay timely attainment of the federal ozone standard. Substantial mitigation of mainly mobile source air quality impacts from project implementation is not feasible, nor required because of the lack of impact significance.

# APPENDIX

# URBEMIS2002 Air Quality Model Output

URBEMIS 2002 For Windows 7.4.2

File Name: <Not Saved>
Project Name: Triangle Ranch
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

CONSTRUCTION EMISSION ESTIMATES

| *** 2003 *** | ROG | NOx | CO | SO2 | PM10 TOTAL | PM10 EXHAUST | PM10 DUST |
|---|---|---|---|---|---|---|---|
| TOTALS (lbs/day,unmitigated) | 23.62 | 197.50 | 166.20 | 0.00 | 49.66 | 9.65 | 40.01 |

| *** 2004 *** | ROG | NOx | CO | SO2 | PM10 TOTAL | PM10 EXHAUST | PM10 DUST |
|---|---|---|---|---|---|---|---|
| TOTALS (lbs/day,unmitigated) | 331.83 | 0.36 | 9.62 | 0.00 | 0.12 | 0.00 | 0.12 |

AREA SOURCE EMISSION ESTIMATES

| | ROG | NOx | CO | SO2 | PM10 |
|---|---|---|---|---|---|
| TOTALS (lbs/day,unmitigated) | 4.16 | 1.03 | 1.42 | 0.03 | 0.00 |

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

| | ROG | NOx | CO | SO2 | PM10 |
|---|---|---|---|---|---|
| TOTALS (lbs/day,unmitigated) | 9.24 | 10.16 | 113.41 | 0.10 | 8.68 |

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

| | ROG | NOx | CO | SO2 | PM10 |
|---|---|---|---|---|---|
| TOTALS (lbs/day,unmitigated) | 13.40 | 11.19 | 114.83 | 0.13 | 8.68 |

URBEMIS 2002 For Windows 7.4.2

File Name: <Not Saved>
Project Name: Triangle Ranch
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

Construction Start Month and Year: June, 2003
Construction Duration: 12
Total Land Use Area to be Developed: 0 acres
Maximum Acreage Disturbed Per Day: 4 acres
Single Family Units: 81 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 0

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (lbs/day)

| Source | ROG | NOx | CO | SO2 | PM10 TOTAL | PM10 EXHAUST | PM10 DUST |
|---|---|---|---|---|---|---|---|
| *** 2003*** | | | | | | | |
| Phase 1 - Demolition Emissions | | | | | | | |
| Fugitive Dust | - | - | - | - | 0.00 | - | 0.00 |
| Off-Road Diesel | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 |
| On-Road Diesel | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Worker Trips | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Maximum lbs/day | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Phase 2 - Site Grading Emissions | | | | | | | |
| Fugitive Dust | - | - | - | - | 40.00 | - | 40.00 |
| Off-Road Diesel | 23.35 | 197.17 | 160.01 | - | 9.64 | 9.64 | 0.00 |
| On-Road Diesel | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Worker Trips | 0.27 | 0.33 | 6.19 | 0.00 | 0.02 | 0.01 | 0.01 |
| Maximum lbs/day | 23.62 | 197.50 | 166.20 | 0.00 | 49.66 | 9.65 | 40.01 |
| Phase 3 - Building Construction | | | | | | | |
| Bldg Const Off-Road Diesel | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 |
| Bldg Const Worker Trips | 0.47 | 0.25 | 5.54 | 0.00 | 0.06 | 0.00 | 0.06 |
| Arch Coatings Off-Gas | 0.00 | - | - | - | - | - | - |
| Arch Coatings Worker Trips | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Asphalt Off-Gas | 0.00 | - | - | - | - | - | - |
| Asphalt Off-Road Diesel | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 |
| Asphalt On-Road Diesel | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Asphalt Worker Trips | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Maximum lbs/day | 0.47 | 0.25 | 5.54 | 0.00 | 0.06 | 0.00 | 0.06 |
| Max lbs/day all phases | 23.62 | 197.50 | 166.20 | 0.00 | 49.66 | 9.65 | 40.01 |
| *** 2004*** | | | | | | | |
| Phase 1 - Demolition Emissions | | | | | | | |
| Fugitive Dust | - | - | - | - | 0.00 | - | 0.00 |
| Off-Road Diesel | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 |
| On-Road Diesel | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Worker Trips | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Maximum lbs/day | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Phase 2 - Site Grading Emissions | | | | | | | |
| Fugitive Dust | - | - | - | - | 0.00 | - | 0.00 |
| Off-Road Diesel | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 |
| On-Road Diesel | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Worker Trips | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Maximum lbs/day | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Phase 3 - Building Construction | | | | | | | |
| Bldg Const Off-Road Diesel | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 |
| Bldg Const Worker Trips | 0.43 | 0.24 | 5.10 | 0.00 | 0.06 | 0.00 | 0.06 |
| Arch Coatings Off-Gas | 331.03 | - | - | - | - | - | - |
| Arch Coatings Worker Trips | 0.40 | 0.18 | 4.81 | 0.00 | 0.06 | 0.00 | 0.06 |
| Asphalt Off-Gas | 0.00 | - | - | - | - | - | - |
| Asphalt Off-Road Diesel | 0.00 | 0.00 | 0.00 | - | 0.00 | 0.00 | 0.00 |
| Asphalt On-Road Diesel | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Asphalt Worker Trips | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Maximum lbs/day | 331.83 | 0.36 | 9.62 | 0.00 | 0.12 | 0.00 | 0.12 |
| Max lbs/day all phases | 331.83 | 0.36 | 9.62 | 0.00 | 0.12 | 0.00 | 0.12 |

Phase 1 - Demolition Assumptions: Phase Turned OFF

Phase 2 - Site Grading Assumptions
Start Month/Year for Phase 2: Jun '03
Phase 2 Duration: 1.2 months
On-Road Truck Travel (VMT): 0
Off-Road Equipment

| No. | Type | Horsepower | Load Factor | Hours/Day |
|---|---|---|---|---|
| 1 | Graders | 174 | 0.575 | 8.0 |
| 1 | Other Equipment | 190 | 0.620 | 8.0 |
| 1 | Rubber Tired Dozers | 352 | 0.590 | 8.0 |
| 4 | Scrapers | 313 | 0.660 | 8.0 |
| 2 | Tractor/Loaders/Backhoes | 79 | 0.465 | 8.0 |

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Jul '03
Phase 3 Duration: 10.2 months
Start Month/Year for SubPhase Building: Jul '03
SubPhase Building Duration: 10.2 months
Off-Road Equipment

| No. | Type | Horsepower | Load Factor | Hours/Day |
|---|---|---|---|---|

Start Month/Year for SubPhase Architectural Coatings: May '04
SubPhase Architectural Coatings Duration: 1 months
Start Month/Year for SubPhase Asphalt: May '04
SubPhase Asphalt Duration: 0.5 months
Acres to be Paved: 0
Off-Road Equipment

| No. | Type | Horsepower | Load Factor | Hours/Day |
|---|---|---|---|---|

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

| Source | ROG | NOx | CO | SO2 | PM10 |
|---|---|---|---|---|---|
| Natural Gas | 0.08 | 1.01 | 0.43 | - | 0.00 |
| Wood Stoves - No summer emissions | | | | | |
| Fireplaces - No summer emissions | | | | | |
| Landscaping | 0.11 | 0.01 | 0.99 | 0.03 | 0.00 |
| Consumer Prdcts | 3.96 | - | - | - | - |
| TOTALS(lbs/day,unmitigated) | 4.16 | 1.03 | 1.42 | 0.03 | 0.00 |

UNMITIGATED OPERATIONAL EMISSIONS

| | ROG | NOx | CO | SO2 | PM10 |
|---|---|---|---|---|---|
| Single family housing | 9.24 | 10.16 | 113.41 | 0.10 | 8.68 |
| TOTAL EMISSIONS (lbs/day) | 9.24 | 10.16 | 113.41 | 0.10 | 8.68 |

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2005 Temperature (F): 90 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

| Unit Type | Trip Rate | Size | Total Trips |
|---|---|---|---|
| Single family housing | 10.54 trips / dwelling units | 81.00 | 853.74 |

Vehicle Assumptions:

Fleet Mix:

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| Light Auto | 56.10 | 2.30 | 97.10 | 0.60 |
| Light Truck < 3,750 lbs | 15.10 | 4.00 | 93.40 | 2.60 |
| Light Truck 3,751- 5,750 | 15.50 | 1.90 | 96.80 | 1.30 |
| Med Truck 5,751- 8,500 | 6.80 | 1.50 | 95.60 | 2.90 |
| Lite-Heavy 8,501-10,000 | 1.00 | 0.00 | 80.00 | 20.00 |
| Lite-Heavy 10,001-14,000 | 0.30 | 0.00 | 66.70 | 33.30 |
| Med-Heavy 14,001-33,000 | 1.00 | 10.00 | 20.00 | 70.00 |
| Heavy-Heavy 33,001-60,000 | 0.80 | 0.00 | 12.50 | 87.50 |
| Line Haul > 60,000 lbs | 0.00 | 0.00 | 0.00 | 100.00 |
| Urban Bus | 0.10 | 0.00 | 0.00 | 100.00 |
| Motorcycle | 1.60 | 87.50 | 12.50 | 0.00 |
| School Bus | 0.30 | 0.00 | 0.00 | 100.00 |
| Motor Home | 1.40 | 14.30 | 78.60 | 7.10 |

Travel Conditions

| | Residential | | | Commercial | | |
|---|---|---|---|---|---|---|
| | Home-Work | Home-Shop | Home-Other | Commute | Non-Work | Customer |
| Urban Trip Length (miles) | 11.5 | 4.9 | 6.0 | 10.3 | 5.5 | 5.5 |
| Rural Trip Length (miles) | 11.5 | 4.9 | 6.0 | 10.3 | 5.5 | 5.5 |
| Trip Speeds (mph) | 35.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| % of Trips - Residential | 20.0 | 37.0 | 43.0 | | | |

# APPENDIX C

# BIOLOGICAL RESOURCES BACKGROUND MATERIALS

# APPENDIX C-1

**Biological Constraints Analysis for the Beautiful City Site, Agoura Hills, California; prepared by Envicom Corporation, February 14, 1997**

# BIOLOGICAL CONSTRAINTS ANALYSIS FOR THE BEAUTIFUL CITY SITE

**Agoura Hills, California**

*Prepared For:*

**Westland Civil, Inc.**
100 N. Rancho Road
Thousand Oaks, California 91362
Attn: Mr. Don Waite

*Prepared By:*

**Envicom Corporation**
28328 Agoura Road
Agoura Hills, California 91301

February 14, 1997

# TABLE OF CONTENTS


| Section | Page |
|---|---|
| PURPOSE AND INTENT | 1 |
| CHARACTERISTICS OF THE PROJECT SITE | 1 |
| Site Description | 1 |
| Watershed Boundaries – Drainage Patterns | 8 |
| Landform and Geologic Features | 8 |
| Biological Resources | 11 |
| Plant Communities | 11 |
| Sensitive Plant Species and Habitats | 13 |
| Wildlife Communities | 16 |
| Sensitive Wildlife Species | 19 |
| CHARACTERISTICS OF THE SURROUNDING AREA | 26 |
| Adjoining Land Use | 26 |
| Public Lands and Preserved Open Space | 26 |
| Regional Plant and Animal Resources | 29 |
| General Habitat Descriptions/Associated Wildlife | 29 |
| Sensitive Biological Resources and CNDDB Search Results | 35 |
| Wildlife Movement | 35 |
| Regional Biological Value of the Site | 39 |
| Relationship of the Site to Regional Biological Resources | 40 |
| BIOLOGICAL CONSTRAINTS | 41 |
| SUMMARY OF CONSTRAINTS | 42 |
| REFERENCES | 44 |
| APPENDICES | |
| Appendix A – Vascular Plants of the Beautiful City Project Site | |
| Appendix B – Observed and Expected Fauna | |

## FIGURES


| | | |
|---|---|---|
| 1. | Subject Property and SEA No. 6 | 2 |
| 2. | Regional Location | 3 |
| 3. | Subject Property on USGS Topographic Map | 4 |
| 4. | Watershed and Drainage Patterns | 9 |
| 5. | Site Topography | 10 |
| 6. | Generalized Vegetation | 12 |
| 7. | Sensitive Plant Locations | 15 |
| 8. | Surrounding Vicinity | 27 |
| 9. | Open Space Reserves and Proposed Acquisition Areas | 28 |
| 10. | Wildlife Movement Patterns | 38 |
| 11. | Areas of Highest and Lowest Sensitivity | 43 |


## TABLES


| | | |
|---|---|---|
| 1. | Sensitive Fauna Observed or Potentially Occurring on the Beautiful City Site | 22 |
| 2. | Results of the CNDDB Report for the Thousand Oaks and Calabasas Quadrangles | 36 |


## PLATES


| | | |
|---|---|---|
| 1. | Aerial View of Site and Vicinity | 5 |
| 2. | Panoramic Views of the Site and Vicinity | 6 |
| 3. | Panoramic Views of the Site and Vicinity | 7 |

**PURPOSE AND INTENT**

The Los Angeles County Department of Regional Planning requires the preparation of a Biological Constraints Analysis as part of the environmental review process for sites that include all or portions of Significant Ecological Areas (SEAs), Environmentally Sensitive Habitat Areas (ESHAs), or Significant Oak Woodlands. As shown on **Figure 1**, the subject property occupies a portion of the Las Virgenes SEA (#6). The Los Angeles County Significant Ecological Areas Technical Advisory Committee (SEATAC) which reviews documents for SEAs in the Santa Monica Mountains, adopted the requirement of a Biological Constraints Analysis. The purpose of the analysis is to provide first technical identification of biological resources prior to development of a project design.

The following report is intended to meet the criteria of the Constraints Analysis Guidelines, and consequently does not contain any analysis of impacts, or proposals for mitigation. We have not been apprised of any site plan for the property, nor has any such plan been considered in this analysis.

**CHARACTERISTICS OF THE SITE**

## SITE DESCRIPTION

### Location

The site is located on the north flank of the Santa Monica Mountains, in the western portion of the range (**Figure 2**). The USGS map location of the site is as follows: occupies portions of the Thousand Oaks and Calabasas 7.5-minute quadrangles, Range 18W, Township 1N, in unsectioned parts of both maps (**Figure 3**).[1] The site is bounded on the north by Malibu Junction, on the west by Ladyface Mountain, on the south by Silver Creek Road and residential development, and extends east into an undeveloped area.

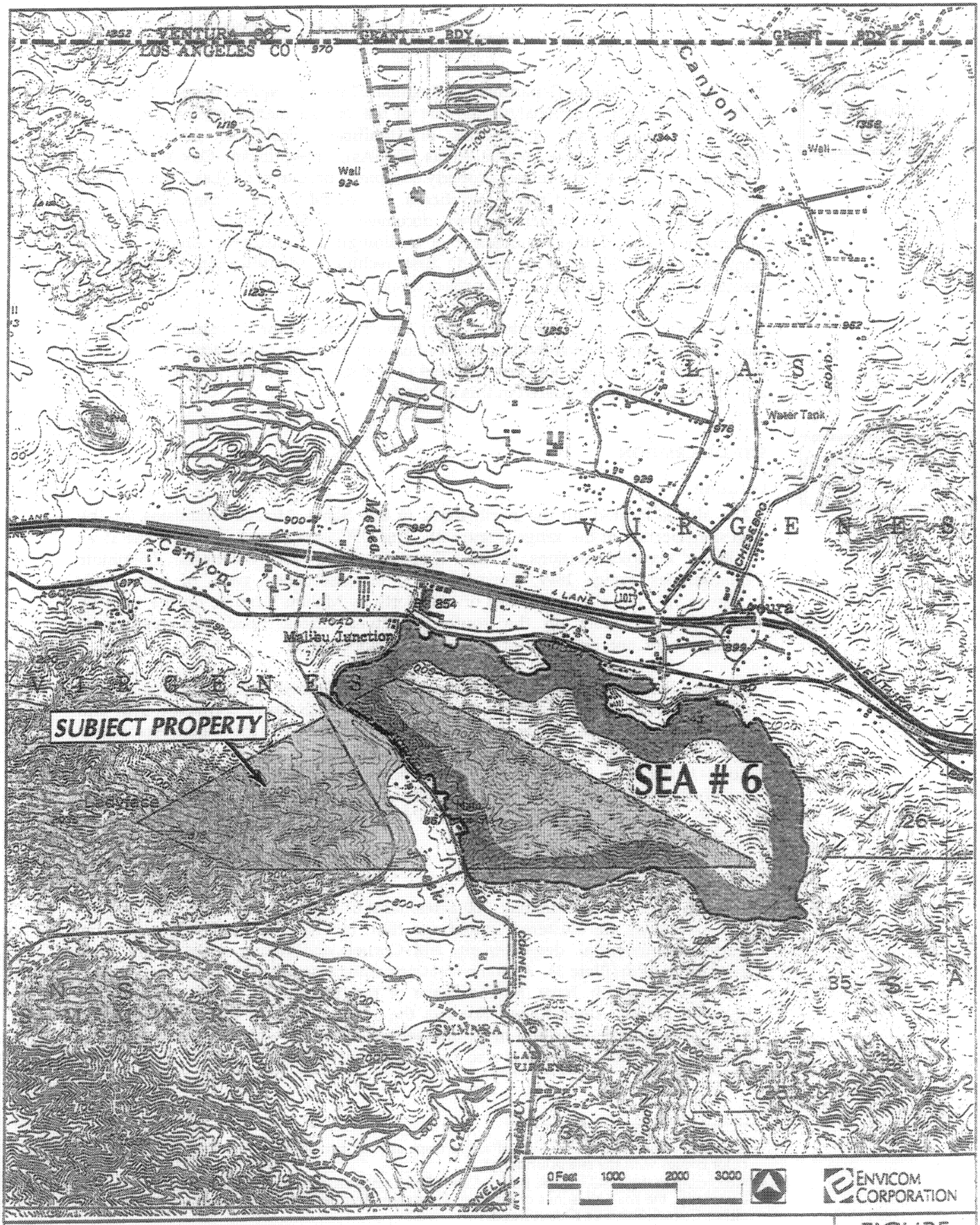
The site lies is generally south of the junction of Cornell and Kanan roads. The nearly triangle site is bisected by Medea Creek which flows between Kanan and Cornell roads (Figure 3). The southern portion encompasses the Malibu Fire Station and residential development between Caleta Road on the north and Silver Creek Road[2] to the south which are not part of the site. The City of Agoura Hills lies to the north, and a part of the Santa Monica Mountains National Recreation Area is to the south (Paramount Ranch). Panoramic views of site are provided in **Plates 1** and **2**.

### Land Use

The site covers approximately 360 acres, most of which is currently undeveloped. The exceptions are clustered inholdings that include the Malibu Fire Station, scattered residential development, and Cornell and Kanan roads which pass through the site (**Plate 3**). At some locations along Kanan and Cornell roads, there are turnouts which have altered some of the natural landscape, and various unpaved roads. Along Kanan Road in the western half of the site, there is a heavy-machinery operation of an undetermined nature, which has disturbed the natural topography. There is also grading activity at the

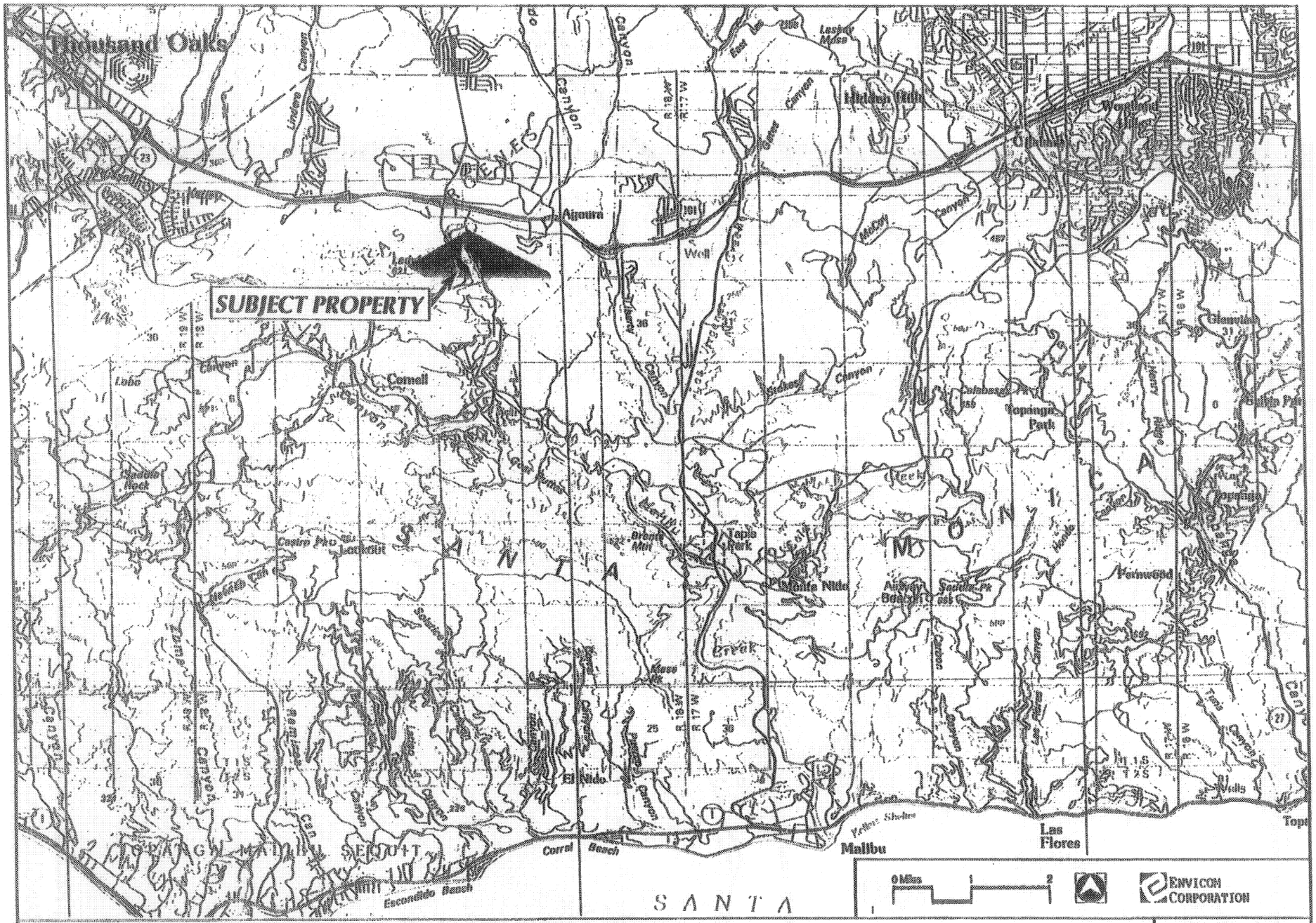
1 Original copies of the USGS quadrangle maps are not provided but are presented instead as color copies with the site boundaries.

2 According to the USGS maps, Silver Creek Road once crossed Medea Creek south of the site. Currently, the road does not cross over the stream, but dead ends at the main channel from either Cornell Road or Kanan Road.



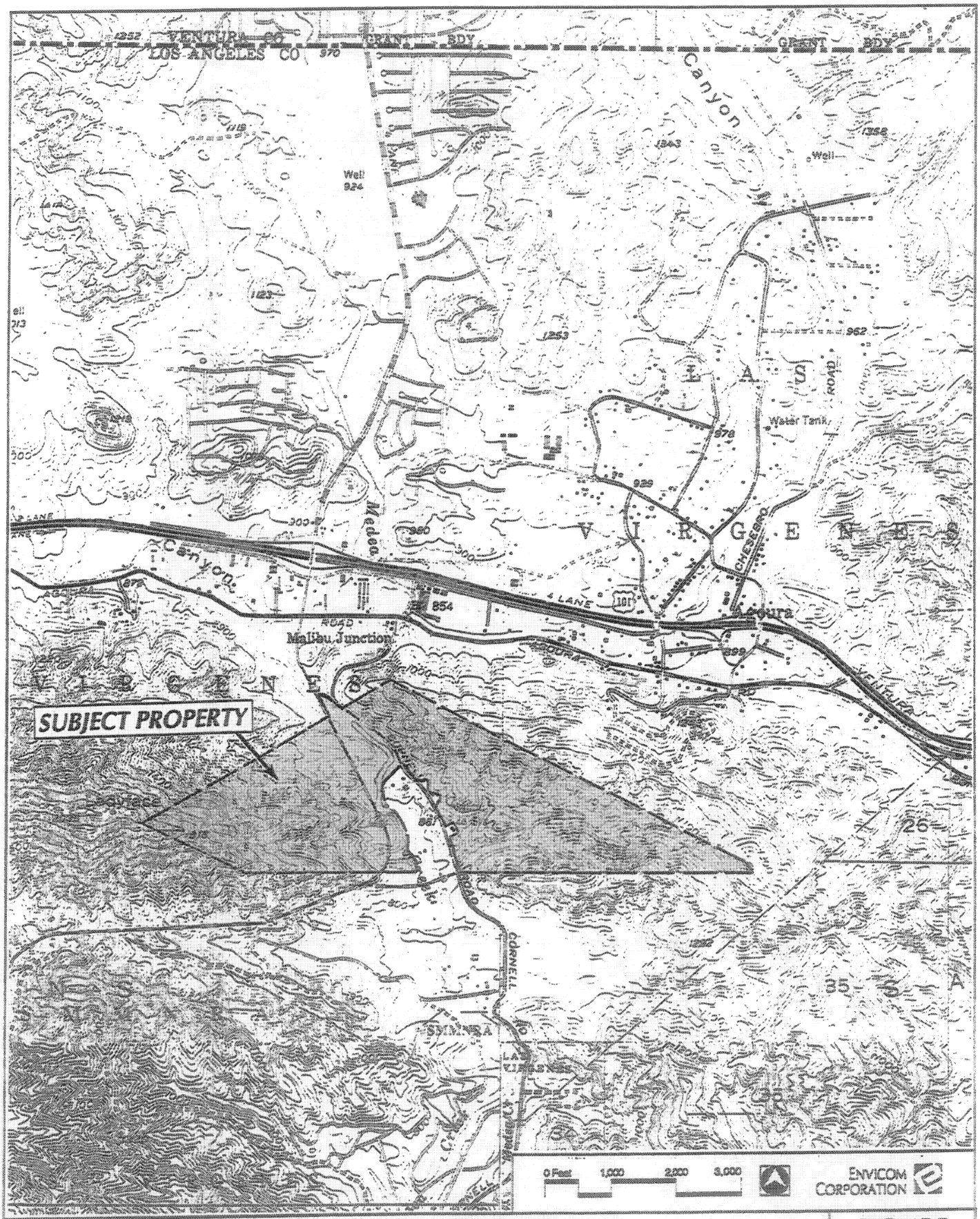

**SUBJECT PROPERTY AND SEA #6**

FIGURE 1



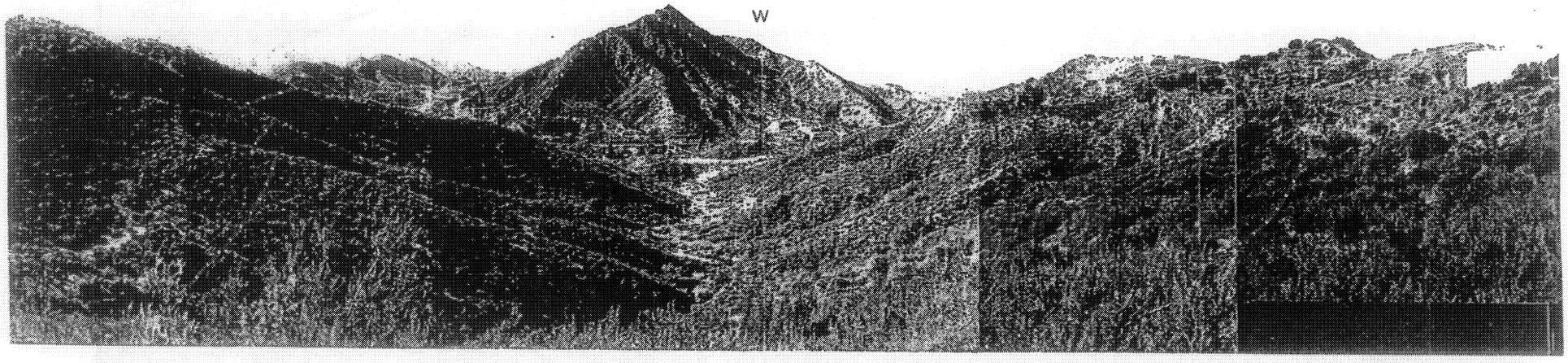

# REGIONAL LOCATION

FIGURE 2




SUBJECT PROPERTY MAPPED ON 7.5 MINUTE U.S.G.S. TOPOGRAPHIC MAP QUADRANGLES (Thousand Oaks and Calabasas Map Sheets)

FIGURE 3




A: From near eastern corner, view westerly, toward Ladyface

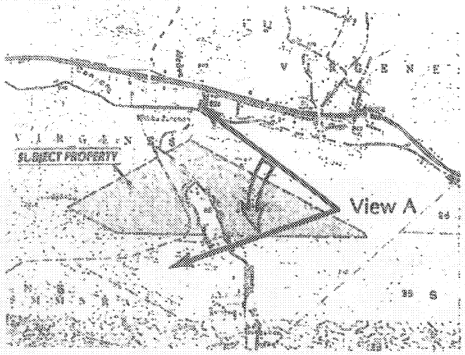
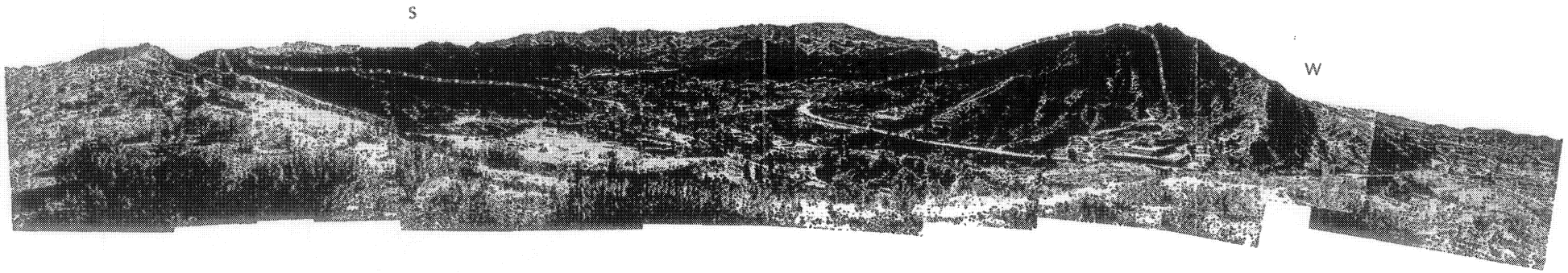
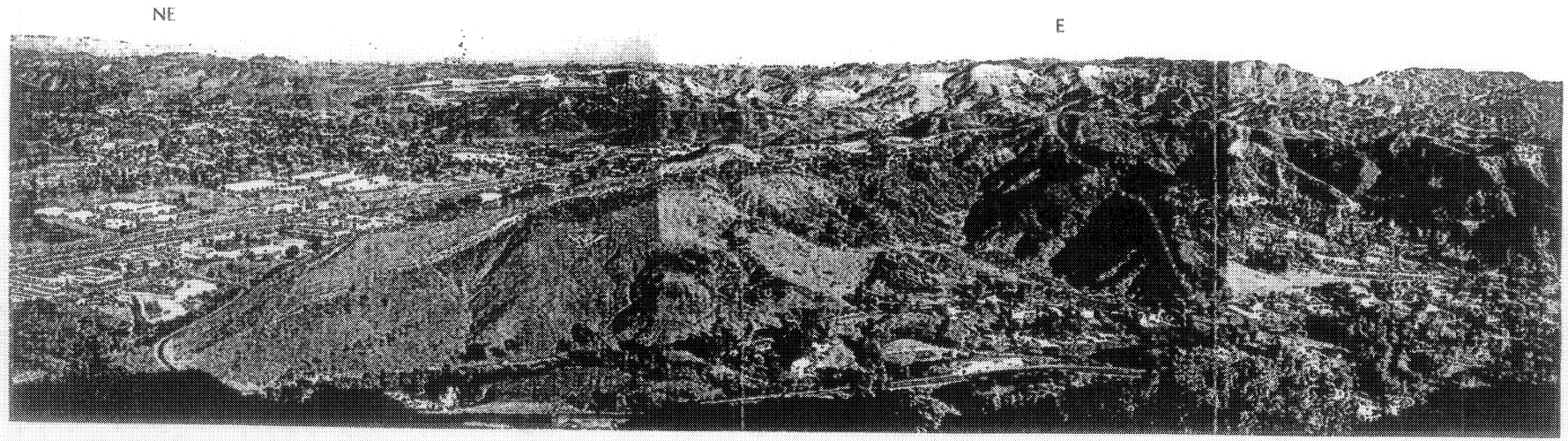



Plate 1

Panoramic View




B: From northern ridgeline, view centered southwesterly down Medea Creek to Malibu Lake




C: From near Ladyface summit, view easterly to Calabasas

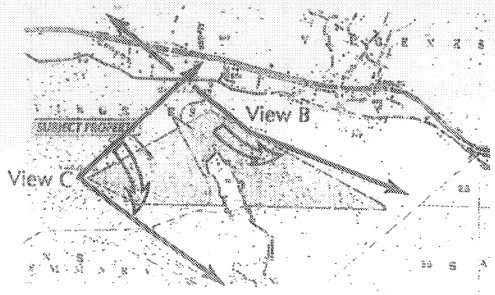
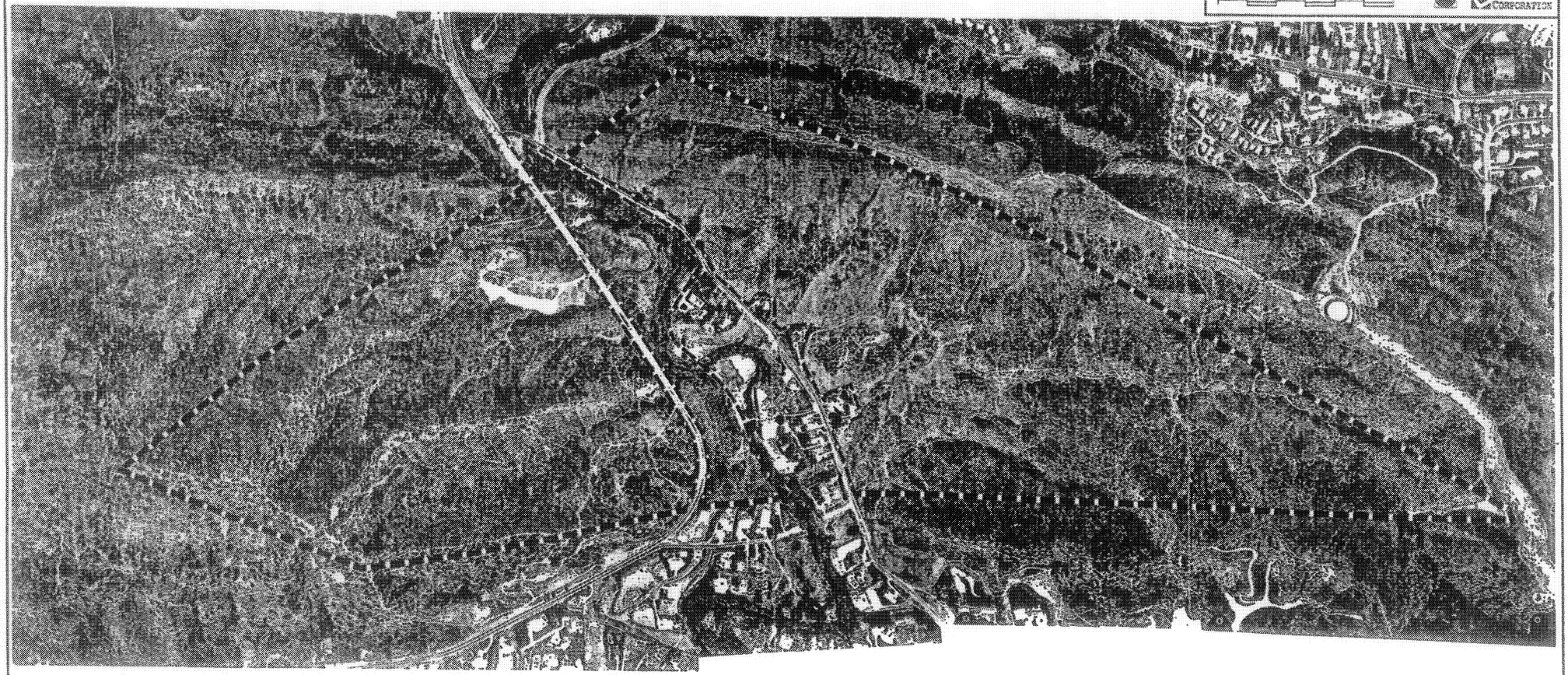



Plate 2

Panoramic Views

PLATE
3

# AERIAL PHOTOGRAPH OF SUBJECT PROPERTY



corner of Kanan and Agoura roads associated with a planned commercial development which is outside of the area considered in this analysis.

## WATERSHED BOUNDARIES – DRAINAGE PATTERNS

The site lies within the greater Medea Creek watershed (**Figure 4**), which is comprised of four sub-drainages (namely, Medea Creek, Lindero, Palo Comado and Cheeseboro canyons) that originate from the south slope of the Simi Hills, and converge in the vicinity of Malibu Junction, just to the north of the project site. These tributaries are substantially concrete-channelized upstream from that location. Over geologic time, the main stem of Medea Creek located downstream from Malibu Junction has cut a narrow passage through the Santa Monica Mountains, carrying the combined flows of all four subdrainages past the project site. Across the project site and southward, the stream gradually widens, passing through Paramount Ranch and into Malibu Lake. Medea Creek then converges with Triunfo Canyon Creek to become Malibu Creek, which subsequently flows to Malibu Lagoon and the ocean. Malibu Creek is the only antecedent drainage in the Santa Monica Mountains.

Slopes on the west side of the project site drain east into Medea Creek, while slopes on the east drain west into the creek (Figure 4). Medea Creek bisects the southern portion of the site as the stream passes between Cornell and Kanan roads. The site also contains portions of several tributaries to Medea Creek, four of which are shown as blue-line streams on the USGS maps.

## LANDFORMS AND GEOLOGIC FEATURES

The project site occupies mountainous terrain and alluvial floodplain on the east and west sides of the main stem of Medea Creek as it flows downstream from Malibu Junction toward Malibu Lake. From the lowest elevation on the property (the bed of Medea Creek) at approximately 800 feet, the parcel extends west to include a sizeable area on the eastern slope of Ladyface, up to an elevation of approximately 1,900 feet. The eastern portion of the property encompasses a west-trending, un-named tributary of Medea Creek, bounded generally on the north and south by prominent 1,100 to 1,200 foot ridgelines, with the site reaching a 1,400 foot peak in the extreme east corner, near the headwaters of the tributary (**Figure 5**).

The north flank of the Santa Monica Mountains here is dominated by a thick, heterogenous sequence of volcanic rocks of the Topanga Group (Yerkes and Campbell 1979). In particular, dark-colored andesitic to basaltic breccias comprise the bulk of Ladyface and the western portion of the project site, and the southern portion of the eastern half of the site. These volcanics are overlain to the north by light-colored and highly-layered andesite-dacite breccia; these dominating the ridgeline in the eastern half of the site and forming the northern boundary. Limited areas of recent alluvium occur along Medea Creek.

Ladyface, the aforementioned prominent ridgeline on the north boundary, Medea Creek, and the un-named tributary are all significant landform and geologic features of the project site.

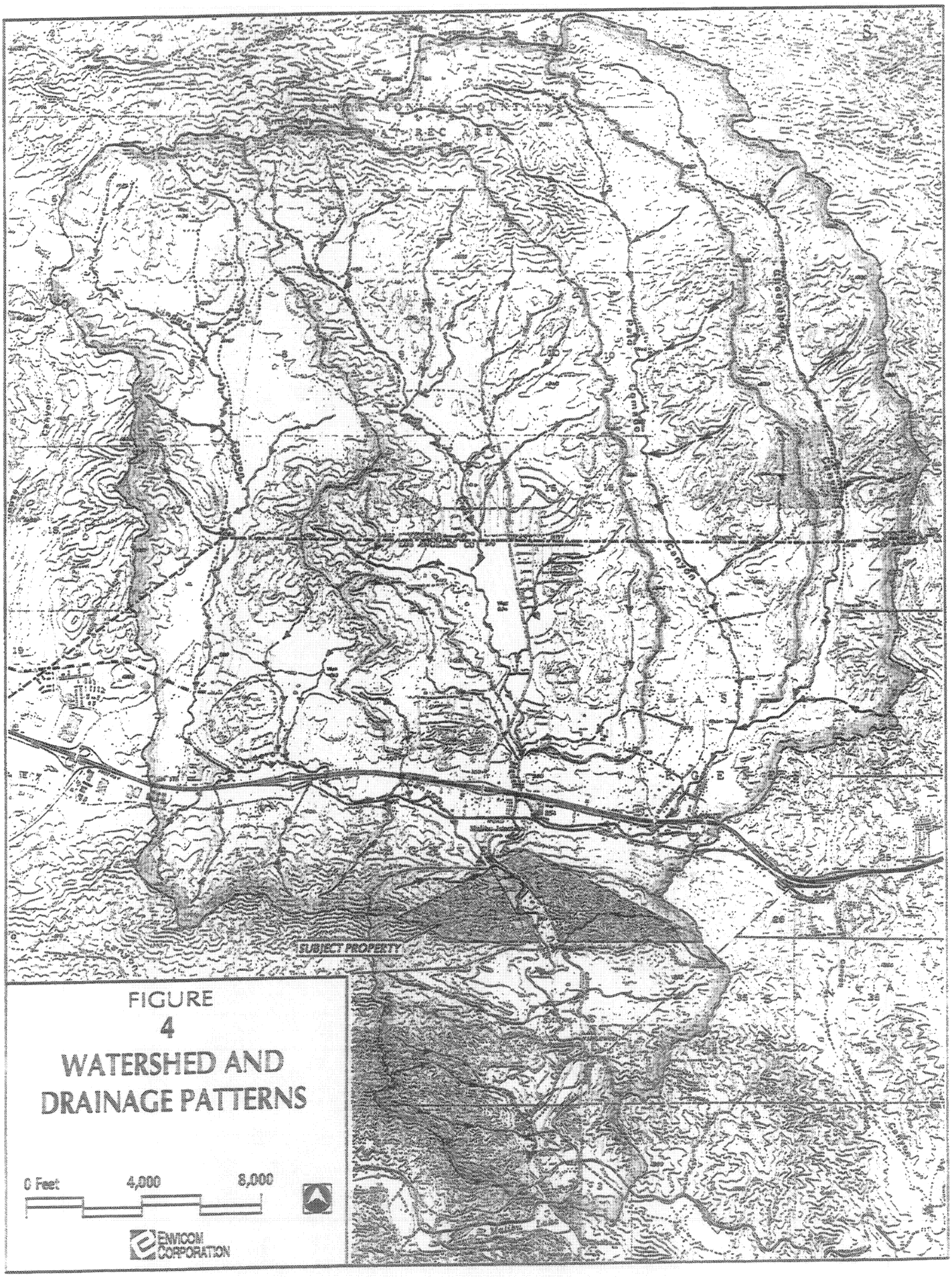
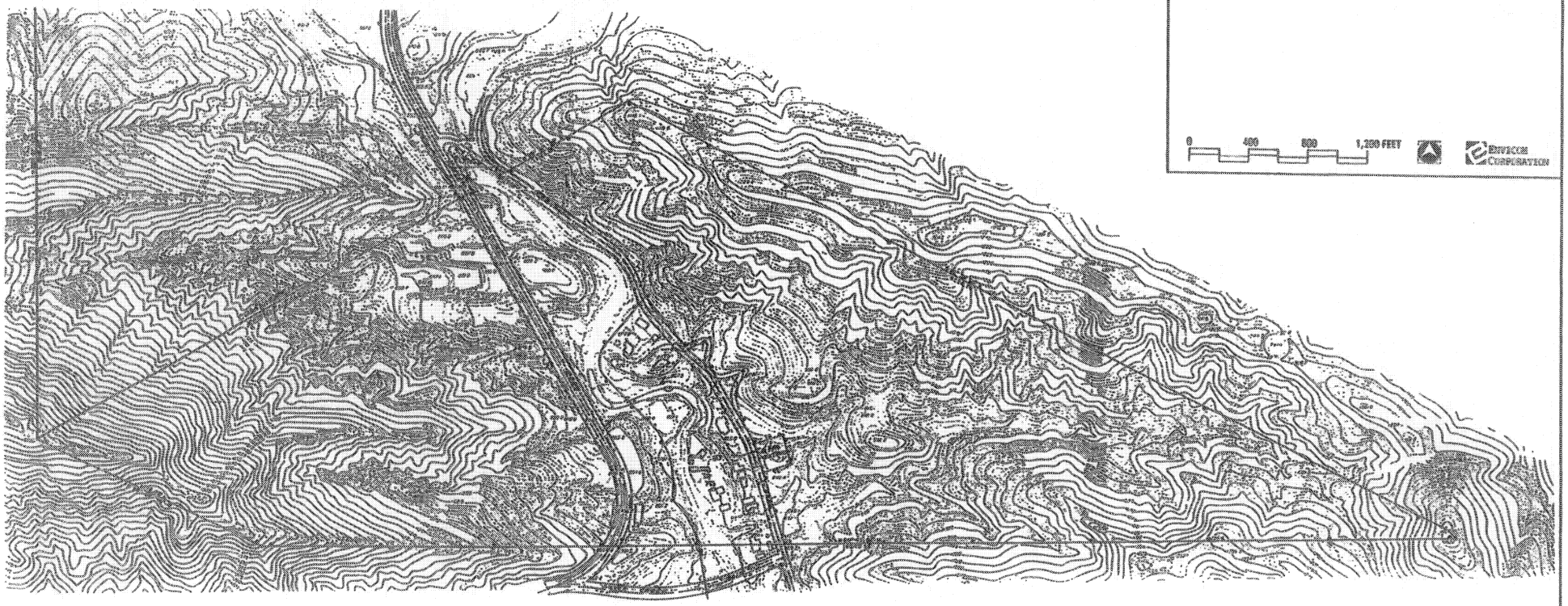



FIGURE
4
WATERSHED AND
DRAINAGE PATTERNS

FIGURE
5

# SITE TOPOGRAPHY



## BIOLOGICAL RESOURCES

The Las Virgenes SEA (#6) was described by Friesen (1982) as supporting grassland, coastal sage scrub, chaparral, and coast live oak woodland. Several notable plant species have been identified in the SEA, including California juniper (*Juniperus californicus*), linear-leaf goldenbush (*Ericameria* [=*Haplopappus*] *linearifolia*), Santa Monica Mountains dudleya (*Dudleya cymosa* ssp. *ovatifolia*), several species of Mariposa lily (*Calochortus clavatus* ssp. *pallidus*, *C. catalinae*, and *C. venustus*), and valley oak (*Quercus lobata*). The first two species are disjunct (out of their normal ranges) from the western Mojave Desert, while the other species are uncommon either throughout their known ranges or in the Santa Monica Mountains (*D. c.* ssp. *ovatifolia* was federally listed as Threatened in January 1997). Friesen (1982) concludes that the Las Virgenes SEA is best described as "a transitional community vegetation" due to the combination of vegetation types.

Our investigation of the site was conducted on December 16 and 19, 1996 by Carl Wishner and Rick Farris, biologists for Envicom Corporation. The site was surveyed by walking as much of the accessible terrain as was practical, and documenting all plant and animal species observed. The findings of this most recent investigation are presented below.

### Plant Communities

The project site encompasses a range of plant communities, wherein approximately 168 species of vascular plants (native and introduced) were observed during two days in December, 1996. These are compiled in **Appendix A**. The distribution of the plant communities is shown on **Figure 6**.

Along Medea Creek, a relatively well-developed **willow riparian forest** occupies the channel, dominated by arroyo willow (*Salix lasiolepis*) and red willow (*S. laevigata*). Scoured areas of the channel support mule fat (*Baccharis salicifolia*), mugwort (*Artemisia douglasiana*), western ragweed (*Ambrosia psilostachya* var. *californica*), poison hemlock (*Conium maculatum*) and fennel (*Foeniculum vulgare*). A mature western sycamore (*Platanus racemosa*), and a few valley oaks (*Quercus lobata*), and several coast live oaks (*Quercus agrifolia* var. *a.*) isolated from the creek by roads, suggest that the alluvial, bottomland forest was once more extensive than at present. Otherwise, only a few oaks occur on uplands of the property, but not forming extensive woodlands. Three coast live oak trees are known to have formerly occupied the drainage on the slopes of Ladyface, to the west of Kanan Road, in an area of the project site now earth-filled.

Steep, south-facing slopes in the east half of the site are frequently **rocklands**, with sparse, although unusual vegetation dominated by Bigelow's spike-moss (*Selaginella bigelovii*), wishbone bush (*Mirabilis californicus*), a few ferns, and succulents (*Dudleya* spp.). North-facing rocklands are considerably more mesic, with greater cover by mosses, ferns, and succulents. Where sufficient, fine-textured soil has developed on south-facing slopes, **grasslands** and sparse **coastal scrub** dominate. Annual introduced and perennial native grasses prevail, as well as a great diversity of native and introduced forbs. Sub-shrubs are interspersed among the grasses, forming a mosaic pattern of grassland and coastal scrub. Prevalent species of the coastal scrub phase include California buckwheat (*Eriogonum fasciculatum*), coast encelia (*Encelia californica*), coast goldenbush (*Isocoma*

FIGURE
6

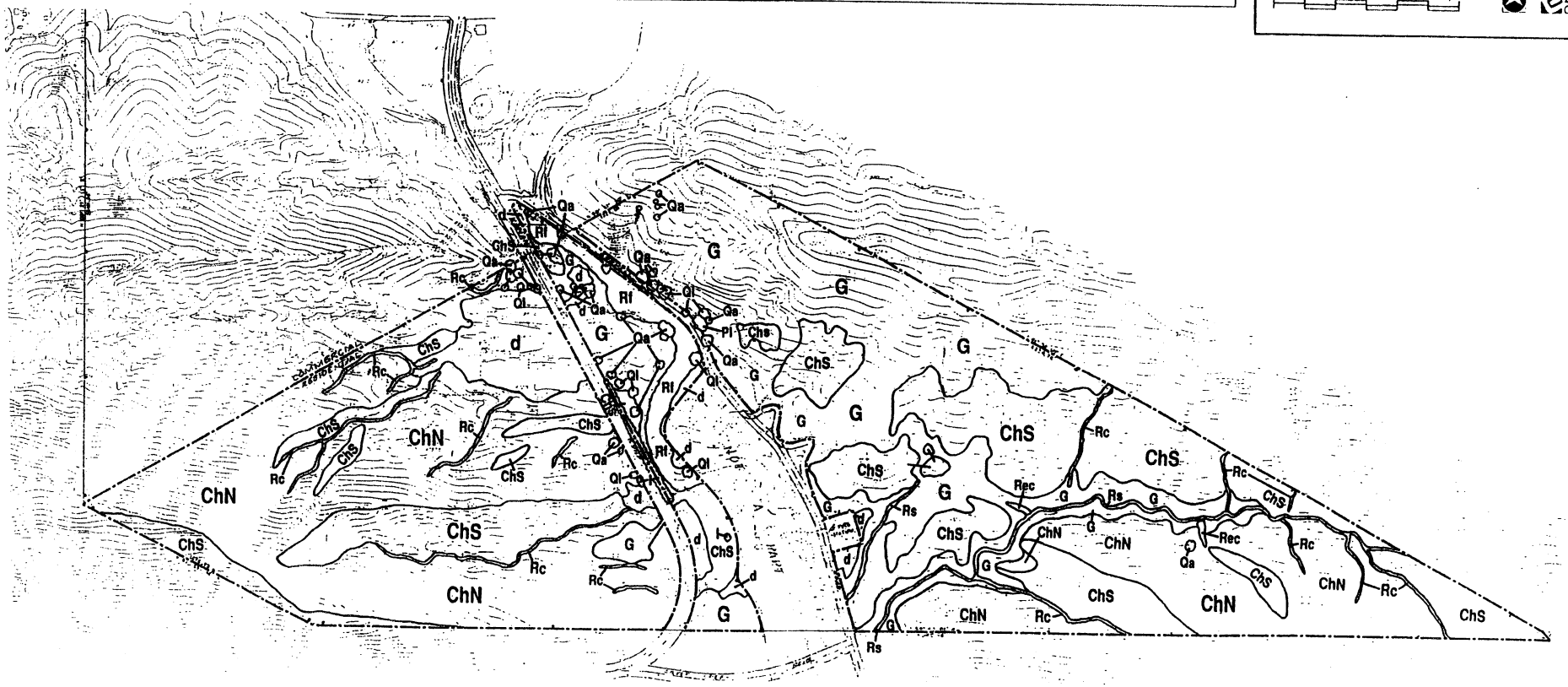
# GENERALIZED VEGETATION

*Explanation of Map Symbols*

| UPLANDS | | RIPARIAN | | TREES | | OTHER | |
|---|---|---|---|---|---|---|---|
| G | Grassland, with sparse scrub | Rf | Forest (Willow) | Ql | Valley Oak | d | Disturbed |
| ChS | Chaparral; South Slopes | Rs | Scrub (Mulefat, willow) | Qa | Coast Live Oak | | |
| ChN | Chaparral; North Slopes | Rc | Chaparral | Pl | Sycamore | | |
| | *Seep* | Rec | Giant Wildrye | I | Introduced | | |

0 400 800 1,200 FEET

ENVICOM CORPORATION



*menziesii* ssp. *vernonioides*), California-aster (*Lessingia filaginafolia* ssp. *latifolia*), and California sagebrush (*Artemisia californica*).

In the eastern half of the project site, **Chaparral** intergrades with coastal scrub on stony, south-facing slopes. The brush here is taller and less penetrable than in the western half of the site, with the most abundant species being chamise (*Adenostoma fasciculatum*), laurel sumac (*Malosma laurina*), bush mallow (*Malacothamnus fasciculatus* var. *laxiflorus*), bigpod ceanothus (*Ceanothus megacarpus*), black sage (*Salvia mellifera*), and birch-leaf mountain mahogany (*Cercocarpus betuloides* var. *b.*).

On north-facing slopes in the east half of the site (south of the un-named tributary), the chaparral is even more dense and impenetrable, with additional species including scrub oak (*Quercus berberidifolia*), California ash (*Fraxinus dipetala*), chaparral currant (*Ribes malvaceum* ssp. *viridifolium*), fuchsia-flowered gooseberry (*Ribes speciosum*), holly-leaf redberry (*Rhamnus ilicifolia*), poison-oak (*Toxicodendron diversilobum*), orange bush monkeyflower (*Mimulus aurantiacus*), heart-leaf penstemon (*Keckiella cordifolia*), honeysuckle (*Lonicera subspicata* var. *denudata*), and manroot (*Marah macrocarpus* var. *m.*). These north slopes also support perennial herbs such as San Diego bedstraw (*Galium nuttallii* ssp. *n.*), Parry's larkspur (*Delphinium parryi* ssp. *p.*), golden-yarrow (*Eriophyllum confertiflorum* var. *c.*), and annual herbs, especially, eucrypta (*Eucrypta chrysanthemifolia* var. *c.*), baby blue-eyes (*Nemophila menziesii*), Chinese houses (*Collinsia heterophylla*), goose grass (*Galium aparine*), chickweed (*Stellaria media*), fiesta flower (*Pholistoma auritum* var. *a.*), ferns including California maidenhair (*Adiantum jordanii*), coffee fern (*Pellaea andromedifolia* var. *a.*), and goldback fern (*Pentagramma triangularis* var. *t.*), Bigelow's spike moss, and mosses.

The pattern of contrasting north and south-facing chaparral is repeated on the western half of the project site, on the slopes of Ladyface, although with some additional, interesting variation. A small, but relatively pure stand of red shank (*Adenostoma sparsifolium*) occurs only on the ridge and north-facing slope of one ridgeline on the east face of Ladyface. A mixed stand of bigberry manzanita (*Arctostaphylos glauca*) is restricted to a limited area of north-facing slopes to the southwest from there.

The drainage of the un-named tributary in the east half of the project site is **riparian scrub** with only a few wetland indicators such as mule fat and arroyo willow present. Giant wildrye (*Leymus condensatus*) forms a dense thicket in one of the minor tributaries to the unnamed drainage. Another small tributary forms a rocky waterfall, where persistent water seepage supports a profusion of wet-site mosses (*Scleropodium* sp.). Further up the drainage, the intermittent stream channels are dominated by chaparral shrubs; these areas are designated as **chaparral riparian**. A patch of Mexican rush (*Juncus mexicanus*) indicates the location of a small **seep** on a south-facing hillside in grassland scrub habitat near the northern apex of the project site.

***Sensitive Plant Species and Habitats***

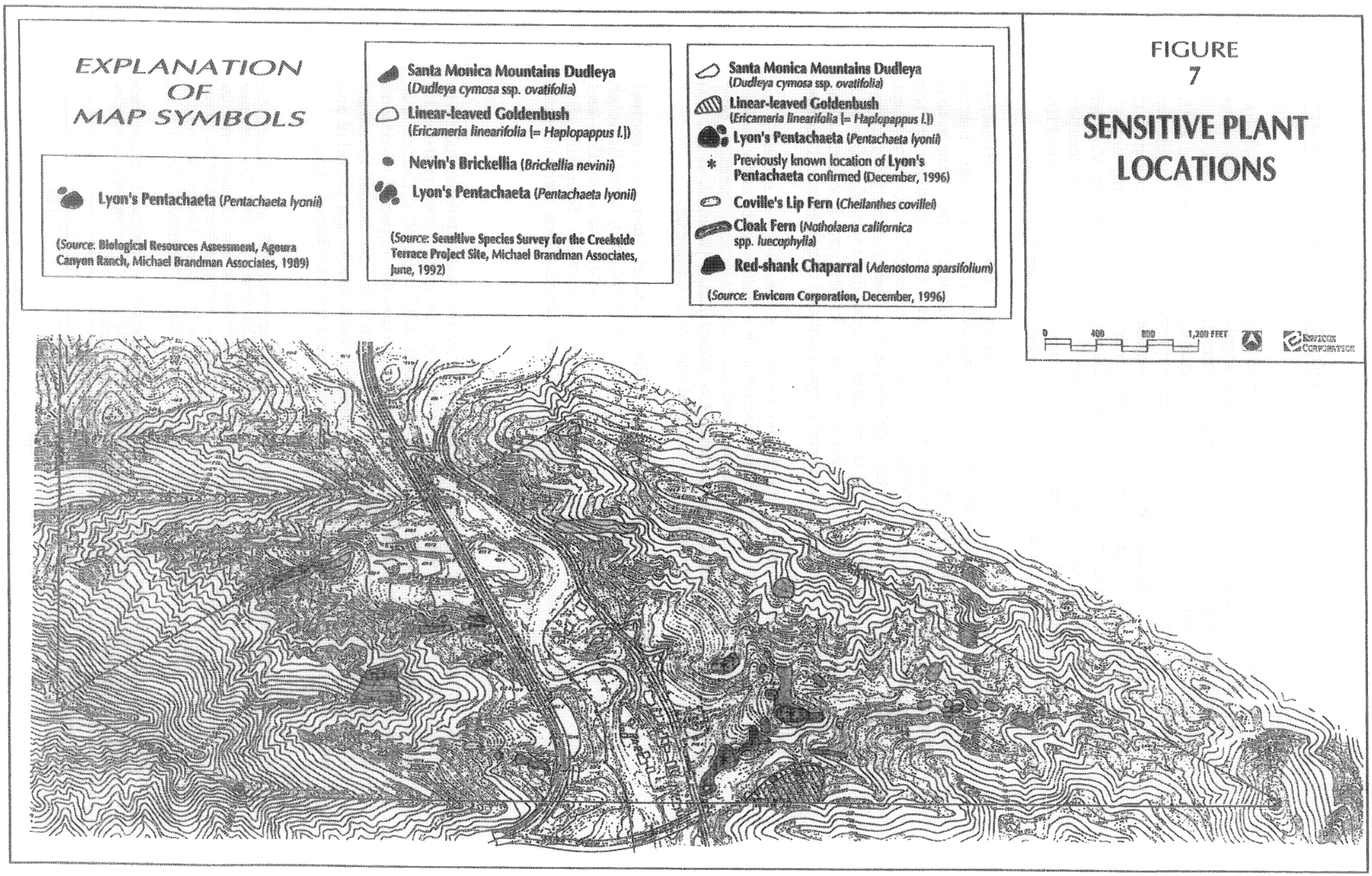
The California Natural Diversity Database (CDFG 1996) contains two reports of the occurrence of state and federally listed Endangered Lyon's pentachaeta (*Pentachaeta lyonii*) on the project site. One report cites the location as "small ridgetops at the east end of Ladyface near Cornell Road." The other report gives

the location as "Cornell Road behind the Malibu Fire Station, south of Malibu Junction." The map detail of the location of these occurrences has been obtained from CDFG, and has been incorporated into the present report. In addition, MBA (1992) reported 22 subpopulations of Lyon's pentachaeta on the site. Our 1996 field investigation has confirmed some of the locations previously identified, and has identified at least one more location where Lyon's pentachaeta occurs on the project site. At the time of our survey, these plants were rather small seedlings, which can only be recognized by an experienced observer. Moreover, because of the difficulty, only small areas could be 'spot-checked' for the presence of recognizable seedlings. We have incorporated all available locations of Lyon's pentachaeta into the map (**Figure 7**).

The California Natural Diversity Database also reports the occurrence of the federally-Threatened Santa Monica Mountains dudleya (*Dudleya cymosa* ssp. *ovatifolia*) from "Cornell Corners, 0.1-0.3 air-miles south of Malibu Junction, along Cornell Road." Our survey found approximately 20 individuals of this species located on a north-facing slope at the northern apex of the project site; essentially an uphill extension of the population from the reported location. This species is also reported by MBA (1992) as three subpopulations containing a total of 307 plants. All reported locations have been included on the sensitive plant map (**Figure 7**). The form of plants of this species found occurring from Agoura to the vicinity of Lake Sherwood has been named *Dudleya cymosa* ssp. *agourensis* Nakai, because it differs from those found in Topanga and lower Malibu Canyon areas, although the latter name has not become widely accepted. Numerous, similar dudleyas were observed on north-facing slopes and rock outcrops elsewhere on the site; however, these are believed to be lance-leaf dudleya (*Dudleya lanceolata*) on the basis of their leaf characteristics and robustness of the dried flower stalks. None of the dudleyas were in flower at the time of our survey.

The original descriptions of SEA No. 6 (England and Nelson 1976; Friesen 1982) identify the presence of several unusual plant species of limited distribution in the range, or not known elsewhere in the Santa Monica Mountains. For instance, prior to the 1978 Kanan fire, about a dozen individuals of California juniper (*Juniperus californica*) were known from the "extreme west-central end of the SEA just above Cornell Road." At present, only two individuals are known to exist, and neither of these occurs on the project site. This species is substantially disjunct from its distribution in the desert and interior mountain ranges of California. The next closest occurrence of this species may be a single specimen on the north slope of the Santa Susana Mountains, west of Magic Mountain (Wishner, observation 1995).

Another unusual species of the SEA is narrow-leaf goldenbush (*Ericameria linearifolia* = *Haplopappus l.*). This species is not known elsewhere in the Santa Monica Mountains, and like California Juniper, it is substantially disjunct from its range in arid interior and desert regions of California and the southwest. The nearest location to the Santa Monica Mountains where this species occurs may be in the vicinity of Acton, in northern Los Angeles County. At least two locations were found on the project site, mostly associated with the north sides of volcanic rocks.


EXPLANATION OF MAP SYMBOLS
Lyon's Pentachaeta (Pentachaeta lyonii)
(Source: Biological Resources Assessment, Agoura Canyon Ranch, Michael Brandman Associates, 1989)
Santa Monica Mountains Dudleya (Dudleya cymosa ssp. ovatifolia)
Linear-leaved Goldenbush (Ericameria linearifolia [= Haplopappus l.])
Nevin's Brickellia (Brickellia nevinii)
Lyon's Pentachaeta (Pentachaeta lyonii)
(Source: Sensitive Species Survey for the Creekside Terrace Project Site, Michael Brandman Associates, June, 1992)
Santa Monica Mountains Dudleya (Dudleya cymosa ssp. ovatifolia)
Linear-leaved Goldenbush (Ericameria linearifolia [= Haplopappus l.])
Lyon's Pentachaeta (Pentachaeta lyonii)
Previously known location of Lyon's Pentachaeta confirmed (December, 1996)
Coville's Lip Fern (Cheilanthes covillei)
Cloak Fern (Notholaena californica spp. leucophylla)
Red-shank Chaparral (Adenostoma sparsifolium)
(Source: Envicom Corporation, December, 1996)
FIGURE 7
SENSITIVE PLANT LOCATIONS
0
400
800
1,200 FEET
ENVICOM CORPORATION

Some other unusual plant species were observed on the project site, which have previously been unreported. A stand of red shank (*Adenostoma sparsifolium*) occurs on the ridge and north slope of an east-trending arm of Ladyface, on the western side of the project site. This species occurs as a nearly pure stand at this location, and forms a distinctive-appearing chaparral type that is visible from some distance. The occurrence is noteworthy because red shank is limited in the Santa Monica Mountains to the Cold Creek drainage on the north slopes of Saddle Peak, and from the vicinity of Lake Sherwood west to Boney Mountain. This occurrence on Ladyface is intermediate between the other locations. Moreover, red shank in the Santa Monica Mountains is substantially disjunct from other populations in the Santa Ana Mountains south to Baja California.

Another unusual occurrence is that of California cloak fern (*Notholaena californica* ssp. *leucophylla*[3]) in strongly-bedded andesite-dacite breccia substrates on steep, south-facing slopes in the east half of the site. Prior to this observation, this species was known from only two other locations in the mountain range, described as "[r]are, on rocky slopes under brush; Point Mugu, Malibu Canyon." (Raven *et al.* 1986). Otherwise, the species is described in The Jepson Manual (Hickman, ed. 1993) as "uncommon, about dry rocky slopes, in rock crevices, and under ledges," occurring in the San Gabriel and San Bernardino Mountains, peninsular ranges and desert ranges southeast to the Sonoran Desert.[4]

Also unusual was the observation of Coville's lip fern (*Cheilanthes covillei*), on the north-face of a low rock outcrop of basalt in the western half of the project site. This species is previously known from the Santa Monica Mountains, only from a single collection on rocky crevices of Boney Ridge (Koutnik *et al.*, 600 DAV). Otherwise, the species is distributed widely in California.

Raven *et al.* also cite that southern gilia (*Gilia australis*) "has been reported from burned slopes of Ladyface." This refers to an observation by Geoff Burleigh in 1978, which according to Mr. Tim Thomas, was probably mis-identified and these plants are probably splendid gilia (*Gilia splendens*).[5] Splendid gilia occurs in the San Gabriel, San Bernardino and Coast Ranges. This annual species has not been observed at the project site.

### Wildlife Communities

Observations of wildlife species made during site visits were supplemented with information on the expected occurrences of various animal groups from appropriate literature sources [e.g. CWHRS (1988, 1990), Garrett and Dunn (1980), DeLisle *et al.* (1986), and others]. All animal species observed or reasonably expected to occur on the site as inferred from literature review are listed in the faunal inventory (**Appendix B**). Estimates of relative abundance for each species are provided and are based upon the observers' regional experience and the site characteristics.

---

3 Subspecies as treated in the *Flora of North America* (FNA Committee, 1993) are mentioned, but not treated as taxonomically distinct in The Jepson Manual (Hickman, ed. 1993). The nominate subspecies (californica) has yellow, waxy-mealy or powder-like material (farina) under the leaves, while ssp. leucophylla, as found on the project site, has white powder under the leaves.

4 Thus, The Jepson Manual does not report this species in the Santa Monica Mountains, although it was earlier reported in the Flora of the Santa Monica Mountains (Raven *et al.*, 1986).

5 Two subspecies are known. Mr. Thomas did not indicate whether the specimen from Ladyface was ssp. *grantii* (San Gabriel and San Bernardino Mountains), or the nominate subspecies (Coast Ranges from Monterey Co. to the San Jacinto Mountains).

The relatively large size of the site, the mosaic of habitat types, the mostly undisturbed condition, and the proximity of other open space suggest that this site should support a wide variety of animal species. The observations we were able to make are only a snapshot of the populations of wildlife that change with the seasons, and consequently, the number of species expected greatly augments the list of observed wildlife. Because these species may use more than one habitat type on the site, wildlife descriptions are presented by group (amphibians, reptiles, etc.).

### *Invertebrates*

Although we did not perform focused surveys for invertebrates, we were able to observe some unusual species which are notable primarily for the rarity of encounters in the field. First, while lifting debris to look for secretive animals, we observed a scorpion (possibly a *Vejovis* sp.) in the midst of a grassland area directly east of the fire station on Cornell Road. Under the same board, we observed ring-legged earwigs (*Euborellia annulipes*) which, while not native to the region,[6] are being displaced by the more common (non-native) European earwig (*Forficula auricularia*).

Because the surveys were conducted in December, we did not perform focused butterfly searches. We anticipate that should a full Biota Report be prepared for the site, that such surveys would be performed. We conclude from our field surveys, however, that the site supports the habitats and plant species suitable to support numerous butterflies, including some sensitive species.

### *Amphibians*

No amphibians were observed on the site during the surveys. It is not clear why, as there is suitable habitat for several species that are known to occur in the area. Also, there was flowing water in all of the larger drainages on the site due to heavy rains the week prior to the surveys. Although the surveys could not be called "focused" for amphibians, we expect to encounter Pacific chorus frogs (*Pseudacris regilla*) through their vocalizations. It is likely that crepuscular or prepuscular surveys would detect vocalizations of frogs and toads on the site.

We would also expect black-bellied slender salamander (*Batrachoseps nigriventris*) and California toad (*Bufo boreas halophilus*) on the site. There are also less common amphibians that could be present, given the occurrence of semi-permanent water in Medea Creek and seasonal flows in several tributaries, as well as the habitat types present on the site. All expected amphibian species are listed in Appendix B.

### *Reptiles*

The only reptile species observed during our surveys were Great Basin fence lizard (*Sceloporus occidentalis biseriatus*) and California side-blotched lizard (*Uta stansburiana elegans*), which were infrequently encountered on exposed rock faces in full sun. We attribute the lack of other reptile observations to the season and cold overnight temperatures (in the low 40's Fahrenheit). Due to the variety of habitats on the site, we would expect other reptiles to be present, and more observable in the spring and summer. The most likely reptile species to occur on the site would be western skink (*Eumeces s. skiltonianus*), San Diego alligator lizard (*Elgaria multicarinata webbi*), California kingsnake

6 According to Hogue (1993), *Euborellia annulipes* was introduced from Europe in the 1880's.

(*Lampropeltis getulus californiae*), California striped racer (*Masticophis l. lateralis*), and San Diego gopher snake (*Pituophis melanoleucus annectens*). Several other less common reptiles are also expected on the site and are listed in Appendix B. Two sensitive reptile species were reported from the site by MBA (1992) and are discussed in the sensitive animal species section to follow.

***Birds***

Among the animal species observed, more species of bird were seen than any other group. This is often the case, as birds are simply more conspicuous and readily identified than other animals which are typically nocturnal, burrowing, or shy. During our surveys, we observed 26 bird species, including:[7]

| | |
|---|---|
| California quail | bushtit |
| turkey vulture | Bewick's wren |
| Cooper's hawk | ruby-crowned kinglet |
| red-tailed hawk | wrentit |
| American kestrel | California thrasher |
| greater roadrunner | phainopepla |
| white-throated swift | yellow-rumped warbler |
| Anna's hummingbird | common yellowthroat |
| acorn woodpecker | western meadowlark |
| northern flicker | white-crowned sparrow |
| black phoebe | golden-crowned sparrow |
| American crow | rufous-crowned sparrow |
| western scrub-jay | California towhee |

Some of these species may be directly associated with certain habitats found on the site. For example, western meadowlark is a grassland species, while rufous-crowned sparrow is closely tied to chaparral vegetation. Other birds may be more cosmopolitan in their habitat use, such as northern flicker which may use riparian woodland or chaparral, or Anna's hummingbird which will be found wherever suitable forage is available. Perhaps more than for any other animal group, the greater the diversity of habitats, the more diverse are the bird species present.

In addition to the birds observed, there are many more that are likely to use the site, but were not present due to the season. The riparian woodland along Medea Creek and the scattered oaks are attractive to several migratory songbird species, while the open grasslands and chaparral attract wintering and migrating raptors. Other species may also breed on the site only in summer. All of these species are listed in **Appendix B** along with their seasonality and expected abundance.

[7] Scientific names for bird species are not given in the text as the common names are standardized. The scientific names are provided in AppendixB.

### *Mammals*

During our surveys, we observed several mammal species or their sign, including many well-developed animal trails on the ridgelines. Most common was mule deer (*Odocoileus hemionus*) as shown by direct observation and the numerous tracks, scat, and abundance of ticks on the vegetation. One area of dried mud showed bobcat (*Felis rufus*) tracks, and we expect this species to be uncommon.

We directly observed coyote (*Canis latrans ochropus*) and California ground squirrel (*Spermophilus beecheyi*). Coyote sign was found in all habitats, while California ground squirrels were most common at the ecotone between the grasslands and chaparral. We also found nests believed to belong to San Diego desert woodrat (*Neotoma lepida intermedia*) due to the placement of the nest mound on exposed rock in the chaparral and high on Ladyface. Botta's pocket gopher (*Thomomys bottae*) burrows were found in most grassland areas.

We would expect several other mammals to be common on the site. The most likely to be present are desert cottontail (*Sylvilagus audubonii*), western harvest mouse (*Rheithrodontomys megalotis longicaudis*), several "white-footed" mice (*Peromyscus* spp.), San Diego dusky-footed woodrat (*Neotoma fuscipes macrotis*), raccoon (*Procyon lotor*), and striped skunk (*Mephitis mephitis*). Smaller rodents are likely to be most common in the grassland/chaparral ecotone due to the abundance of forage (seed) and cover. The large mammals in the area use most of the habitats on the site, with regular visits to riparian areas for water, especially Medea Creek in dry periods. Other less common mammals found in the region that could use the site are listed in Appendix B.

### *Sensitive Wildlife Species*

For purposes of this report, sensitive wildlife species are those animals that have recognition in one or more of the following categories:

State Listed Endangered or Threatened
Candidates for State Listing as Endangered or Threatened
California Species of Special Concern
California Department of Fish and Game Special Animals
Federally Listed Endangered or Threatened Species
Species Proposed for Federal Listing as Endangered or Threatened
Federal Candidates for Listing as Endangered or Threatened[8]
Locally Uncommon (DeLisle *et al.* 1987)

During our surveys, we observed three sensitive animal species. Most common of these was **ashy rufous-crowned sparrow (*Aimophila ruficeps canescens*)**, a Category 2 Candidate for federal listing. Rufous-crowned sparrows were observed in several locations in the chaparral, more commonly on the eastern side of the site in the vicinity of the fire station on Cornell Road (see **Figure 6**). The observation of this species on the site is unusual, as rufous-crowned sparrows normally avoid dense chaparral (Garrett and Dunn, 1980). The presence of rufous-crowned sparrows on the site is likely due to the mosaic of

8 Although the U.S. Fish and Wildlife Service published new rules that eliminated the "Candidate" program in February 1996, this action was not given a public review period. Subsequently, such a review has been instituted and a decision regarding this action is pending. In the interim, we will continue to recognize federal Candidates as listed in the Federal Register (November 15, 1994).

chaparral and grasslands, the rocky terrain, and the presence of elements of coastal sage scrub such as coastal sagebrush and purple sage within the chaparral.

Another sensitive species observed was **Cooper's hawk** (***Accipiter cooperi***); a California Species of Special Concern. In this region, Cooper's hawks are most commonly observed as fall migrants. Some remain over winter, and even fewer nest in the region. Nesting occurs in riparian woodland or deep canyons. It is unclear whether or not Cooper's hawks nest on the site. The individual observed may be a winter visitor attracted to the scattered oaks and grassland, as well as the riparian habitat along Medea Creek, although there is suitable nesting habitat on the site.

The third sensitive species observed was **San Diego desert woodrat** (***Neotoma lepida intermedia***); a federal candidate, Category 2. Two nest mounds were observed on the site; one east of Cornell Road and the other high on Ladyface Mountain. Although the more common dusky-footed woodrat also may occur on the site, desert woodrats typically build their nest mounds on exposed rock, in contrast to dusky-footed woodrats which build their mounds in the midst of vegetation.

In addition to the sensitive animal species observed during the current site visits, MBA (1992) reports observing three individual **coastal western whiptails** (***Cnemidophorus tigris multiscutatus***) – a federal candidate, Category 2, and one individual and sign of **San Diego horned lizard** (most likely ***Phrynosoma coronatum blainvillei***[9] – a federal Candidate, Category 2, and California Species of Special Concern (Jennings and Hayes, 1994). There is substantial suitable habitat for both species on the site, especially in areas near grasslands and chaparral.

Following the site visit, we reviewed the listings of sensitive animal species provided by the USFWS and CDFG to determine whether other such species may be reasonably expected in the region. We compared the results of that review with the habitat requirements of the species, their known ranges, and any reports available on other observations in the vicinity of the site. In particular, we examined the California Natural Diversity Data Base (CNDDB) Rarefind report (1996) for the Thousand Oaks and Calabasas quadrangles which contain the site. None of the sensitive animal species listed in the CNDDB were reported from within the site boundaries. Of those sensitive animal species reported by the CNDDB for the two quadrangles, the only one known or likely to occur on the site is **San Diego horned lizard**, which has been reported by MBA (1992) as being present on the site.

The other animal species reported for the region by the CNDDB are southwestern pond turtle (*Clemmys marmorata pallida*), bank swallow (*Riparia riparia*), and least Bell's vireo (*Vireo belli pusillus*). Due to disturbance and human activity, there is low potential for southwestern pond turtle on the site, although, the species has been reported from Malibu Lake and Medea Creek (DeLisle *et al.*, 1986). Both bank swallow and least Bell's

9 There is some debate as to whether the horned lizard in the Santa Monica Mountains is P.c. blainvillei or its close relative, *P.c. frontale*. For this report, we will follow Jennings and Hayes (1994) and the CNDDB, recognizing that *P.c. blainvillei* is the subspecies in the area. In any case, the species' sensitivities are identical.

vireo may occur in the area during migration, but it is unlikely that either species would nest in the area, due to a lack of suitable habitat and the amount of disturbance along Medea Creek (the most likely location for them to nest).

There are numerous wildlife species that could occur on the site, but which we did not observe, or were not reported to the CNDDB. These are species for which the site supports suitable habitat, and are known to occur in the Santa Monica Mountains. These additional sensitive species are listed in **Table 1**, along with a description of their potential for occurrence on the site. Because we can only demonstrate presence and not absence, we assume that for those wildlife species where the evidence indicates a high likelihood for their presence, that these species are probably present when analyzing the site's constraints. From **Table 1**, the sensitive animal species not observed yet likely to be on the site include:[10]

satyr anglewing
Monterey ensatina
arboreal salamander
San Diego mountain kingsnake
San Bernardino ringneck snake
coast patchnose snake
western yellow-bellied racer
red coachwhip
sharp-shinned hawk
northern harrier
white-tailed kite
red-shouldered hawk
barn owl
Lewis' woodpecker
western bluebird
yellow warbler
yellow-breasted chat
Bell's sage sparrow
San Diego black-tailed hare
long-tailed weasel
American badger

The above list illustrates that this site, and others like it in the Santa Monica Mountains, have the potential to support a large number of sensitive wildlife species. This is due primarily to the size of the site, mix of habitat types, undisturbed conditions, and connectivity to other regional open space. The linkage of habitats is described more fully in the following section.

[10] Scientific names and status are provided in Table 1.

**TABLE 1**

Sensitive Fauna Observed or Potentially Occurring on the Beautiful City Site

| **Common Name** *Scientific name* | **Status (sensitivity criteria)** | **Potential On Site** |
|---|---|---|
| **INVERTEBRATES** | | |
| California dogface *Zerene eurydice* | locally sensitive (California's state insect) | Host plant (*Amorpha*) not observed on the site; low potential. |
| Harford's sulfur *Colias alexandra harfordii* | locally sensitive | Host plant (*Astragalus*) not observed on site, but species is a strong flier and may occur as a transient. |
| Comstock's fritillary *Argynnis [Speyeria] callippe comstocki* | locally sensitive | Host plant (*Viola pedunculata*) not observed on the site; low potential for occurrence. |
| Gabb's checkerspot *Melitaea [Chlosyne] g. gabbii* | locally sensitive | Host plants present on site (Asteraceae); low potential for occurrence as species is rare in the range. |
| satyr anglewing *Polygonia satyrus satyrus* | locally sensitive | Host plants present (Urticaceae) and potential for occurrence is considered moderate. |
| Santa Monica Mountains hairstreak *Satyrium auretorum fumosum* | F2[1], U | There is slight potential for this species on the site as the host plant (scrub oak) is fairly common. |
| cloudy copper *Lycaena rota nubila* | locally sensitive | Host plants (*Ribes*) present on site, but potential for occurrence is considered low due to insect's rarity. |
| monarch *Danaus plexippus* | SA - Sensitivity is based upon threats to winter roost sites. | Larval foodplants for this species (*Asclepias* spp.) were not observed, nor are suitable winter roost sites present. |
| **VERTEBRATES** **Amphibians and Reptiles** | | |
| Monterey ensatina *Ensatina e. eschscholtzi* | u | Moderate potential to occur on the site. |
| arboreal salamander *Aneides lugubris* | u | Moderate potential to occur on the site. |
| coast range newt *Taricha torosa torosa* | CSC | Suitable habitat appears to present on the site, but potential is considered low due to stream disturbances. |

[1] In January 1996, USFWS published new guidelines for the listing of Candidate species. The new guidelines fail to recognize any Candidate species other than those formerly listed as Category 1. Although this streamlines the list, it fails to recognize species that are declining but have not had the benefit of a thorough review. Therefore, we retain the Candidate list as published in 1994 as this list does recognize species known to be declining.

**TABLE 1 (cont.)**

Sensitive Fauna Observed or Potentially Occurring on the Beautiful City Site

| **Common Name** *Scientific name* | **Status (sensitivity criteria)** | **Potential On Site** |
|---|---|---|
| southwestern pond turtle *Clemmys marmorata pallida* | CSC, F2 | Recorded in Malibu Lake and Medea Creek, but suitable habitat on site is disturbed; potential low. |
| silvery legless lizard *Anniella pulchra pulchra* | CSC, F2 | There is low potential for the presence of this species; suitable substrates are not common on the site. |
| coastal (western) whiptail *Cnemidophorus tigris multiscutatus* | F2 | Likely to be present in the chaparral. |
| San Diego mountain kingsnake *Lampropeltis zonata pulchra* | F2, CSC | Moderate potential to occur on the site. |
| San Bernardino ringneck snake *Diadophis punctatus modestus* | F2 | Probable resident at the site. |
| coast patchnose snake *Salvadora hexalepis virgutlea* | F2 | Moderate potential to occur on the site. |
| southwestern blind snake *Leptotyphlops humilis* | u | Moderate potential to occur on the site. |
| western yellow-bellied racer *Coluber constrictor mormon* | u | Habitat is present for this species, and it is a probable resident. |
| red coachwhip *Masticophis flagellum piceus* | u | Local conditions are suitable and it is a probable resident. |
| **Birds** | | |
| great blue heron *Ardea herodias* | SA (Sensitivity is based upon the decline of suitable rookery sites in California and not on population declines outside of rookery areas) | No rookeries are present on the site, but the species probably forages in Medea Creek. |
| black-crowned night-heron *Nycticorax nycticorax* | SA (Sensitivity is based upon the decline of suitable rookery sites in California and not on population declines outside of rookery areas) | No rookeries are present on the site; unlikely even as a visitor. |
| sharp-shinned hawk *Accipiter striatus* | CSC, B | Likely to use the site in winter and as a migrant. |
| Cooper's hawk Accipiter cooperi | CSC | Observed during field surveys. |
| golden eagle *Aquila chrysaetos* | CP, CSC | The site is within the home range of one family of golden eagles (Malibu Creek State Park), and they are expected over the area while foraging. |

**TABLE 1 (cont.)**

Sensitive Fauna Observed or Potentially Occurring on the Beautiful City Site

| **Common Name** *Scientific name* | **Status (sensitivity criteria)** | **Potential On Site** |
|---|---|---|
| northern harrier *Circus cyaneus* | CSC, B | Moderate potential as a winter visitor over grasslands. |
| white-tailed kite *Elanus leucurus* | SA, CP | Suitable habitat present; most likely as a winter visitor. |
| red-shouldered hawk *Buteo lineatus* | B | Likely resident along Medea Creek. |
| prairie falcon *Falco mexicanus* | CSC | There is low potential for this species as a visitor, altough some of the cliff faces may offer suitable nesting sites. |
| barn owl *Tyto alba* | SC | Likely resident. |
| western burrowing owl *Athene cunicularia hypugea* | CSC, F2 | Suitable habitat is present, but the potential for their presence is considered low. |
| Lewis' woodpecker *Melanerpes lewis* | SC | The potential for occurrence of this species on the site is considered moderate. |
| southwestern willow flycatcher *Empidonax traillii extimus* | CSC, FE | The species is expected to utilize the site as a rare transient only. |
| western bluebird *Sialia mexicana* | S,SC | Most likely a winter visitor, but may nest in oaks. |
| loggerhead shrike *Lanius ludovicianus* | S,B, CSC | Suitable habitat exists, and species is considered likely to be present. |
| yellow warbler *Dendroica petechia brewsteri* | CSC | Nesting habitat along Medea Creek is marginal, but nesting is unlikely; likely in migration. |
| yellow-breasted chat *Icteria virens* | CSC | Suitable nesting habitat appears to be absent, although the species is considered to have low potential for occurrence at the site in migration. |
| ashy rufous-crowned sparrow Aimophila ruficeps canescens | F2 | Observed in several areas on the site in sparse chaparral. |
| Bell's sage sparrow *Amphispiza belli belli* | F2, CSC | Suitable chaparral habitat is present on the site; there is moderate potential for this species' occurrence. |
| **Mammals** | | |
| California leaf-nosed bat *Macrotis californicus* | CSC, F2 | Too few data are available upon which to base conclusions about potential for occurrence. |
| spotted bat *Euderma maculatum* | CSC, F2 | Too few data are available upon which to base conclusions about potential for occurrence. |

**TABLE 1 (cont.)**

Sensitive Fauna Observed or Potentially Occurring on the Beautiful City Site

| **Common Name** *Scientific name* | **Status (sensitivity criteria)** | **Potential On Site** |
|---|---|---|
| pale big-eared bat *Plecotus townsendii pallescens* | CSC, F2 | Too few data are available upon which to base conclusions about potential for occurrence. |
| pallid bat *Antrozous pallidus* | CSC | Too few data are available upon which to base conclusions about potential for occurrence. |
| greater western mastiff-bat *Eumops perotis californicus* | CSC, F2 | Too few data are available upon which to base conclusions about potential for occurrence. |
| San Diego desert woodrat *Neotome lepida intermedia* | F2 | Nest mounds observed in rocky areas. |
| (San Diego) black-tailed hare *Lepus californicus bennettii* | CSC, F2 | Suitable habitat is present, but potential for occurrence is low. |
| ringtail *Bassariscus astutus* | CP | Suitable habitat is present at the site, but potential for occurrence is considered low due to overall rarity and shyness. |
| long-tailed weasel *Mustela frenata* | U | Suitable habitat present and moderate potential for occurrence. |
| American badger *Taxidea taxus* | SA | Suitable habitat present and moderate potential for occurrence. |
| mountain lion *Felis concolor* | U | May occur on the site but so scarce in the region, observations unlikely. |

In addition to the extensive listing and discussion above, there are additional (bird) species which have recently been identified as being of concern for southern California (USDI:FWS, 1990). In the interest of space, these will not be discussed in detail, but suffice to say that each of the following are among the list of concern and observed or expected for the project site: belted kingfisher (expected), hairy woodpecker (expected), blue-gray gnatcatcher (expected), warbling vireo (expected), Wilson's warbler (expected), blue grosbeak (expected), and lazuli bunting (expected).

Status Codes Definitions:

| | |
|---|---|
| CE | California Endangered |
| CT | California Threatened |
| CP | California Fully Protected |
| FE | Federally Endangered |
| FT | Federally Threatened |
| FPE | Federally Proposed Endangered |
| F2 | Federal Candidate Category 2 |
| F3c | Federal Candidate Category 3c |
| CSC | California Special Concern (CDFG, 1987) |
| SA | Special Animal (CDFG, 1994) |
| S | Sensitive (USDI:FWS, 1986) |
| SC | Special Concern (Tate, 1986) |
| B | National Audubon Society Blue List (Tate, 1986) |
| U | Uncommon (USDI:NPS, 1982) |
| u | Uncommon (De Lisle, *et al.*, 1986) |

**CHARACTERISTICS OF THE SURROUNDING AREA**

The surrounding area examined for this report is formed roughly by Agoura Hills on the north, Lindero Canyon Road and Westlake Village on the west, Malibu Creek State Park on the south, and Las Virgenes Canyon on the east. It encompasses the entirety of SEA #6 (**Figure 8**).

### Adjoining Land Uses

To the north of the site lies the City of Agoura Hills and the Ventura Freeway corridor (refer to **Figure 2**). This area is characterized by a mix of residential development and commercial/industrial development, which generally parallels the freeway. South of the freeway, residential development is generally single-family, custom homes, but to the east, near Chesebro Road, there is some clustering of tract housing. Commercial development is dominant in the area north of the site, with businesses including gas stations, recycling centers, small businesses, restaurants, and office buildings. The most recent development is at the southwest corner of Agoura and Kanan roads, where grading is underway for a multi-screen theater complex.

The area east of the site is generally undeveloped, except for some clustered housing and commercial structures near the intersection of Chesebro and Agoura roads, and tract housing along Liberty Canyon Road. Approximately one-half of SEA #6 is east of the site, and the area outside of the SEA has connection to public open space to the east and south.

Paramount Ranch, a unit of the National Park Service, is directly south, separated from the site by estate residences. Most of the area south of Paramount Ranch is undeveloped and maintains connection to the site through Medea Creek and across open country to the southeast. The western portion of Malibu Creek State Park is south of Paramount Ranch, where Medea Creek enters Malibu Lake.

The area to the west of the site, surrounding Ladyface, is undeveloped, mostly due to the steep terrain. There has been some grading and aggregate removal adjacent to Kanan Road on the site, approximately 1 mile south of the 101 Freeway.

Several roads cross the site and the surrounding area. The largest is Kanan Road which bisects the site from north to south, paralleling Medea Creek on the west. Although the road is two-lane (one in each direction) across the site, it is rather wide and heavily used. The other north-south route is Cornell Road, which roughly parallels Kanan Road but runs on the east side of Medea Creek

### Public Lands and Preserved Open Space

The extent and distribution of public lands and open space is shown on **Figure 9**. The closest such area to the site is Paramount Ranch which is part of the Santa Monica Mountains National Recreation Area. Paramount Ranch encompasses a portion of Medea Creek and is used for a number of events (formerly the site of the Renaissance Pleasure Faire).

Nearby, the largest, permanent open space is Malibu Creek State Park, which lies to the southeast of the site, and contains Malibu Lake where Medea Creek terminates. Other open space areas in the vicinity include Peter Strauss Ranch (Lake Enchanto), and Cheeseboro Canyon (which is northeast of the site, north of the Ventura Freeway).

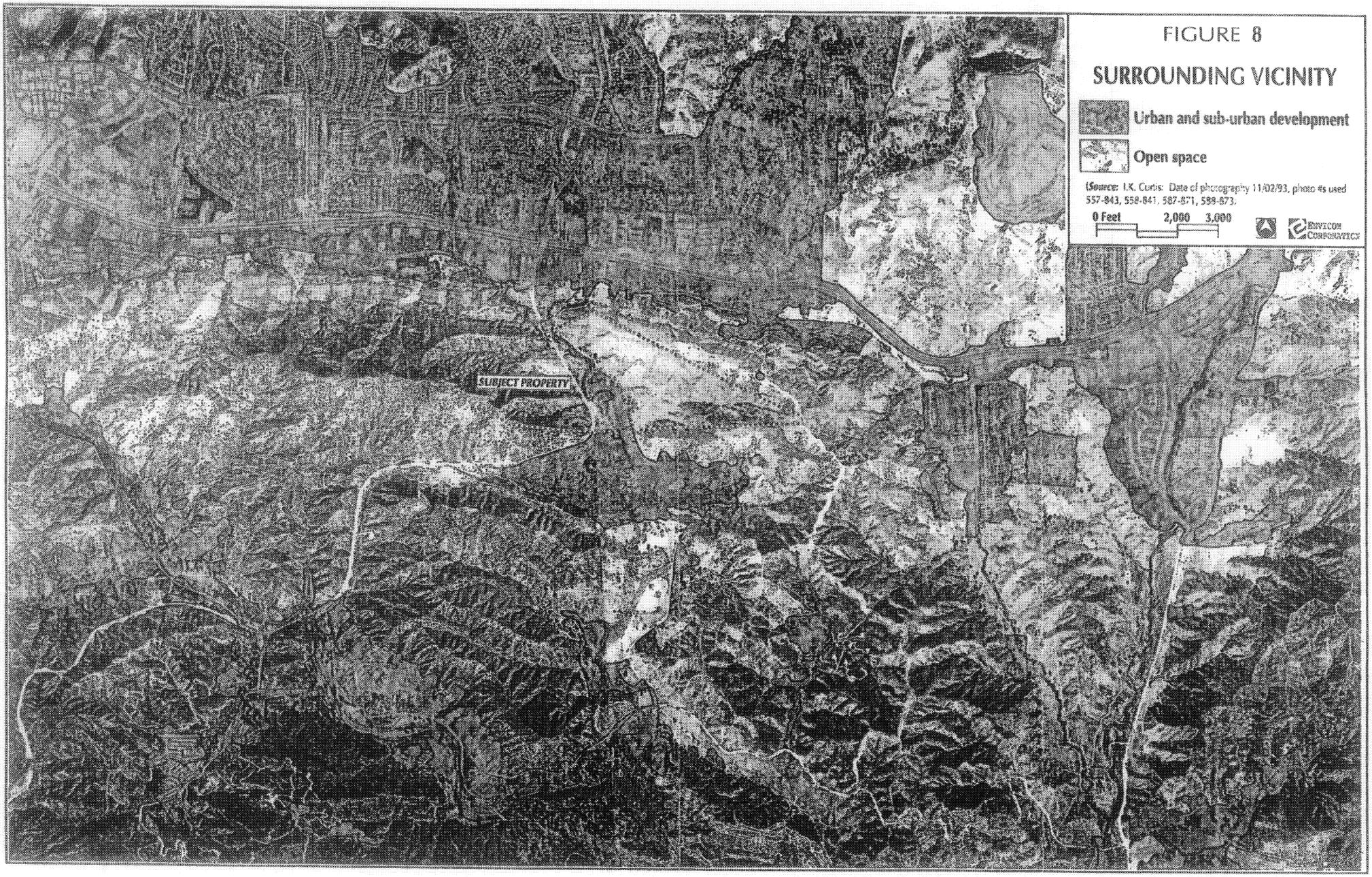



FIGURE 8

## SURROUNDING VICINITY

Urban and sub-urban development

Open space

(Source: I.K. Curtis: Date of photography 11/02/93, photo #s used 557-843, 558-841, 587-871, 588-873.

0 Feet 2,000 3,000

ENVICOR CORPORATION

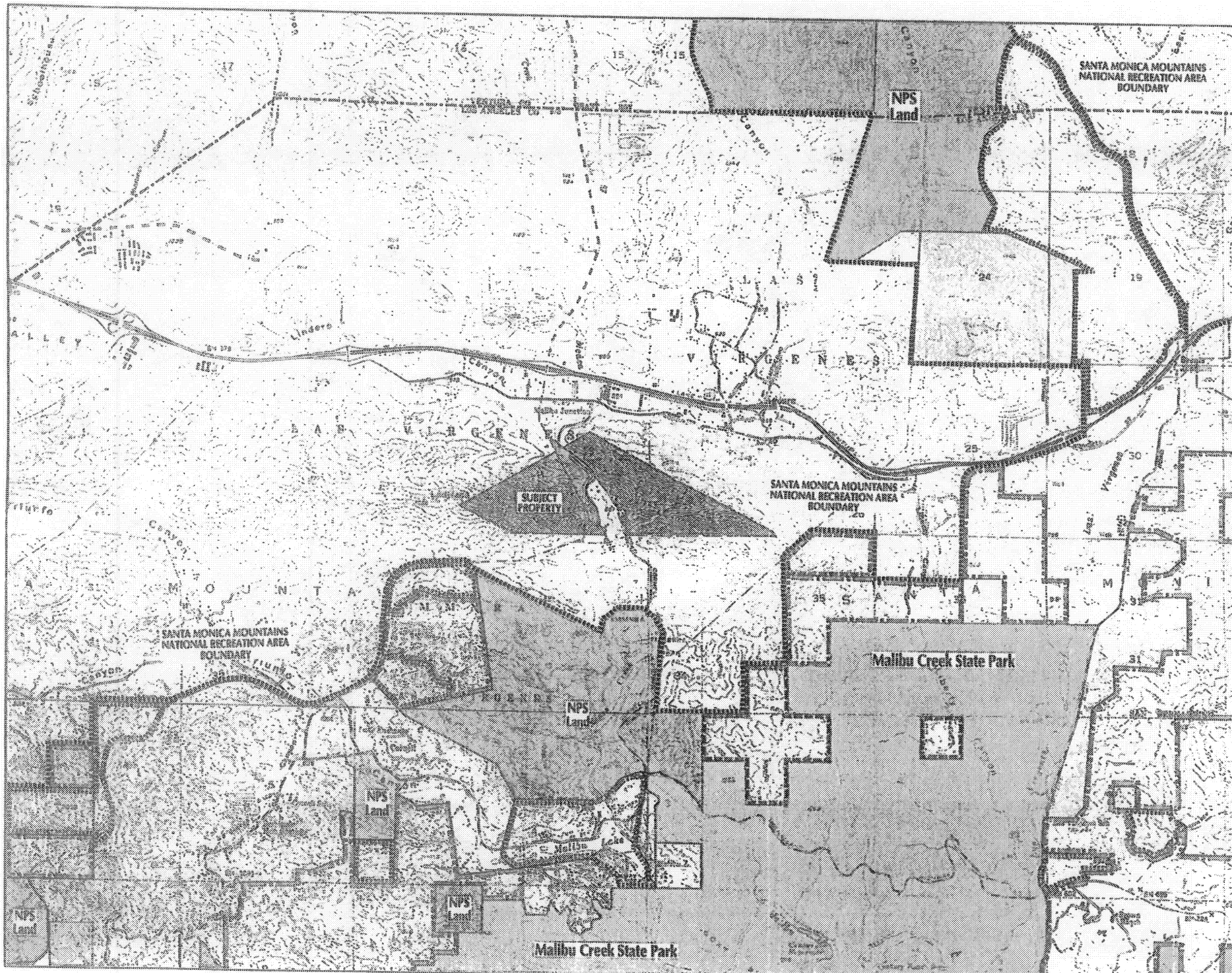



FIGURE 9

## OPEN SPACE RESERVES AND PROPOSED ACQUISITION AREAS

- National Park Service Land
- Proposed National Park Service Fee Acquisition Area
- Proposed National Park Service Easement Acquisition Area
- Malibu Creek State Park
- Proposed State Acquisition Area
- Other Public Land
- Private Recreation Land

Although most of the land surrounding the site is privately-owned, it remains open. Currently, the site is best characterized as a large, natural area with some development in the center and to the distant north and east, with most of its periphery connected to the larger Santa Monica Mountains through natural linkages.

### Regional Plant and Animal Resources

The following describes the major habitats of the area surrounding the site in terms of ecosystem function, plant species, and associated wildlife species. Major sources for this section include National Park Service (1981, 1982), Friesen (1982), and the observations and experience of Envicom Corporation biologists. The CNDDB (1996) was reviewed for occurrences of sensitive habitats, plants, and animals.

Most of the regional habitats are represented within the site, although these habitats may be more well-developed in the surrounding area. The descriptions of the regional plants and animals is potentially applicable to most parts of the Santa Monica Mountains, with the possible exception of the higher elevations and more coastal zones. The site and immediate surroundings are typical of the region with a few exceptions as noted in earlier descriptions of the site's resources.

The lists of observed and expected flora and fauna for the site (refer to **Appendices A and B**) also estimate regional population densities of these species. While population estimates have been assigned, caution must be used in applying these abundances outside of the study area. Throughout the Santa Monica Mountains, long-term population census studies have not been conducted for most species.

### General Habitat Descriptions/Associated Wildlife

#### *Chaparral*

Chaparral covers much of the surrounding area. This community is composed of dense, woody evergreen shrubs, usually with thick leathery or waxy leaves, with many species being dormant during the late summer and fall.

Chaparral occurs on steep, rocky slopes with poor drainage and thin, infertile soils. Areas of the chaparral that are over 20 years old contain a high percentage of dead undergrowth as the result of low decomposition. Fire is an important factor in the rejuvenation and rebirth of most of the plant species as many of these species only resprout from root burls, such as mountain mahogany (*Cercocarpus betuloides*), ceanothus, manzanita (*Arctostaphylos* spp.), chamise (*Adenostoma fasciculatum*), and toyon (*Heteromeles arbutifolia*). Others produce seeds at an early age, then die-back, and then after many years, the remaining viable seeds will germinate only after a fire episode. Examples include black sage (*Salvia mellifera*), buckwheat (*Eriogonum fasciculatum*), and golden-yarrow (*Eriophyllum confertiflorum*). In the year following the fire, herbaceous growth becomes extensive, and the chaparral community experiences a temporary increase in species diversity. Consequently, chaparral returns to a mature form in ten to fifteen years after a fire.

The dominant plant species of chaparral in the region include chamise, ceanothus (*Ceanothus* spp.), scrub oak (*Quercus berberidifolia*), mountain mahogany, toyon, manzanita, sugarbush (*Rhus ovata*), holly-leaf redberry (*Rhamnus ilicifolia*), poison oak (*Toxicodendron diversilobum*), and black sage.

*Associated Wildlife*

Chaparral provides excellent cover for numerous animal species. Some chaparral plants produce large amounts of seed, thus providing resources for birds and small mammals. Reptiles are relatively common and include several species of snakes and lizards. Examples include the Great Basin fence lizard side-blotched lizard, coast horned lizard, San Diego gopher snake, and Southern Pacific rattlesnake (*Crotalus viridis helleri*).

Amphibians are not common in chaparral due to the lack of substantial moisture. However, several species will travel through the community in search of moisture in the adjacent communities; these species include California toad and Pacific chorus frog. Invertebrate species, which are usually overlooked, are especially numerous in this community, particularly in the spring and early summer months. These invertebrates, including the arachnids (scorpions, harvestmen, ticks, spiders), are the most important animal food source for herbivorous species, which require animal protein supplements. Tremendous numbers of insect species may be present in the appropriate season.

The age of the chaparral has an impact on food production. For example, old growth stands actually have low nutritional value for deer (because of the large percentage of dead undergrowth), but provide protection from large predators. Conversely, young chaparral vegetation, with resprouting growth and new herbaceous plants produces excellent browse and provides high nutritional value for a wide range of wildlife species. Common herbivorous mammals include California ground squirrel, desert cottontail, Botta's pocket gopher, brush mouse (*Peromyscus boylii*), and dusky-footed woodrat. Predatory mammals include mountain lion (*Felis concolor*), bobcat, American badger (*Taxidea taxus*), coyote, grey fox (*Urocyon cinereoargenteus*), ringtail (*Bassariscus astutus*), and striped skunk.

The diversity and abundance of bird species is reflective of the seed availability and the variety of insect prey. Many bird species use chaparral, but nest in other habitats. Others, such as wrentit, are permanent residents in shrub habitats.

***Coastal Sage Scrub***

In contrast to chaparral, coastal sage scrub is an association of half-woody, often aromatic shrubs found on rocky or gravelly slopes in areas where marine fog can penetrate, at least occasionally. It is often referred to as "soft chaparral." Coastal sage scrub is found on the lower, south-facing coastal slopes of some surrounding areas. Soils in this community tend to be sandy with a high percentage of gravels, low fertility, and erosive.

Many coastal sage scrub plant species invade quickly after soil disruption and therefore, play an important role in slope stabilization. Also, this vegetation is sometimes found in disturbed areas as a transitional stage to chaparral. This

effect is caused by the tendency of the plants to grow numerous shallow roots just below the surface. Because these roots have the ability to regenerate after a fire, recovery of the community occurs much faster than the chaparral. Additionally, many coastal sage scrub plants are able to reproduce from seed that has remained dormant for years since the last fire.

Characteristic species in the region include coastal sagebrush, white sage (*Salvia apiana*), purple sage (*S. leucophylla*), black sage, laurel sumac (*Malosma laurina*), California encelia, orange bush monkey flower, California buckwheat, ashyleaf buckwheat (*Eriogonum cinereum*), canyon sunflower (*Venegasia carpesioides*), lemonade berry (*Rhus integrifolia*), golden-yarrow, giant wild rye, deer weed (*Lotus scoparius*), coyote brush (*Baccharis pilularis* ssp. *consanguinea*), and chaparral yucca (*Yucca whipplei intermedia*).

*Associated Wildlife*

The wildlife community in coastal sage scrub is very similar to that described for chaparral. In some parts of southern California, there is a distinct coastal sage scrub animal community, but many of those specialists are not found in the Santa Monica Mountains [e.g. California gnatcatcher (*Polioptila californica*)]

***Oak and Walnut Woodlands***

The surrounding area supports patches of coast live oak, particularly along the edges of mesic slopes and intermediate stream courses. Coast live oak thrives on soils that are deep and moist, usually in canyons with north facing slopes. These areas tend to be protected from fires and typically form closed canopies. A great deal of the moisture is held within the leaf litter, which decays to form a rich topsoil.

Common plant species in this community include the oaks and shrubs, such as toyon, Mexican elderberry (*Sambucus mexicana*), poison oak, and bay laurel (*Umbellularia californica*). Various native and non-native grasses including giant wildrye, wild oat (*Arena* spp.), rip-gut brome (*Bromus diandrus*), soft chess (*B. hordeaceus*), foothill needlegrass (*Nassella lepida*), and perennial ryegrass (*Lolium perenne*); herbaceous forbs include various filarees (*Erodium* spp.), bur-clover (*Medicago polymorpha*), tocalote (*centauria melitensis*), and black mustard (*Hirschfeldia incana*), short-pod mustard (*Brassica geniculata*), Parry's larkspur, miner's lettuce (*Claytonia perfoliata*), and various clarkias (*Clarkia* spp.).

Substantial coast live oak woodland in the surrounding area occurs in Malibu Creek State Park, Paramount Ranch, and on surrounding private lands.

Valley oak woodlands, sometimes referred to as valley oak savannas, also occur in the surrounding area, but are more limited in distribution. Found in association with grasslands, valley oaks are large (up to 70' tall), broad-leaved deciduous trees, that grow widely spaced. Valley oak savannas are typically found on flat alluvial valley bottoms of low soil moisture, where they extend massive tap roots down 30 to 60 feet to absorb ground water during the summer months. Climate and understory plant species are essentially the same as the valley grasslands.

California walnut woodlands are considered herein as part of the coast live oak woodland and are referred to as a "sub-community." This sub-community is dominated by California walnut *(Juglans californica)* and coast live oak. Walnut woodlands are declining, and they are of significance within the surrounding area. Important walnut woodlands occur in the vicinity of Calabasas, primarily south of the Ventura Freeway, from slopes just west of Las Virgenes Creek, west nearly to Cheeseboro Canyon, the Cold Creek drainage, Malibu Creek State Park, Tapia Park, Solstice and Piuma Canyons.

*Associated Wildlife*

The combination of grasslands and oak woodlands provides valuable habitat for many wildlife species. Acorns are a high-nutritional food resource used by insects, birds and mammals. Grasses and oaks host large populations of insects, which provide the essential protein requirements for both migrating and resident birds. An assemblage of small herbivores [ground squirrels, rabbits, gophers, voles (*Microtus californicus*), and mice(*Peromyscus* spp.)] provide the primary food sources for raptors such as red-tailed hawk, red-shouldered hawk, Cooper's hawk, American kestrel, barn owl, great horned owl, and screech owl, which may also nest in the oak trees. Mid-size mammalian predators such as bobcat, grey fox, coyote, and American badger, also prey upon small mammals.

***Riparian Woodlands and Scrub***

Riparian or stream-side woodlands may support the greatest species diversity of any regional habitat type, even though the total area involved is substantially less. The riparian habitats are found along creek and stream courses throughout the surrounding area, with the most substantial examples in the vicinity are found along Medea and Malibu creeks. Plants associated with the riparian woodlands are dependent on substantial and nearly constant moisture availability.

Riparian tree species provide an extensive canopy, shading the water and the stream course. Consequently, the climate within this community differs greatly from the surrounding communities. Temperatures under the canopy can be ten to fifteen degrees cooler than the oak woodland community in the summer months, and above the frost level in the winter. The shading over much of the area, presence of water, and the evaporative effects under the canopy allows for shade tolerant and moisture-dependent plants (shrubs, herbs, ferns and mosses) to become established. Many of these plants survive the hot dry summers as the result of a microclimate created by the canopy.

On occasion, vast quantities of runoff can greatly alter the topography and cause substantial eroding of streambanks, resulting in destruction and uprooting of canopy and understory plants.

The high nutrient availability of this habitat provides for relatively high species diversity. This condition results from several factors unique to this habitat: 1) The washing of plant debris from surrounding adjacent habitat into the watercourse; 2) the falling of surrounding plant materials (leaves, branches) into the water; and 3) the multitude of insect species associated with the water.

The dominant riparian plant in the region is often western sycamore. This tree occurs in both of the distinct types of riparian communities; woodland and scrub. In addition to sycamore, the riparian woodland community may be composed of coast live oak, and California bay-laurel. The rich understory of plants includes arroyo willow, poison oak, fuchsia-flowering gooseberry *(Ribes speciosum)*, heart-leaf penstemon, snowberry *(Symphoricarpos mollis)*, mugwort, common eucrypta, blue fiesta flower, baby blue eye, creek monkey flower (*Mimulus guttatus*), and streamside orchid (*Epipactis gigantea*). Occasionally, there are small rocky enclaves supporting lance-leaf dudleya (*Dudleya lanceolata*), and Humboldt lily (*Lilium humboldtii*).

Much of the riparian scrub in the area has been lost to urban and flood control developments, such as that along Medea Creek in the vicinity of the Ventura Freeway. Malibu Creek State Park and Medea Creek downstream of the site contain relatively undisturbed riparian habitats.

*Associated Wildlife*

As indicated above, the riparian community has the richest diversity of plant species among the habitat types examined, and this is reflected in the abundance of wildlife species. For example the near-constant moisture supports numerous insects. These insects typically emerge and spread into the surrounding vegetation, attracting large numbers of insect-eating birds. The multi-layered structure of riparian vegetation provides many niches for animals to occupy.

The soil moisture and surface water provides habitat for many amphibians. Common species in regional riparian habitats may include California newt (*Taricha t. torosa*), black-bellied slender salamander, Monterey ensatina (*Ensatina e. eschscholzii*), California toad, California treefrog, and Pacific chorus frog. Some reptile species also prefer the moist conditions in riparian habitats, including southwestern blind snake (*Leptotyphlops h. humilis*), San Bernardino ringneck snake (*Diadophis punctatus modestus*), San Diego night snake (*Hypsiglena torquata klauberi*), and San Diego mountain kingsnake (*Lampropeltis zonata pulchra*).

Bird species are likely to be especially diverse in riparian habitats. This is due to the variety of plant species and structural diversity. Riparian woodlands and scrub also attract migratory songbirds, some of which pass through and others that may remain to nest in the summer. Typical riparian bird species include red-shouldered hawk, great horned owl, belted kingfisher, Nuttall's woodpecker, black phoebe, house wren, warbling vireo, yellow-rumped warbler, yellow warbler, common yellowthroat, hooded oriole, Bullock's oriole, song sparrow, spotted towhee, blue grosbeak, and house finch.

Many mammals in the region may use riparian habitats occasionally, mainly for access to surface water. Typical riparian mammals (residents and casual visitors to this habitat) may include Virginia opossum (*Didelphis virginiana*), several bat species, western gray squirrel (*Scirus griseus*), dusky-footed woodrat, coyote, raccoon, striped skunk, bobcat and mule deer.

*Grassland*

Flatlands and uplands with heavy soils surrounding the site, typically support grassland communities. Grassland vegetation generally forms a mosaic or understory to oak and walnut woodlands, and occurs as openings in both coastal sage scrub and chaparral.

The dominant species within these grasslands are usually introduced annual grasses and introduced forbs. Because introduced species may dominate, this habitat association is sometimes referred to as non-native grassland. This is misleading, as these grasslands serve the ecological equivalent of native-dominated grasslands, which are rare in the Santa Monica Mountains. We prefer to call such areas dominated by non-native grass species annual grasslands, or just grasslands, which is a more accurate description of the function of this vegetation.

Exotic species are characteristically introduced Mediterranean annuals which have replaced the native California grasses. The most abundant species in the region include wild oat, red brome (*Bromus rubens*), rip-gut brome, soft chess, and introduced forbs including various filarees, bur-clover, tocalote, black mustard, and short-pod mustard.

Before grazing, cultivation and urban development displaced much of this habitat, native perennial bunch grasses were the natural species present. Important species include purple needlegrass (*Nassella pulchra*), foothill needlegrass, blue ryegrass (*Elymus glaucus*), Malpais bluegrass (*Poa secunda*) coast melica (*Melica imperfecta*), and also the annual fox-tail fescue (*Vulpia myuros hispida*). Abundant herbs species can also be found throughout the grassland areas, such as common fiddleneck (*Amsinckia menziesii* spp. *intermedia*), rusty popcorn flower (*Plagiobothrys nothofulvus*), succulent lupine (*Lupinus succulentus*), Angel's and globe gilias (*Gilia angelensis* and *G. capitata*), red maids (*Calandrinia ciliata*), miner's-lettuce, Johnny jump-ups (*Viola pedunculata*), Pacific sanicle (*Sanicula crassicaulis*), and native bulbs such as blue-dicks (*Dichelostemma capitata*), golden-stars (*Bloomeria crocea*), and Mariposa lilies (*Calochortus* spp.).

*Associated Wildlife*

As discussed above, although grasslands in the region are typically dominated by introduced plant species, they still support many of the grassland wildlife species that occur in the region, and in fact may serve as the ecological equivalent of native perennial grasslands. This is because annual grasslands still offer the resources wildlife require (food, cover, etc.). The exceptions may be those animal species that prefer open grasslands, as native grasslands are generally more open than annual grasslands, and butterflies that rely upon native grass species as their hosts.

Animal species present in grasslands provide significant food resources for animals that normally reside in the surrounding communities. Wildlife species include many species of invertebrates, particularly grasshoppers (Order: Orthoptera) and true bugs (Order: Hemiptera). Vertebrate species present may include California toad, Pacific treefrog, Great Basin fence lizard, side-blotched lizard, San Diego gopher snake, and Southern Pacific rattlesnake, and mammal species such as California ground squirrel, desert cottontail,

Botta's pocket gopher, brush mouse, western harvest mouse, and California vole (*Microtus californicus*). Grassland predators include mountain lion, bobcat, American badger, coyote, grey fox, and striped skunk. Common bird species include several raptors such as red-tailed hawk, red-shouldered hawk, Cooper's hawk, American kestrel, barn owl, great horned owl, screech owl, burrowing owl, and turkey vulture. Other bird species in grasslands include mourning dove, western kingbird, horned lark, loggerhead shrike, western meadowlark, lark sparrow, fox sparrow, and house finch.

**Sensitive Biological Resources and CNDDB Search Results**

The sensitive biological resources for the region are fully discussed in the description of the site's sensitive resources. While the discussions and tables in that section focus upon the site, the habitat requirements and probabilities for occurrence are generally the same for the regional view.

As discussed earlier, we reviewed the CNDDB (1996) report for the Thousand Oaks and Calabasas quadrangles. The results of the data base run are summarized in **Table 2**. Of the elements reported, those reported from or most likely to be present within the area include: Valley Needlegrass Grassland, Southern Coast Live Oak Riparian Forest, Lyon's pentachaeta, Santa Monica Mountains dudleya, Plummer's Mariposa lily (*Calochortus plummerae*), and San Diego horned lizard. The other species are (1) distant from the site; (2) records of transients; (3) old records no longer considered extant; or (4) the species has specific habitat needs which may occur in the area but were not observed on the site (e.g. calcareous soils).

***Wildlife Movement (Habitat Linkages)***

As urbanization continues to fragment natural habitat, the biological importance of maintaining habitat linkages has grown dramatically. In the Santa Monica Mountains, large areas of natural open space that historically maintained ecological continuity have become isolated through the construction of roads, housing tracts, business centers, industrial parks and more. In order to salvage current levels of interaction between the remnants of natural populations throughout the region, it is necessary to plan for, and to protect, undisturbed habitat parcels that link core habitat. These connecting strips are generally referred to as habitat linkages.

While habitat linkages implies an existing continuity of natural vegetation, "wildlife corridors" are generally artifacts of development. Corridors are often narrow strips of undeveloped land that are intended to maintain continuity between otherwise disconnected natural areas or fragments. Ideally, corridors provide opportunities for animal populations to interact, thus reducing the risk of genetic, ecological, and demographic isolation, and increasing species community and ecosystem stability. In reality, wildlife corridors are often designed as an afterthought, using undevelopable land for that purpose and not considering the physical and biological needs of large mammals or existing wildlife trails.

## TABLE 2

Results of CNDDB Report for the
Thousand Oaks and Calabasas Quadrangles

| ELEMENTS OF BIOLOGICAL DIVERSITY | ON THE SITE? |
|---|---|
| **Plant Communities** | |
| Valley Needlegrass Grassland | no |
| Southern Coast Live Oak Riparian Forest | no |
| Southern Sycamore Alder Riparian Woodland | no |
| Valley Oak Woodland | no |
| California Walnut Woodland | no |
| **Plant Species** | |
| Santa Susana tarplant<br>*Hemizonia minthornii* | unknown[1] |
| Lyon's pentachaeta<br>*Pentachaeta lyonii* | yes |
| Conejo dudleya<br>*Dudleya abramsii* ssp. *parva* | probably absent[2] |
| Santa Monica Mountains dudleya<br>*Dudleya cymosa* ssp. *ovatifolia* | yes |
| many-stemmed dudleya<br>*Dudleya multicaulis* | probably absent |
| Braunton's milk-vetch<br>*Astragalus brauntonii* | unknown<br>(low potential) |
| Conejo buckwheat<br>*Eriogonum crocatum* | probably absent |
| Plummer's mariposa lily<br>*Calochortus plummerae* | unknown<br>(possible) |
| San Fernando spineflower<br>*Chorizanthe parryi* ssp. *fernandina* | no[3] |
| **Animals** | |
| southwestern pond turtle<br>*Clemmys marmorata pallida* | not likely[4] |
| San Diego horned lizard<br>*Phrynosoma coronatum blainvillei* | present[5] |
| bank swallow<br>*Riparia riparia* | possible transient[6] |
| least Bell's vireo<br>*Vireo belli pusillus* | possible transient |

---

1 Plant species for which presence is "unknown" are either not identifiable when surveys were conducted, or would require focused searches to detect.

2 "Probably absent" indicates that these species are only known from areas distant from the site and/or have habitat requirements we did not observe. Their presence cannot be totally ruled out without focused surveys in the proper season.

3 Species for which a "no" is indicated are those which it is determined are highly unlikely to be present due to habitat requirements or regional status (e.g. *Chorizanthe parryi* ssp. *fernandina* is believed to be extinct).

4 This species is known from Medea Creek, but conditions on the site are marginal.

5 "Present" indicates that this species was observed on the site by MBA (1992).

6 "Possible transient" indicates that these species may occur on the site but only in migration; not likely to nest on the site.

The study of habitat linkages for the site has involved a review of pertinent literature, interpretation of aerial photographs for habitat connectivity to the subject area, and field investigations by Envicom Corporation biologists. In particular, we followed the steps proposed by Beier and Loe (1992) for evaluating wildlife movement.[11]

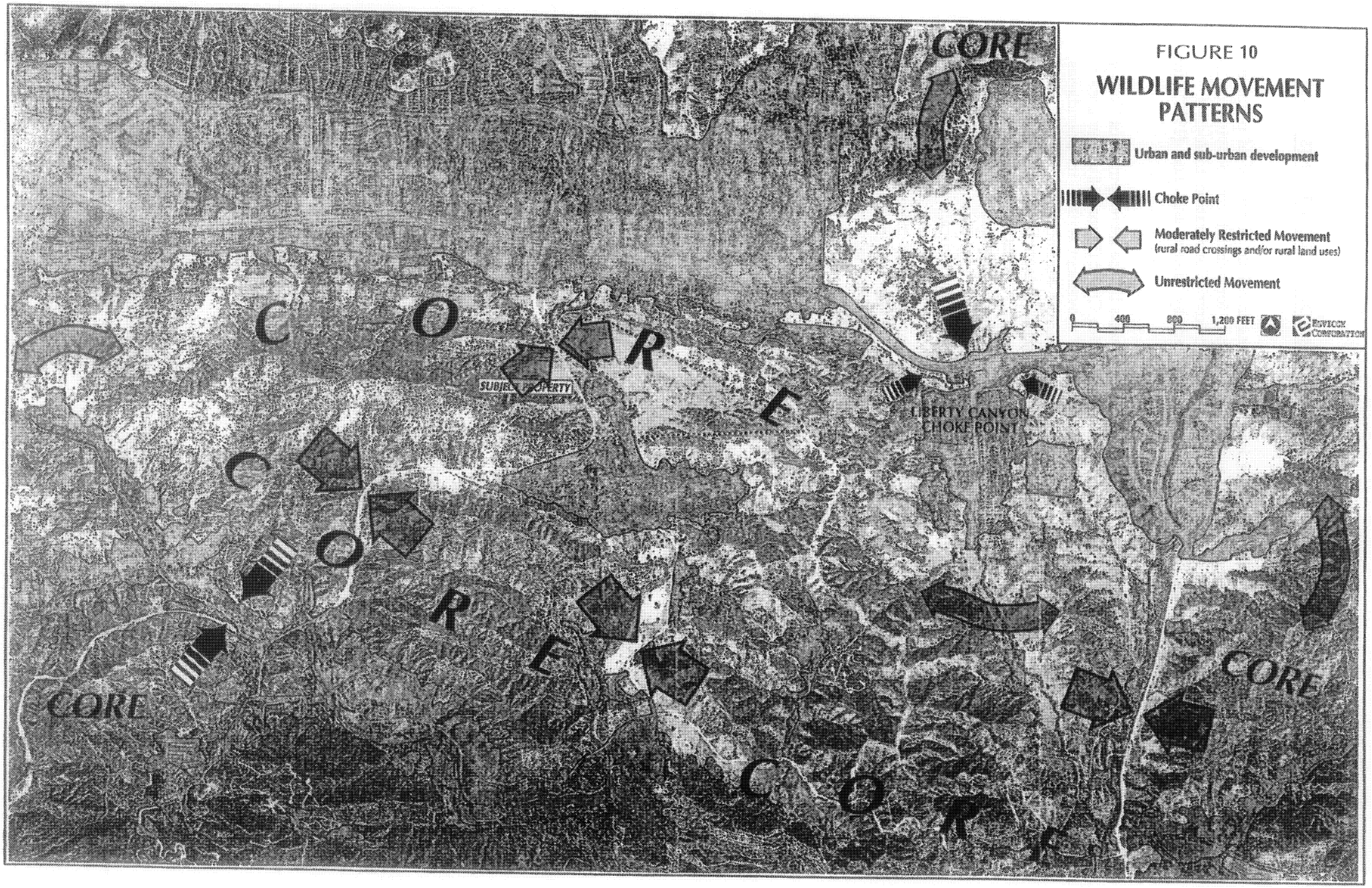
The site is divided into two large open space areas by the development of Cornell Road, Kanan Road, and residences along Medea Creek (**Figure 10**). The area to the east of Cornell has unrestricted wildlife movement within its boundaries, and has unimpeded access to regional open space at Malibu Creek State Park to the south. The northern side is closed to animal movement by urban development along Agoura Road and, to a greater degree, by the Ventura Freeway. To the west, wildlife movement is encumbered by estate developments and Cornell and Kanan roads; however, there was evidence of wildlife movement (coyote, bobcat, and mule deer tracks) along Medea Creek which may indicate that animals are moving east and west across the site, or north and south along the creek. While some animals may be able to traverse these barriers, it is more likely that most wildlife movement in the eastern portion of the site will occur to the south and east. What little fencing is present is either around the large residences, or is not an impenetrable barrier.

The half of the site west of Kanan Road has direct connection to the greater portion of the range to the west and south. As with the eastern side, animals in this half of the site are restricted in their northward movements by urbanization and the Ventura Freeway. Wildlife movement is also somewhat restricted to the east by Kanan and Cornell roads, and by residential development along Medea Creek. Also like the eastern side, this portion of the site has generally unrestricted connection to the south. In contrast to the eastern half, there is fairly open connection to the western end of the Santa Monica Mountains. The only impassable fencing is a small area of chain-link surrounding a grading operation adjacent to Kanan Road; otherwise there is no impenetrable fencing. Topography in this portion of the site is steep and rugged, but is probably not prohibitive to wildlife movement.

Edelman (1990) describes regional habitat areas that currently could maintain populations of wildlife species at risk from extirpation if these areas remain connected through a network of wildlife corridors or habitat linkages. The large-scale natural habitat areas considered in the Edelman (1990) report include the Los Padres and Angeles National Forests, the Santa Susana Mountains, the Simi Hills and the Santa Monica Mountains. Movement throughout this larger zone consists most often of dispersal, or the movement of organisms away from their place of origin.

The species at risk from habitat fragmentation (Edelman 1990) include mountain lion, bobcat, gray fox, long-tailed weasel, American badger, and numerous raptors. These "target species" may be extirpated from the Santa Monica Mountains unless viable connections within the range and to other zones (e.g. Simi Hills) are maintained.

[11] Although the Beier and Loe (1992) report was intended for evaluation of wildlife corridors incorporated into a development, the assumptions and methods for determining functionality are useful for describing existing wildlife movement patterns.


CORE
CORE
CORE
CORE
C O R E
C O R E
SUBJECT PROPERTY
LIBERTY CANYON
CHOKE POINT
FIGURE 10
WILDLIFE MOVEMENT
PATTERNS
Urban and sub-urban development
Choke Point
Moderately Restricted Movement
(rural road crossings and/or rural land uses)
Unrestricted Movement
0
400
800
1,200 FEET
RINCON
CONSULTANTS

For the site under consideration in this report, Edelman (1990) indicates that the portion east of Cornell Road is part of a large undeveloped area, and thus serves as a section of core habitat of the Santa Monica Mountains (refer to Figure 4 of Edelman 1990). The site is also directly west of a critical corridor (a "choke point") identified by Edelman from the Santa Monica Mountains to the Simi Hills through Liberty Canyon. Liberty Canyon is one of only two potential crossings of the Ventura (101) Freeway in this portion of the range. For the site, this means that animals that make the crossing at Liberty Canyon (or attempting to do so) have an area of natural habitat to reach or depart from, helping such movements to be more successful.

As indicated earlier, the site has connection to dedicated open space areas in the mountains, most importantly Malibu Creek State Park. Any connection to dedicated open space provides for movement of organisms throughout the region as these species depend upon corridors or "stepping-stones" of appropriate habitat to move from one area to another. Also of concern is the home range of species that utilize smaller areas on a daily or seasonal basis to meet life-history needs, such as those species currently utilizing the undeveloped portions of the site. Therefore, it appears that portions of the site are an integral part of the regional natural habitat, and may thus contribute to regional wildlife movement.

To summarize, the site has generally unrestricted wildlife movement within its boundaries (**Figure 10**), although large animal movement may follow established trails, ridgelines, or canyon bottoms. Access to and from the site is greatly restricted to the north by Agoura Hills and the Ventura Freeway, and somewhat inhibited within the center of the site by Kanan and Cornell roads and residential development along Medea Creek. For wildlife movement, the real value of the site may be as core habitat in the Santa Monica Mountains, providing resources for wildlife using this portion of the range.

### Regional Biological Value of the Site

The surrounding area is judged to be of high overall biological value, based upon field observations and supplemented with literature research. This region possesses a number of attributes that contribute to its value as a biological "reservoir." First, the surrounding area (especially to the southeast, east, and west) is large and relatively undeveloped. Of special importance is the interaction between riparian corridors, which provide a source of nearly perennial water with dense vegetative cover, and upland habitats. In terms of plant species, approximately one in five of all plant species in California occur in the Santa Monica Mountains, and nearly 200 of these were observed on the site, including several sensitive species. Observed and expected wildlife species include the larger mammals that range over extensive areas such as bobcat, mountain lion, mule deer, gray fox, coyote, and American badger. High biological value is further in evidence by the existing number of SEA's, parklands and reserves of the surrounding region, as listed below:

Malibu Canyon and Lagoon (SEA #5)
Hepatic Gulch (SEA #7)
Malibu Creek State Park Buffer Area (#8)
Cold Creek (SEA #9)

Cheeseboro Canyon(National Park Service)
Rocky Oaks (National Park Service)
Castro Crest (National Park Service)
Peter Strauss Ranch/Lake Enchanto (National Park Service)
Paramount Ranch (National Park Service)
Malibu Creek State Park (California Department Parks and Recreation)
Palo Comado Canyon (Santa Monica Mountains National Recreation Area)

**Relationship of the Site to Regional Biological Resources**

The site contains representative habitat of six plant communities within a relatively cohesive topographic range. Such a close-knit pattern of vegetation types encourages high usage by wildlife and also supports diverse plant species, including some disjunct desert plants. Whereas surrounding areas also support a wide array of biological resources, the unique aspect of the site is the self-contained nature of the vegetation types within two distinct topographic units. In terms of supporting wildlife, the property offers fresh water sources, nesting sites, plentiful food sources, cover and wildlife movement areas. Additionally, the community types of the subject property add considerably to the surrounding area's biological diversity. The high proportion of native plants observed indicates minimal past disturbance, except the grassland areas adjacent to Cornell Road and the Malibu Fire Station that are grazed by horses.

**BIOLOGICAL CONSTRAINTS**

The primary purpose of this report is to identify resources of concern early in the project planning effort to ensure that these resources are adequately considered in future site design and management. Therefore, the majority of this report investigated existing biological resources, both on-site and in surrounding areas, with the goal of assigning "Sensitivity Units." Delineating Sensitivity Units involved developing criteria of valuation based upon the overall mission of agencies responsible for protection of biological resources and the researchers' experience with the unique characteristics of the site and vicinity. This study ranks sensitivity into four units which recognize the protection goals of federal, state, and local public and private agencies, as well as current scientific objectives and principles.

## Sensitivity Unit Definitions

The definition of sensitivity is necessarily subjective and may take a different form with each biologist. The rankings and their characteristics presented below are based on the premise that the *more difficult an impact to a given resources would be to mitigate, the higher its sensitivity.* That is, we asked, for which resources would reviewing agencies (e.g. U.S. Fish and Wildlife Service or California Department of Fish and Game) be most likely to seek avoidance, or which would present the greatest mitigation problems. For the most part, we can conclude that sensitive species and habitats would be a high priority because they are discrete entities that normally occupy a limited space. But beyond these resources, the assignment of sensitivity must consider the biological integrity of the site as a whole, the diversity of plant and animal assemblages, and the region in which the site exists.

The areas of highest biological sensitivity **(S-1)** have one or more of the following features:

- Habitat or known locations of plant species listed by state or federal agencies as endangered, threatened or rare, or species currently proposed for such listing for this site, includes Lyon's pentachaeta and Santa Monica Mountains dudleya.
- Locations of mature oak trees and other native trees (e.g. sycamore) that are regulated by the County Oak Tree Ordinance, and provide exceptional wildlife values.
- Habitats known to provide exceptional resources, such as water, nesting sites, or abundant food; for the site, this has been limited to riparian habitats due to the intense regulatory scrutiny such habitats are given.

Because the protection of S-1 resources is of high priority, "buffer zones" are required. These buffers vary in width, depending upon the resource. Endangered plants and riparian forest include 100 foot buffers, while oak trees and riparian scrub buffers range from the immediate vicinity of the trees to 50 feet for riparian scrub.

The second most sensitive units **(S-2)** are areas supporting unique or unusual plants or communities: Coville's lip fern, cloak fern, linear-leaved goldenbush, and the stand of redshank chaparral.

The third most sensitive areas **(S-3)** are those which support the assemblages of sensitive wildlife species, and are part of the core habitat for wildlife movement. Note that the area for S-3 sensitivities covers most of the site, and that the S-2

sensitivities are discrete units within the core habitat. If the majority of the area had been assigned a higher ranking, it would imply that the sites for the unusual plant species, if listed as S-2, would constitute lower sensitivity within an area of higher sensitivity, when in fact these areas overlap. Consequently, *the level of sensitivity or differentiation between S-2 and S-3 is not so great that development would be less constrained in S-3 areas than in S-2 areas.*

The least sensitive areas (S-4) are those locations described as disturbed due to grading and removal of natural vegetation. There are two such areas within the site: one west of Kanan Road in the northern portion of the site, and the second south on Kanan, just east of the road.

**SUMMARY OF CONSTRAINTS**

These sensitivity units have been mapped as shown on **Figure 11**. Note that areas of highest sensitivity (S-1) constrain portions of the site. This is because of the presence of endangered and threatened plant species, and the number of tributaries supporting riparian habitat. The complex intergradation of several different habitat types and their continuity with off-site habitats increases the value of the site as a whole. In most cases, the remote areas are generally most sensitive, whereas areas close to existing development or human activity tend to be less sensitive. However, portions of this site that would be considered less sensitive (grasslands with a predominance of non-native species and regular disturbance) have been assigned high sensitivity because these areas are habitat for Lyon's pentachaeta.

Our findings indicate that the least sensitive areas are previously graded, undeveloped land west of Kanan Dume Road, and a second flat area above Medea Creek.

FIGURE
11

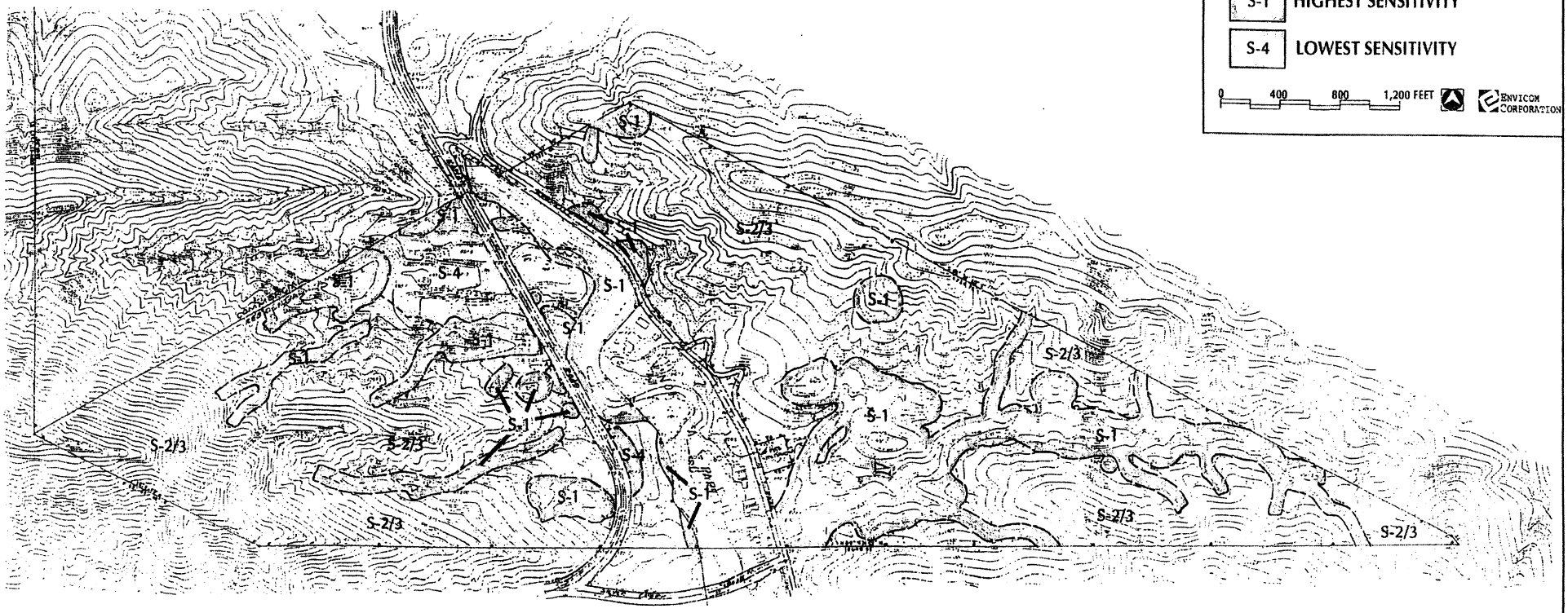
# AREAS OF HIGHEST AND LOWEST SENSITIVITY

S-1 HIGHEST SENSITIVITY

S-4 LOWEST SENSITIVITY

0 400 800 1,200 FEET

ENVICOM CORPORATION



## REFERENCES

Beier, P. And S. Loe. 1992. A Checklist for Evaluating Impacts to Wildlife Movement Corridors. Note from workshop on wildlife corridors sponsored by the Southern California Interagency Natural Areas Coordinating Committee and the California Department of Fish and Game, Riverside, California, March 20, 1991.

Booth, E.S. 1968. Mammals of Southern California. University of California Press, Berkeley, CA.

Burt, W.H. and R.P. Grossenheider. 1976. Mammals. Houghton Mifflin Co., Boston, MA.

California Department of Fish and Game. April 1994. Special Animals. California Department of Fish and Game, Natural Diversity Data Base, Sacramento, CA.

California Department of Fish and Game. July 1996. Special Plants. California Department of Fish and Game, Natural Diversity Data Base, Sacramento, CA.

California Department of Fish and Game. August 1996. Natural Diversity Data Base Rarefind Report for Thousand Oaks and Calabasas 7.5-minute Quadrangles. California Department of Fish and Game, Sacramento, CA.

California Statewide Wildlife Habitat Relationships System. 1988. Volume I: Amphibians and Reptiles. The Resources Agency, Department of Fish and Game, Sacramento, CA.

California Statewide Wildlife Habitat Relationships System. 1988. Volume II: Birds. The Resources Agency, Department of Fish and Game, Sacramento, CA.

California Statewide Wildlife Habitat Relationships System. 1988. Volume III: Mammals. The Resources Agency, Department of Fish and Game, Sacramento, CA.

DeLisle, H., G. Cantu, J. Feldner, P. O'Connor, M. Peterson, and P. Brown. 1986. The Distribution and Present Status of the Herpetofauna of the Santa Monica Mountains of Los Angeles and Ventura Counties, California. Southwestern Herpetologists' Society and the Society for the Study of Amphibians and Reptiles.

Dixon, J.R. 1967. Amphibians and Reptiles of Los Angeles County. Los Angeles County Museum of Natural History, Los Angeles, CA.

Edelman, P. 1990. Critical Wildlife Corridor/Habitat Linkages Between the Santa Susana Mountains, the Simi Hills and the Santa Monica Mountains. Santa Monica Mountains Conservancy, Malibu, California. Corrections as of 2/91.

Envicom Corporation. 1985. Draft Biology Report, George Demaree Project, Agoura, California. Prepared for Valcon, Incorporated, CA.

Friesen, R.D. 1982. Significant Ecological Areas of the Santa Monica Mountains. Prepared for Los Angeles County Department of Regional Planning. Los Angeles County Museum of Natural History.

Garrett, K. and J. Dunn. 1980. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society, Los Angeles, CA.

Garth, J.S. and J.W. Tilden. 1986. California Butterflies. University of California Press, Berkeley, CA.

Hickman, J. (ed.). 1993. The Jepson Manual, Higher Plants of California. Univ. Cal. Press, Berkeley.

Hogue, C.L. 1993. Insects of the Los Angeles Basin.

Holland, R.F. 1986. Preliminary Description of the Terrestrial Natural Communities of California. California Resources Agency, Department of Fish and Game, Non-game Heritage Program, Sacramento, CA.

Ingles, L.G. 1965. Mammals of the Pacific States. Stanford University Press, Stanford, CA.

Jameson, E.W., Jr. and H.J. Peeters. 1988. California Mammals. University of California Press, Berkeley, CA.

Jennings, M. and M. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, CA.

Lieberstein, T. *et al.* 1987. Wildlife Corridor Design: A case study for Los Angeles and Ventura Counties. Part III in the Series: Biogeography and the Zoo. California State University, Northridge, CA.

Los Angeles County. 1981. The Malibu/Santa Monica Mountains Area Plan, (December). Department of Regional Planning.

Los Angeles County. 1988. General Plan (November). Department of Regional Planning.

Malibu Local Coastal Plan. 1987. Los Angeles County Department of Regional Planning, Los Angeles, CA.

Manion. 1988. Proposed Wildlife Corridor Definition and Statement. Topanga-Las Virgenes Resource Conservation District, Topanga, CA.

Mattoni, R. 1990. The Butterflies of Los Angeles and Vicinity. Private Publisher, Beverly Hills, CA.

Michael Brandman Associates (MBA). 1992. Sensitive Species Survey for the Creekside Terrace Project Site. Prepared for Beautiful City, Agoura Hills, CA.

Munz, P.A. 1974. A Flora of Southern California. University of California Press, Berkeley, CA.

National Park Service (NPS). 1981. Draft Natural Resource Management Plan Environmental Assessment. Department of the Interior, Santa Monica Mountains National Recreation Area. Agoura Hills, CA.

NPS. 1982. General Management Plan. Department of the Interior, Santa Monica Mountains National Recreation Area. Agoura Hills, CA.

NPS. 1987. Birds of the Santa Monica Mountains National Recreation Area: An Annotated Checklist. Department of the Interior, Santa Monica Mountains National Recreation Area. Agoura Hills, CA.

Raven, P. H. Thompson and B. Prigge. 1986. Flora of the Santa Monica Mountains, California. Southern California Botanists, Special Publication No. 2, 2nd Edition, University of California, Los Angeles, CA.

Remsen, J.V., Jr. 1978. Bird Species of Special Concern in California. California Department of Fish and Game Non-game Wildlife Report No. 78-1. Sacramento, CA.

Smith, H.M. 1978. A Guide to Field Identification: Amphibians of North America. Golden Press, New York, NY.

Smith H.M. and E.D. Brodie, Jr. 1982. A Guide to Field Identification: Reptiles of North America. Golden Press, New York, NY.

Soulé, M.E. 1989. National Park Service Proposed Land Exchange Wildlife Corridors. Prepared for the Department of the Interior, Santa Monica Mountains National Recreation Area, Agoura Hills, CA.

Stebbins, R.C. 1985. Western Reptiles and Amphibians. University of California Press, Berkeley, CA.

Whitaker, J.O., Jr. 1980. The Audubon Society Field Guide to North American Mammals. A.A. Knopf, Inc., New York, NY.

Williams, D.F. 1986. Mammalian Species of Special Concern in California. California Department of Fish and Game Wildlife Management Division Administrative Report 86-1. Sacramento, CA.

Yerkes, R.F. and R.H. Campbell. 1979. Stratigraphic Nomenclature of the Central Santa Monica Mountains, Los Angeles County, California. Geological Survey Bulletin 1457-E. USGS Washington D.C.

## APPENDIX A

Vascular Plants of the Beautiful City Project Site
Envicom Corp. survey, December 16 and 19, 1996[1]

| | | ABUNDANCE | |
|---|---|---|---|
| **FERNS AND ALLIES** | | **Site** | **Region** |
| **Selaginellaceae** | **spike-moss family** | | |
| *Selaginella bigelovii* | Bigelow's spike-moss | c | a |
| **Pteridaceae** | **brake family** | | |
| *Adiantum jordanii* | California maidenhair | u | a |
| *Cheilanthes covillei* | Coville's lip fern | r | r |
| *Notholaena californica* ssp. *leucophylla* | California cloak fern | r | r |
| *Pellaea andromedifolia* var. *a.* | coffee fern | r | a |
| *Pellaea mucronata* | bird's-foot fern | r | a |
| *Pentagramma triangularis* var. *t.* | goldback fern | c | a |
| **FLOWERING PLANTS-DICOTS** | | | |
| **Anacardiaceae** | **sumac or cashew family** | | |
| *Malosma laurina* | laurel sumac | c | a |
| *Rhus ovata* | sugar bush | c | a |
| *Rhus trilobata* | squaw bush | u | a |
| *Toxicodendron diversilobum* | western poison-oak | c | a |
| **Apiaceae** | **carrot family** | | |
| *Apium graveolens* | celery | r | a |
| *Conium maculatum* | poison hemlock | u | a |
| *Foeniculum vulgare* | fennel | u | a |
| *Lomatium dasycarpum* | hog fennel | u | a |
| *Lomatium lucidum* | shiny-leaf lomatium | r | u |
| *Sanicula crassicaulis* | Pacific sanicle | u | a |
| *Tauschia arguta* | southern tauschia | u | a |
| **Asclepiadaceae** | **milkweed family** | | |
| *Asclepias fascicularis* | narrow-leaf milkweed | u | a |
| **Asteraceae** | **sunflower family** | | |
| *Ambrosia psilostachya* var. *californica* | western ragweed | u | a |
| *Artemisia californica* | California sagebrush | c | a |
| *Artemisia douglasiana* | mugwort | u | a |
| *Baccharis pilularis* ssp. *consanguinea* | coyote brush | c | a |
| *Baccharis salicifolia* | mule fat; seep-willow | u | a |
| *Brickellia californica* | California brickellbush | r | a |
| *Carduus pycnocephalus* | Italian thistle | a | a |
| *Centauria melitensis* | tocalote | a | a |
| *Cirsium vulgare* | bull thistle | u | a |
| *Encelia californica* | coast encelia | c | a |
| *Ericameria linearifolia* | interior goldenbush | r | r |
| *Erigeron foliosus* var. *stenophyllus* | fleabane daisy | u | a |
| *Eriophyllum confertiflorum* var. *c.* | golden-yarrow | c | a |
| *Gnaphalium bicolor* | two-tone everlasting | u | a |
| *Gnaphalium californicum* | fragrant or green everlasting | c | a |
| *Hemizonia fasciculata* | slender tarweed | c | a |

[1] Abundances for site and for region given as rare, uncommon, common or abundant.

## APPENDIX A (cont.)

Vascular Plants of the Beautiful City Project Site
Envicom Corp. survey, December 16 and 19, 1996

| | | | |
|---|---|---|---|
| **Asteraceae (cont.)** | | | |
| *Heterotheca grandiflora* | telegraph weed | c | a |
| *Hypochaeris glabra* | cat's-ear | c | a |
| *Isocoma menziesii* var. *vernonioides* | coast isocoma | c | a |
| *Lactuca serriola* | prickly lettuce | c | a |
| *Lasthenia californica* | goldfield | c | a |
| *Lessingia filaginafolia* ssp. *latifolia* | California-aster | c | a |
| *Malacothrix saxatilis* var. *tenuifolia* | cliff-aster | c | a |
| *Micropus californicus* var. *c.* | slender cottonweed | u | a |
| *Pentachaeta lyonii* | Lyon's pentachaeta | u | r |
| *Senecio vulgaris* | common groundsel | a | a |
| *Silybum marianum* | milk thistle | u | a |
| *Sonchus oleraceus* | common sow thistle | a | a |
| *Stephanomeria virgata* ssp. *v.* | wand chicory | c | a |
| *Uropappus lindleyi* | silver puffs | u | u |
| *Xanthium strumarium* | cocklebur | u | a |
| **Boraginaceae** | **borage family** | | |
| *Amsinckia menziesii* var. *intermedia* | common fiddleneck; rancher's fireweed | c | a |
| *Cryptantha* sp.[2] | popcorn flower | c | a |
| *Pectocarya linearis* var. *ferocula* | linear-leaf pectocarya | c | a |
| *Plagiobothrys nothofulvus* | popcorn flower | c | a |
| **Brassicaceae** | **mustard family** | | |
| *Brassica nigra* | black mustard | a | a |
| *Capsella bursa-pastoris* | shepherd's purse | c | a |
| *Hirschfeldia incana* | shortpod mustard | a | a |
| *Lepidium latifolium* | whitetop | u | u |
| *Lepidium nitidum* | shining peppergrass | a | a |
| **Caprifoliaceae** | **honeysuckle family** | | |
| *Lonicera subspicata* var. *denudata* | southern honeysuckle | c | a |
| *Sambucus mexicana* | blue elderberry | u | a |
| **Caryophyllaceae** | **pink family** | | |
| *Silene gallica* | windmill pink | a | a |
| **Chenopodiaceae** | **goosefoot family** | | |
| *Atriplex semibaccata* | Australian saltbush | u | a |
| *Chenopodium ambrosioides* | Mexican tea | r | r |
| *Chenopodium californicum* | soap plant | u | a |
| *Salsola tragus* | Russian-thistle | a | a |
| **Convolvulaceae** | **morning-glory family** | | |
| *Calystegia macrostegia* ssp. *cyclostegia* | chaparral morning-glory | c | a |
| **Crassulaceae** | **stonecrop family** | | |
| *Crassula connata* | pygmyweed | c | a |
| *Dudleya cymosa* ssp. *ovatifolia*[3] | Santa Monica Mountains dudleya | r | r |

---

2 Seedlings observed could be one or more species.

3 Plants at this location have been named *D. c.* ssp. *agourensis* Nakai.

## APPENDIX A (cont.)

Vascular Plants of the Beautiful City Project Site
Envicom Corp. survey, December 16 and 19, 1996

| | | | |
|---|---|---|---|
| **Crassulaceae (cont.)** | | | |
| *Dudleya lanceolata* | lance-leaf dudleya | u | a |
| *Dudleya pulverulenta* ssp. *p.* | chalk dudleya | r | u |
| **Cucurbitaceae** | **gourd family** | | |
| *Marah macrocarpus* var. *m.* | manroot | u | a |
| **Ericaceae** | **heath family** | | |
| *Arctostaphylos glauca* | bigberry manzanita | r | u |
| **Euphorbiaceae** | **spurge family** | | |
| *Eremocarpus setigerus* | turkey-mullein | c | a |
| **Fabaceae** | **pea family** | | |
| *Astragalus didymocarpus* var. *d.* | two-seeded milkvetch | r | a |
| *Lotus purshianus* | Spanish clover | a | a |
| *Lotus scoparius* var. *s.* | deerbush; California broom | u | a |
| *Lotus* sp.[4] | hosackia | a | a |
| *Lupinus microcarpus* var. *m.* | chick lupine | r | r |
| *Lupinus succulentus* | arroyo lupine | r | a |
| *Lupinus* sp.[5] | lupine | r | u |
| *Medicago polymorpha* | California burclover | a | a |
| *Vicia villosa* ssp. *v.* | winter or hairy vetch | a | a |
| **Fagaceae** | **oak family; beech family** | | |
| *Quercus agrifolia* var. *a.* | coast live oak; encina | r | a |
| *Quercus berberidifolia* | scrub oak | c | a |
| *Quercus lobata* | valley oak; roble | r | u |
| **Geraniaceae** | geranium family | | |
| *Erodium botrys* | broad-leaf filaree | r | a |
| *Erodium cicutarium* | red-stem filaree | a | a |
| **Grossulariaceae** | **gooseberry family** | | |
| *Ribes malvaceum* ssp. *viridifolium* | chaparral currant | r | a |
| *Ribes speciosum* | fuchsia-flowered gooseberry | r | a |
| **Hydrophyllaceae** | **waterleaf family** | | |
| *Eucrypta chrysanthemifolia* var. *c.* | common eucrypta | c | a |
| *Nemophila menziesii* var. ? | baby blue-eyes | u | a |
| *Phacelia ramosissima* var. *latifolia* | branching phacelia | u | a |
| *Pholistoma auritum* var. *a.* | fiesta flower | c | a |
| **Juglandaceae** | **walnut family** | | |
| *Juglans californica* var. c. | southern California black walnut | r | u |

---

4 No flowers or fruits- *L. salsuginosus-strigosus-wrangelianus* complex.

5 Possibly *L. concinnus.*

## APPENDIX A (cont.)

Vascular Plants of the Beautiful City Project Site
Envicom Corp. survey, December 16 and 19, 1996

| | | | |
|---|---|---|---|
| **Lamiaceae** | **mint family** | | |
| *Marrubium vulgare* | horehound | r | a |
| *Salvia apiana* | white sage | r | a |
| *Salvia columbariae* | chia | u | a |
| *Salvia leucophylla* | purple sage | r | a |
| *Salvia mellifera* | black sage | a | a |
| *Trichostema lanceolata* | vinegar weed | c | a |
| **Malvaceae** | **mallow family** | | |
| *Malacothamnus fasciculatus* var. *laxiflorus* | chaparral mallow | c | a |
| **Nyctaginaceae** | four o'clock family | | |
| *Mirabilis californicus* | wishbone bush | c | a |
| **Oleaceae** | **olive family** | | |
| *Fraxinus dipetala* | California ash | u | a |
| **Onagraceae** | **evening primrose family** | | |
| *Camissonia californica* | mustard evening primrose | c | a |
| *Camissonia* sp.[6] | sun cup | c | a |
| *Clarkia unguiculata*[7] | elegant clarkia | c | a |
| *Clarkia* spp.[8] | clarkia | c | a |
| *Epilobium canum* ssp. *angustifolium* | California fuchsia | c | a |
| **Paeoniaceae** | **peony family** | | |
| *Paeonia californica* | California peony | r | a |
| **Plantaginaceae** | **plantain family** | | |
| *Plantago erecta* | California plantain | a | a |
| **Platanaceae** | **plane tree; sycamore family** | | |
| *Platanus racemosa* | western sycamore | r | u |
| **Polemoniaceae** | **phlox family** | | |
| *Eriastrum sapphirinum* | sapphire star | r | c |
| **Polygonaceae** | **buckwheat family** | | |
| *Chorizanthe staticoides* | Turkish rugging | r | a |
| *Eriogonum elongatum* var. *e.* | long-stem buckwheat | a | a |
| *Eriogonum fasciculatum* ssp. ? | California buckwheat | a | a |
| *Pterostegia drymarioides* | threadstem | r | a |
| *Rumex crispus* | curly dock | c | a |
| *Rumex salicifolius* var. *crassus* | willow dock | r | u |
| **Portulaceae** | **purslane family** | | |
| *Calyptridium monandrum?* | pussy-paws | u | u |
| *Claytonia perfoliata* | miner's-lettuce | c | a |

---

6 Possibly *C. intermedia.*

7 Identified at this time of year by fruits that are conspicuously hairy.

8 Could include one or more of *C. bottae, C. cylindrica, or C. purpurea.*

## APPENDIX A (cont.)

Vascular Plants of the Beautiful City Project Site
Envicom Corp. survey, December 16 and 19, 1996

| | | | |
|---|---|---|---|
| **Primulaceae** | **primrose family** | | |
| *Anagallis arvensis*[9] | scarlet pimpernell; poor-man's weatherglass | a | a |
| **Ranunculaceae** | **buttercup family** | | |
| *Delphinium parryi* ssp. *p.* | Parry's larkspur | u | u |
| **Rhamnaceae** | **buckthorn family** | | |
| *Ceanothus crassifolius* | hoaryleaf ceanothus | r | a |
| *Ceanothus megacarpus* | bigpod ceanothus | c | a |
| *Rhamnus californica* ssp. *c.* | California coffeeberry | u | a |
| *Rhamnus ilicifolia* | holly-leaf redberry | u | a |
| **Rosaceae** | **rose family** | | |
| *Adenostoma fasciculatum* | chamise | c | a |
| *Adenostoma sparsifolium* | red shank | r | r |
| *Cercocarpus betuloides* var. *b.* | birch-leaf mountain mahogany | c | a |
| *Prunus ilicifolia* ssp. *i.* | islay; holly-leaved cherry | u | a |
| *Rosa californica* | California rose | u | u |
| **Rubiaceae** | **bedstraw family** | | |
| *Galium angustifolium* ssp. *a.* | narrow-leaved bedstraw | c | a |
| *Galium aparine* | goose grass | c | a |
| *Galium nuttallii* ssp. *n.* | San Diego bedstraw | u | a |
| **Salicaceae** | **willow family** | | |
| *Populus fremontii* ssp. *f.* | Fremont cottonwood | r | u |
| *Salix laevigata* | red willow | u | u |
| *Salix lasiolepis* | arroyo willow | u | a |
| **Saxifragaceae** | **saxifrage family** | | |
| *Saxifraga californica* | California saxifrage | r | u |
| **Scrophulariaceae** | **figwort family** | | |
| *Collinsia heterophylla* | Chinese houses | u | a |
| *Cordylanthus rigidus* ssp. *r.* | bird's-beak | u | a |
| *Keckiella cordifolia* | heart-leaf penstemon | c | a |
| *Mimulus aurantiacus*[10] | orange bush monkeyflower | c | a |
| **Solanaceae** | **nightshade family** | | |
| *Datura wrightii* | jimson weed; tolguache | r | a |
| *Nicotiana glauca* | tree tobacco | u | a |
| *Solanum douglasii* | Douglas' or white nightshade | r | a |
| *Solanum xanti* var. *intermedium* | purple or chaparral nightshade | c | a |

[9] An unusual blue flowered population occurs here, along with scarlet.

[10] Treated as *Mimulus longiflorus* in earlier references.

## APPENDIX A (cont.)

Vascular Plants of the Beautiful City Project Site
Envicom Corp. survey, December 16 and 19, 1996

| | | | |
|---|---|---|---|
| **Verbenaceae** | **vervain family** | | |
| *Verbena robusta* var. *scabrida* | western verbena | u | a |

**FLOWERING PLANTS-MONOCOTS**

| | | | |
|---|---|---|---|
| **Juncaceae** | **rush family** | | |
| *Juncus mexicanus* | Mexican rush | r | u |
| **Liliaceae** | **Lily family** | | |
| *Bloomeria crocea* | goldenstar | r | u |
| *Calochortus catalinae*[11] | Catalina mariposa lily | r | u |
| *Calochortus* sp.[12] | mariposa | r | u |
| *Chlorogalum pomeridianum* var. *p.* | wavy-leaf soap plant | u | a |
| *Dichelostema capitata* ssp. *c.* | blue dicks | u | a |
| *Yucca whipplei* ssp. *intermedia* | our lord's candle | r | a |
| **Poaceae** | **grass family** | | |
| *Acnatherum coronatum* | giant stipa | r | u |
| *Avena barbata* | slender wild oat | a | a |
| *Bromus diandrus* | ripgut grass | a | a |
| *Bromus hordeaceus* | soft brome; soft chess | a | a |
| *Bromus madritensis* ssp. *rubens* | foxtail chess | a | a |
| *Distichlis spicata* | salt grass | r | r |
| *Hordeum murinum* ssp. *glaucum* | hare barley; foxtail barley | a | a |
| *Leymus condensatus* | giant ryegrass | r | a |
| *Melica imperfecta* | coast melic | u | a |
| *Nassella lepida* | foothill needlegrass | c | a |
| *Nassella* sp.[13] | needlegrass | u | a |
| *Piptatherum miliaceum* | smilo grass | u | a |
| *Poa secunda* ssp. *s.* | one-sided bluegrass | u | a |
| *Vulpia myuros* var. *m.* | rattail fescue | a | a |

---

[11] Determined by distinctive capsule shape.

[12] One or more of *C. clavatus*, *C. venustus*, or *C. plummerae* anticipated.

[13] No fruits- either *N. pulchra* or *N. cernua*.

## APPENDIX B

Observed and Expected Fauna[1]

LEGEND

ABUNDANCE

c = common - observed or expected throughout the area in high numbers; should be easily seen on most site visits in appropriate habitat and season

f = fairly common - observed or expected in moderate numbers over most of the area; should be located during active searches in appropriate habitat and season

u = uncommon - observed or expected in low numbers in a portion or all of the site; may be seen on a few site visits

o = occasional - observed or expected only sporadically on the site; only casually observed during site visits, even in suitable habitat and season; no more than a few individuals are present at any time

s = scarce - observed or expected rarely; may be observed if site is visited frequently at appropriate season and in suitable habitat; usually individual observations, rarely more than one present at a given time

+ = presence noted by direct observation, identification of vocalization, or observation of diagnostic sign (scat, tracks, burrows, etc.)

* = non-native

SEASONALITY (Birds Only)

R = resident - expected on the site any time of year

S = summer - present only during summer nesting season

W = winter - present only during winter; nests elsewhere

V = visitor - nests off-site but may occur on the site from nearby areas

T = transient - seen in migration; unlikely to nest in the region

| FAMILY<br>*Scientific Name* | Common Name (Status[2] | Abundance | |
|---|---|---|---|
| | | Site | Region |
| **AMPHIBIANS** | | | |
| SALAMANDRIDAE - Newts | | | |
| *Taricha t. torosa* | California newt (CSC) | s | u |
| PLETHODONTIDAE - Lungless Salamanders | | | |
| *Aneides lugubris* | arboreal salamander | s | s |
| *Batrachoseps nigriventris* | black-bellied slender salamander | f | f |
| *Batrachoseps pacificus major* | garden (Pacific) slender salamander | o | o |
| *Ensatina e. eschscholtzii* | Monterey ensatina | s | s |
| BUFONIDAE - True Toads | | | |
| *Bufo boreas halophilus* | California (western) toad | f | c |

[1] Includes observations by Envicom biologists in 1996 and MBA (1992).

[2] Status codes are defined at the end of the appendix.

**APPENDIX B (cont.)**

Observed and Expected Fauna

| FAMILY *Scientific Name* | Common Name | Abundance | |
|---|---|---|---|
| | | Site | Region |
| HYLIDAE - Treefrogs | | | |
| *Hyla regilla* | Pacific chorus frog | o | f |
| *Hyla cadaverina* | California treefrog | s | u |
| RANIDAE - True Frogs | | | |
| *Rana catesbeiana* | bullfrog | s | u |
| **REPTILES** | | | |
| EMYDIDAE - Box and Water Turtles | | | |
| *Clemmys marmorata pallida* | southwestern (western) pond turtle (CSC, F2) | | s |
| IGUANIDAE - Iguanid Lizards | | | |
| + *Sceloporus occidentialis biseriatus* | Great Basin (western) fence lizard | c | c |
| + *Uta stansburiana hesperis* | California side-blotched lizard | c | c |
| *Phrynosoma coronatum blainvillei* | San Diego coast horned lizard (CSC, F2) | s | s |
| SCINCIDAE - Skinks | | | |
| *Eumeces s. skiltonianus* | western skink | f | f |
| TEIIDAE - Whiptail Lizards | | | |
| *Cnemidophorus tigris multiscutatus* | coastal (western) whiptail (F2) | s | o |
| ANGUIDAE - Alligator Lizards | | | |
| *Gerrhonotus multicarinatus webbi* | San Diego (southern) alligator lizard | f | c |
| ANNIELLIDAE - California Legless Lizards | | | |
| *Anniella p. pulchra* | silvery legless lizard (CSC) | s | s |
| LEPTOTYPHLOPIDAE - Slender Blind Snakes | | | |
| *Leptotyphlops h. humilis* | southwestern blind snake | s | s |
| COLUBRIDAE - Colubrid Snakes | | | |
| *Diadophis punctatus modestus* | San Bernardino ringneck snake (F2) | s | o |
| *Masticophis l. lateralis* | chaparral whipsnake (California striped racer) | f | c |
| *Masticophis flagellum piceus* | red coachwip (red racer) | s | o |
| *Coluber constrictor mormon* | western yellow-bellied racer | s | o |
| *Pituophis melanoleucus annectens* | San Diego gopher snake | f | c |
| *Salvadora hexalepis virgultea* | coast (western) patch-nosed snake (CSC,F2) | s | s |
| *Lampropeltis zonata pulchra* | San Diego (California) mountain kingsnake (CSC, F2) | s | o |
| *Lampropeltis getulus californiae* | California (common) kingsnake | u | f |
| *Tantilla planiceps* | California black-headed snake | s | s |
| *Trimorphodon biscutatus vandenburghi* | California lyre snake | s | s |
| *Hypsiglena torquata klauberi* | (San Diego) night snake | o | u |

**APPENDIX B (cont.)**

Observed and Expected Fauna

| FAMILY<br>*Scientific Name* | Common Name | Abundance<br>Site | <br>Region |
|---|---|---|---|
| VIPERIDAE - Vipers | | | |
| *Crotalis viridis helleri* | southern pacific (western) rattlesnake | o | u |
| **BIRDS** | | | |
| ARDEIDAE - Bitterns and Herons | | | |
| *Ardea herodias* | great blue heron (SA) | s,V | s,V |
| *Butorides striatus* | green-backed heron | s,V | s,V |
| *Ardea alba* | great egret | s,V | s,V |
| *Egretta thula* | snowy egret | s,V | s,V |
| *Nycticorax nycticorax* | black-crowned night heron (SA) | s,V | s,V |
| ANATIDAE - Swans, Geese and Ducks | | | |
| *Aix sponsa* | wood duck | s,T | s,T |
| *Anas platyrhynchos* | mallard | s,T | c,R |
| CATHARTIDAE - New World Vultures | | | |
| + *Cathartes aura* | turkey vulture | u,R/V | f,R/V |
| ACCIPITRIDAE - Hawks | | | |
| *Elanus caeruleus* | black-shouldered kite (SA, CP) | s,R/o,W | o,R/f,W |
| *Circus cyaneus* | northern harrier (CSC) | s,W | o,W |
| *Accipiter striatus* | sharp-shinned hawk (CSC) | o,W/u,T | u,W/f,T |
| + *Accipiter cooperii* | Cooper's hawk (CSC) | u,W/T | f,W/T |
| *Buteo lineatus* | red-shouldered hawk | o,R | f,R |
| + *Buteo jamaicensis* | red-tailed hawk | u,R | f,R |
| *Aquila chrysaetos* | golden eagle (CSC, CP) | s,V | o,V |
| FALCONIDAE - Falcons | | | |
| + *Falco sparverius* | American kestrel | u,R | f,R |
| *Falco mexicanus* | prairie falcon (CSC) | s,V/o,W | o,V/o,W |
| PHASIANIDAE - Grouse and Quail | | | |
| + *Callipepla californica* | California quail | f,R | f,R |
| CHARADRIIDAE - Plovers | | | |
| *Charadrius vociferus* | killdeer | o,W/s,R | c,W/u,R |
| COLUMBIDAE - Doves and Pigeons | | | |
| *Columba fasciata* | band-tailed pigeon | o,R | o,R |
| *Columba livia* | rock dove | u,R | u,R |
| *Zenaida macroura* | mourning dove | f,R | f,R |
| CUCULIDAE - Cuckoos | | | |
| + *Geococcyx americanus* | greater roadrunner | u,R | u,R |
| TYTONIDAE - Barn Owls | | | |
| *Tyto alba* | barn owl | o,R | f,R |

**APPENDIX B (cont.)**

Observed and Expected Fauna

| FAMILY<br>*Scientific Name* | Common Name | Abundance | |
|---|---|---|---|
| | | Site | Region |
| STRIGIDAE - Typical Owls | | | |
| *Otus kennicottii* | western screech-owl | s,R | u,R |
| *Bubo virginianus* | great-horned owl | u,R | f,R |
| *Athene cunicularia* | burrowing owl (CSC) | s,R | s,R |
| CAPRIMULGIDAE - Goatsuckers (Nightjars) | | | |
| *Phalaenoptilus nuttallii* | common poorwill | o,S/o,T | o,S/u,T |
| APODIDAE - Swifts | | | |
| *Cypseloides niger* | black swift (CSC) | s,T | s,T |
| *Chaetura vauxi* | Vaux's swift | u,T | f,T |
| + *Aeronautes saxatalis* | white-throated swift | u,R | f,R |
| TROCHILIDAE - Hummingbirds | | | |
| *Archilochus alexandri* | black-chinned hummingbird | f,S | c,S |
| *Calypte costae* | Costa's hummingbird | u,S/s,W | f,S/o,W |
| + *Calypte anna* | Anna's hummingbird | c,R | c,R |
| *Selasphorus rufus* | rufous hummingbird | u,T | f,T |
| *Selasphorus sasin* | Allen's hummingbird | u,T | c,T |
| ALCEDINIDAE - Kingfishers | | | |
| *Ceryle alcyon* | belted kingfisher | s,R | o,R |
| PICIDAE - Woodpeckers | | | |
| *Melanerpes lewis* | Lewis' woodpecker (S) | s,W | s,W |
| + *Melanerpes formicivorus* | acorn woodpecker | f,R | c,R |
| *Sphyrapicus ruber* | red-breasted sapsucker | u,W/u,T | f,W/f,T |
| *Sphyrapicus nuchalis* | red-naped sapsucker | s,T/s,W | o,T/s,W |
| *Picoides nuttallii* | Nuttall's woodpecker | u,R | f,R |
| *Picoides pubescens* | downy woodpecker | o,R | o,R |
| + *Colaptes auratus* | northern flicker (red-shafted) | f,R | f,R |
| TYRANNIDAE - Tyrant Flycatchers | | | |
| *Tyrannus vociferans* | Cassin's kingbird | o,S/o,W | f,S/u,W |
| *Tyrannus verticalis* | western kingbird | o,S | u,S |
| *Myiarchus cinerascens* | ash-throated flycatcher | u,S/o,T | f,S/f,T |
| *Contopus sordidulus* | western wood-pewee | o,S/o,T | u,S/f,T |
| *Contopus borealis* | olive-sided flycatcher | s,T | u,T |
| + *Sayornis nigricans* | black phoebe | f,R | f,R |
| *Sayornis saya* | Say's phoebe | u,W | f,W |
| *Empidonax hammondii* | Hammond's flycatcher | s,T | u,T |
| *Empidonax difficilis* | Pacific-slope flycatcher | f,S/c,T | f,S/c,T |
| ALAUDIDAE - Larks | | | |
| *Eremophila alpestris* | horned lark | s,T/S,W | c,T/f,W |
| HIRUNDINIDAE - Swallows | | | |
| *Tachycineta bicolor* | tree swallow | c,T/s,W | c,T/s,W |
| *Tachycineta thalassina* | violet-green swallow | o,W/f,T | o,W/f,T |
| *Stelgidopteryx serripennis* | northern rough-winged swallow | c,S/c,T | c,S/c,T |

## APPENDIX B (cont.)

Observed and Expected Fauna

| FAMILY<br>*Scientific Name* | Common Name | Abundance | |
|---|---|---|---|
| | | Site | Region |
| HIRUNDINIDAE - Swallows (cont.) | | | |
| *Hirundo pyrrohnota* | cliff swallow | f,S/c,T | f,S/c,T |
| *Hirundo rustica* | barn swallow | f,T | f,T |
| CORVIDAE - Crows, Jays, and Magpies | | | |
| + *Corvus brachyrhynchos* | American crow | f,R | f,R |
| *Corvus corax* | common raven | f,R | c,R |
| + *Apehelocoma californica* | western scrub-jay | c,R | c,R |
| PARIDAE - Chickadees and Titmice | | | |
| *Parus inornatus* | plain titmouse | u,R | f,R |
| AEGITHALIDAE - Bushtits | | | |
| + *Psaltriparus minimus* | bushit | c,R | c,R |
| SITTIDAE - Nuthatches | | | |
| *Sitta carolinensis* | white-breasted nuthatch | o,R | o,R |
| CERTHIIDAE - Creepers | | | |
| *Certhia americana* | brown creeper | s,W | o,W |
| TROGLODYTIDAE - Wrens | | | |
| *Salpinctes obsoletus* | rock wren | s,R | o,R |
| *Catherptes mexicanus* | canyon wren | s,R | u,R |
| + *Thryomanes bewickii* | Bewick's wren | u,R | f,R |
| *Troglodytes aedon* | house wren | o,R | f,R |
| MUSCICAPIDAE (part) - Kinglets and Gnatcatchers | | | |
| + *Regulus calendula* | ruby-crowned kinglet | f,W | c,W |
| *Regulus satrapa* | golden-crowned kinglet | s,W | s,W |
| *Polioptila caerulea* | blue-gray gnatcatcher | u,S | f,S |
| MUSCICAPIDAE (part) - Thrushes | | | |
| *Turdus migratorius* | American robin | u,R | c,R |
| *Ixoreus naevius* | varied thrush | s,W | s,W |
| *Myadestes townsendi* | Townsend's solitaire | s,W | o,W |
| *Catharus ustulatus* | Swainson's thrush | s,S | s,S |
| *Catharus guttatus* | hermit thrush | o,W | f,W |
| *Sialia mexicana* | western bluebird (S) | u,R/f,W | f,R/c,W |
| + *Chamaea fasciata* | wrentit | c,R | c,R |
| MIMIDAE - Mimic Thrushes | | | |
| *Mimus polyglottos* | northern mockingbird | f,R | c,R |
| + *Toxostoma redivivum* | California thrasher | f,R | f,R |
| MOTACILLIDAE - Wagtails and Pipits | | | |
| *Anthus rufescens* | American pipit | s,W | u,W |
| BOMBYCILLIDAE- Waxwings | | | |
| *Bombycilla cedrorum* | cedar waxwing | o,W | o,W |

**APPENDIX B (cont.)**

Observed and Expected Fauna

| FAMILY *Scientific Name* | Common Name | Abundance Site | Abundance Region |
|---|---|---|---|
| PTILOGONATIDAE- Silky Flycatchers | | | |
| + *Phainopepla nitens* | phainopepla | u,R | u,R |
| LANIIDAE - Shrikes | | | |
| *Lanius ludovicianus* | loggerhead shrike (F2, CSC) | s,R | u,R |
| STURNIDAE - Starlings | | | |
| *Sternus vulgaris* | European starling | f,R | c,R |
| VIREONIDAE - Vireos | | | |
| *Vireo solitarius* | solitary vireo | o,T | u,T |
| *Vireo huttonii* | Hutton's vireo | s,R | f,R |
| *Vireo gilvus* | warbling vireo | f,T | c,T |
| EMBERIZIDAE (part) - Wood Warblers | | | |
| + *Dendroica coronata* | yellow-rumped warbler | c,W | c,W |
| *Dendroica townsendi* | Townsend's warbler | u,T/W | u,T/W |
| *Dendroica occidentalis* | hermit warbler | s,T | u,T |
| *Dendroica petechia* | yellow warbler (CSC) | s,T | o,T |
| *Dendroica nigrescens* | black-throated gray warbler | o,T | f,T |
| *Wilsonia pusilla* | Wilson's warbler | o,T | u,T |
| *Vermivora ruficapilla* | Nashville warbler | o,T | u,T |
| *Vermivora celata* | orange-crowned warbler | o,S/o,W | f,S/f,W |
| *Oporornis tolmiei* | McGillivray's warbler | s,T | s,T |
| + *Geothlypis trichas* | common yellowthroat | o,R/o,T | u,R/f,T |
| *Icteria virens* | yellow-breasted chat (CSC) | s,T | s,T |
| EMBERIZIDAE (part) - Blackbirds, Orioles, and Tanagers | | | |
| *Euphagus cyanocephalus* | Brewer's blackbird | f,R | c,R |
| *Agelaius phoeniceus* | red-winged blackbird | o,R | f,R |
| *Sturnella neglecta* | western meadowlark | f,R | f,R |
| *Molothrus ater* | brown-headed cowbird | o,R | f,R |
| *Icterus bullockii* | Bullock's oriole | u,S | f,S |
| *Icterus cucullatus* | hooded oriole | u,S | u,S |
| *Piranga ludoviciana* | western tanager | o,T | u,T |
| EMBERIZIDAE (part) - Sparrows | | | |
| + *Zonotrichia leucophrys* | white-crowned sparrow | c,W | c,W |
| + *Zonotrichia atricapilla* | golden-crowned sparrow | f,W | f,W |
| *Chondestes grammacus* | lark sparrow | c,W/f,R | c,W/f,R |
| *Amphispiza belli belli* | Bell's sage sparrow (F2) | s,R | s,R |
| *Spizella passerina* | chipping sparrow | o,T | f,T (fall) |
| + *Aimophila ruficeps canescens* | rufous-crowned sparrow (F2,CSC) | s,R | s,R |
| *Ammodramus savannarum* | grasshopper sparrow (S) | s,S | s,S |
| *Passerella neglecta* | fox sparrow | o,W | f,W |
| *Melospiza melodia* | song sparrow | u,R | c,R |
| *Melospiza lincolnii* | Lincoln's sparrow | o,W | f,W |
| *Ammodramus sandwichensis nevadensis* | savannah sparrow | o,T/o,W | c,T/f,W |

**APPENDIX B (cont.)**

Observed and Expected Fauna

| FAMILY *Scientific Name* | Common Name | Abundance Site | Abundance Region |
|---|---|---|---|
| EMBERIZIDAE (part) - Sparrows (cont.) | | | |
| *Pipilo maculatus* | spotted towhee | f,R | c,R |
| + *Pipilo crissalis* | California towhee | c,R | c,R |
| *Junco hyemalis oreganus* | dark-eyed junco (Oregon) | f,W | f,W |
| EMBERIZIDAE (part) - Grosbeaks | | | |
| *Pheucticus melanocephalus* | black-headed grosbeak | o,S | f,S |
| *Guiraca caerulea* | blue grosbeak (S) | s,S | o,S |
| *Passerina amoena* | Lazuli bunting | o,S | u,S |
| FRINGILIDAE - Finches | | | |
| *Carpodacus mexicanus* | house finch | c,R | c,R |
| *Carpodacus purpureus* | purple finch | s,W | o,W |
| *Carduelis tristis* | American goldfinch | u,R | c,R |
| *Carduelis psaltria* | lesser goldfinch | c,R | c,R |
| *Carduelis lawrencei* | Lawrence's goldfinch | s,T/s,S | o,T/s,S |
| *Carduelis pinus* | pine siskin | o,W | o,W |
| PASSERIDAE - Weaver Finches | | | |
| *Passer domesticus* | house sparrow | f,R | c,R |
| **MAMMALS** | | | |
| DIDELPHIIDAE - Opossums | | | |
| *Didelphis marsupialis* | Virginia opossum | u | c |
| SORICIDAE - Shrews | | | |
| *Sorex o. ornatus* | ornate shrew | s | u |
| TALPIDAE - Moles | | | |
| *Scapanus latimanus* | broad-handed mole | u | u |
| PHYLLOSTOMIDAE - Leafnose Bats | | | |
| *Macrotis californicus* | California leaf-nosed bat (CSC, F2) | s | s |
| VESPERTILIONIDAE - Plainnose Bats | | | |
| *Myotis thysanodes* | fringed myotis | s | o |
| *Myotis evotis* | long-eared myotis | s | u |
| *Myotis californicus* | California myotis | s | c |
| *Myotis (subulatus) leibii* | small-footed myotis | s | u |
| *Myotis yumanensis* | Yuma myotis | o | f |
| *Myotis volans* | hairy-winged (long-legged) myotis | s | u |
| *Lasiurus cinerea* | hoary bat | o | c |
| *Lasiurus borealis* | red bat | s | o |
| *Pipistrellus hesperus* | western pipistrelle | o | f |
| *Eptesicus fuscus* | big brown bat | o | c |
| *Plecotus townsendi pallescens* | pale big-eared bat (CSC) | s | s |
| *Antrozous pallidus* | pallid bat (CSC) | o | f |

**APPENDIX B (cont.)**

Observed and Expected Fauna

| | FAMILY<br>*Scientific Name* | Common Name | Abundance | |
|---|---|---|---|---|
| | | | Site | Region |
| | MOLOSSIDAE - Freetail Bats | | | |
| | *Eumops perotis californicus* | California (western) mastiff bat (CSC, F2) | s | s |
| | *Tadarida brasiliensis* | Brazilian (Mexican) freetail bat | s | f |
| | LEPORIDAE - Hares and Rabbits | | | |
| | *Lepus californicus bennettii* | San Diego black-tailed hare (F2) | s | s |
| | *Sylvilagus audubonii* | desert cottontail | f | c |
| | *Sylvilagus bachmani* | brush rabbit | o | f |
| | SCIURIDAE - Squirrels | | | |
| + | *Spermophilus beechyi* | California ground squirrel | c | c |
| | *Sciurus griseus* | western gray squirrel | s | u |
| | *Tamias merriami* | Merriam's chipmunk | s | o |
| | GEOMYIDAE - Pocket Gophers | | | |
| + | *Thomomys bottae* | Botta's pocket gopher | c | c |
| | HETEROMYIDAE - Pocket and Kangaroo Mice and Rats | | | |
| | *Perognathus californicus dispar* | California pocket mouse | u | u |
| | *Dipodomys a. agilis* | Pacific kangaroo rat | u | f |
| | CRICETIDAE - Mice, Rats, Lemmings, Voles | | | |
| | *Reithrodontomys megalotis longicaudis* | western harvest mouse | c | c |
| | *Peromyscus e. eremicus* | cactus mouse | o | o |
| | *Peromyscus californicus insignis* | parasitic (California) mouse | u | f |
| | *Peromyscus maniculatus gambelii* | deer mouse | f | c |
| | *Peromyscus boylii rowleyi* | brush mouse | f | f |
| | *Peromyscus truei multipinoris* | piñon mouse | s | o |
| + | *Neotoma lepida intermedia* (F2) | (San Diego) desert woodrat (F2) | u | o |
| | *Neotoma fuscipes macrotis* | dusky-footed woodrat | u | u |
| | *Microtus californicus sanctidiegi* | California vole | u | f |
| | MURIDAE - Old World Rats and Mice | | | |
| * | *Rattus norvegicus* | Norway rat | s | f |
| * | *Rattus rattus* | black rat | s | u |
| * | *Mus musculus* | house mouse | f | c |
| | CANIDAE - Dogs, Wolves, Foxes | | | |
| + | *Canis latrans ochropus* | coyote | c | c |
| * | *Canis familiaris* | domestic dog | s | o |
| | *Urocyon cinereoargenteus californicus* | gray fox | s | o |
| | PROCYONIDAE - Racoons, Coatis | | | |
| | *Procyon lotor* | raccoon | f | f |
| | BASSARISCIDAE - Ringtails | | | |
| | *Bassariscus astutus* | ringtail (CP) | s | s |

## APPENDIX B (cont.)

Observed and Expected Fauna

| | FAMILY *Scientific Name* | Common Name | Abundance Site | Abundance Region |
|---|---|---|---|---|
| | MUSTELIDAE - Weasels, Skunks, etc. | | | |
| | *Mustela frenata* | long-tailed weasel | s | s |
| | *Taxidea taxus* | American badger (SA) | s | s |
| | *Spilogale (putorius) gracilis* | western spotted skunk | o | u |
| | *Mephitis mephitis* | striped skunk | f | c |
| | FELIDAE - Cats | | | |
| | *Felis concolor* | mountain lion | s | s |
| + | *Felis rufus* | bobcat | o | u |
| * | *Felis catus* | house cat | u | o |
| | CERVIDAE - Deer | | | |
| + | *Odocoileus h. hemionus* | mule deer | c | f |

Status Codes Definitions:

| | |
|---|---|
| CE | California Endangered |
| CT | California Threatened |
| CP | California Fully Protected |
| FE | Federally Endangered |
| FT | Federally Threatened |
| FPE | Federally Proposed Endangered |
| F2 | Federal Candidate Category 2 |
| F3c | Federal Candidate Category 3c |
| CSC | California Special Concern (CDFG, 1987) |
| SA | Special Animal (CDFG, 1994) |
| S | Sensitive (USDI:FWS, 1986) |
| SC | Special Concern (Tate, 1986) |
| B | National Audubon Society Blue List (Tate, 1986) |
| U | Uncommon (USDI:NPS, 1982) |
| u | Uncommon (De Lisle, *et al.*, 1986) |

# APPENDIX C-2

**Biota Report for the Beautiful Homes Site, Los Angeles County; prepared by Envicom Corporation, March 10, 1998**

# BIOTA REPORT

*for the*

# BEAUTIFUL HOMES SITE

## Los Angeles County, California

*Prepared For:*

**Beautiful City Holding Corporation**
28912 Roadside Drive
Agoura Hills, California 91301
Attn: Mr. Vance Moran

*Prepared By:*

**Envicom Corporation**
28328 Agoura Road
Agoura Hills, California 91301

March 1998

| SECTION | | PAGE |
|---|---|---|
| I. | **Purpose and Intent** | 1 |
| II. | **Characteristics of the Project Site** | 1 |
| | Location | 1 |
| | Land Use | 1 |
| | Watershed Boundaries – Drainage Patterns | 1 |
| | Landforms and Geologic Features | 9 |
| | Biological Resources | 9 |
| | *Plant Communities* | |
| | *Sensitive Plant Species and Habitats* | |
| | *Wildlife* | |
| | *Sensitive Wildlife Species* | |
| III. | **Characteristics of the Surrounding Area** | 28 |
| | Adjoining Land Uses | 28 |
| | Public Lands and Preserved Open Space | 28 |
| | Regional Plant and Animal Resources | 31 |
| | *General Habitat Descriptions/Associated Wildlife* | |
| | *Sensitive Biological Resources/CNDDB Search Results* | |
| | Wildlife Movement | 36 |
| | Regional Biological Value of the Site | 40 |
| | Relationship of the Site to Regional Biological Resources | 40 |
| IV. | **Impact Analysis** | 41 |
| | Project Description | 41 |
| | Thresholds of Significance | 43 |
| | Impacts | 43 |
| | *Vegetation Removed* | |
| | *Number and Species of Trees Affected* | |
| | *Impacts to Sensitive Species* | |
| | *Effects on Integrity of the SEA* | |
| | *Brush Clearance Impacts* | |
| | *Impacts from Accessory Structures* | |
| | *Wildlife Movement* | |
| | *Cumulative Projects* | |
| | *Indirect Impacts* | |

| | | |
|---|---|---|
| V. | **Mitigation Measures** | 51 |
| | Project Design | 51 |
| | Additional Measures | 52 |
| | Indirect Impacts | 56 |
| | Cumulative Impacts | 57 |
| | Residual Impacts | 58 |
| VI. | **Monitoring Program** | 61 |
| VII. | **References** | 65 |

VIII. **Appendices**

Appendix A – Vascular Plants of the Beautiful Homes Project Site
Appendix B – Observed and Expected Fauna
Appendix C – Results of Butterfly Surveys
Appendix D – Sensitive Species Impacts Table
Appendix E – SEATAC Guidelines Compliance Checklist
Appendix F– Preparer's Qualifications/Resumes

**FIGURES**

| | | |
|---|---|---|
| 1. | Subject Property and SEA No. 6 | 2 |
| 2. | Regional Location | 3 |
| 3. | Subject Property on USGS Topographic Map | 4 |
| 4. | Watershed and Drainage Patterns | 8 |
| 4a. | Site Drainages | 10 |
| 5. | Site Topography | 11 |
| 6. | Generalized Vegetation | 14 |
| 7. | Sensitive Plant Locations | 16 |
| 8. | Areas of Highest and Lowest Sensitivity | 27 |
| 9. | Surrounding Vicinity | 29 |
| 10. | Open Space Reserves and Proposed Acquisition Areas | 30 |
| 11. | Wildlife Movement Patterns | 39 |
| 12. | Proposed Project | 42 |
| 13. | Vegetation Impacts | 44 |
| 14. | Sensitive Plant Species Impacts | 48 |
| 15. | Recommended Lot Deletions | 53 |

**PLATES**


| | | |
|---|---|---|
| 1. | Panoramic View | 5 |
| 2. | Panoramic Views | 6 |
| 3. | Aerial Photograph | 7 |


**TABLES**


| | | |
|---|---|---|
| 1. | Sensitive Fauna Observed or Potentially Occurring | 23 |
| 2. | Results of the CNDDB Report | 38 |
| 3. | Recommended Lot Delineations | 52 |
| 4. | Impact, Mitigation, Significance | 59 |
| 5. | Mitigation Monitoring | 62 |

## I. PURPOSE AND INTENT

The Los Angeles County Department of Regional Planning requires the preparation of a Biota Report as part of the environmental review process for projects that include all or portions of Significant Ecological Areas (SEAs), Environmentally Sensitive Habitat Areas (ESHAs), or Significant Oak Woodlands. As shown on **Figure 1**, the subject property occupies a portion of the Las Virgenes SEA (#6).

The Los Angeles County Significant Ecological Areas Technical Advisory Committee (SEATAC) adopted the requirement of a Biological Constraints Analysis prepared prior to project planning, intended to help avoid adverse impacts in the design phase of development. Such a report was submitted and has been reviewed by SEATAC on January 5, 1998. This Biota Report updates the previous Biological Constraints Analysis, and in addition addresses the impacts of the proposed project, and recommends mitigation to reduce significant impacts. The present report is intended to meet the criteria of the 1995 Biota Report Guidelines, prepared by the County Department of Regional Planning.

## II. CHARACTERISTICS OF THE SITE

### Location

The site is located on the north flank of the Santa Monica Mountains, in the western portion of the range (**Figure 2**). The USGS map location of the site is as follows: portions of the Thousand Oaks and Calabasas 7.5-minute quadrangles, Range 18W, Township 1N, in unsectioned parts of both maps (**Figure 3**).[1] The site is bounded on the north by Malibu Junction, on the west by Ladyface Mountain, on the south by Silver Creek Road and residential development, and east by undeveloped (private) areas.

The site lies generally south of the junction of Cornell and Kanan roads, and is bisected by Medea Creek as it flows between these roads (**Figure 3**). The southern portion of the site encompasses the Malibu Fire Station and residential development between Caleta Road on the north and Silver Creek Road[2] to the south, which are not part of the site. The City of Agoura Hills lies to the north, and various estate developments lie to the south. Panoramic views of site are provided in **Plates 1** and **2**.

### Land Use

The site covers approximately 330 acres, most of which is currently undeveloped. The exceptions are clustered inholdings that include the Los Angeles County Fire Station No. 65, scattered residential development, and Cornell and Kanan roads, which pass through the site (**Plate 3**). At some locations along Kanan and Cornell roads, there are turnouts which have altered some of the natural landscape, and various unpaved roads. Along Kanan Road in the western half of the site, there is a heavy-machinery operation, which has disturbed the natural topography. There is also grading activity at the corner of Kanan and Agoura roads associated with a planned commercial development, which is not considered in this analysis. Two areas between Kanan Road and Medea Creek are disturbed, and the northernmost of these two areas is a storage site for large dumpsters.

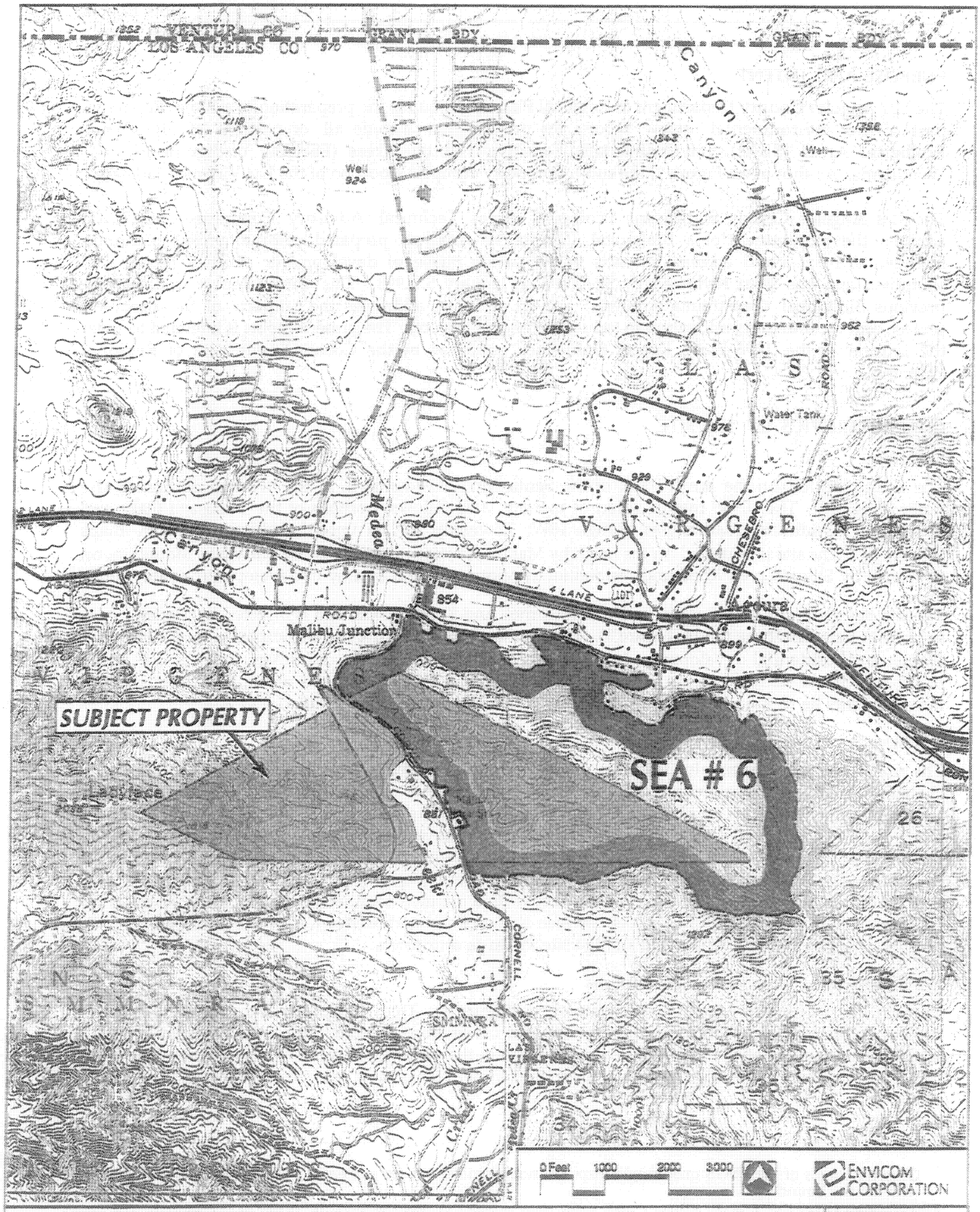
### Watershed Boundaries/Drainage Patterns

The site lies within the Medea Creek watershed (**Figure 4**). This watershed is comprised of four sub-drainages: Medea Creek, Lindero, Palo Comado and Cheeseboro canyons. The four drainages originate from the south slope of the Simi Hills, and converge in the vicinity of Malibu Junction, just to the north of the project site. These tributaries are concrete-channelized as they pass through the City of Agoura Hills.

---

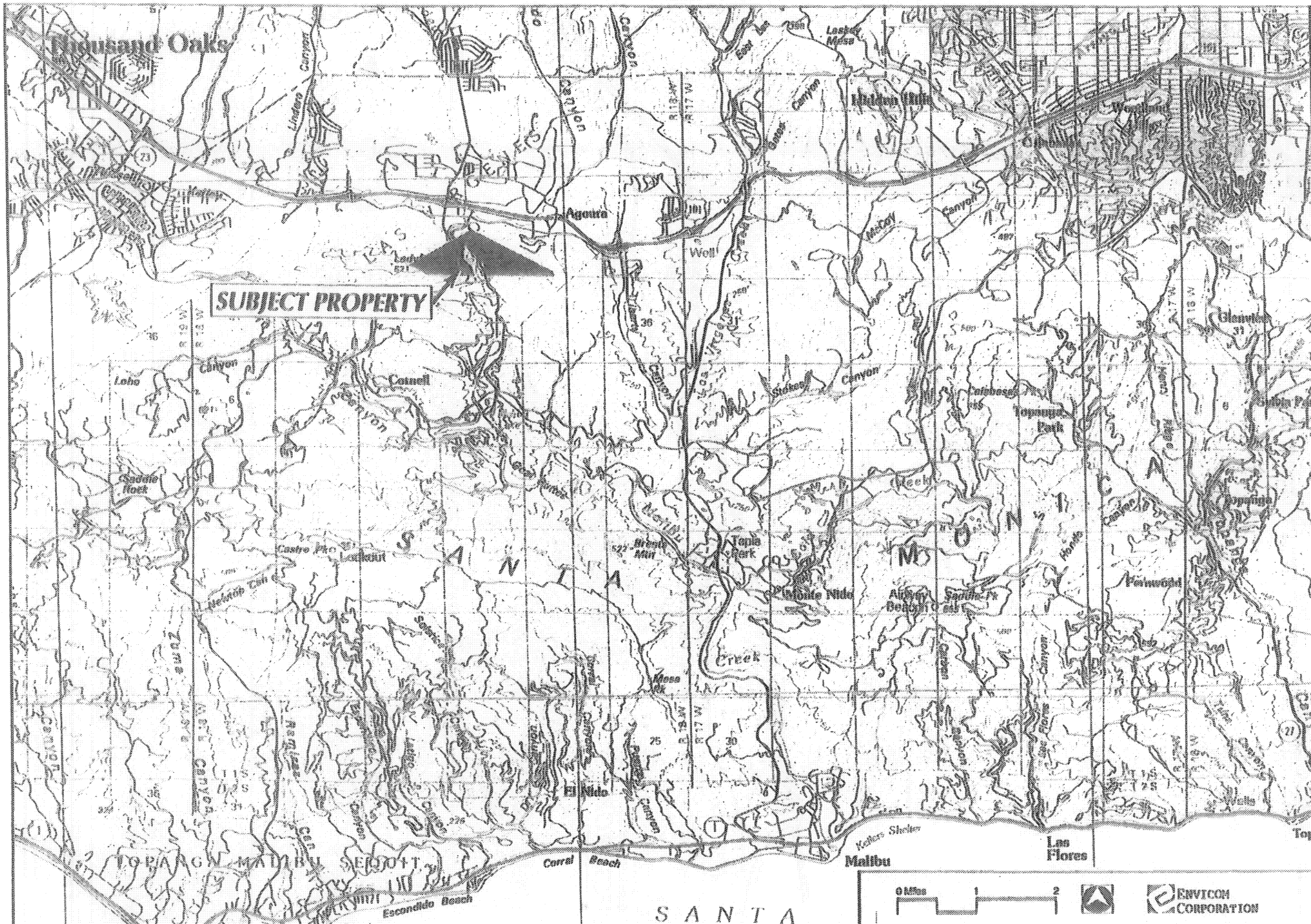
[1] Original copies of the USGS quadrangle maps are not provided but are presented instead as spliced color copies with the site boundaries.

[2] According to the USGS maps, Silver Creek Road once crossed Medea Creek south of the site. Currently, the road does not cross over the stream, but dead ends at the main channel from either Cornell Road or Kanan Road.



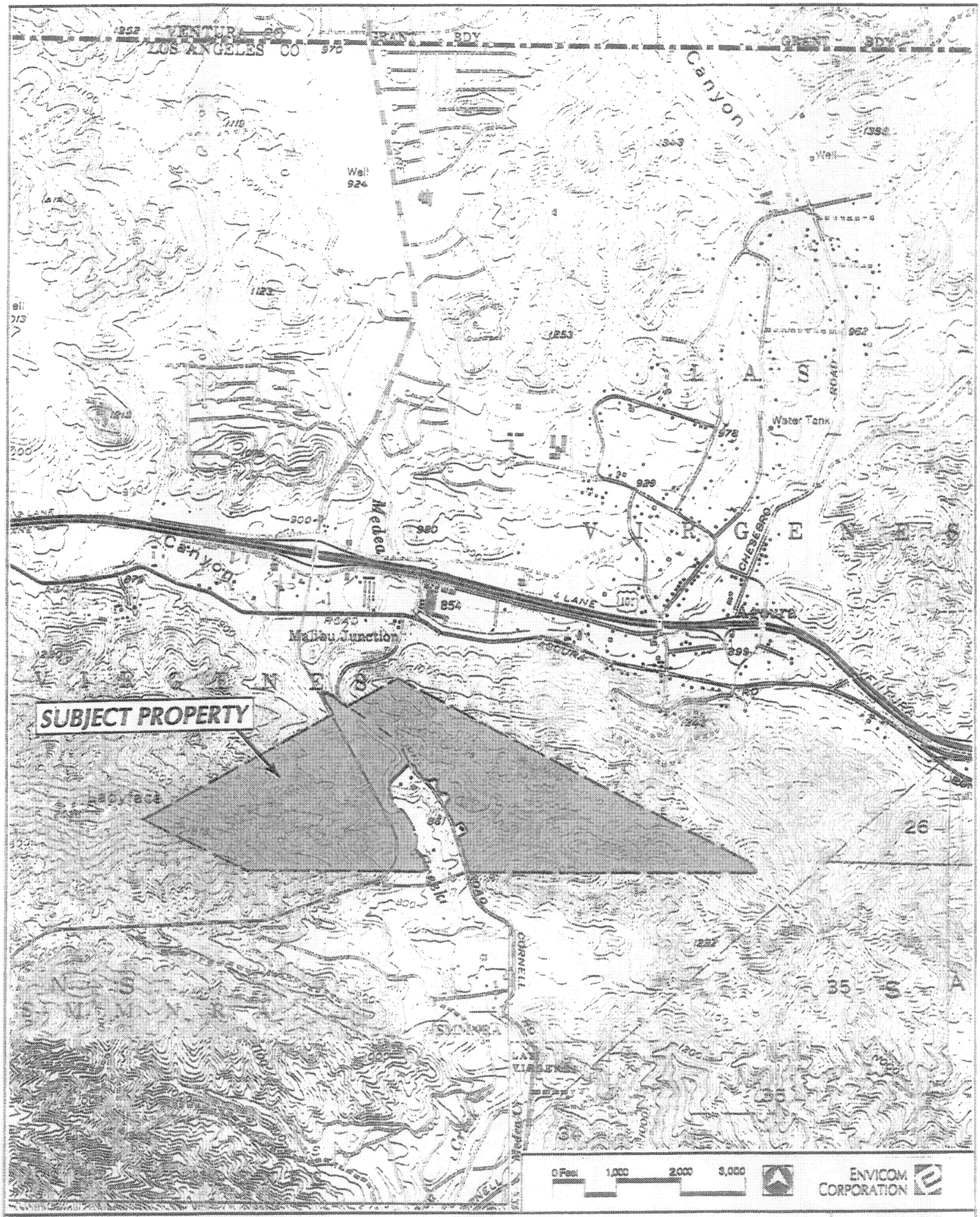

SUBJECT PROPERTY AND SEA #6

FIGURE 1



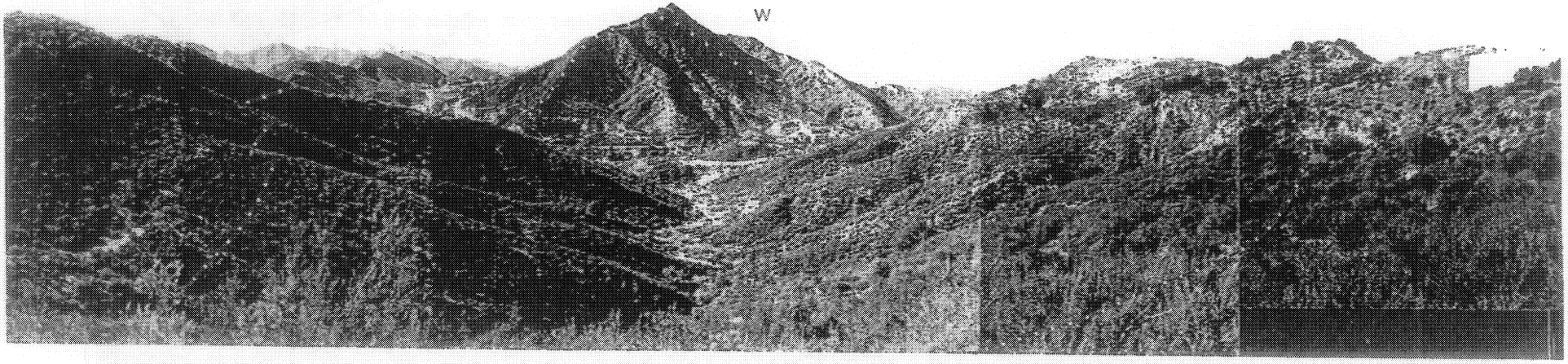

REGIONAL LOCATION

FIGURE 2




SUBJECT PROPERTY MAPPED ON 7.5 MINUTE U.S.G.S. TOPOGRAPHIC MAP QUADRANGLES (Thousand Oaks and Calabasas Map Sheets)

FIGURE 3




A: From near eastern corner, view westerly, toward Ladyface

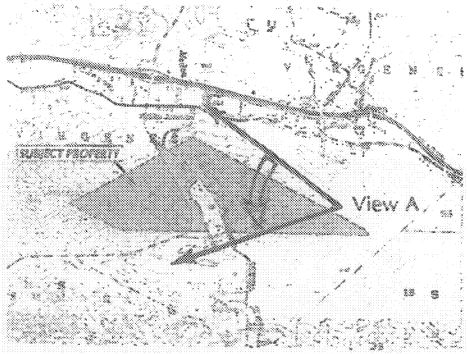
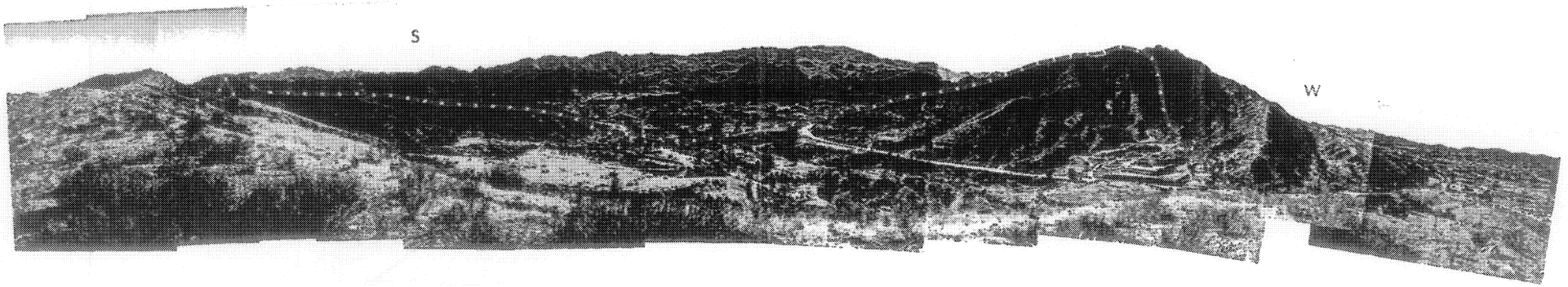
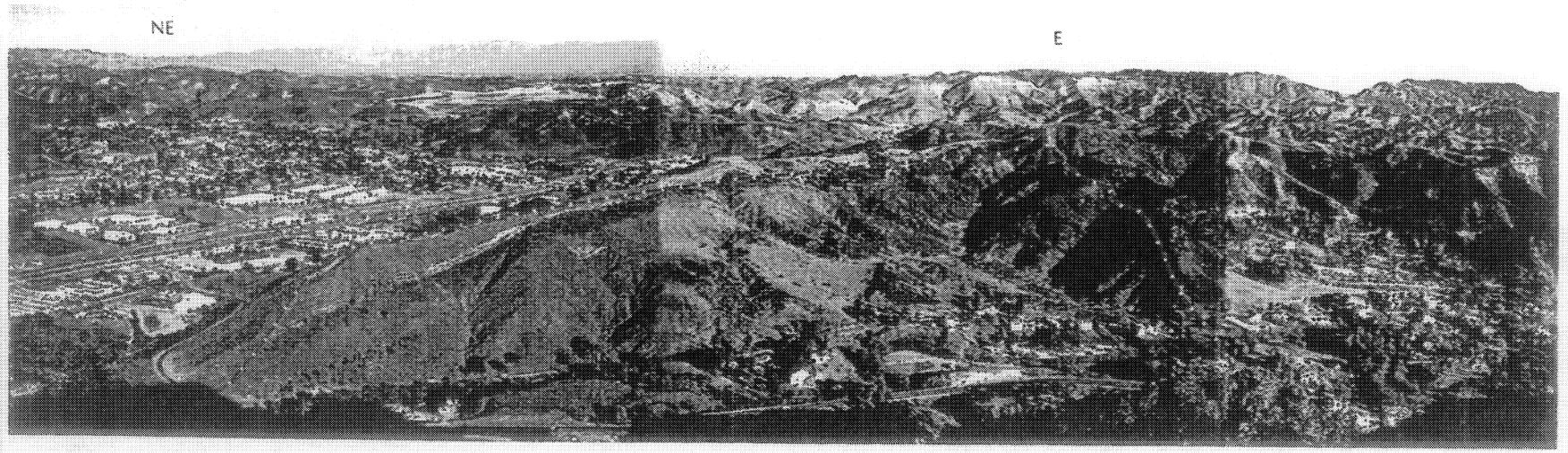



Plate 1

Panoramic View




B: From northern ridgeline, view centered southwesterly down Medea Creek to Malibu Lake




C: From near Ladyface summit, view easterly to Calabasas

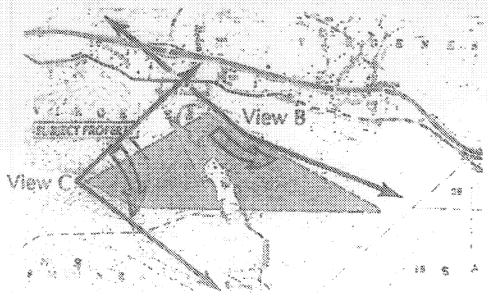



Plate 2

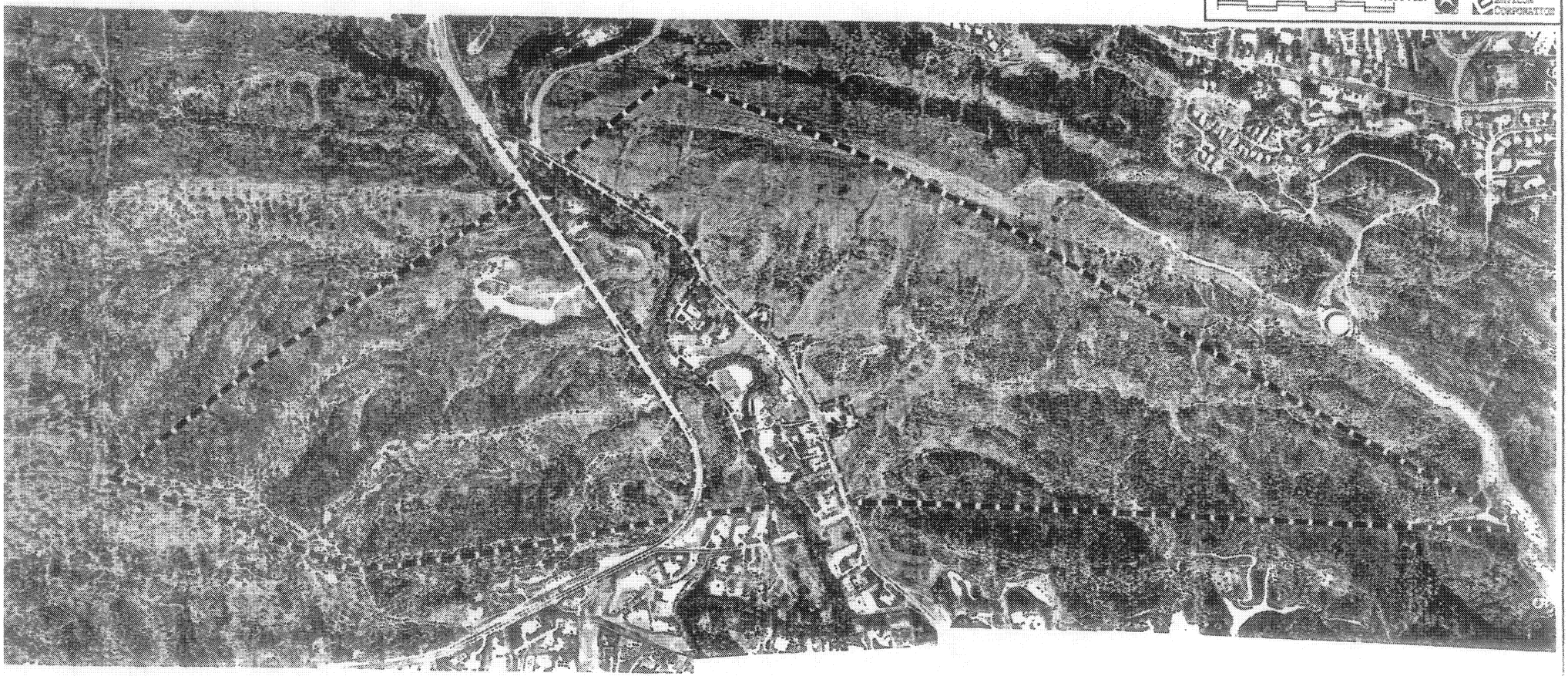
Panoramic Views

PLATE
3

# AERIAL PHOTOGRAPH OF SUBJECT PROPERTY

0 400 800 1,200 FEET

ENVICOM CORPORATION



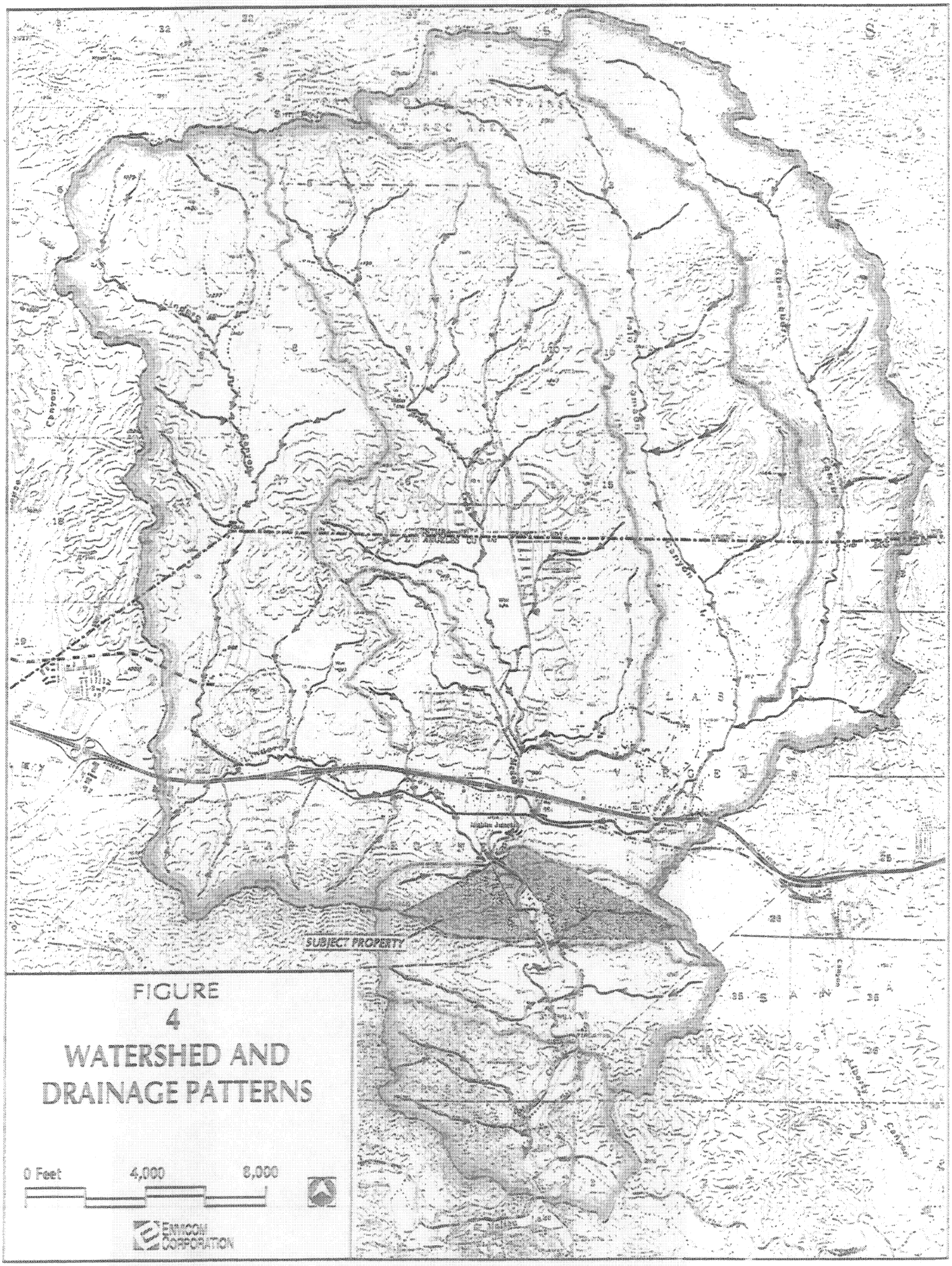



FIGURE
4
WATERSHED AND
DRAINAGE PATTERNS

Over geologic time, the main stem of Medea Creek downstream from Malibu Junction has cut a narrow passage through the Santa Monica Mountains, carrying the combined flows of all four subdrainages past the project site. Across the project site and southward, the stream gradually widens, passing through the Wagon Road Ranchos and Medea Valley Estates developments, Paramount Ranch, then emptying into Malibu Lake. Medea Creek converges with Triunfo Canyon Creek to become Malibu Creek, which subsequently flows to Malibu Lagoon and the ocean. Malibu Creek is the only antecedent drainage in the Santa Monica Mountains.

Slopes on the west side of the project site drain east into Medea Creek, while slopes on the east drain west into the creek (**Figure 4**). Medea Creek bisects the site as the stream passes between Cornell and Kanan roads. The site also contains portions of several tributaries to Medea Creek, four of which are shown as blue-line streams on the USGS maps. The blue-line streams on the site include Medea Creek, small sections of Lindero and Cheeseboro creeks, an unnamed tributary on the northwest (hereafter referred to as "Drainage A"), and another unnamed tributary to Media Creek on the southeast (hereafter referred to as "Drainage B"). These blue-line streams are shown on **Figure 4a**.

**Landforms and Geologic Features**

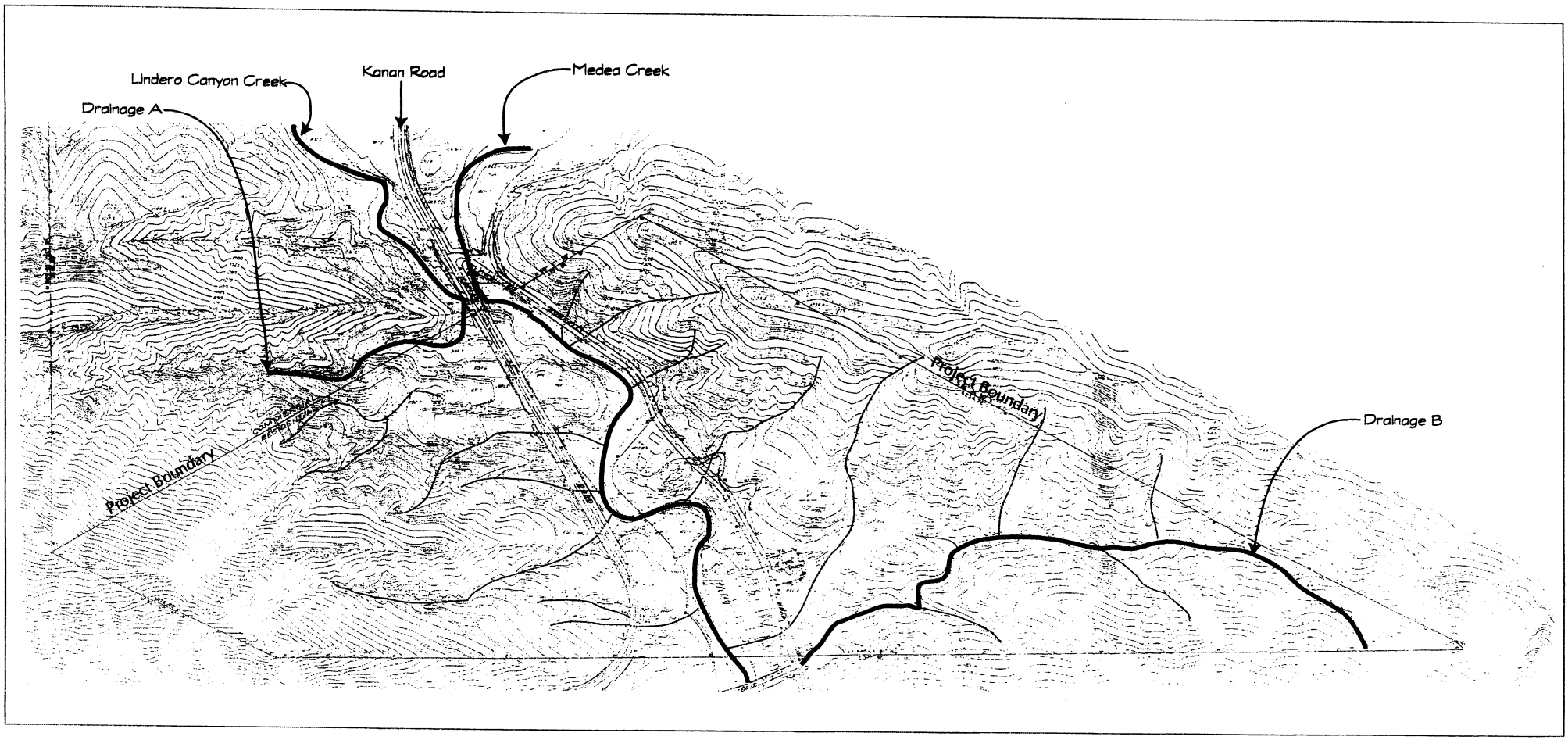
The project site occupies mountainous terrain and alluvial floodplain on the east and west sides of Medea Creek, as it flows downstream from Malibu Junction. From the lowest elevation on the property (the bed of Medea Creek) at approximately 800 feet, the parcel extends west to include a sizable area on the eastern slope of Ladyface, up to an elevation of approximately 1,900 feet. The eastern portion of the property encompasses a west-trending, tributary of Medea Creek (Drainage B, **Figure 4a**), bounded generally on the north and south by prominent 1,100 to 1,200 foot ridgelines, with the site reaching a 1,400 foot peak in the extreme east corner, near the headwaters of Drainage B (**Figure 5**).

The north flank of the Santa Monica Mountains here is dominated by a thick, heterogeneous sequence of volcanic rocks of the Topanga Group (Yerkes and Campbell 1979). In particular, dark-colored andesitic to basaltic breccias comprise the bulk of Ladyface and the western portion of the project site, and the southern portion of the eastern half of the site. These volcanics are overlain to the north by light-colored and highly-layered andesite-dacite breccia. These features are visible on the ridgeline in the eastern half of the site that forms the northern boundary. Limited areas of recent alluvium occur along Medea Creek.

Ladyface is the most prominent landform in the area, visible from the Ventura Freeway corridor and most surrounding locations. Other prominent geologic features include the ridgeline on the north boundary of the site, Medea Creek, and the un-named tributary on the eastern side of the site (Drainage B).

**Biological Resources**

The Las Virgenes SEA (#6) was described by Friesen (1982) as supporting grassland, coastal sage scrub, chaparral, and coast live oak woodland. Several notable plant species have been identified in the SEA, including California juniper (*Juniperus californicus*), linear-leaf goldenbush (*Ericameria* [=*Haplopappus*] *linearifolia*), Santa Monica Mountains dudleya (*Dudleya cymosa* ssp. *ovatifolia*), several species of Mariposa lily (*Calochortus clavatus* ssp. *pallidus*, *C. catalinae*, and *C. venustus*), and valley oak (*Quercus lobata*). The first two species are disjunct from the western Mojave Desert, while the other species are uncommon either throughout their known ranges or in the Santa Monica Mountains (*D. c.* ssp. *ovatifolia* was federally listed as Threatened in January 1997). Friesen (1982) concludes that the Las Virgenes SEA is best described as "a transitional community vegetation" due to the combination of vegetation types.




## Site Drainages

Legend

- Blue Line Streams
- Drainages

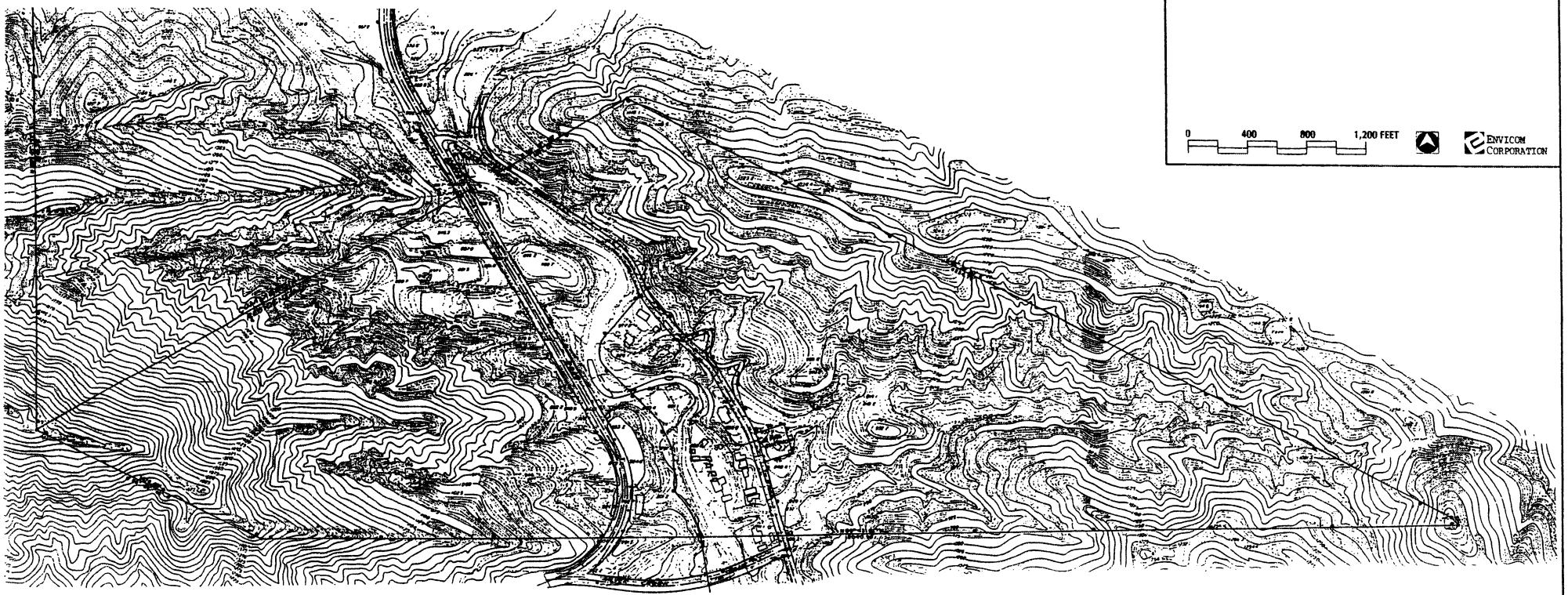
ENVICOM CORPORATION

FEET 0 500 1000

FIGURE 4a

FIGURE
5

# SITE TOPOGRAPHY



0 400 800 1,200 FEET

ENVICOM CORPORATION

Recent investigations of the site have been conducted by Mr. Carl Wishner and Mr. Rick Farris, biologists for Envicom Corporation, supplemented with data from earlier surveys (MBA 1992). Envicom Corporation survey dates and activities were as follows:

| Date | Survey Activities |
|---|---|
| 12/16/96 | - Initial general surveys<br>- Compile flora and fauna<br>- Photographs |
| 12/17/96 | - Initial general surveys<br>- Compile flora and fauna<br>- Examine area for habitat connectivity |
| 3/21/97 | - Sensitive plant surveys<br>- Wildlife observations |
| 3/24/97 | - Sensitive plant surveys<br>- Examine Medea Creek<br>- Wildlife observations |
| 3/25/97 | - Sensitive plant surveys |
| 3/26/97 | - Sensitive plant surveys |
| 4/1/97 | - Sensitive plant surveys |
| 4/3/97 | - Sensitive plant surveys<br>- Wildlife observations |
| 4/4/97 | - Sensitive plant surveys |
| 4/8/97 | - Butterfly surveys<br>- Sensitive plant surveys<br>- Wildlife observations |
| 4/9/97 | - Sensitive plant surveys<br>- Wildlife observations |
| 4/10/97 | - Butterfly surveys<br>- Sensitive plant surveys |
| 4/17/97 | - Butterfly surveys<br>- Sensitive plant surveys |
| 4/29/97 | - Sensitive plant surveys<br>- Wildlife observations |
| 5/8/97 | - Butterfly surveys<br>- Sensitive plant surveys |
| 5/16/97 | - Butterfly surveys |
| 5/29/97 | - Butterfly surveys<br>- Sensitive plant surveys |
| 1/22/98 | - Sensitive wildlife searches<br>- Debris search for herps<br>- Raptor nest search<br>- Plant observations |
| 1/23/98 | - Sensitive wildlife searches<br>- Debris search for herps<br>- Raptor nest search |
| 1/26/98 | - Sensitive wildlife searches<br>- Debris search for herps<br>- Plant observations |
| 1/27/98 | - Sensitive wildlife searches<br>- Debris search for herps<br>- Raptor observations |

As the dates indicate, surveys were performed in appropriate seasons to detect flowering plants, butterflies, and most wildlife species. Surveys were conducted by walking the site and documenting all plant and animal species observed. Binoculars were used to observe distant resources.

Spring surveys were conducted to locate and map populations of sensitive plants. Sensitive plant populations were mapped as follows: two observers walked opposite sides of each population, placing bright flagging in shrubs on the periphery; the locations of the flagging were transferred to topographic maps at a scale of 1"=40'; the points indicated by flagging were connected to define the polygons encompassing sensitive plant populations.

Butterfly surveys were conducted at midday. Observers either identified butterflies with binoculars, or captured them to be further observed or photographed in clear plastic boxes. No butterflies were killed. (The details of the butterfly surveys are provided in **Appendix C.**)

The findings of all investigations are presented below.

### *Plant Communities*

The project site encompasses a range of plant communities which support at least 275 species of vascular plants (native and introduced), as recorded during surveys in 1996, 1997, and 1998. These are compiled in **Appendix A**. The distribution of the plant communities is shown on **Figure 6**.

Along Medea Creek, a relatively well-developed **willow riparian forest** occupies the channel, dominated by arroyo willow (*Salix lasiolepis*) and red willow (*S. laevigata*). Scoured areas of the channel support mule fat (*Baccharis salicifolia*), mugwort (*Artemisia douglasiana*), western ragweed (*Ambrosia psilostachya* var. *californica*), poison hemlock (*Conium maculatum*) and fennel (*Foeniculum vulgare*). A mature western sycamore (*Platanus racemosa*), and a few valley oaks (*Quercus lobata*), and several coast live oaks (*Quercus agrifolia* var. *a.*) isolated from the creek by roads, suggest that the alluvial, bottomland forest was once more extensive than at present. Otherwise, oaks occur on uplands of the property, but not forming extensive woodlands. Three coast live oak trees are known to have formerly occupied the drainage on the slopes of Ladyface, to the west of Kanan Road, in an area of the project site now earth-filled.

Steep, south-facing slopes in the east half of the site are frequently **rocklands**, with sparse vegetation dominated by Bigelow's spike-moss (*Selaginella bigelovii*), wishbone bush (*Mirabilis californicus*), a few ferns, and succulents (*Dudleya* spp.). North-facing rocklands are considerably more mesic, with greater cover by mosses, ferns, and succulents. Where sufficient, fine-textured soil has developed on south-facing slopes, **grasslands** with coastal sage scrub elements are dominant.[3] Annual introduced and perennial native grasses prevail, as well as a great diversity of native and introduced forbs. Sub-shrubs are interspersed among the grasses, forming a mosaic of grassland and coastal scrub. Prevalent species of the coastal scrub phase include California buckwheat (*Eriogonum fasciculatum*), coast encelia (*Encelia californica*), coast goldenbush (*Isocoma menziesii* ssp. *vernonioides*), California-aster (*Lessingia filaginafolia* ssp. *latifolia*), and California sagebrush (*Artemisia californica*).

In the eastern half of the project site, **chaparral** intergrades with grasslands on stony, south-facing slopes. The brush here is taller and less penetrable than in the western half of the site, with the most abundant species being chamise (*Adenostoma fasciculatum*), laurel sumac (*Malosma laurina*), bush mallow (*Malacothamnus fasciculatus* var. *laxiflorus*), buckbrush (*Ceanothus cuneatus*), black sage (*Salvia mellifera*), and birch-leaf mountain mahogany (*Cercocarpus betuloides* var. *b.*).

On north-facing slopes in the east half of the site (south of Drainage B), the chaparral is even more dense and impenetrable, with additional species including scrub oak (*Quercus berberidifolia*), California ash (*Fraxinus dipetala*), chaparral currant (*Ribes malvaceum* ssp. *viridifolium*), fuchsia-flowered gooseberry (*Ribes speciosum*), holly-leaf redberry (*Rhamnus ilicifolia*), poison-oak (*Toxicodendron diversilobum*), orange bush monkeyflower (*Mimulus aurantiacus*), heart-leaf penstemon (*Keckiella cordifolia*), honeysuckle (*Lonicera subspicata* var. *denudata*), and manroot (*Marah macrocarpus* var. *m.*).

[3] At the request of SEATAC, Envicom biologists re-visited the site to attempt to separate coastal sage scrub from chaparral and grasslands. It was determined that, although coastal sage scrub was identified by earlier researchers, there is not enough differentiation or uniformity of plant species to make such refinements. Typical coastal sage scrub plant species are scattered throughout the site, but do not form complete stands. Where these species occur, they are dominated by chamise or other chaparral plants, or are so scattered within grassland areas that separation is not justified.

FIGURE
6

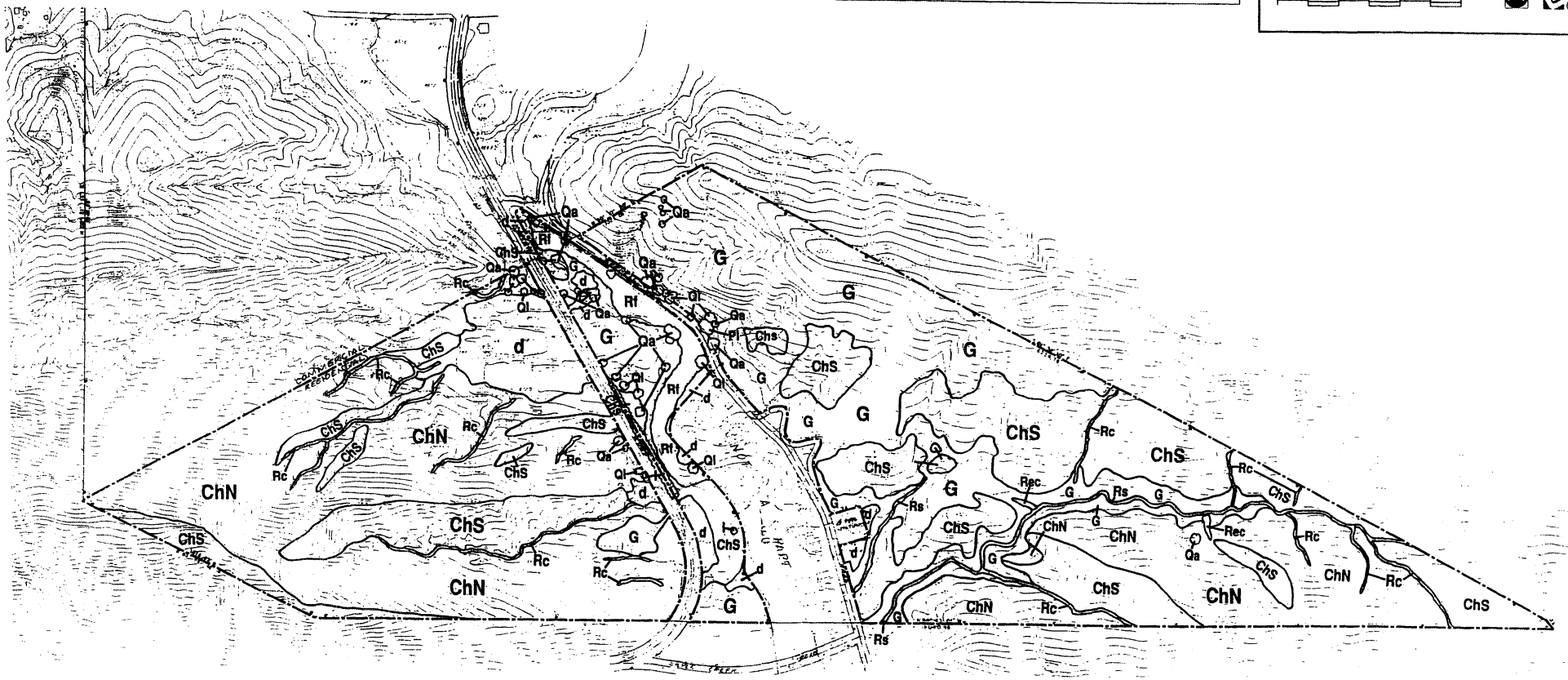
# GENERALIZED VEGETATION

*Explanation of Map Symbols*

| UPLANDS | | RIPARIAN | | TREES | | OTHER | |
|---|---|---|---|---|---|---|---|
| G | Grassland, with sparse scrub | Rf | Forest (Willow) | Ql | Valley Oak | d | Disturbed |
| ChS | Chaparral; South Slopes | Rs | Scrub (Mulefat, willow) | Qa | Coast Live Oak | | |
| ChN | Chaparral; North Slopes | Rc | Chaparral | Pl | Sycamore | | |
| | *Seep* | Rec | Giant Wildrye | I | Introduced | | |

0 400 800 1,200 FEET

ENVICOM CORPORATION



The pattern of contrasting north and south-facing chaparral is repeated on the western half of the project site, on the slopes of Ladyface, with some variation. A small, but relatively pure stand of red shank (*Adenostoma sparsifolium*) occurs only on the ridge and north-facing slope of one ridgeline on the east face of Ladyface. A mixed stand of bigberry manzanita (*Arctostaphylos glauca*) is restricted to a small area of north-facing slopes to the southwest of the redshanks stand.

Drainage B in the east half of the project site supports **riparian scrub** with only a few wetland indicators such as mule fat and arroyo willow present. Giant wildrye (*Leymus condensatus*) forms a dense thicket in one of the minor tributaries to Drainage B. Another small tributary to Drainage B forms a rocky waterfall, where persistent water seepage supports a profusion of wet-site mosses (*Scleropodium* sp.). Further up the drainage, the intermittent stream channels are dominated by chaparral shrubs; these areas are designated as **chaparral riparian.** A patch of Mexican rush (*Juncus mexicanus*) indicates the location of a small **seep** on a south-facing hillside in grassland scrub habitat near the northern apex of the project site.

### *Sensitive Plant Species and Habitats*

#### State and Federally Listed Plants

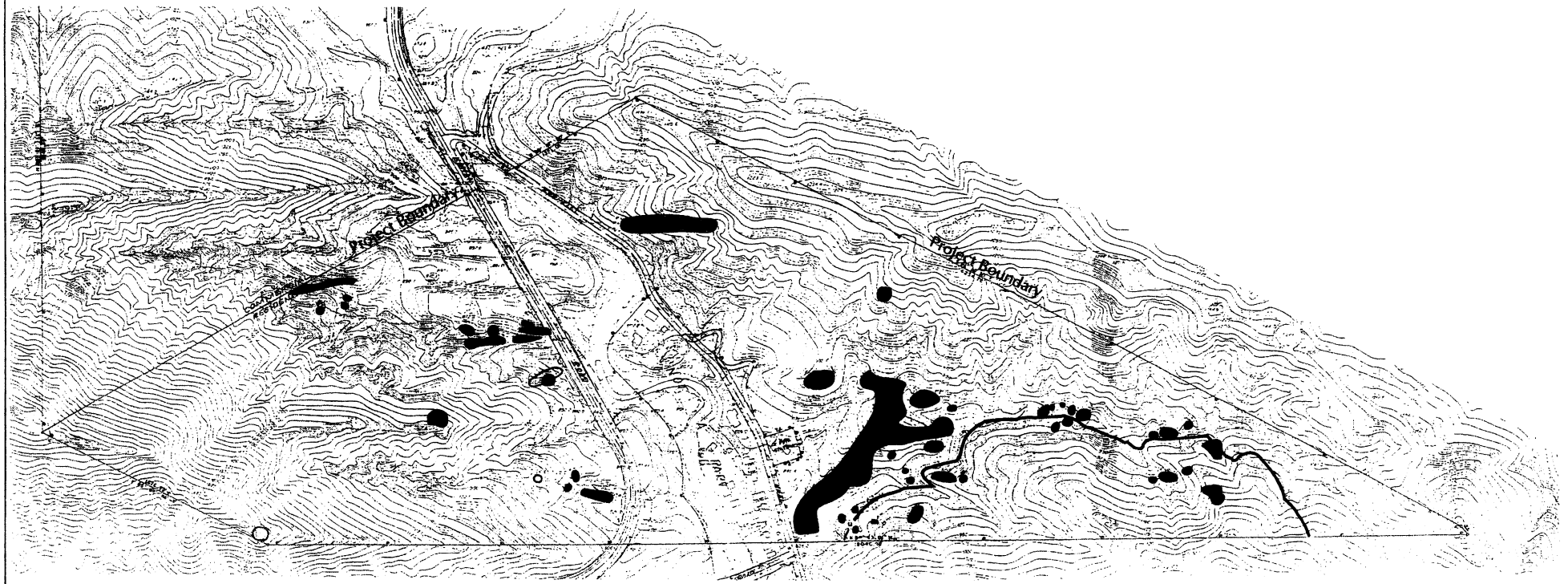
The California Natural Diversity Database (CDFG 1996) reports two occurrences of the state and federally listed Endangered Lyon's pentachaeta (*Pentachaeta lyonii*) on the project site. One report cites the location as "small ridgetops at the east end of Ladyface near Cornell Road." The other report gives the location as "Cornell Road behind the Malibu Fire Station, south of Malibu Junction." The map detail of the location of these occurrences was obtained from CDFG, and was verified and refined in the spring of 1997. These updates are shown on the sensitive plant species map (**Figure 7**). We consider this the most up to date and accurate location information for Lyon's pentachaeta on this property.

The California Natural Diversity Database also reports the occurrence of the federally-Threatened Santa Monica Mountains dudleya (*Dudleya cymosa* ssp. *ovatifolia*) from "Cornell Corners, 0.1-0.3 air-miles south of Malibu Junction, along Cornell Road." This species is also reported by MBA (1992) as three subpopulations containing a total of 307 plants. All reported locations have been included on the sensitive plant map (**Figure 7**). Numerous, similar dudleyas observed on north-facing slopes and rock outcrops elsewhere on the site, are lance-leaf dudleya (*Dudleya lanceolata*), as determined during spring surveys.

#### Other Notable Plant Species

The original descriptions of SEA No. 6 (England and Nelson 1976; Friesen 1982) identify the presence of several unusual plant species of limited distribution in the range, or not known elsewhere in the Santa Monica Mountains. For instance, prior to the 1978 Kanan fire, about a dozen individuals of California juniper (*Juniperus californica*) were known from the "extreme west-central end of the SEA just above Cornell Road." At present, only one individual is known to exist, but this does not occur on the Beautiful Homes project site. This species is substantially disjunct from its distribution in the desert and interior mountain ranges of California. The next closest natural occurrence of this species may be a single specimen on the north slope of the Santa Susana Mountains, on Newhall Ranch, west of Magic Mountain (Wishner, observation 1995).

Another unusual species of the SEA is narrow-leaf goldenbush (*Ericameria linearifolia* = *Haplopappus l.*). This species is not known elsewhere in the Santa Monica Mountains, and like California Juniper, it is substantially disjunct from its range in arid interior and desert regions of California and the southwest. The nearest location to the Santa Monica Mountains where this species occurs may be in the Santa Clarita Valley, in northern Los Angeles County. At least two locations were found on the project site, mostly associated with the north sides of volcanic rocks and widespread on the eastern half (**Figure 7**).




## Sensitive Species

LEGEND

- Lyon's Pentachaeta
- Redshank
- Linear-Leaved Goldenbush
- Coville's Lip Fern
- Cloak Fern
- Santa Monica Mountains Dudleya
- Nevin's Brickellia

ENVICOM CORPORATION

FEET 0 200 400

FIGURE 7

Some other unusual plant species were observed on the project site. A stand of red shank (*Adenostoma sparsifolium*) occurs on the ridge and north slope of an east-trending arm of Ladyface, on the western half of the project site. This species occurs as a nearly pure stand at this location, and forms a distinctive-appearing chaparral type that is visible from some distance. The occurrence is noteworthy because red shank is limited in the Santa Monica Mountains to the Cold Creek drainage on the north slopes of Saddle Peak, and from the vicinity of Lake Sherwood west to Boney Mountain. This occurrence on Ladyface is intermediate between the other locations. Red shank in the Santa Monica Mountains is substantially disjunct from other populations in the Santa Ana Mountains south to Baja California.

Another unusual occurrence is that of California cloak fern (*Notholaena californica* ssp. *leucophylla*[4]) in strongly-bedded andesite-dacite breccia substrates on steep, south-facing slopes in the east half of the site. Prior to this observation, this species was known from only two other locations in the mountain range, described as "[r]are, on rocky slopes under brush; Point Mugu, Malibu Canyon" (Raven *et al.* 1986). Otherwise, the species is described in The Jepson Manual (Hickman, ed. 1993) as "uncommon, about dry rocky slopes, in rock crevices, and under ledges," occurring in the San Gabriel and San Bernardino Mountains, peninsular ranges and desert ranges southeast to the Sonoran Desert.[5]

Also unusual was the observation of Coville's lip fern (*Cheilanthes covillei*), on the north faces of several outcrops of basalt in the western half of the project site, often associated with Santa Monica Mountains dudleya. This species is previously known from the Santa Monica Mountains, only from a single collection on rocky crevices of Boney Ridge (Koutnik *et al.*, 600 DAV). Otherwise, the species is distributed widely in California.

Raven *et al.* also cite that southern gilia (*Gilia australis*) "has been reported from burned slopes of Ladyface." This refers to an observation by Geoff Burleigh in 1978, which according to Mr. Tim Thomas, was probably mis-identified and these plants are probably splendid gilia (*Gilia splendens*).[6] Splendid gilia occurs in the San Gabriel, San Bernardino and Coast Ranges. This annual species has not been observed at the project site.

Another unusual observation is the presence of the diminutive annual pygmy linanthus (*Linanthus pygmaeus* ssp. *continentalis*), in openings among chaparral on north slopes in the southeast portion of the property. Heretofore unreported from the Santa Monica Mountains, this white-flowered subspecies occurs from the mountains of interior San Diego County to western Riverside County, and the coast ranges to central California.

Several other species observed are noteworthy. Clustered broom-rape (*Orobanche fasciculata*), a root parasite of shrubs such as California buckwheat is restricted to rocky areas south of the Medea Creek tributary, in the southeast portion of the property. The local flora reports this species only from "Cornell Corners." Poison sanicle (*Sanicula bipinnata*) is previously reported only from Griffith Park. Several plants are present at the base of north facing slopes in the southeast portion of the site. Nevin's brickellia (*Brickellia nevinii*), a CNPS list 4 species, occurs as a few individuals high on the slopes of Ladyface. Douglas' microseris (*Microseris*

---

4 Subspecies as treated in the *Flora of North America* (FNA Committee, 1993) are mentioned, but not treated as taxonomically distinct in The Jepson Manual (Hickman, ed. 1993). The nominate subspecies (*californica*) has yellow, waxy-mealy or powder-like material (farina) under the leaves, while ssp. leucophylla, as found on the project site, has white powder under the leaves.

5 The Jepson Manual does not report this species in the Santa Monica Mountains, although it was earlier reported in the Flora of the Santa Monica Mountains (Raven *et al.*, 1986).

6 Two subspecies are known. Mr. Thomas did not indicate whether the specimen from Ladyface was ssp. *grantii* (San Gabriel and San Bernardino Mountains), or the nominate subspecies (Coast Ranges from Monterey Co. to the San Jacinto Mountains).

*douglasii*), a rarely documented or collected species in these mountains, occurs extensively throughout grasslands of the property. Collections from the site correspond poorly to description of the two subspecies previously reported from the range, instead being referable to subspecies *platycarpha*, which heretofore is unreported from these mountains. Alchemilla (*Aphanes occidentalis*), a diminutive member of the rose family, occurs on north facing slopes in openings in chaparral, often with pygmy linanthus, in the southeast portion of the property. Reported from only a few locations in these mountains, it is easily overlooked, and probably occurs widespread. Chocolate lily (*Fritillaria biflora*), a CNPS List 4 species occurs scattered in heavy soils on north slopes, in both the east and west portions of the property. California melic (*Melica californica*) occurs occasionally near rock outcrops on north slopes in the western portion of the property. This species is previously unreported from the Santa Monica Mountains. Mr. Wishner has observed this species at several locations in the Conejo volcanics between Agoura and Lake Sherwood, and also at Fryman Canyon on the east end of the range.

### *Wildlife*

Observations of wildlife species made during site visits were supplemented with information on the expected occurrences of various animal groups from appropriate literature sources [e.g. CWHRS (1988, 1990), Garrett and Dunn (1980), DeLisle *et al.* (1986), and others]. All animal species observed or reasonably expected to occur on the site as inferred from literature review are listed in the faunal inventory (**Appendix B**). Estimates of relative abundance for each species are provided and are based upon the observers' regional experience and the site characteristics.

The relatively large size of the site, the mosaic of habitat types, the mostly undisturbed condition, and the proximity of other open space suggest that this site should support a wide variety of animal species. In the absence of several years of observations, reported wildlife are only a snapshot of the populations of wildlife that change with the seasons, and consequently, the number of species expected greatly augments the list of observed wildlife. Because these species may use more than one habitat type on the site, wildlife descriptions are presented by group (amphibians, reptiles, etc.).

#### Invertebrates

Focused surveys were conducted for butterflies in Spring 1997 and the results are reported in **Appendix C**. Some unusual (non-butterfly) species were observed which are notable primarily for the rarity of encounters in the field. First, while lifting debris to look for secretive animals, we observed a scorpion (possibly a *Vejovis* sp.) in the midst of a grassland area directly east of the fire station on Cornell Road. Under the same board, we observed ring-legged earwigs (*Euborellia annulipes*) which, while not native to the region,[7] are being displaced by the more common (non-native) European earwig (*Forficula auricularia*).

#### Amphibians

Two amphibians were observed on the site during the surveys: Pacific chorus frog (*Pseudacris regilla*) and black-bellied slender salamander (*Batrachoseps nigriventris*). There was flowing water in all of the larger drainages during most surveys, and we also expect to encounter California toad (*Bufo boreas halophilus*) on the site.

There are less common amphibians that could be present, given the occurrence of semi-permanent water in Medea Creek and seasonal flows in several tributaries, as well as the habitat types present on the site. All expected amphibian species are listed in Appendix B.

[7] According to Hogue (1993), *Euborellia annulipes* was introduced from Europe in the 1880's.

Reptiles

Three reptile species were observed during our surveys, including Great Basin fence lizard (*Sceloporus occidentalis biseriatus*), California side-blotched lizard (*Uta stansburiana elegans*), and western skink (*Eumeces s. skiltonianus*). We attribute the lack of other reptile observations to their shyness. Due to the variety of habitats on the site, we would expect many reptiles to be present. The most likely reptile species to occur on the site would be San Diego alligator lizard (*Elgaria multicarinata webbi*), California kingsnake (*Lampropeltis getulus californiae*), California striped racer (*Masticophis l. lateralis*), and San Diego gopher snake (*Pituophis melanoleucus annectens*). Several other less common reptiles are also expected on the site and are listed in Appendix B. Two sensitive reptile species, viz., coastal whiptail and coast horned lizard were reported from the site by MBA (1992) and are discussed in the sensitive animal species section to follow.

Birds

Among the animal species observed, more species of bird were seen than any other group. This is often the case, as birds are simply more conspicuous and readily observed than other animals which are typically nocturnal, burrowing, or shy. During our surveys, we observed 34 bird species, including:[8]

turkey vulture
sharp-shinned hawk
Cooper's hawk
red-tailed hawk
American kestrel
California quail
mourning dove
greater roadrunner
white-throated swift
Anna's hummingbird
acorn woodpecker
northern flicker
Nuttall's woodpecker
black phoebe
Say's phoebe
American crow
common raven
western scrub-jay
bushtit
Bewick's wren
ruby-crowned kinglet
wrentit
California thrasher
phainopepla
yellow-rumped warbler
common yellowthroat
western meadowlark
white-crowned sparrow
golden-crowned sparrow
rufous-crowned sparrow
spotted towhee
California towhee
house finch
lesser goldfinch

Some of these species may be directly associated with certain habitats found on the site. For example, western meadowlark is a grassland species, while rufous-crowned sparrow is closely tied to rocky chaparral vegetation. Other birds may be more cosmopolitan in their habitat use, such as northern flicker which may use riparian woodland or chaparral, or Anna's hummingbird, which will be found wherever suitable forage is available. Perhaps more than for any other animal group, the greater the diversity of habitats, the more diverse are the bird species present.

In addition to the birds observed, there are many more that are likely to use the site. The riparian woodland along Medea Creek and the scattered oaks are attractive to several migratory songbird species, while the open grasslands and chaparral attract wintering and migrating raptors. Other species may also breed on the site only in summer. All of these species are listed in Appendix B along with their seasonality and expected abundance.

[8] Scientific names for bird species are not given in the text as the common names are standardized. The scientific names are provided in Appendix B.

Mammals

During our surveys, we observed several mammal species or their sign, including many well-developed animal trails on the ridgelines. Most common was mule deer (*Odocoileus hemionus*) as shown by direct observation and the numerous tracks, scat, and abundance of ticks on the vegetation. Areas of dried mud showed bobcat (*Felis rufus*) and raccoon (*Procyon lotor*) tracks, and we expect these species to be uncommon.

We directly observed coyote (*Canis latrans ochropus*) and California ground squirrel (*Spermophilus beecheyi*). Coyote sign was found in all habitats, while California ground squirrels were most common at the ecotone between the grasslands and chaparral. We also found nests believed to belong to San Diego desert woodrat (*Neotoma lepida intermedia*) due to the placement of the nest mound on exposed rock in the chaparral and high on Ladyface. Botta's pocket gopher (*Thomomys bottae*) burrows were found in most grassland areas, and desert cottontail (*Sylvilagus audubonii*) were observed occasionally throughout the site.

We would expect several other mammals to be common. The most likely to be present are western harvest mouse (*Rheithrodontomys megalotis longicaudis*), several "white-footed" mice (*Peromyscus* spp.), San Diego dusky-footed woodrat (*Neotoma fuscipes macrotis*), and striped skunk (*Mephitis mephitis*). Smaller rodents are likely to be most common in the grassland/chaparral ecotone due to the abundance of forage (seed) and cover. The large mammals in the area use most of the habitats on the site, with regular visits to riparian areas for water, especially Medea Creek in dry periods. Other less common mammals found in the region that could use the site are listed in Appendix B.

### *Sensitive Wildlife Species*

For purposes of this report, sensitive wildlife species are those animals that have recognition in one or more of the following categories:

- State Listed Endangered or Threatened
- Candidates for State Listing as Endangered or Threatened
- California Species of Special Concern
- California Department of Fish and Game Special Animals
- Federally Listed Endangered or Threatened Species
- Species Proposed for Federal Listing as Endangered or Threatened
- Federal Species of Concern[9]
- Locally Uncommon[10]

During our surveys, we observed four sensitive animal species. Most common of these was **ashy rufous-crowned sparrow (*Aimophila ruficeps canescens*)**, a Federal Species of Concern. Rufous-crowned sparrows were observed in several locations in the chaparral, equally on both the eastern and western sides of the site. The observation of this species on the site is unusual, as rufous-crowned sparrows normally avoid dense chaparral (Garrett and Dunn, 1980). The presence of rufous-crowned sparrows on the site is likely due to the mosaic of chaparral and grasslands, the rocky terrain, and the presence of elements of coastal sage scrub, such as coastal sagebrush and purple sage, within the chaparral.

[9] The U.S. Fish and Wildlife Service published new rules that eliminated the "Candidate" program in February 1996 As a result, former Category 2 Candidates have been redesignated as Species of Concern.

[10] "Locally uncommon" species are those recoginezed by experts familiar with regional biological resources, such as DeLisle *et. al.* (1987).

Another sensitive species observed was **Cooper's hawk** (***Accipiter cooperi***); a California Species of Special Concern. In this region, Cooper's hawks are most commonly observed as fall migrants. Some remain over winter, and even fewer nest in the region. Nesting occurs in riparian woodland or deep canyons. It is unclear whether or not Cooper's hawks nest on the site, but it is considered unlikely. The individual observed may be a winter visitor attracted to the scattered oaks and grassland, as well as the riparian habitat along Medea Creek, although there is suitable nesting habitat on the site.

In winter, 1998, **sharp-shinned hawk** (***Accipiter striatus***) was observed; a California Species of Special Concern. Sharp-shinned hawks do not nest in southern California, but are generally more numerous than the similar Cooper's hawk in winter. This is a woodland species that feeds on small birds and occasionally other small animals. We do not expect sharp-shinned hawks to nest on the site, but wintering habitat is equally important to the species.

The fourth sensitive species observed by Envicom Corporation biologists was **San Diego desert woodrat** (***Neotoma lepida intermedia***); a Federal Species of Concern. Two nest mounds were observed on the site; one east of Cornell Road and the other high on Ladyface. Although the more common dusky-footed woodrat also may occur on the site, desert woodrats typically build their nest mounds on exposed rock, in contrast to dusky-footed woodrats which build their mounds in the midst of vegetation.

In addition to the sensitive animal species observed during the current site visits, MBA (1992) reports observing three individual **coastal western whiptails** (***Cnemidophorus tigris multiscutatus***) – a Federal Species of Concern, and one individual and sign of **San Diego horned lizard** [most likely ***Phrynosoma coronatum blainvillei***[11]– a Federal Species of Concern, and still a California Species of Special Concern (Jennings and Hayes, 1994)]. There is substantial suitable habitat for both species on the site, especially in areas near grasslands and chaparral.

The site was searched for the potential for nesting raptors. In January 1998, courtship behavior was noted between two **red-tailed hawks** as they soared over the site. They did not appear to be nesting on the site, and most often departed to the northeast. Some large nests were noted in trees along Medea Creek, but no raptor activity was observed. Most likely to nest in the area, besides red-tailed hawk, would be red-shouldered hawk (*Buteo lineatus*), which were not observed.

Following the December 1996 site visits, listings of sensitive animal species provided by the USFWS and CDFG were reviewed to determine whether other such species may be reasonably expected in the region. The results of that review were compared with the habitat requirements of the species, their known ranges, and any reports available on other observations in the vicinity of the site. In particular, we examined the California Natural Diversity Data Base (CNDDB) Rarefind report (1996) for the Thousand Oaks and Calabasas quadrangles which contain the site. None of the sensitive animal species listed in the CNDDB were reported from within the site boundaries. Of those sensitive animal species reported by the CNDDB for the two quadrangles, the only one known or likely to occur on the site is **San Diego horned lizard**, which has been reported by MBA (1992) as being present on the site.

The other animal species reported for the region by the CNDDB are southwestern pond turtle (*Clemmys marmorata pallida*), bank swallow (*Riparia riparia*), and least Bell's vireo (*Vireo belli pusillus*). Due to disturbance and human activity, there is low potential for southwestern pond turtle on the site, although, the species has been reported from Malibu Lake and Medea Creek

[11] There is some debate as to whether the horned lizard in the Santa Monica Mountains is *P.c. blainvillei* or its close relative, *P.c. frontale*. For this report, we will follow Jennings and Hayes (1994) and the CNDDB, recognizing that *P.c. blainvillei* is the subspecies in the area. In any case, the species' sensitivities are identical.

(DeLisle *et al.*, 1986). Both bank swallow and least Bell's vireo may occur in the area during migration, but it is unlikely that either species would nest in the area, due to a lack of suitable habitat and the amount of disturbance along Medea Creek (the most likely location for them to nest).

There are numerous other sensitive wildlife species that could occur on the site, but which were not observed, or were not reported to the CNDDB. These are species for which the site supports suitable habitat, and are known to occur in the Santa Monica Mountains. These additional sensitive species are listed in **Table 1**, along with a description of their potential for occurrence on the site. Because observers can only demonstrate presence and not absence, it is assumed that for those wildlife species where the evidence indicates a high likelihood for their presence, that these species are probably present when analyzing the proposed project's impacts. From **Table 1**, the sensitive animal species not observed, yet likely to be on the site include:[12]

| | |
|---|---|
| satyr anglewing | red-shouldered hawk |
| Monterey ensatina | barn owl |
| arboreal salamander | Lewis' woodpecker |
| San Diego mountain kingsnake | western bluebird |
| San Bernardino ringneck snake | yellow warbler |
| coast patchnose snake | yellow-breasted chat |
| western yellow-bellied racer | Bell's sage sparrow |
| red coachwhip | San Diego black-tailed hare |
| northern harrier | long-tailed weasel |
| white-tailed kite | American badger |

The above list illustrates that this site, and others like it in the Santa Monica Mountains, have the potential to support a large number of sensitive wildlife species. This is due primarily to the size of the site, mix of habitat types, undisturbed conditions, and connectivity to other regional open space. The linkage of habitats is described in the "Characteristics of the Surrounding Area Section."

[12] Scientific names and status are provided in Table 1.

## TABLE 1

### Sensitive Fauna Observed or Potentially Occurring on the Beautiful Homes Site

| Common Name<br>*Scientific name* | Status (sensitivity criteria) | Potential On Site |
|---|---|---|
| **INVERTEBRATES** | | |
| California dogface<br>*Zerene eurydice* | locally sensitive (California's state insect) | Host plant (*Amorpha*) not observed on the site; low potential. |
| Harford's sulfur<br>*Colias alexandra harfordii* | locally sensitive | Host plant (*Astragalus*) not observed on site, but species is a strong flier and may occur as a transient. |
| Comstock's fritillary<br>*Argynnis [Speyeria] callippe comstocki* | locally sensitive | Host plant (*Viola pedunculata*) not observed on the site; low potential for occurrence. |
| Gabb's checkerspot<br>*Melitaea [Chlosyne] g. gabbii* | locally sensitive | Host plants present on site (Asteraceae); low potential for occurrence as species is rare in the range. |
| satyr anglewing<br>*Polygonia satyrus satyrus* | locally sensitive | Host plants present (Urticaceae) and potential for occurrence is considered moderate. |
| Santa Monica Mountains hairstreak<br>*Satyrium auretorum fumosum* | FSC,[13] U | There is slight potential for this species on the site as the host plant (scrub oak) is fairly common. |
| cloudy copper<br>*Lycaena rota nubila* | locally sensitive | Host plants (*Ribes*) present on site, but potential for occurrence is considered low due to insect's rarity. |
| monarch<br>*Danaus plexippus* | SA - Sensitivity is based upon threats to winter roost sites. | Larval foodplants for this species (*Asclepias* spp.) were not observed, nor are suitable winter roost sites present. |
| **VERTEBRATES**<br>**Amphibians and Reptiles** | | |
| Monterey ensatina<br>*Ensatina e. eschscholtzi* | U | Moderate potential to occur on the site. |
| arboreal salamander<br>*Aneides lugubris* | U | Moderate potential to occur on the site. |
| coast range newt<br>*Taricha torosa torosa* | CSC | Suitable habitat appears to present on the site, but potential is considered low due to stream disturbances. |
| southwestern pond turtle<br>*Clemmys marmorata pallida* | CSC, FSC | Recorded in Malibu Lake and Medea Creek, but suitable habitat on site is disturbed; potential low. |
| silvery legless lizard<br>*Anniella pulchra pulchra* | CSC, FSC | There is low potential for the presence of this species; suitable substrates are not common on the site. |
| coastal (western) whiptail<br>*Cnemidophorus tigris multiscutatus* | FSC | Likely to be present in the chaparral. |
| San Diego mountain kingsnake<br>*Lampropeltis zonata pulchra* | FSC, CSC | Moderate potential to occur on the site. |
| San Bernardino ringneck snake<br>*Diadophis punctatus modestus* | FSC | Probable resident at the site. |

[13] In January, 1996, USFWS published new guidelines for the listing of Candidate species. The new guidelines fail to recognize any Candidate species other than those formerly listed as Category 1. To avoid the loss of information, former Category 2 Candidates are recognized as Federal Special Concern Species.

TABLE 1 (cont.)

Sensitive Fauna Observed or Potentially Occurring on the Beautiful Homes Site

| Common Name<br>*Scientific name* | Status (sensitivity criteria) | Potential On Site |
|---|---|---|
| coast patchnose snake<br>*Salvadora hexalepis virgutlea* | FSC | Moderate potential to occur on the site. |
| southwestern blind snake<br>*Leptotyphlops humilis* | U | Moderate potential to occur on the site. |
| western yellow-bellied racer<br>*Coluber constrictor mormon* | U | Habitat is present for this species, and it is a probable resident. |
| red coachwhip<br>*Masticophis flagellum piceus* | U | Local conditions are suitable and it is a probable resident. |
| **Birds** | | |
| great blue heron<br>*Ardea herodias* | SA (Sensitivity is based upon the decline of suitable rookery sites in California and not on population declines outside of rookery areas) | No rookeries are present on the site, but the species probably forages in Medea Creek. |
| black-crowned night-heron<br>*Nycticorax nycticorax* | SA (Sensitivity is based upon the decline of suitable rookery sites in California and not on population declines outside of rookery areas) | No rookeries are present on the site; unlikely even as a visitor. |
| sharp-shinned hawk<br>*Accipiter striatus* | CSC, B | Observed during field surveys. |
| Cooper's hawk<br>Accipiter cooperi | CSC | Observed during field surveys. |
| golden eagle<br>*Aquila chrysaetos* | CP, CSC | The site is within the home range of one family of golden eagles (Malibu Creek State Park), and they are expected over the area while foraging. |
| northern harrier<br>*Circus cyaneus* | CSC, B | Moderate potential as a winter visitor over grasslands. |
| white-tailed kite<br>*Elanus leucurus* | SA, CP | Suitable habitat present; most likely as a winter visitor. |
| red-shouldered hawk<br>*Buteo lineatus* | B | Likely resident along Medea Creek. |
| prairie falcon<br>*Falco mexicanus* | CSC | There is low potential for this species as a visitor, altough some of the cliff faces may offer suitable nesting sites. |
| barn owl<br>*Tyto alba* | SC | Likely resident. |
| western burrowing owl<br>*Athene cunicularia hypugea* | CSC, FSC | Suitable habitat is present, but the potential for their presence is considered low. |
| Lewis' woodpecker<br>*Melanerpes lewis* | SC | The potential for occurrence of this species on the site is considered moderate. |
| southwestern willow flycatcher<br>*Empidonax traillii extimus* | CSC, FE | The species is expected to utilize the site as a rare transient only. |
| western bluebird<br>*Sialia mexicana* | S,SC | Most likely a winter visitor, but may nest in oaks. |
| loggerhead shrike<br>*Lanius ludovicianus* | S,B, CSC | Suitable habitat exists, and species is considered likely to be present. |
| yellow warbler<br>*Dendroica petechia brewsteri* | CSC | Nesting habitat along Medea Creek is marginal, but nesting is unlikely; likely in migration. |

**TABLE 1 (cont.)**

Sensitive Fauna Observed or Potentially Occurring on the Beautiful Homes Site

| Common Name<br>*Scientific name* | Status (sensitivity criteria) | Potential On Site |
|---|---|---|
| yellow-breasted chat<br>*Icteria virens* | CSC | Suitable nesting habitat appears to be absent, although the species is considered to have low potential for occurrence at the site in migration. |
| ashy rufous-crowned sparrow<br>Aimophila ruficeps canescens | FSC | Observed in several areas on the site in sparse chaparral. |
| Bell's sage sparrow<br>*Amphispiza belli belli* | FSC, CSC | Although suitable chaparral habitat is present on the site this species is known only from the western end of the range; low potential. |
| Mammals | | |
| California leaf-nosed bat<br>*Macrotis californicus* | CSC, FSC | Too few data are available upon which to base conclusions about potential for occurrence. |
| spotted bat<br>*Euderma maculatum* | CSC, FSC | Too few data are available upon which to base conclusions about potential for occurrence. |
| pale big-eared bat<br>*Plecotus townsendii pallescens* | CSC, FSC | Too few data are available upon which to base conclusions about potential for occurrence. |
| pallid bat<br>*Antrozous pallidus* | CSC | Too few data are available upon which to base conclusions about potential for occurrence. |
| greater western mastiff-bat<br>*Eumops perotis californicus* | CSC, FSC | Too few data are available upon which to base conclusions about potential for occurrence. |
| San Diego desert woodrat<br>*Neotome lepida intermedia* | FSC | Nest mounds observed in rocky areas. |
| (San Diego) black-tailed hare<br>*Lepus californicus bennettii* | CSC, FSC | Suitable habitat is present, but potential for occurrence is low. |
| ringtail<br>*Bassariscus astutus* | CP | Suitable habitat is present at the site, but potential for occurrence is considered low due to overall rarity. |
| long-tailed weasel<br>*Mustela frenata* | U | Suitable habitat present and moderate potential for occurrence. |
| American badger<br>*Taxidea taxus* | SA | Suitable habitat present and moderate potential for occurrence. |
| mountain lion<br>*Felis concolor* | U | May occur on the site but so scarce in the region, observations unlikely. |

In addition to the extensive listing and discussion above, there are additional (bird) species which have been identified as being of concern for southern California (USDI:FWS, 1990). In the interest of space, these will not be discussed in detail, but suffice to say that each of the following are among the list of concern and observed or expected for the project site: belted kingfisher (expected), blue-gray gnatcatcher (expected), warbling vireo (expected), Wilson's warbler (expected), blue grosbeak (expected), and lazuli bunting (expected).

Status Codes Definitions:

| | |
|---|---|
| CE | California Endangered |
| CT | California Threatened |
| CP | California Fully Protected |
| FE | Federally Endangered |
| FT | Federally Threatened |
| FPE | Federally Proposed Endangered |
| FSC | Federal Species of Concern |
| CSC | California Special Concern (CDFG, 1987) |
| SA | Special Animal (CDFG, 1994) |
| S | Sensitive (USDI:FWS, 1986) |
| SC | Special Concern (Tate, 1986) |
| B | National Audubon Society Blue List (Tate, 1986) |
| U | Uncommon (USDI:NPS, 1982; De Lisle, *et al.*, 1986) |

**Biological Constraints**

Prior to the design of proposed Beautiful Homes development, a Constraints Analysis was prepared to identify resources of concern early in the project planning effort. This study ranked portions of the site into one of four sensitivity units. The rankings and their characteristics presented below are based on the premise that the *more difficult an impact to a given resources would be to mitigate, the higher its sensitivity.*

The areas of highest biological sensitivity **(S-1)** have one or more of the following features:

- Habitat or known locations of plant species listed by state or federal agencies as endangered, threatened or rare, or species currently proposed for such listing for this site, includes Lyon's pentachaeta and Santa Monica Mountains dudleya.
- Locations of mature oak trees that are regulated by the County Oak Tree Ordinance and other native trees (e.g. sycamore), that provide exceptional wildlife values.
- Habitats known to provide exceptional resources, such as water, nesting sites, or abundant food; for the site, this has been limited to riparian habitats due to the intense regulatory scrutiny such habitats are given.

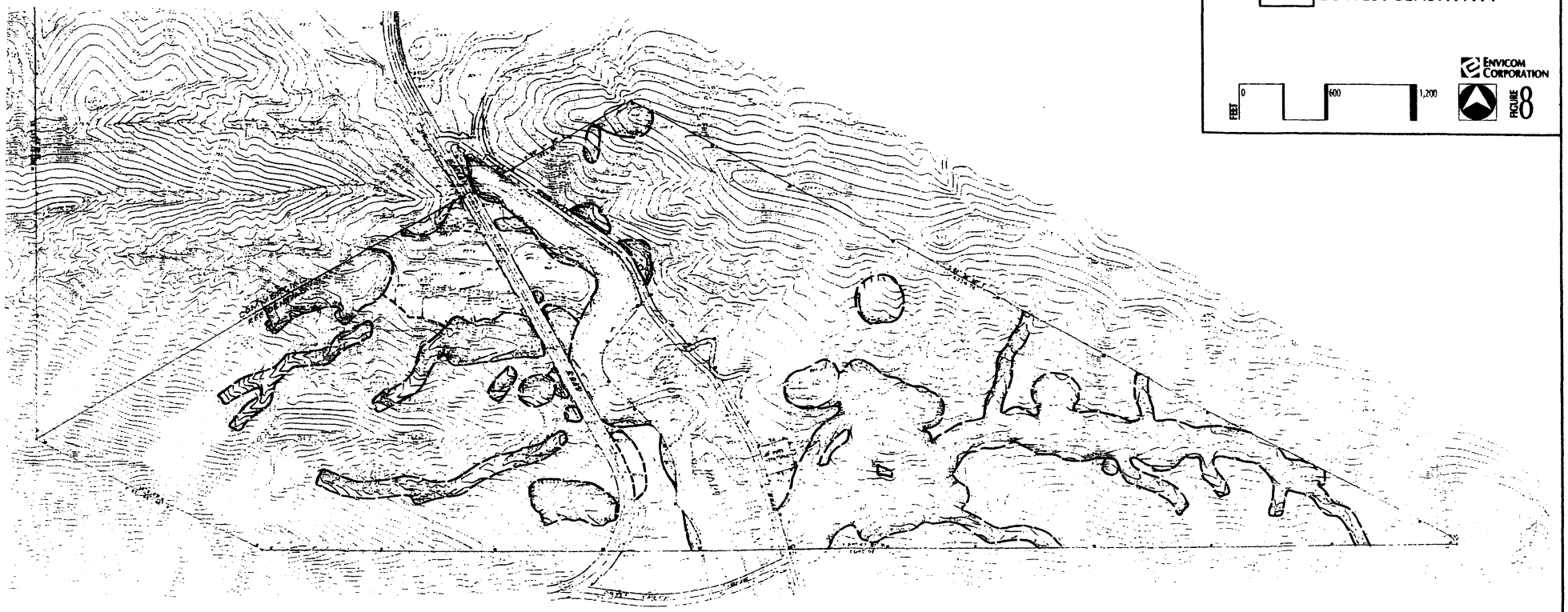
Because the protection of S-1 resources is of high priority, "buffer zones" are needed to protect their integrity. These buffers vary in width, depending upon the resource. The areas of endangered plants and riparian forest shown on **Figure 8** include 100 foot buffers, while oak trees and riparian scrub buffers range from the immediate vicinity of the trees to 50 feet for riparian scrub.

The second most sensitive units **(S-2)** are areas supporting unique or unusual plants or communities: Coville's lip fern, cloak fern, linear-leaved goldenbush, and the stand of redshank chaparral.

The third most sensitive areas **(S-3)** are those which support the assemblages of sensitive wildlife species, and are part of the core habitat for wildlife movement. Note that the area for S-3 sensitivities covers most of the site, and that the S-2 sensitivities are discrete units within the core habitat. If the majority of the area had been assigned a higher ranking, it would imply that the sites for the unusual plant species, if listed as S-2, would constitute lower sensitivity within an area of higher sensitivity, when in fact these areas overlap. Consequently, *the level of sensitivity or differentiation between S-2 and S-3 is not so great that development would be less constrained in S-3 areas than in S-2 areas.*

The least sensitive areas **(S-4)** are those locations described as disturbed due to grading and removal of natural vegetation. There are two such areas within the site: one west of Kanan Road in the northern portion of the site; the second south on Kanan, just east of the road.

These sensitivity units have been mapped as shown on **Figure 8**. The findings indicate that the least sensitive areas are previously graded, undeveloped land west of Kanan Dume Road, and the flat area above Medea Creek.


AREAS OF HIGHEST AND LOWEST SENSITIVITY
HIGHEST SENSITIVITY
LOWEST SENSITIVITY
ENVICOM CORPORATION
FEET
0
600
1,200
FIGURE 8

## III. CHARACTERISTICS OF THE SURROUNDING AREA

The surrounding area examined for this report is formed roughly by Agoura Hills on the north, Lindero Canyon Road and Westlake Village on the west, Malibu Creek State Park on the south, and Las Virgenes Canyon on the east. It encompasses the entirety of SEA #6 (**Figure 9**).

### Adjoining Land Uses

To the north of the site lies the City of Agoura Hills and the Ventura Freeway corridor (refer to **Figure 2**). This area is characterized by a mix of residential, commercial, and industrial development, generally paralleling the freeway. South of the freeway, residential development is mostly single-family, custom homes; to the east, near Chesebro Road, there is some clustering of tract housing. Commercial development is dominant in the area north of the site, with businesses including gas stations, recycling centers, small businesses, restaurants, and office buildings. The most recent development is at the southwest corner of Agoura and Kanan roads, where grading is underway for a multi-screen theater complex. The Beautiful Homes applicant is also the proponent of that project.

The area east of the site is generally undeveloped, except for some clustered housing and commercial structures near the intersection of Chesebro and Agoura roads, and tract housing along Liberty Canyon Road. Approximately one-half of SEA #6 is east of the site, and the area outside of the SEA has connection to public open space to the east and south.

Paramount Ranch, a unit of the National Park Service, is directly south, separated from the site by estate residences in the Silvercreek development. Most of the area south of Paramount Ranch is undeveloped and maintains connection to the site through Medea Creek and across open country to the southeast. The western portion of Malibu Creek State Park is south of Paramount Ranch, where Medea Creek enters Malibu Lake.

The area to the west of the site, surrounding Ladyface, is undeveloped, mostly due to the steep terrain. There has been some grading and aggregate removal adjacent to Kanan Road on the site, approximately 1 mile south of the 101 Freeway.

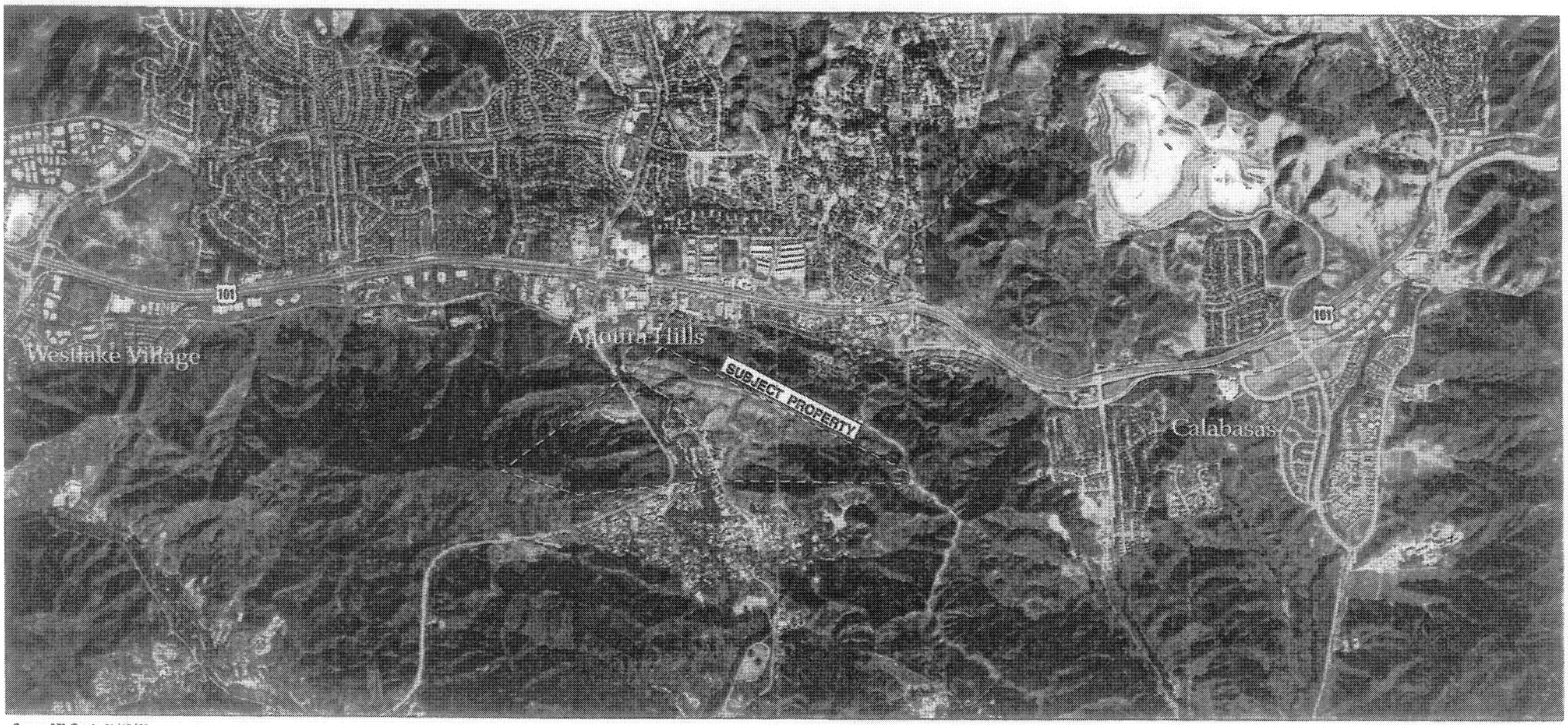
Several roads cross the site and the surrounding area. The largest is Kanan Road which bisects the site from north to south, paralleling Medea Creek on the west. Although the road is two-lane (one in each direction) across the site, it is rather wide and heavily used. The other north-south route is Cornell Road, which roughly parallels Kanan Road, but runs on the east side of Medea Creek

### Public Lands and Preserved Open Space

The extent and distribution of public lands and open space is shown on **Figure 10**. The closest such area to the site is Paramount Ranch, which is part of the Santa Monica Mountains National Recreation Area. Paramount Ranch encompasses a portion of Medea Creek and is used for a number of events (formerly the site of the Renaissance Pleasure Faire).

Nearby, the largest, permanent open space is Malibu Creek State Park, which lies to the southeast of the site, below Malibu Lake, where Medea Creek terminates. Other open space areas in the vicinity include Peter Strauss Ranch (Lake Enchanto), and Cheeseboro Canyon (which is northeast of the site, north of the Ventura Freeway).

Although most of the land surrounding the site is privately-owned, it remains undeveloped. Currently, the site is best characterized as a large, natural area with some development in the center and to the distant north and east, with most of its periphery connected to the larger Santa Monica Mountains through natural linkages.



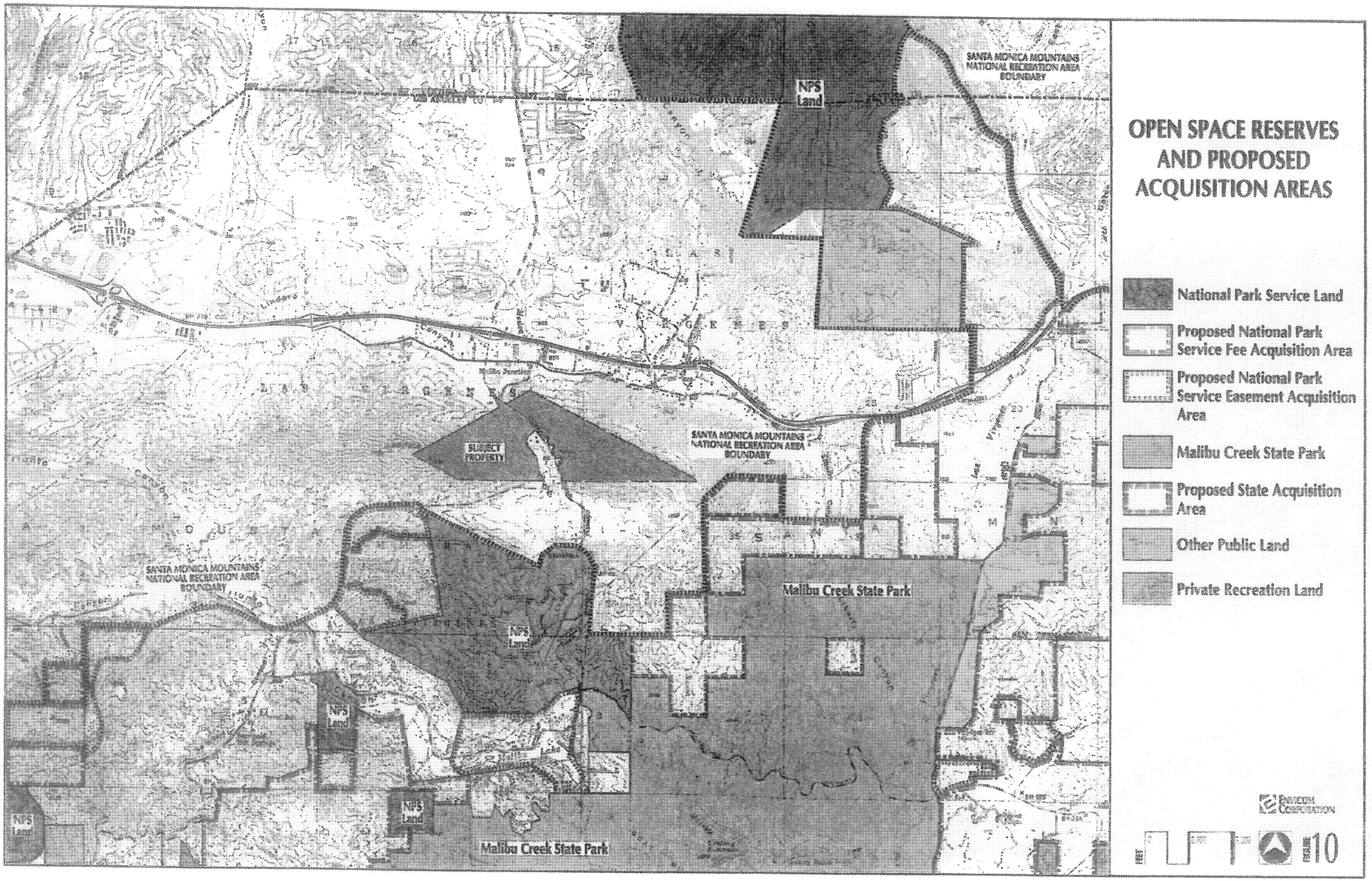

Source: I.K. Curtis, 11/02/93

**Surrounding Vicinity**

LEGEND

Developed Areas
(urban & suburban)

Open Space


SANTA MONICA MOUNTAINS NATIONAL RECREATION AREA BOUNDARY
NPS Land
SUBJECT PROPERTY
Malibu Creek State Park
OPEN SPACE RESERVES AND PROPOSED ACQUISITION AREAS
National Park Service Land
Proposed National Park Service Fee Acquisition Area
Proposed National Park Service Easement Acquisition Area
Malibu Creek State Park
Proposed State Acquisition Area
Other Public Land
Private Recreation Land
ENVICOM CORPORATION
10

## Regional Plant and Animal Resources

The following describes the major habitats of the area surrounding the site in terms of ecosystem function, plant species, and associated wildlife species. Major sources for this section include National Park Service (1981, 1982), Friesen (1982), and the observations and experience of Envicom Corporation biologists. The CNDDB (1996) was reviewed for occurrences of sensitive habitats, plants, and animals.

Most of the regional habitats are represented within the site, although these habitats may be more well-developed in the surrounding area. The descriptions of the regional plants and animals is potentially applicable to most parts of the Santa Monica Mountains, with the possible exception of the higher elevations and more coastal zones. The site and immediate surroundings are typical of the region with a few exceptions as noted in earlier descriptions of the site's resources.

The lists of observed and expected flora and fauna for the site (refer to **Appendices A and B**) also estimate regional population densities of these species. While population estimates have been assigned, caution must be used in applying these abundances outside of the study area. Throughout the Santa Monica Mountains, long-term population census studies have not been conducted for most species.

### *General Habitat Descriptions/Associated Wildlife*

#### Chaparral

Chaparral covers much of the surrounding area. This community is composed of dense, woody evergreen shrubs, usually with thick leathery or waxy leaves, with many species being dormant during the late summer and fall.

Chaparral occurs on steep, rocky slopes with poor drainage and thin, infertile soils. Areas of the chaparral that are over 20 years old contain a high percentage of dead undergrowth as the result of low decomposition. Fire is an important factor in the removal of senescent material as many of these species only resprout from root burls, such as mountain mahogany (*Cercocarpus betuloides*), ceanothus, manzanita (*Arctostaphylos* spp.), chamise (*Adenostoma fasciculatum*), and toyon (*Heteromeles arbutifolia*). Others produce seeds at an early age, then die-back, and then after many years, the remaining viable seeds will germinate only after a fire episode. Examples include black sage (*Salvia mellifera*), buckwheat (*Eriogonum fasciculatum*), and golden-yarrow (*Eriophyllum confertiflorum*). In the year following the fire, herbaceous growth becomes extensive, and the chaparral community experiences a temporary increase in species diversity. Consequently, chaparral returns to a mature form in ten to fifteen years after a fire.

The dominant plant species of chaparral in the region include chamise, ceanothus (*Ceanothus* spp.), scrub oak (*Quercus berberidifolia*), mountain mahogany, toyon, manzanita, sugarbush (*Rhus ovata*), holly-leaf redberry (*Rhamnus ilicifolia*), poison oak (*Toxicodendron diversilobum*), and black sage.

##### *Associated Wildlife*

Chaparral provides excellent cover for numerous animal species. Some chaparral plants produce large amounts of seed, thus providing resources for birds and small mammals. Reptiles are relatively common and include several species of snakes and lizards. Examples include the Great Basin fence lizard side-blotched lizard, coast horned lizard, San Diego gopher snake, and Southern Pacific rattlesnake (*Crotalus viridis helleri*).

Amphibians are not common in chaparral due to the lack of substantial moisture. However, several species will travel through the community in search of moisture in the adjacent communities; these species include California toad and Pacific chorus frog. Invertebrate species, which are usually overlooked, are especially numerous in this community, particularly

in the spring and early summer months. These invertebrates, including the arachnids (scorpions, harvestmen, ticks, spiders), are the most important animal food source for herbivorous species, which require animal protein supplements. Tremendous numbers of insect species may be present in the appropriate season.

The age of the chaparral has an impact on food production. For example, old growth stands actually have low nutritional value for deer (because of the large percentage of dead undergrowth), but provide protection from large predators. Conversely, young chaparral vegetation, with resprouting growth and new herbaceous plants produces excellent browse and provides high nutritional value for a wide range of wildlife species. Common herbivorous mammals include California ground squirrel, desert cottontail, Botta's pocket gopher, brush mouse (*Peromyscus boylii*), and dusky-footed woodrat. Predatory mammals include mountain lion (*Felis concolor*), bobcat, American badger (*Taxidea taxus*), coyote, grey fox (*Urocyon cinereoargenteus*), ringtail (*Bassariscus astutus*), and striped skunk.

The diversity and abundance of bird species is reflective of the seed availability and the variety of insect prey. Many bird species use chaparral, but nest in other habitats. Others, such as wrentit, are permanent residents in shrub habitats.

## Coastal Sage Scrub

In contrast to chaparral, coastal sage scrub is an association of half-woody, often aromatic shrubs found on rocky or gravelly slopes in areas where marine fog can penetrate, at least occasionally. It is often referred to as "soft chaparral." Coastal sage scrub is found on the lower, south-facing coastal slopes of some surrounding areas. Soils in this community tend to be sandy with a high percentage of gravels, low fertility, and erosive.

Many coastal sage scrub plant species invade quickly after soil disruption and therefore, play an important role in slope stabilization. Also, this vegetation is sometimes found in disturbed areas as a transitional stage to chaparral. This effect is caused by the tendency of the plants to grow numerous shallow roots just below the surface. Because these roots have the ability to regenerate after a fire, recovery of the community occurs much faster than the chaparral. Additionally, many coastal sage scrub plants are able to reproduce from seed that has remained dormant for years since the last fire.

Characteristic species in the region include coastal sagebrush, white sage (*Salvia apiana*), purple sage (*S. leucophylla*), black sage, laurel sumac (*Malosma laurina*), California encelia, orange bush monkey flower, California buckwheat, ashy-leaf buckwheat (*Eriogonum cinereum*), canyon sunflower (*Venegasia carpesioides*), lemonade berry (*Rhus integrifolia*), golden-yarrow, giant wild rye, deer weed (*Lotus scoparius*), coyote brush (*Baccharis pilularis* ssp. *consanguinea*), and chaparral yucca (*Yucca whipplei intermedia*).

### *Associated Wildlife*

The wildlife community in coastal sage scrub is very similar to that described for chaparral. In some parts of southern California, there is a distinct coastal sage scrub animal community, but many of those specialists are not found in the Santa Monica Mountains [e.g. California gnatcatcher (*Polioptila californica*)]

## Oak and Walnut Woodlands

The surrounding area supports patches of coast live oak, particularly along the edges of mesic slopes and intermediate stream courses. Coast live oaks thrive on soils that are deep and moist, usually in canyons and north facing slopes. Substantial coast live oak woodlands in the

surrounding area occur in Malibu Creek State Park, Paramount Ranch, and on surrounding private lands.

Common plant species in this community include the oaks and shrubs, such as toyon, Mexican elderberry (*Sambucus mexicana*), poison-oak, and bay laurel (*Umbellularia californica*). Various native and non-native grasses including giant wildrye, wild oat (*Avena* spp.), rip-gut brome (*Bromus diandrus*), soft chess (*B. hordeaceus*), foothill needlegrass (*Nassella lepida*), and perennial ryegrass (*Lolium perenne*); herbaceous forbs include various filarees (*Erodium* spp.), bur-clover (*Medicago polymorpha*), tocalote (*Centauria melitensis*), and black mustard (*Hirschfeldia incana*), short-pod mustard (*Brassica geniculata*), Parry's larkspur, miner's lettuce (*Claytonia perfoliata*), and various clarkias (*Clarkia* spp.).

Valley oak woodlands, sometimes referred to as valley oak savannas, also occur in the surrounding area. Found in association with grasslands, valley oaks are large (up to 70' tall), broad-leaved deciduous trees, that grow widely spaced. Valley oak savannas are typically found on flat alluvial valley bottoms, where they extend massive tap roots down 30 to 60 feet to absorb ground water during the summer months. Climate and understory plant species are essentially the same as the valley grasslands.

California walnut woodlands are included with the coast live oak woodland and are referred to as a "sub-community." This sub-community is dominated by California walnut (*Juglans californica*) and coast live oak. Walnut woodlands are declining, and they are of significance within the surrounding area. Important walnut woodlands occur in the vicinity of Calabasas, primarily south of the Ventura Freeway, from slopes just west of Las Virgenes Creek, west nearly to Cheeseboro Canyon, the Cold Creek drainage, Malibu Creek State Park, Tapia Park, Solstice and Piuma Canyons.

*Associated Wildlife*

The combination of grasslands and oak woodlands provides valuable habitat for many wildlife species. Acorns are a highly-nutritional food resource used by insects, birds and mammals. Grasses and oaks host large populations of insects, which provide the essential protein requirements for both migrating and resident birds. An assemblage of small herbivores [ground squirrels, rabbits, gophers, voles (*Microtus californicus*), and mice (*Peromyscus* spp., *Rheithrodontomys megalotis, Perognathus* spp.)] provide the primary food sources for raptors such as red-tailed hawk, red-shouldered hawk, Cooper's hawk, American kestrel, barn owl, great horned owl, and screech owl, which may also nest in the oak trees. Mid-size mammalian predators such as bobcat, grey fox, coyote, and American badger, also prey upon small mammals.

Riparian Forests, Woodlands and Scrub

Riparian, or streamside habitats are found throughout the surrounding area; substantial examples in the vicinity occur along Malibu Creek and its tributaries, including Medea Creek. The distinction between forest, woodland and scrub is one of stature and spacing of the plants occurring the habitat. Forests are dominated by closely-spaced trees, whereas woodlands exhibit greater spacing. Riparian scrub is dominated by shrubs, or small trees, which sometimes represent a post-flood recovery of former forest or woodland. In this case, the shrubs may ultimately mature into trees.

Riparian tree and shrub species provide shading the water and the stream course. Consequently, the microclimate within this community differs greatly from the surrounding upland communities. Summer temperatures under the canopy can be ten to fifteen Fahrenheit degrees cooler than an adjacent oak woodland community in the summer months. Shading and the presence of water allows for shade tolerant and moisture-dependent plants (shrubs, herbs, ferns

and mosses) to become established. Periodically, floods scour the streamcourses, altering the topography by erosion and deposition, and uprooting of canopy and understory plants.

Moisture and high nutrient availability for plants in this habitat allow for relatively high primary productivity, and consequently, for animal species diversity. Accumulation of plant debris washed from surrounding adjacent habitat into the watercourse, and falling of leaves and branches directly into the water sustain myriad microscopic invertebrates as well as macroinvertebrates that are associated with the water.

Trees of riparian forests and woodlands in the region typically include coast live oak, arroyo and red willows (*Salix lasiolepis, S. laevigata*), Fremont and black cottonwoods (*Populus fremontii, P. balsamifera trichocalyx*), western sycamore (*Platanus racemosa*). The understory of plants include arroyo willow, poison-oak, fuchsia-flowering gooseberry (*Ribes speciosum*), heart-leaf penstemon, snowberry (*Symphoricarpos mollis*), mugwort, common eucrypta, blue fiesta flower, baby blue-eyes, and creek monkey flower (*Mimulus guttatus*).

Riparian scrub in the region is usually dominated by small willows (*Salix* spp.), and or mule fat (*Baccharis salicifolia*). The understory is often lacking, or composed on annual or perennial herbs characteristic of uplands.

*Associated Wildlife*

As indicated above, high primary productivity of riparian habitats is reflected in an abundance of wildlife species. For example the near-constant moisture supports numerous insects. These insects typically emerge and spread into the surrounding vegetation, attracting large numbers of insect-eating birds. The multi-layered structure of riparian vegetation provides many niches for animals to occupy.

The soil moisture and surface water provides habitat for amphibians. Those in the region include California newt (*Taricha t. torosa*), black-bellied slender salamander, Monterey ensatina (*Ensatina e. eschscholzii*), California toad, California treefrog, and Pacific chorus frog. Some reptile species also prefer the moist conditions in riparian habitats, including southwestern blind snake (*Leptotyphlops h. humilis*), San Bernardino ringneck snake (*Diadophis punctatus modestus*), San Diego night snake (*Hypsiglena torquata klauberi*), and San Diego mountain kingsnake (*Lampropeltis zonata pulchra*).

Bird species are especially diverse in riparian habitats. This is due to the variety of plant species and structural diversity. Riparian woodlands and scrub also attract migratory songbirds, some of which pass through, and others that may remain to nest in the summer. Typical riparian bird species include red-shouldered hawk, great horned owl, belted kingfisher, Nuttall's woodpecker, black phoebe, house wren, warbling vireo, yellow-rumped warbler, yellow warbler, common yellowthroat, hooded oriole, Bullock's oriole, song sparrow, spotted towhee, blue grosbeak, and house finch.

Mammals in the region may use riparian habitats for access to surface water. Typical riparian mammals (residents and casual visitors to this habitat) may include Virginia opossum (*Didelphis virginiana*), several bat species, western gray squirrel (*Sciurus griseus*), dusky-footed woodrat, coyote, raccoon, striped skunk, bobcat and mule deer.

## Grassland

Flatlands and uplands with heavy soils surrounding the site typically support grassland communities. Grassland vegetation generally forms a mosaic or understory to oak and walnut woodlands, and occurs as openings in both coastal sage scrub and chaparral.

The dominant species within these grasslands are usually introduced annual grasses and introduced forbs. Because introduced species may dominate, this habitat association is sometimes referred to as non-native grassland. This is misleading, as these grasslands serve the ecological equivalent of native-dominated grasslands, which are rare in the Santa Monica Mountains. We prefer to call such areas dominated by non-native grass species annual grasslands, or just grasslands, which is a more accurate description of the function of this vegetation.

Exotic species are characteristically introduced Mediterranean annuals which have replaced the native California grasses. The most abundant species in the region include wild oat, red brome (*Bromus madritensis rubens*), rip-gut brome, soft chess, and introduced forbs including various filarees, bur-clover, tocalote, black mustard, and short-pod mustard.

Before grazing, cultivation and urban development displaced much of this habitat, native perennial bunch grasses were the natural species present. Important species include purple needlegrass (*Nassella pulchra*), foothill needlegrass, blue ryegrass (*Elymus glaucus*), Malpais bluegrass (*Poa secunda*) coast melica (*Melica imperfecta*), and also several annual fescues (*Vulpia* spp. ). These, as well as native herbs species can still be found throughout the grassland areas, such as slender tarweed (*Hemizonia fasciculata*), common fiddleneck (*Amsinckia menziesii* spp. *intermedia*), rusty popcorn flower (*Plagiobothrys nothofulvus*), succulent lupine (*Lupinus succulentus*), Angel's and globe gilias (*Gilia angelensis* and *G. capitata*), red maids (*Calandrinia ciliata*), miner's-lettuce, Johnny jump-ups (*Viola pedunculata*), snakeroot (*Sanicula arguta*), and native bulbs such as blue dicks (*Dichelostemma capitata*), golden-stars (*Bloomeria crocea*), and Mariposa lilies (*Calochortus* spp.).

*Associated Wildlife*

As discussed above, although grasslands in the region are typically dominated by introduced plant species, they still support many of the grassland wildlife species that occur in the region, and in fact may serve as the ecological equivalent of native perennial grasslands. This is because annual grasslands still offer the resources that wildlife require (food, cover, etc.). The exceptions may be those animal species that prefer open grasslands, as native grasslands are generally more open than annual grasslands, and butterflies that rely upon native grass species as their hosts.

Animal species present in grasslands provide significant food resources for animals that normally reside in the surrounding communities. Wildlife species include many species of invertebrates, particularly grasshoppers (Order: Orthoptera) and true bugs (Order: Hemiptera). Vertebrate species present may include California toad, Pacific chorus frog, Great Basin fence lizard, side-blotched lizard, San Diego gopher snake, Southern Pacific rattlesnake, and mammal species such as California ground squirrel, desert cottontail, Botta's pocket gopher, brush mouse, western harvest mouse, and California vole (*Microtus californicus*). Grassland predators include mountain lion, bobcat, American badger, coyote, grey fox, and striped skunk. Common bird species include several raptors such as red-tailed hawk, red-shouldered hawk, Cooper's hawk, American kestrel, barn owl, great horned owl, screech owl, and turkey vulture. Other bird species in grasslands include mourning dove, western kingbird, horned lark, loggerhead shrike, western meadowlark, lark sparrow, fox sparrow, and house finch.

***Sensitive Biological Resources and CNDDB Search Results***

The sensitive biological resources for the region are fully discussed in the description of the site's sensitive resources. While the discussions and tables in that section focus upon the site, the habitat requirements and probabilities for occurrence are generally the same for the regional view.

As discussed earlier, we reviewed the CNDDB (1996) report for the Thousand Oaks and Calabasas quadrangles. The results of the data base run are summarized in **Table 2**. Of the elements reported, those reported from or most likely to be present within the area include: Valley Needlegrass Grassland, Southern Coast Live Oak Riparian Forest, Lyon's pentachaeta, Santa Monica Mountains dudleya, Plummer's Mariposa lily (*Calochortus plumage*), and San Diego horned lizard. The other species are: (1) distant from the site; (2) records of transients; (3) old records no longer considered extant; or (4) the species has specific habitat needs which may occur in the area but were not observed on the site (e.g. calcareous soils).

**Wildlife Movement (Habitat Linkages)**

As urbanization continues to fragment natural habitat, recognition of the biological importance of maintaining habitat linkages has increased. In the Santa Monica Mountains, large areas of natural open space that historically have maintained ecological continuity have become isolated through the construction of roads, housing tracts, business centers, industrial parks, and more. In order to salvage current levels of interaction between the remnants of natural populations throughout the region, it is necessary to plan for, and to protect, undisturbed habitat parcels that link core habitat. These connecting strips are generally referred to as habitat linkages.

While habitat linkages implies an existing continuity of natural vegetation, "wildlife corridors" are generally artifacts of development. Corridors are often narrow strips of undeveloped land that are intended to maintain continuity between otherwise disconnected natural areas or fragments. Ideally, corridors provide opportunities for animal populations to interact, thus reducing the risk of genetic, ecological, and demographic isolation, and maintaining community and ecosystem stability. In reality, wildlife corridors are often designed as an afterthought, using undevelopable land for that purpose and not considering the physical and biological needs of large mammals or existing wildlife trails.

The study of habitat linkages for the Beautiful Homes site has involved a review of pertinent literature[14], interpretation of aerial photographs for habitat connectivity to the subject area, and field investigations by Envicom Corporation biologists. In particular, we followed the steps proposed by Beier and Loe (1992) for evaluating wildlife movement.[15]

The site is divided into two large open space areas by Cornell Road, Kanan Road, and residences along Medea Creek (**Figure 11**). The two halves of the site have similar functions in terms of wildlife movement. Both areas have unrestricted wildlife movement within their boundaries. The eastern half of the site (east of Cornell Road) is connected to open space to the east and southeast, while the western half is connected to larger open space to the west and southwest. The eastern half of the site is identified by Edelman (1991) as part of the Santa Monica Mountains core habitat, and is a destination for wildlife moving through the Liberty Canyon underpass from the Simi Hills. The Liberty Canyon crossing is identified as a "choke point" by Edelman (1991), and is one of only two potential crossings of the Ventura (101) Freeway in this portion of the range. For the site, this means that animals that make the crossing at Liberty Canyon (or attempting to do so) have an area of natural habitat to reach or depart from, helping such movements to be more successful.

Wildlife movement between the two halves of the site is encumbered by estate developments and Cornell and Kanan roads; however, there was evidence of wildlife movement (coyote, bobcat, and mule deer tracks) along Medea Creek, which may indicate that animals are moving east and west across the

[14] The report by Lieberstein (1989) does not address the project area and is not considered in the discussion of wildlife movement. The report was reviewed for background information.

[15] Although the Beier and Loe (1992) report was intended for evaluation of wildlife corridors incorporated into a development, the assumptions and methods for determining functionality are useful for describing existing wildlife movement patterns.

site, or north and south along the creek. The connection across Medea Creek is tenuous, but there are gaps among the existing residences and crossings of Kanan Road are possible, although hazardous.

Taken as a whole, the northern side of the Beautiful Homes property is closed to animal movement by urban development along Agoura Road and, to a greater degree, by the Ventura Freeway. To the direct south, there are numerous estate residences in the Cornell Road Ranchos, Wagon Road Ranchos, and Medea Valley Estates that extend nearly the width of the entire southern edge of the Beautiful Homes site (see **Figure 10**). The cluster of homes in these developments poses a formidable barrier to wildlife movement south to Paramount Ranch. While some animals may be able to traverse the developments at Agoura Hills and the estates south of the site, it is more likely that most wildlife movement to and from the Beautiful Home site will occur to the east, west, southeast, and southwest.

**TABLE 2**

Results of CNDDB Report for the Thousand Oaks and Calabasas Quadrangles

| ELEMENTS OF BIOLOGICAL DIVERSITY | ON THE SITE? |
|---|---|
| **Plant Communities** | |
| Valley Needlegrass Grassland | no |
| Southern Coast Live Oak Riparian Forest | no |
| Southern Sycamore Alder Riparian Woodland | no |
| Valley Oak Woodland | no |
| California Walnut Woodland | no |
| **Plant Species** | |
| Santa Susana tarplant *Hemizonia minthornii* | unknown[16] |
| Lyon's pentachaeta *Pentachaeta lyonii* | yes |
| Conejo dudleya *Dudleya abramsii* ssp. *parva* | probably absent[17] |
| Santa Monica Mountains dudleya *Dudleya cymosa* ssp. *ovatifolia* | yes |
| many-stemmed dudleya *Dudleya multicaulis* | probably absent |
| Braunton's milk-vetch *Astragalus brauntonii* | unknown (low potential) |
| Conejo buckwheat *Eriogonum crocatum* | probably absent |
| Plummer's mariposa lily *Calochortus plummerae* | unknown (possible) |
| San Fernando spineflower *Chorizanthe parryi* ssp. *fernandina* | no[18] |
| **Animals** | |
| southwestern pond turtle *Clemmys marmorata pallida* | not likely[19] |
| San Diego horned lizard *Phrynosoma coronatum blainvillei* | present[20] |
| bank swallow *Riparia riparia* | possible transient[21] |
| least Bell's vireo *Vireo belli pusillus* | possible transient |

[16] Plant species for which presence is "unknown" are either not identifiable when surveys were conducted, or would require focused searches to detect.

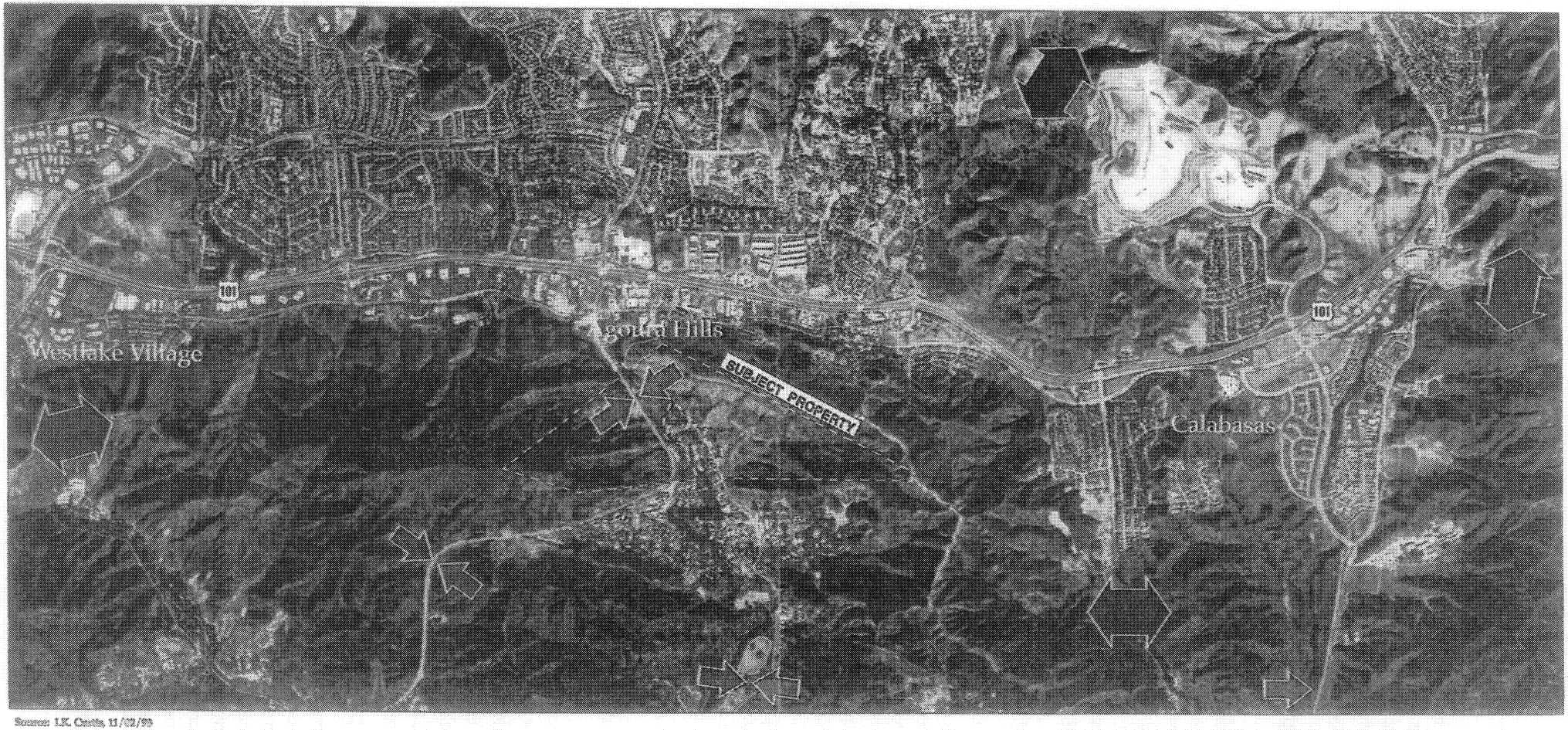
[17] "Probably Absent" indicates that these species are only known from areas distant from the site and/or have habitat requirements that were not observed. Their presence cannot be totally ruled out without focused surveys in the proper season.

[18] Species for which a "no" is indicated are those which it is determined are highly unlikely to be present due to habitat requirements or regional status (e.g., *Chorizanthe parryi* ssp. *Fernandina* is believed to be extinct).

[19] This species is known from Madea Creek, however, conditions on the site are marginal.

[20] "Present" indicates that this species was observed on the site by MBA (1992).

[21] "Possible Transient" indicates that these species may occur on the site, but only in migration; not likely to nest on the site




Source: LK. Castle, 11/02/99

**Wildlife Movement Patterns**

LEGEND

- Developed Areas (urban & suburban)
- Open Space
- Unrestricted Movement
- Moderately Restricted Movement (rural road crossings and/or rural land uses)
- Choke Point

ENVICOM CORPORATION

FIGURE 11

As indicated earlier, the site has indirect connection to dedicated open space areas in the mountains, most importantly southwest to Malibu Creek State Park. Any connection to dedicated open space provides for movement of organisms throughout the region as these species depend upon corridors or "stepping-stones" of appropriate habitat to move from one area to another. Also of concern is the home range of species that utilize smaller areas on a daily or seasonal basis to meet life-history needs, such as those species currently utilizing the undeveloped portions of the site. Therefore, it appears that portions of the site are an integral part of the regional natural habitat, and may contribute to regional wildlife movement.

To summarize, the site has generally unrestricted wildlife movement within its boundaries (**Figure 10**), although large animal movement may follow established trails, ridgelines, or canyon bottoms. Access to and from the site is greatly restricted to the north by Agoura Hills and the Ventura Freeway, and to the south by the Cornell Road Ranchos, Wagon Road Ranchos, and Medea Valley Estates developments. Combined with the inhibited crossing of Medea Creek within the project boundaries, wildlife movement opportunities form almost a "dumbbell," with the handle being the effectively narrowed Medea Creek crossing and the two ends the open space on either side of Cornell and Kanan roads. For wildlife movement, the real value of the site may be as core habitat in the Santa Monica Mountains, providing resources for wildlife using this portion of the range.

**Regional Biological Value of the Site**

The surrounding area is judged to be of high overall biological value, based upon field observations and supplemented with literature research. This region possesses a number of attributes that contribute to its value as a biological "reservoir." First, the surrounding area (especially to the southeast, east, and west) is large and relatively undeveloped. Of special importance is the interaction between riparian corridors, which provide a source of nearly perennial water with dense vegetative cover, and upland habitats. In terms of plant species, approximately fifteen percent of all the plant species occurring in California can be found in the Santa Monica Mountains, and over thirty percent (275) of these were observed on the site, including several sensitive species. Observed and expected wildlife species include the larger mammals that range over extensive areas such as bobcat, mountain lion, mule deer, gray fox, coyote, and American badger. High biological value is further in evidence by the existing number of SEAs, parklands and reserves of the surrounding region, as listed below:

Malibu Canyon and Lagoon (SEA #5)
Hepatic Gulch (SEA #7)
Malibu Creek State Park Buffer Area (#8)
Cold Creek (SEA #9)
Cheeseboro Canyon (National Park Service)
Rocky Oaks (National Park Service)
Castro Crest (National Park Service)
Peter Strauss Ranch/Lake Enchanto (National Park Service)
Paramount Ranch (National Park Service)
Malibu Creek State Park (California Department Parks and Recreation)
Palo Comado Canyon (Santa Monica Mountains National Recreation Area)

**Relationship of the Site to Regional Biological Resources**

The site contains representative habitat of six plant communities within a relatively cohesive topographic range. Such a close-knit pattern of vegetation types encourages high usage by wildlife and also supports diverse plant species, including some disjunct desert plants. While surrounding areas also support a wide array of biological resources, the unique aspect of the site is the self-contained nature of the vegetation types within two distinct topographic units. In terms of supporting wildlife, the property offers fresh water sources, nesting sites, plentiful food sources, cover and wildlife movement areas. Additionally, the community types of the subject property add considerably to the surrounding area's biological diversity. The high proportion of native plants observed indicates minimal past

disturbance, except the grassland areas adjacent to Cornell Road and the Malibu Fire Station that are grazed by horses. The location of the site in relation to SEA # 6 means that impacts to the surrounding area could adversely affect the biological resources in the SEA. The SEA does not exist as a separate entity from the rest of the regional biological resources. Connections to other undeveloped land is important for the maintenance of plant and animal diversity in the SEA and in areas which connect to the SEA, such as the areas to the east and south. For this reason, the potential loss of resources in areas adjacent to the SEA must be examined, even though portions of the property do not encompass designated SEA land.

## IV. IMPACT ANALYSIS

### Project Description

The applicant proposes to build a residential development on the 330 acre site roughly encompassing the area south of the intersection of Cornell and Kanan Roads (**Figure 12**), in the County of Los Angeles at the southern border of the City of Agoura Hills. The project would involve six phases (**Figure 12**) and consist of the following:

| PHASE | LOTS | ACREAGE |
|---|---|---|
| 1 | 46 | 23.79 |
| 2 | 18 | 5.72 |
| 3 | 14 | 10.25 |
| 4 | 11 | 6.78 |
| 5 | 7 | 4.25 |
| 6 | 43 | 21.30 |
| **TOTAL** | **139** | **72.09** |

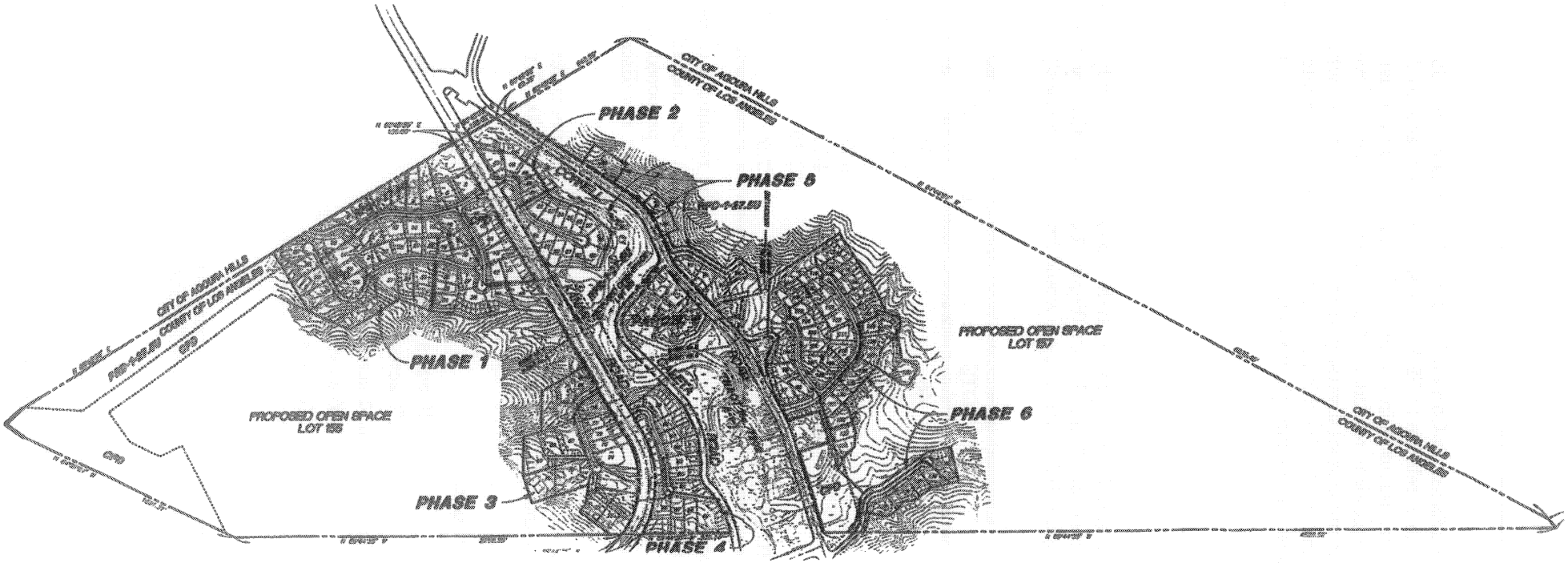
Note that the total development acreage is approximately 72.1 acres. The remainder of the 330 acre site (258 acres, 78 percent) would be left as dedicated open space in Lots 155, 156, and 157. The open space would remain along Medea Creek and to the east and west of the proposed development (**Figure 12**). Lots 140 through 154 constitute common landscape areas which are not discernible at the scale of **Figure 12**.

Cut and fill would not be balanced on site. The proposed project would necessitate the cut of approximately 555,000 C.Y. of material and fill of 452,000 C.Y. The balance (103,000 C.Y.) would have to be exported off-site.

Other areas as indicated on the plan include:

- Private Roads 5.10 acres
- Private Driveway 1.50 acres
- Landscape, Access and Storm Drains 6.31 acres
- Public Streets 0.56 acres
- Public Park 2.71 acres
- Total Impervious Area/Roads and Lots 19.60 acres
- Total Landscaped Area 52.49 acres

Note that Total Impervious Area combined with Total Landscaped Area constitutes the entire project footprint of 72.09 acres. The other features listed above are included in the Total Impervious Area and Total Landscaped Area.




**Proposed Project**

ENVICOM CORPORATION

FIGURE 12

### Thresholds of Significance

Appendix G of the CEQA Guidelines indicates that a project would normally have a significant effect on biological resources if it would:

- Substantially affect a rare, threatened, or endangered species of plant or animal or the habitat of such species;
- Interfere with the movement of any migratory or resident fish or wildlife species;
- Substantially diminish habitat for fish, wildlife, and plants;
- Have environmental effects that are individually limited but cumulatively considerable;
- Conflict with the adopted environmental plans and goals of the community where it is located.

In addition, CEQA Section 15380(d) states that a species not identified as endangered or threatened under the state or federal Endangered Species Acts can nevertheless be considered to be rare, threatened or endangered if the species can be shown to meet the following definitions: (1) "endangered" if the species is in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, predation, disease, competition, or other factors; (2) "threatened" if the species is likely to become endangered within the foreseeable future; or (3) "rare" when although presently faced with extinction, the species exists in such small numbers that it could become endangered if its environment worsens. Plant and animal species that may fit these criteria are those of highest sensitivity, especially former federal candidates, California Species of Special Concern, and highest priority plant species on the CNPS Inventory (i.e. List 1b).

The County Biota Report Requirements also identify certain types of impacts that must be analyzed. In general, these impacts can be categorized as follows:

- Vegetation Impacts
- Number and Species of Trees Affected
- Impacts to Sensitive Species
- Effects on the Integrity of the SEA
- Fuel Modification
- Impacts from Accessory Structures
- Wildlife Movement
- Cumulative Projects

Each of these impact types is discussed below, with the additional consideration of the CEQA Appendix G Guidelines. Impacts are assigned significance without consideration of any project proposed mitigation measures.

### Impacts

#### *Vegetation Removed*

The proposed project would replace approximately 72 acres of undeveloped land with residential structures and infrastructure. **Figure 13** is an overlay of the project footprint on the vegetation communities. This figure shows the area of direct impact due to grading, which would involve 550,000 cubic yards of cut and 452,000 cubic yards of fill. Because cut and fill cannot be balanced onsite, 103,000 cubic yards of material would have to be exported offsite.

# GENERALIZED VEGETATION WITH PROJECT FOOTPRINT

## *Explanation of Map Symbols*

### UPLANDS

- G — Grassland, with sparse scrub
- ChS — Chaparral; South Slopes
- ChN — Chaparral; North Slopes
- Seep

### RIPARIAN

- Rf — Forest (Willow)
- Rs — Scrub (Mulefat, willow)
- Rc — Chaparral
- Rsc — Giant Wildrye

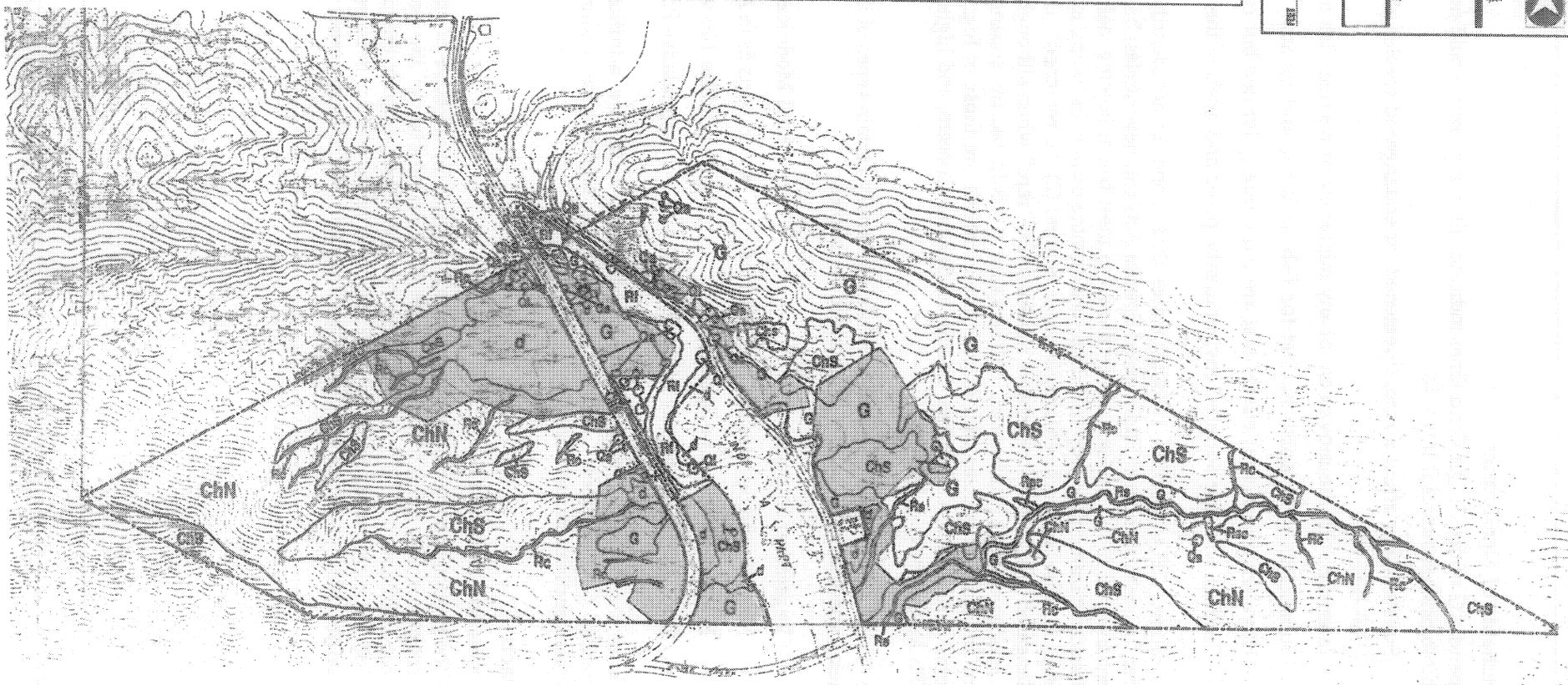
### TREES

- Ql — Valley Oak
- Qa — Coast Live Oak
- Pl — Sycamore
- I — Introduced

### OTHER

- d — Disturbed
- Project Footprint

ENVICOM CORPORATION



The acreages of habitats that would be affected are as follows:

| Habitat Type[22, 23] | Existing (acres) | Impact (acres) | Change (percent) |
|---|---|---|---|
| Grassland | 87.4 | 22.3 | -25.5 |
| Chaparral/North-facing | 116.2 | 20.2 | -17.4 |
| Chaparral/South-facing | 88.0 | 13.7 | -15.6 |
| Riparian/Chaparral | 3.8 | 2.2 | -57.9 |
| Riparian/Scrub | 0.9 | 0.4 | -44.4 |
| Disturbed | 15.0 | 13.7 | -91.3 |

The loss of these portions of the plant communities is considered a significant impact because it represents the diminishment of habitat for plants and animals. The loss of 15.0 acres of disturbed area is not significant because these areas do not support the range of native plants and animals seen on less affected areas. (Impacts to sensitive resources as a result of the loss of these habitats are discussed later.)

The loss of 57 acres of natural habitat (72 acre development minus 15 acres of disturbed area) could adversely affect associated animal communities. In addition to direct loss of individual animals (mortalities through site preparation), the project could displace animals into adjacent areas where they would be subject to predation and would compete with resident animals. Such changes have the potential to disrupt wildlife community function to the point where the diversity of species could drop. The project would cause significant impacts to wildlife as a result of habitat loss.

***Number and Species of Trees Affected***

Poly Associates (1996) has prepared an oak tree report for the site. According to the report, the project would remove 37 of 87 total oak trees. Both coast live oaks and valley oaks are to be removed. The removal of 37 native oak trees is considered a significant impact, requiring compliance with the County Oak Tree Ordinance for replacement, preservation, and maintenance. The Poly Associates (1996) report does not provide such detail.

***Impacts to Sensitive Species***

The sensitive species observed on the site or considered likely to be present, given their habitat requirements and ranges are listed in **Appendix D**. The Appendix is a matrix of the impacts, as provided in the County Biota Report Requirements, which requires answering several questions concerning each species. The species listed in this appendix are derived from Table 1, and from the discussion of sensitive plants species. The list is extensive, as it includes species of even low potential, or those that may not be substantially affected by the project.

The analysis of impacts to these species is also summarized in **Appendix D**. The answers to the impact questions are not always clear-cut, and some assumptions concerning each question must be made, such as using a flexible definition of "substantial" that varies between species.

[22] Some of the acreage is covered by individual oak trees. The impacts to these trees are handled on tree-by-tree basis, as the trees are too scattered to constitute oak woodland habitat.

[23] Habitats not listed but identified on the site would not be affected by the project.

To summarize, **Appendix D** shows that the project could have a significant effect on the following species:

| SPECIES | STATUS | REASON FOR FINDING |
|---|---|---|
| Lyon's pentachaeta | SE, FE | Direct loss of known occurrences of a listed species |
| Coville's lip fern | u | Would be eliminated from the site by proposed project |
| Monterey ensatina | u | Loss of habitat, indirect effects |
| arboreal salamander | u | Loss of habitat, indirect effects |
| California horned lizard | FSC, CSC | Loss of habitat, indirect effects, potential to eliminate from site |
| coastal whiptail | FSC | Loss of habitat, indirect effects |
| San Diego mountain kingsnake | FSC, CSC | Loss of habitat, indirect effects |
| San Bernardino ringneck snake | FSC | Loss of habitat, indirect effects |
| coast patchnose snake | FSC | Loss of habitat, indirect effects |
| western yellow-bellied racer | u | Loss of habitat, indirect effects |
| red coachwhip | u | Loss of habitat, indirect effects |
| sharp-shinned hawk | CSC | Loss of foraging habitat, indirect effects |
| Cooper's hawk | CSC | Loss of potential nesting/foraging habitat, indirect effects |
| northern harrier | CSC | Loss of wintering habitat, indirect effects |
| white-tailed kite | CP, SA | Loss of foraging/nesting habitat, indirect effects |
| red-shouldered hawk | u | Loss of nesting/foraging habitat, indirect effects |
| Lewis' woodpecker | u | Loss of oak trees, indirect effects |
| western bluebird | u | Loss of nesting habitat, indirect effects |
| loggerhead shrike | CSC | Loss of foraging habitat, indirect effects |
| ashy rufous-crowned sparrow | FSC | Loss of habitat, indirect effects |
| San Diego desert woodrat | FSC | Loss of habitat, indirect effects |
| San Diego black-tailed hare | FSC | Loss of habitat, indirect effects |
| American badger | SA | Loss of habitat, indirect effects, interference with movement |
| mountain lion | u | Loss of habitat, indirect effects, interference with movement |

Of particular concern for this project is the direct loss of populations of the state and federally-listed endangered Lyon's pentachaeta. Impacts to a listed species will require consultation with the California Department of Fish and Game and U.S. Fish and Wildlife Service, and extensive mitigation to obtain incidental take permits from those agencies. For the non-listed species, the project has the potential to affect a large number of species, and although none of these other

species are listed, the potential loss of so many sensitive species are considered a significant impact. The areas of sensitive plant species impacts is shown on **Figure 14**, which is an overlay of the project footprint and the sensitive plant populations.

Indirect effects are a major component of the findings of significance for impacts to sensitive species. These indirect impacts can include any of those discussed in the Indirect Impacts section. One particular indirect effect is known to affect a sensitive species observed on the site. Human development creates opportunity for non-native Argentine ants (*Linepithema humilis*) due to watering of landscaping and presence of food waste. Argentine ants are aggressive and will expand their territories into surrounding undeveloped land where they displace native harvester ants (*Pogonomyrmex* spp.) through direct attacks (Hogue 1993). Harvester ants are the primary food source for coast horned lizards. When the harvester ants disappear, the horned lizards also disappear (Los Angeles Times 1997). Therefore, the expansion of development into natural landscapes can result in the indirect loss of coast horned lizards; a significant impact.

***Effects on the Integrity of the SEA***

The project site occupies approximately 50 percent of the Las Virgenes SEA (refer to **Figure 1**). The proposed project would remove approximately 26 acres of the 434 acre SEA, or 6 percent. The applicant proposes to designate the remainder as permanent open space. From an acreage stand point, the impacts to the SEA do not appear significant. However, the placement of new residential development along Cornell and Kanan Roads will increase the isolation of the SEA from areas to the west at Ladyface Mountain. Also, indirect impacts will extend the area of degradation beyond the project footprint (see the discussion of indirect impacts below). The fragmentation of regional biological resources and indirect effects would constitute a degradation of the SEA, and therefore, a significant impact.

We also examined the project with respect to the SEA Design and Compatibility Guidelines in the Los Angeles County General Plan. The analysis makes the following conclusions:

(1) "The development is designed to be highly compatible with biotic resources within the SEA, and may include the setting aside of appropriate and sufficient undisturbed areas."

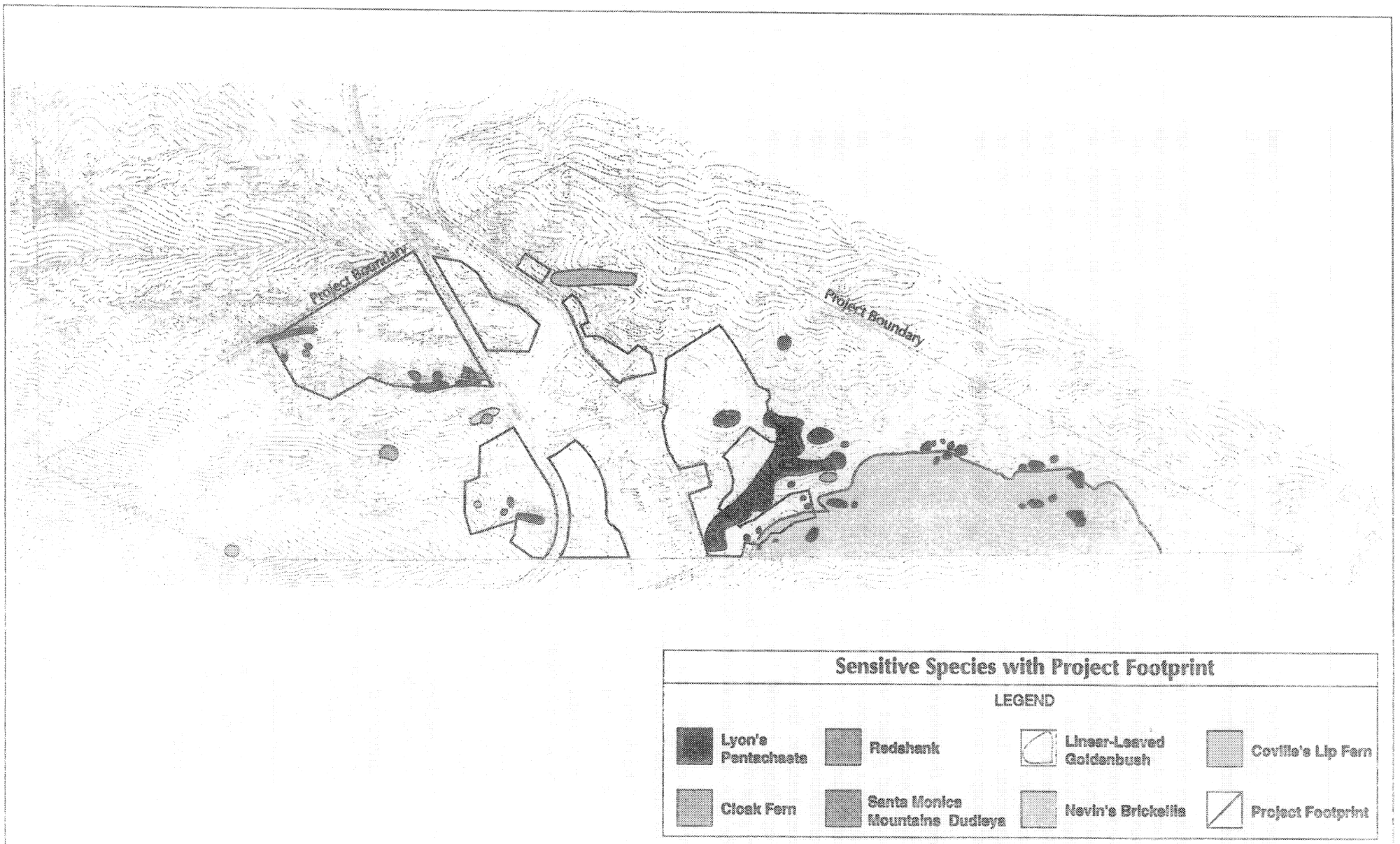
Incompatible – The applicant has designed the development to avoid most of the sensitive habitat areas, although some sensitive plant populations would be affected. It should be noted that of the 330 acres constituting the site, 258 acres (78 percent) are to be set aside as dedicated open space. It should be noted that of the 434 acres of the SEA, within the Beautiful Homes site 26 acres would be affected; the remainder of the property encompassing the SEA would be dedicated open space.

(2) "The development is designed to maintain waterbodies, watercourses, and their tributaries in a natural state."

Compatible – Medea Creek is completely avoided by the proposed development. Other unnamed tributaries to Medea Creek that occur on the property are mostly avoided, with the exception of small areas of drainages supporting chaparral and scrub plant species.

(3) "The development is designed so that wildlife movement corridors (migratory paths or habitat linkages) are left in a natural undisturbed state."

Incompatible – The proposed development would contribute to the interruption of wildlife movement between east and west halves of the property, which is already tenuous due to other development and Kanan and Cornell roads. This is a cumulative effect.


Project Boundary
Project Boundary
Sensitive Species with Project Footprint
LEGEND
Lyon's Pentachaeta
Redshank
Linear-Leaved Goldenbush
Coville's Lip Fern
Cloak Fern
Santa Monica Mountains Dudleya
Nevin's Brickellia
Project Footprint

(4) "The development retains sufficient natural vegetative cover or open spaces to buffer critical resource areas from the proposed uses."

Incompatible – Development between Kanan Road and Medea Creek does not provide any buffering, and will essentially remove all natural non-riparian vegetation between the road and the creek. Elsewhere, sensitive plant populations would be either immediately adjacent to or within proposed development footprints, without adequate buffering.

(5) "Fences and walls, where necessary, are provided to buffer important habitat areas from development."

Partially Compatible – The location of the proposed project indicates that visual elements would be an important selling point for the new homes. Fences that could buffer adjacent areas from encroachment, such as chain-link or block walls, would be visually unappealing and are not likely to be built. However, such fences are not recommended in areas where wildlife movement is an issue. Because wildlife movement is important at the Beautiful Homes site, we would discourage the use of barrier fences (see mitigation measures). Consequently, the project is only incompatible with this criterion because it is desirable to avoid barrier fences.

(6) "Roads and utilities serving the proposed development are located and designed so as not to conflict with critical resources, habitat areas, or migratory paths."

Incompatible – The infrastructure is fitted within the proposed development, and insofar as the development is deemed incompatible with sensitive resources and wildlife movement, the roads and utilities would be incompatible as well. These infrastructure items do not extend the impacts beyond the proposed project footprint, however.

The proposed development would be incompatible with five of the six criteria. Because these criteria were adopted to protect the integrity of the SEAs, the proposed project would cause significant impacts.

### *Fuel Modification*

The County Fire Department has prepared guidelines that determine the clearance distances around structures in high fuel areas. Given the flammability of the local vegetation at the Beautiful Homes site and the terrain, clearance requirements are likely to be great. These "fuel modification zones" extend the area of impact to natural vegetation well beyond the proposed project footprint. The exact clearance distance is likely to be up to 200 feet from structures. Such vegetation removal will contribute to the loss of native vegetation and wildlife habitat. This additional loss of habitat will exacerbate already significant impacts identified for vegetation loss, wildlife movement, SEA integrity, and to sensitive species.

### *Impacts from Accessory Structures*

The proposed project plan does not show any accessory structures. The proposed lot sizes are not sufficient to accommodate stables or corrals. Assuming that future owners would be limited to the area within their lots as shown on the plan, no additional impacts from accessory structures are expected.

### *Wildlife Movement*

The discussion of wildlife movement concluded that the site is perhaps most important as part of the Santa Monica Mountains core habitat, as described by Edelman (1990). Within the site's boundaries, wildlife movement is generally unrestricted with the exception of east-west traversals that are hampered by Cornell and Kanan roads and development along Medea Creek. Movement to the north is blocked by Agoura Hills and the Ventura Freeway, while movement to the direct south

is hindered by large estate development. In the larger context, the proposed project would not significantly affect wildlife movement north or south.

The proposed project would intrude into a portion of the core habitat, east of Cornell Road. New development along Cornell and Kanan roads would further reduce the already tenuous connection between the east and west halves of the property. Due to the potential for cumulative projects to sever connection to the core habitat identified by Edelman (1990), and to isolate the SEA from east-west movement, the proposed project would constitute a significant impact to biological resources.

### *Cumulative Projects*

Past development has included individual homes along Medea Creek and the large estate developments to the south. There is also a fire station on the east side of Cornell Road. Kanan and Cornell Roads also constitute past development. With the exception of the Wagon Road Ranchos, Cornell Road Ranchos, and Medea Valley Estates, most of the development in the area has been piecemeal, with individual houses built on smaller lots. The presence of these developments combined with the proposed project represents the continuing extension of development into the Santa Monica Mountains, and fragmentation of the large undeveloped areas as private landowners develop their lands. This is considered a significant cumulative impact.

As of the printing of this report, we have not yet received the list and map from the County for future proposed projects in the vicinity. Two projects that are known include: (1) the Creekside Commercial development directly to the north of the Beautiful Homes site, west of Kanan Road; and (2) a proposed lot subdivision to the south of the project site. These and other regional projects combined with the Beautiful Homes project represent the incremental loss of natural open space in the Santa Monica Mountains, which is considered a significant cumulative impact.

The proposed project, combined with existing homes along Medea Creek, would result in the conversion of remaining non-riparian vegetation along the creek to residential development. The lack of upland habitat to buffer the stream in this area may result in additional pollutants in Medea Creek from landscape maintenance (pesticides, fertilizers), oil and grease, litter, and increased flows due to the addition of impermeable surfaces. The streamcourse already exhibits signs of degradation due to the tendency for rubbish to accumulate in the stream from either illegal dumping or escaped materials from numerous dumpsters located near the junction of Cornell Road and Kanan Road. The ongoing and potentially new adverse impacts to stream flows could affect downstream resources on public lands. The potential downstream effects would be a significant impact.

### *Indirect Impacts*

In addition to direct loss of biological resources due to grading and construction, the expansion of human development into undeveloped areas can result in a number of indirect impacts. Indirect impacts are those that occur away from the project or at a later time. These indirect effects may already be occurring as a result of past development, but the introduction of new structures expands the range of such impacts further into natural areas. Indirect impacts that can be expected from the Beautiful Homes development include:

- Additional habitat loss, beyond the grading limits, due to brush clearance requirements for fire suppression and trails.
- Introduction of non-native predators (cats, dogs) into natural areas where they can prey upon small native animals (Los Angeles Times 1997a).
- Introduction of exotic plant species from landscaping, which could displace native plants.

- Human intrusions into open space which, although usually passive, can include killing of animals, increased fire frequency, littering, creation of trails that cause erosion, collection of flowering plants, and encouragement of pet activity in open space.
- Night lighting that can disrupt plant and animal cycles.
- Increased noise that can interfere with animal behavior. Some short-term effects are expected from construction activities.
- Overspray of fertilizers and pesticides which can affect surrounding areas.

Any one of these indirect impacts could cause the loss of an important resource, or could disrupt an ecological cycle. Combined, these impacts enlarge the area of impact beyond the project footprint, and extend its effects into the future. This would be a significant impact.

## V. MITIGATION MEASURES

### Project Design Measures

The applicant has designed portions of the project to avoid most areas of highest sensitivity as identified in the Constraints Analysis (refer to **Figure 8**). These design elements include utilizing all of the disturbed portions for development, and clustering near existing development, as opposed to placing homes in remote portions of the property. These features have helped to avoid significant impacts to several sensitive species and habitats, minimize the loss of habitat, and make the project compatible with one of the Design Criteria for SEAs.

Other impacts are not avoided by the design, and the applicant proposes to mitigate many of these impacts by the dedication of portions of the property as permanent open space. Of the 330 acre site, the applicant proposes to set aside 258 acres (78 percent) as dedicated open space. The open space dedications comprise the extreme western end at Ladyface Mountain, and the eastern end which encompasses approximately 50 percent of the Las Virgenes SEA.

There are difficulties with evaluating open space dedications in terms of their mitigative value. While the project proponents may consider large open space dedications sufficient to mitigate all effects, the significant impacts may not be related to the area preserved, in which case little mitigative value can be applied. Also, preservation of remaining habitat still results in the loss of habitat within the development footprint, and no compensation is achieved. However, the landowner must be given some incentive to contribute to open space preservation, and this is most readily available in the form of open space dedication in exchange for development approval. For the Beautiful Homes project, the open space dedications would preserve the majority of most habitat types present (with the exception of disturbed areas which are of lowest sensitivity). Consequently, we conclude that although there is still a net loss of habitat, the open space dedications mitigate impacts to plant communities and general (not sensitive) wildlife habitat to less than significant, if the following measures are also incorporated:

- Open space areas shall be subject to the following restrictions, as posted on signage and in notifications given to each homeowner:
  - No off-road vehicle use in open space areas, including motorcycles, ATVs, SUVs, or bicycles.
  - No hunting.
  - No weapons allowed in open space areas, including firearms, airguns, BB guns, slingshots, paintball guns, crossbows, bows, or any other device used to shoot a projectile.
  - No camping, fires, trailers, or other overnight use of open space areas.

- No ancillary structures, such as corrals, sheds, gazebos, decks, pools, treehouses, etc., shall be constructed in open space areas. Any such structures erected shall be removed immediately at the homeowners' expense.

- Homes shall be built on that portion of the lot which is as far from the open space boundaries as possible.

**Additional Mitigation Measures**

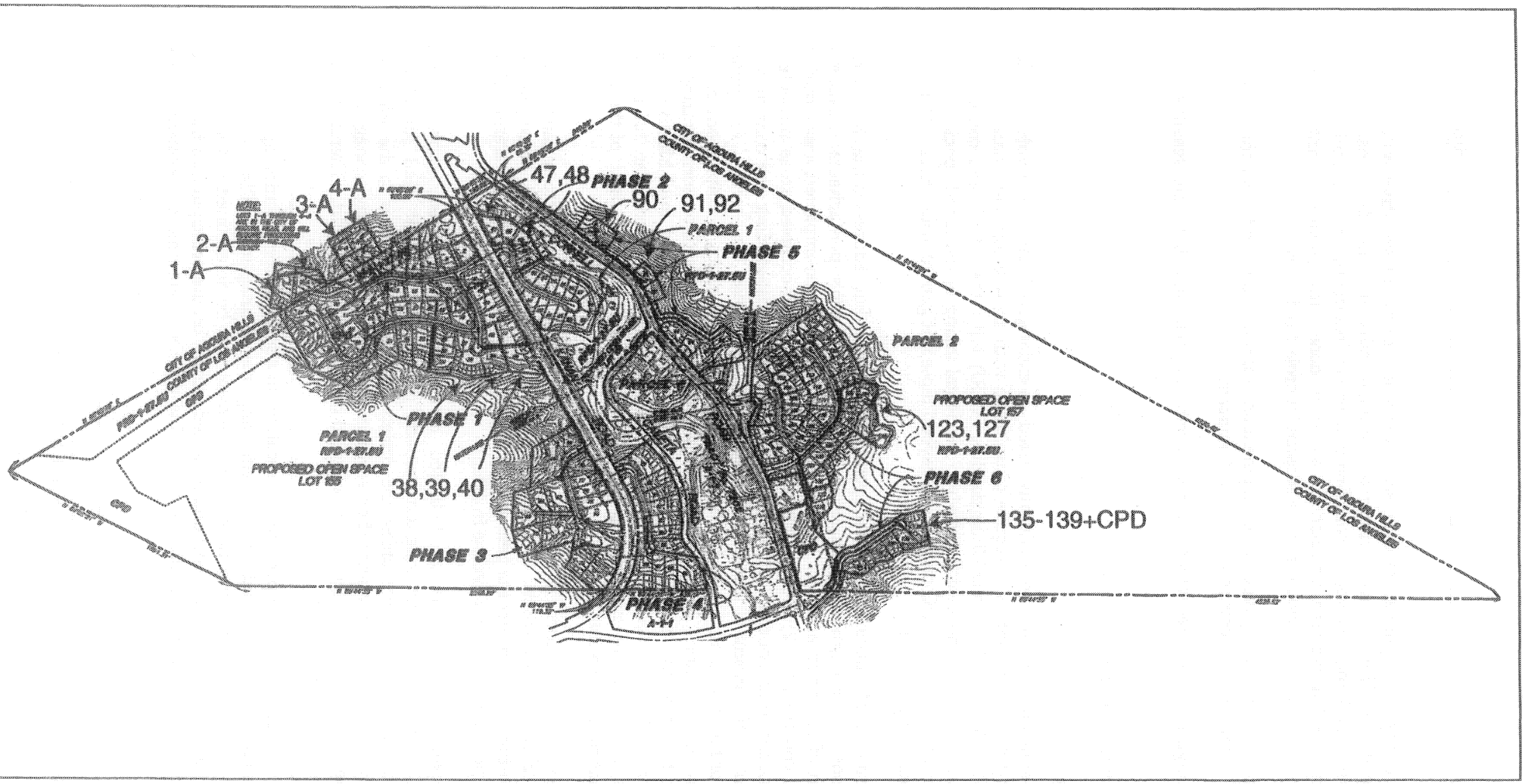
Envicom Corporation reviewed the proposed Beautiful Homes development plan and the list of significant impacts remaining after considering the open space dedications, to determine the best means of mitigating the negative effects. Of the possible measures, project redesign appears to be the most effective way to mitigate some of the direct significant impacts from a biological standpoint.

Table 3 lists recommended changes to the proposed development plan and the effect on significant impacts, and the changes to the plan are shown on **Figure 15**. These project redesign suggestions have focused upon the deletion of individual lots to avoid direct impacts to sensitive resources, such as listed plants and wildlife movement. These changes take into account the applicant's goal of developing the site in a manner the applicant considers feasible based upon usable terrain, reasonable return on lot sales versus open space dedication, and environmental concerns other than biology (e.g. archaeology). The suggested lot deletions, combined with other measures described below will mitigate impacts as listed in **Table 3**.

**TABLE 3**

**Recommended Lot Deletions to Mitigate Certain Significant Impacts**

| Lot Deletion (numbers) | Effects on Significant Impacts |
|---|---|
| 1 through 9 | Reduce impacts to east/west wildlife movement<br>Avoid removal of numerous oak trees |
| 38, 39, 40 | Reduce impacts to east/west wildlife movement<br>Avoid impacts to Lyon's pentachaeta and Santa Monica Mountains dudleya |
| 47 and 48 | Reduce impacts to east/west wildlife movement<br>Avoid removal of several oak trees |
| 90, 91, 92 | Reduce impacts to east/west wildlife movement<br>Avoid removal of several oak trees |
| 124 through 127 | Avoid impacts to Lyon's pentachaeta |
| 135 through 139 | Avoid impacts to sensitive plants<br>Avoid impacts to streamcourse |
| 1A, 2A, 3A, 4A (Creekside Property) | Reduce impacts to east/west wildlife movement<br>Avoid removal of oak trees |




Project Plan Showing
Recommended Lot Deletions

ENVICOM CORPORATION

FIGURE 15

As **Table 3** shows, some of the more general impacts, such as loss of habitat for sensitive wildlife and effects on the integrity of the SEA, cannot be mitigated through individual lot deletions. This is because these impacts are based upon the conversion of natural areas to residential use, and widespread resources cannot be pinpointed to isolated populations, as can be done with sensitive plant species. Mitigation of more generalized impacts would require substantial project redesign.

Indirect impacts are a consequence of any type of development and cannot be avoided. For the indirect effects, there are means to minimize or compensate for such impacts.

Described below are mitigation measures which address specific impacts, and that are feasible and likely to be effective.

***Impacts to Sensitive Plant Species***

Lyon's pentachaeta

Because Lyon's pentachaeta is state and federally-listed as endangered, impacts involving take of individuals or occupied habitat will require consultation with trustee agencies, namely, the CDFG and USFWS. A Memorandum of Understanding (MOU) with the CDFG and concurrence from USFWS is anticipated as the vehicle by which incidental taking of the listed species would be permitted. Conditions of the MOU may extend beyond those mitigations listed here. At least, the following should be provided:

- Development of a Management Plan for Lyon's pentachaeta that addresses the following considerations: 1) Pre-grading delineation of extent of Lyon's pentachaeta including demarcation of impacted areas for salvage, and protection of non-impacted areas during grading and construction; 2) Pre-grading salvage of topsoil from occupied areas impacted, and translocation to an unoccupied, protected receiver site; 3) post-grading and construction protection and enforcement of protections for remaining areas over long-term; 4) regular monitoring of habitat condition and population trend, and provisions to implement future warranted remedial actions, including the possibility of using fire and/or horse grazing as active tools for long-term management; 5) integration of an approved Fuel Modification Plan pursuant to Los Angeles county's requirements into the Management Plan for Lyon's pentachaeta, and; 6) future modification of the Management Plan in the light of the most current scientific information.

- Under the existing conditions, it appears that horse grazing is helping to maintain the existing pentachaeta populations. The current landowner should ensure that horse grazing continues on the site, and that the pentachaeta populations be monitored to guarantee that the existing populations do not decline in extent.

The remaining open space is to be fee dedicated to an appropriate conservation agency. Responsibility for implementing the long-term aspects of the Management Plan for Lyon's pentachaeta could shift to the agency, unless the project proponent contributes to the effort or takes responsibility. If the project applicant/homeowners do not contribute to the management of pentachaeta in the open space dedications, there would be no mitigation credit. Therefore, the following measures are recommended:

- Upon transfer of control of the open space dedications to a suitable conservation agency, the applicant shall *endow* a fund for implementing the Management Plan for Lyon's pentachaeta on the site. The amount of the endowment will be determined of the basis of anticipated minimum operational cost and projected returns on the principal into the future, subject to approval by the conservation agency. This will be a one-time endowment by the applicant.

- Following the initial endowment, future homeowners will contribute to specific-purpose supplemental fund each year through their HOA fees, which will be available to the agency that accepts the open space dedications, and attendant responsibility to implement the Management Plan for Lyon's pentachaeta. The amount of annual contribution shall be determined as adequate to provide for 1) past cost overruns; 2) expected or identified contingencies over the minimum operational cost of the Management Plan. The special-purpose supplement fund will be used only for the intended purpose. Unused portions of the previous year's fees may be used to offset the next year's fees, but would not be returned to the HOA for other uses.

Coville's Lip Fern

Impacts to Coville's lip fern are limited to one rock outcrop located in the southwestern portion of the site (Phase 3 on Figure 12; also refer to Figure 14). This impact can be mitigated by the following measure:

- The rock supporting Coville's lip fern in the Phase 3 portion of the proposed development will be relocated to a similar area in the open space dedication. The rock will be placed in the same orientation, slope positioning, and soil depth as it currently exists.

After these measures, combined with the preservation of populations outside of the project footprint and recommended lot deletions, impacts to sensitive plant species would be reduced to less than significant.

***Loss of Oak Trees***

- The applicant shall contract with a recognized oak tree expert to develop an Oak Tree Replacement and Maintenance Plan. The shall contain the following:
  - Irrigation
  - Drainage
  - Soils
  - Fertilizing
  - Insects and Disease
  - Weed Abatement
  - Transplanting
  - Leg Bracing
  - Cavities
  - Mycorrhizal Fungi
  - Public Safety
  - Summary of Field Inspection
  - Plants Under Trees
  - Fill Soil
  - Aeration of Soils
  - Pruning/Deadwooding
  - Mulching
  - Planting/Maintenance of New Trees
  - Guy Wire Recommendations
  - Cabling
  - Decay
  - Mechanical Damage
  - Trees Needing Immediate Care
- Oak trees removed shall be replaced at an appropriate ratio as determined by the County.

Proper implementation of the oak tree plan and replacement of the lost trees would reduce the loss of the trees to less than significant.

***Wildlife Movement***

- Chain-link fencing or other wildlife excluding fences, shall be used only around the immediate vicinity of residences. Fencing passable by wildlife shall be used for common areas (open space, landscaping, etc.), and no fencing shall be allowed outside of designated lots.
- Large animals that wander into the development shall not be harmed, but shall be relocated or discouraged with practical means in consultation with CDFG and Animal Care and Control.

- The applicant, having ownership interest in property to the north of the project site in Agoura Hills designated as the Creekside site, shall delete plans for development of four lots on the Creekside site on the Los Angeles County/Agoura Hills border, indicated as Lots 1A-4A on Figure 12. The remainder of the Creekside property, with the exception of approved development on the southwest corner of Kanan and Agoura roads, shall be dedicated as permanent space to preserve a portion of the connection between the east and west halves of the Beautiful Homes site.

These measures, combined with lot deletions described in Table 3, will minimize impacts to wildlife movement. However, it is likely that the increase in urban development in the area from the Beautiful Homes development and past projects will further diminish an already tenuous connection across Medea Creek and Cornell and Kanan roads. Impacts to wildlife movement would remain significant.

***Brush Clearance***

The applicant will prepare a Fuel Modification Plan that incorporates the following elements:

- Preservation and avoidance of sensitive plant populations.
- A pre-construction site visit to examine the placement of structures in relation to flammable vegetation.
- Development of fuel modification zones for each potential hazard area.
- Listing of abatement measures, such as removal of deadwood, irrigation, mowing, maintenance of oak trees, etc., for each hazard area.
- Preservation of native plants of low fuel capacity.
- Avoidance and preservation of sensitive plant populations.
- Submittal of the plan to the LACFD for approval.

This will minimize the impact to natural habitat and effects of brush clearance will be reduced to less than significant.

**Indirect Impacts**

***Introduction of Exotic Plants***

- All landscaping shall be done with either low fuel native plant species known to occur in the local area, or fire department approved species that are known to be non-invasive, as determined by a qualified botanist, with reference to the California Exotic Pest Plant Council (CalEPPC) listings.
- Native plants shall be preserved within the development areas to the maximum extent possible (excluding high fuel species), especially trees and large shrubs.
- The Homeowners' Association (HOA) shall provide to all homeowners a list of acceptable plant species for use in landscaping, and a list of exotic species to avoid. Any invasive species used in landscaping shall be removed.

These measures will help reduce impacts from exotic vegetation, and potential impacts will be reduced to less than significant.

*Night lighting*

- All outdoor lighting shall be shielded and directed away from adjacent open space areas, as determined by a lighting expert.
- Any street lighting shall be of a type that is of low intrusion or has no impact on wildlife, such as sodium type fixtures.
- Excessive outdoor lighting shall be avoided, and only the minimal required to satisfy local ordinances shall be installed.
- Vegetation screening shall be installed to minimize light intrusions into open space.

Implementation of these measures will minimize the effects of night lighting to less than significant.

*Noise*

- Between the months of April through June, construction shall be limited to the hours of 8:00 AM to 5:00 PM to avoid high activity periods for territorial birds.
- All construction equipment shall be properly maintained and muffled to minimize noise.

Despite these measures, short-term impacts to wildlife due to noise are likely to remain significant. Long-term impacts cannot be mitigated as these are a consequence of human activity.

*Chemicals*

- No chemicals shall be introduced into natural areas, either during or after construction.
- All chemical use shall be restricted to developed lots and shall not be used within 100 feet of dedicated natural areas.
- No chemical pesticides or fertilizers shall be used within 100 feet of streamcourses or drainages.
- No poison traps shall be used to control rodents.
- The HOA shall inform the residents of their responsibilities with regard to proper use of pesticides.

Chemical pollution resulting from the proposed project would likely be minimized by these measures to less than significant. However, the dense development upstream in Agoura Hills and the existing development along Medea Creek within and south of the site, combined with potential new pollution from the Beautiful Homes project will cumulatively affect the stream.

**Cumulative Impacts**

Cumulative impacts cannot be mitigated by individual measures, and must be considered when evaluating open space dedications as mitigation. This is because the past developments and future development on adjacent property cannot be controlled by the Beautiful Homes project proponents. Given the effects of past projects, including the estate developments to the south and the growth of Agoura Hills, cumulative impacts would remain significant, but are partially mitigated through dedication of 78 percent of the property as open space.

**Residual Impacts**

Implementation of the specific mitigation measures described above, combined with the recommended lot deletions and open space preservation designed into the project, would mitigate impacts as shown in **Table 4.** The table also shows that the impacts not fully mitigated include:

- loss of habitat for sensitive wildlife species;
- impacts to SEA integrity;
- interference with wildlife movement;
- introduction of non-native animals, including predators and Argentine ants;
- human intrusions into adjacent open space and their effects (e.g. increased fire frequency, littering, plant and animal collection, etc.);
- short-term effects of noise (construction) on wildlife;
- chemical pollution (additions to existing contamination of Medea Creek); and
- cumulative contribution to the incremental loss of habitat in the Santa Monica Mountains.

With the exceptions of impacts to the SEA integrity and disruption of wildlife movement, the residual impacts are those that typically accompany development in natural areas, and which can only be mitigated through complete avoidance.

**TABLE 4**

Impacts, Mitigations, and Significance

| IMPACT | MITIGATION MEASURE(S) | EFFECT ON SIGNIFICANCE | RESIDUAL |
|---|---|---|---|
| *Direct* | | | |
| Loss of vegetation | Open space dedications | Mitigated | Less than significant |
| Loss of general wildlife habitat | Open space dedication | Mitigated | Less than significant |
| Loss of trees | Lot deletions (1-9, 47, 48, 90-92)<br>Oak tree report/mitigation plan | Mitigated | Less than significant |
| Sensitive Species | | | |
| *Plants* | Lot deletions (38-40, 124-9127, 135-139)<br>Open space dedications<br>Specific Measures | Mitigated | Less than significant |
| *Wildlife* | Open space dedications | Not mitigated | Significant |
| Integrity of SEA | Listed below | | |
| *loss of habitat* | Open space dedications | Mitigated | Less than significant |
| *wildlife movement* | Lot deletions (1-9, 38-40, 47, 48, 90-92)<br>Open space dedications | Partially mitigated | Significant |
| *buffering* | Open space dedications | Not mitigated | Significant |
| *fences/walls* | Prohibition of wild-exclusionary fencing<br>Protection of stray wild animals | Mitigated | Less than significant |
| *roads/utilities* | None | Not mitigated | Significant |
| Brush clearance | Development of Fuel Modification Plan | Mitigated | Less than significant |
| Wildlife Movement | Lot deletions (1-9, 38-40, 47, 48, 90-92)<br>Open space dedications | Partially mitigated | Significant |

**TABLE 4 (cont.)**

Impacts, Mitigations, and Significance

| IMPACT | MITIGATION MEASURE(S) | EFFECT ON SIGNIFICANCE | RESIDUAL |
|---|---|---|---|
| *Indirect* | | | |
| Additional habitat loss | Resident restrictions<br>Fuel modification plan | Mitigated | Less than significant |
| Non-native species | Use of native plants in development<br>Restrictions on plant use by residents | Mitigated | Less than significant for plants<br>Significant for animals |
| | Preservation of native vegetation | Not mitigated | |
| Human intrusions | None | Not mitigated | Significant |
| Night lighting | Shielding<br>Use of low impact fixtures<br>Minimization of light usage<br>Vegetation screening | Mitigated | Less than significant |
| Noise | Seasonal construction hour limits | Partially mitigated | Short-term = Significant |
| | Maintenance of equipment<br>No outdoor speakers on residences | Mitigated | Long-term = less than significant |
| Chemical pollution | Control of chemical during construction<br>Prohibition of chemical use within 100 feet of open space or watercourses<br>Prohibition on poison traps<br>HOA information for homeowners | Mitigated for this project | Less than significant, but cumulatively significant |

## VI. MONITORING PROGRAM

Assembly Bill 3180 requires public agencies to adopt monitoring programs to ensure effective implementation of mitigation measures for all projects for which an EIR or Mitigated Negative Declaration was approved. The goal of monitoring is to bridge the gap between identifying appropriate environmental protection measures and implementing specific programs to accomplish the mitigation. A checklist of significant impacts, mitigation measures, monitoring processes, milestones, and responsible parties for the Beautiful Homes project is provided in **Table 5**.

## TABLE 5

Table of Significant Impacts, Mitigation Measures, and Monitoring Requirements for the Beautiful Homes Project

| Impact | Mitigation Measure[1] | Monitoring Process | Monitoring Milestone | Responsible Parties |
|---|---|---|---|---|
| Loss of natural vegetation | Dedication of 248 acres of open space. | Plan check | Prior to final plan approval | County Planning Department |
| Loss of habitat for non-sensitive wildlife species | Dedication of 248 acres of open space. | Plan check | Prior to final plan approval | County Planning Department |
| Loss of habitat for sensitive plants | Project redesign to avoid sensitive plant populations | Plan check | Prior to final plan approval | County Planning Department |
| | Continued grazing to preserve Lyon's pentachaeta | Plan check<br>Field review | Prior to final plan approval; ongoing for life of project | County Planning Department, applicant |
| | Removal of seed bank for Lyon's pentachaeta and relocation to a new site | Plan check<br>Field review | Prior to final plan approval; ongoing for life of project | County Planning Department, applicant |
| | Creation of fund to maintain Lyon's pentachaeta in open space dedications | Plan check | Prior to final plan approval; ongoing for life of project | Applicant<br>Conservation Agency |
| | Relocation of rock supporting Coville's lip fern | Plan check<br>Field review | Prior to final plan approval; ongoing for life of project | Applicant<br>Conservation Agency |
| Loss of habitat for sensitive wildlife | Project redesign to avoid sensitive wildlife populations | Plan check | Prior to final plan approval | County Planning Department |

[1] Includes lot deletions as recommended in Table 3. If lot deletions are not adopted, underlined impact will remain significant as no feasible, effective mitigation is available.

**TABLE 5 (cont.)**

Table of Significant Impacts, Mitigation Measures, and Monitoring Requirements for the Beautiful Homes Project

| Impact | Mitigation Measure | Monitoring Process | Monitoring Milestone | Responsible Parties |
|---|---|---|---|---|
| Loss of 37 mature oak trees | Replacement and preservation per the County oak tree ordinance | Plan check, periodic field checks, reports to County staff | Oak tree permit will be obtained prior to grading | County Planning Department, applicant, oak tree consultant |
| Incompatibility with SEA design criteria | Project design to avoid impacts to SEA | Plan check | Prior to final plan approval | County Planning Department |
| Loss of habitat due to brush clearance | Preparation of Fire Protection Plan to minimize loss of native plants | Plan check and periodic field checks, reports to LACFD and County Planning | Fire Protection will be submitted and reviewed by County and LACFD prior to final plan approval | County Planning Department, LACFD, and qualified biologist to prepare Fire Protection Plan. |
| Interference with wildlife movement across Medea Creek | Project design to avoid impacts to wildlife movement and core habitat | Plan check | Prior to final plan approval | County Planning Department |
| | Prohibition of chain-link or other barrier fencing | Plan check | Prior to final plan approval | |
| | Protection of large animals that enter development | HOA directive | HOA directives to be reviewed by County Planning prior to final plan approval | |

**TABLE 5 (cont.)**

Table of Significant Impacts, Mitigation Measures, and Monitoring Requirements for the Beautiful Homes Project

| Impact | Mitigation Measure | Monitoring Process | Monitoring Milestone | Responsible Parties |
|---|---|---|---|---|
| Introduction of exotic plants species | Landscaping with native plant species, or non-invasive low-fuel species | Plan check | Prior to final plan approval | County Planning Department |
| | Preservation of native plants within undeveloped areas | Plan check | | |
| | Provision of a list of acceptable plant species by the HOA to residents | Review by a qualified botanist, Plan check | | |
| Intrusion of night lighting into adjacent natural areas | Outdoor lighting shall be shielded away from open space | Plan check | Prior to final plan approval | County Planning Department |
| | Use of lighting that has low impact on wildlife and plants | | | |
| | Use of minimal outdoor lighting to meet local ordinances | | | |
| | Use of vegetation screening | | | |
| Intrusion of night lighting into adjacent natural areas | Outdoor lighting shall be shielded away from open space | Plan check | Prior to final plan approval | County Planning Department |
| | Use of lighting that has low impact on wildlife and plants | | | |
| | Use of minimal outdoor lighting to meet local ordinances | | | |
| | Use of vegetation screening | | | |

## VII. REFERENCES

Beier, P. And S. Loe. 1992. A Checklist for Evaluating Impacts to Wildlife Movement Corridors. Note from workshop on wildlife corridors sponsored by the Southern California Interagency Natural Areas Coordinating Committee and the California Department of Fish and Game, Riverside, California, March 20, 1991.

Booth, E.S. 1968. Mammals of Southern California. University of California Press, Berkeley, CA.

Burt, W.H. and R.P. Grossenheider. 1976. Mammals. Houghton Mifflin Co., Boston, MA.

California Department of Fish and Game. April 1994. Special Animals. California Department of Fish and Game, Natural Diversity Data Base, Sacramento, CA.

California Department of Fish and Game. July 1996. Special Plants. California Department of Fish and Game, Natural Diversity Data Base, Sacramento, CA.

California Department of Fish and Game. August 1996. Natural Diversity Data Base Rarefind Report for Thousand Oaks and Calabasas 7.5-minute Quadrangles. California Department of Fish and Game, Sacramento, CA.

California Statewide Wildlife Habitat Relationships System. 1988. Volume I: Amphibians and Reptiles. The Resources Agency, Department of Fish and Game, Sacramento, CA.

California Statewide Wildlife Habitat Relationships System. 1988. Volume II: Birds. The Resources Agency, Department of Fish and Game, Sacramento, CA.

California Statewide Wildlife Habitat Relationships System. 1990. Volume III: Mammals. The Resources Agency, Department of Fish and Game, Sacramento, CA.

DeLisle, H., G. Cantu, J. Feldner, P. O'Connor, M. Peterson, and P. Brown. 1986. The Distribution and Present Status of the Herpetofauna of the Santa Monica Mountains of Los Angeles and Ventura Counties, California. Southwestern Herpetologists' Society and the Society for the Study of Amphibians and Reptiles.

Dixon, J.R. 1967. Amphibians and Reptiles of Los Angeles County. Los Angeles County Museum of Natural History, Los Angeles, CA.

Edelman, P. 1990. Critical Wildlife Corridor/Habitat Linkages Between the Santa Susana Mountains, the Simi Hills and the Santa Monica Mountains. Santa Monica Mountains Conservancy, Malibu, California. Corrections as of 2/91.

England and Nelson Environmental Consultants. 1976. Los Angeles County Significant Ecological Area Study. Prepared for Los Angeles County and Environmental Systems Research.

Envicom Corporation. 1985. Draft Biology Report, George Demaree Project, Agoura, California. Prepared for Valcon, Incorporated, CA.

Friesen, R.D. 1982. Significant Ecological Areas of the Santa Monica Mountains. Prepared for Los Angeles County Department of Regional Planning. Los Angeles County Museum of Natural History.

Garrett, K. and J. Dunn. 1980. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society, Los Angeles, CA.

Garth, J.S. and J.W. Tilden. 1986. California Butterflies. University of California Press, Berkeley, CA.

Hickman, J. (ed.). 1993. The Jepson Manual, Higher Plants of California. Univ. Cal. Press, Berkeley.

Hogue, C.L. 1993. Insects of the Los Angeles Basin. Los Angeles County Museum, Los Angeles, California.

Holland, R.F. 1986. Preliminary Description of the Terrestrial Natural Communities of California. California Resources Agency, Department of Fish and Game, Non-game Heritage Program, Sacramento, CA.

Ingles, L.G. 1965. Mammals of the Pacific States. Stanford University Press, Stanford, CA.

Jameson, E.W., Jr. and H.J. Peeters. 1988. California Mammals. University of California Press, Berkeley, CA.

Jennings, M. and M. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, CA.

Lieberstein, T. 1989. Reserve Design in the Santa Monica Mountains: A thesis submitted in partial satisfaction of the requirement of the degree of Master of Arts in Geography.

Lieberstein, T. *et al.* 1987. Wildlife Corridor Design: A case study for Los Angeles and Ventura Counties. Part III in the Series: Biogeography and the Zoo. California State University, Northridge, CA.

Los Angeles County. 1981. The Malibu/Santa Monica Mountains Area Plan, (December). Department of Regional Planning.

Los Angeles County. 1988. General Plan (November). Department of Regional Planning.

Los Angeles Times. 1997a. "Cats are now in the doghouse." Saturday, November 15, 1997.

Los Angeles Times. 1997b. "Armies of invader ants may harm ecosystem." Sunday, August 24, 1997.

Malibu Local Coastal Plan. 1987. Los Angeles County Department of Regional Planning, Los Angeles, CA.

Manion, S. 1988. Proposed Wildlife Corridor Definition and Statement. Topanga-Las Virgenes Resource Conservation District, Topanga, CA.

Mattoni, R. 1990. The Butterflies of Los Angeles and Vicinity. Private Publisher, Beverly Hills, CA.

Michael Brandman Associates (MBA). 1992. Sensitive Species Survey for the Creekside Terrace Project Site. Prepared for Beautiful City, Agoura Hills, CA.

Munz, P.A. 1974. A Flora of Southern California. University of California Press, Berkeley, CA.

National Park Service (NPS). 1981. Draft Natural Resource Management Plan Environmental Assessment. Department of the Interior, Santa Monica Mountains National Recreation Area. Agoura Hills, CA.

NPS. 1982. General Management Plan. Department of the Interior, Santa Monica Mountains National Recreation Area. Agoura Hills, CA.

NPS. 1987. Birds of the Santa Monica Mountains National Recreation Area: An Annotated Checklist. Department of the Interior, Santa Monica Mountains National Recreation Area. Agoura Hills, CA.

Raven, P. H. Thompson and B. Prigge. 1986. Flora of the Santa Monica Mountains, California. Southern California Botanists, Special Publication No. 2, 2nd Edition, University of California, Los Angeles, CA.

Remsen, J.V., Jr. 1978. Bird Species of Special Concern in California. California Department of Fish and Game Non-game Wildlife Report No. 78-1. Sacramento, CA.

Smith, H.M. 1978. A Guide to Field Identification: Amphibians of North America. Golden Press, New York, NY.

Smith H.M. and E.D. Brodie, Jr. 1982. A Guide to Field Identification: Reptiles of North America. Golden Press, New York, NY.

Soulé, M.E. 1989. National Park Service Proposed Land Exchange Wildlife Corridors. Prepared for the Department of the Interior, Santa Monica Mountains National Recreation Area, Agoura Hills, CA.

Stebbins, R.C. 1985. Western Reptiles and Amphibians. University of California Press, Berkeley, CA.

Whitaker, J.O., Jr. 1980. The Audubon Society Field Guide to North American Mammals. A.A. Knopf, Inc., New York, NY.

Williams, D.F. 1986. Mammalian Species of Special Concern in California. California Department of Fish and Game Wildlife Management Division Administrative Report 86-1. Sacramento, CA.

Yerkes, R.F. and R.H. Campbell. 1979. Stratigraphic Nomenclature of the Central Santa Monica Mountains, Los Angeles County, California. Geological Survey Bulletin 1457-E. USGS Washington D.C.

# APPENDICES

# APPENDIX A

## APPENDIX A

Vascular Plants of the Beautiful Homes Project Site
Envicom Corporation Surveys
December 16 and 19, 1996, March 24 - 26, 1997, April 4, 8-10, 17, 1997[1]

| | | ABUNDANCE | |
|---|---|---|---|
| | | Site | Region |
| **FERNS AND ALLIES** | | | |
| *Scientific Name* | *Common Name* | | |
| **Selaginellaceae** | **spike-moss family** | | |
| *Selaginella bigelovii* | Bigelow's spike-moss | c | a |
| **Polypodiaceae** | **polypody family** | | |
| *Polypodium californicum* | California polypody | r | r |
| **Pteridaceae** | **brake family** | | |
| *Adiantum jordanii* | California maidenhair | u | a |
| *Cheilanthes covillei* (2420, 2491)[2] | Coville's lip fern | r | r |
| *Notholaena californica* ssp. *leucophylla* (2419) | California cloak fern | r | r |
| *Pellaea andromedifolia* var. *a.* | coffee fern | r | a |
| *Pellaea mucronata* | bird's-foot fern | r | a |
| *Pentagramma triangularis* var. *t.* | goldback fern | c | a |
| **FLOWERING PLANTS-DICOTS** | | | |
| **Anacardiaceae** | **sumac or cashew family** | | |
| *Malosma laurina* | laurel sumac | c | a |
| *Rhus ovata* | sugar bush | c | a |
| *Rhus trilobata* | squaw bush | u | a |
| *Toxicodendron diversilobum* | western poison-oak | c | a |
| **Apiaceae** | **carrot family** | | |
| *Apiastrum angustifolium* | wild-celery | a | a |
| *Apium graveolens* | celery | r | a |
| *Conium maculatum* | poison hemlock | u | a |
| *Foeniculum vulgare* | fennel | u | a |
| *Lomatium dasycarpum* | hog fennel | u | a |
| *Lomatium lucidum* | shiny-leaf lomatium | r | u |
| *Lomatium utriculatum* | hog-fennel | u | u |
| *Sanicula bipinnata* (2435) | poison sanicle | r | r |
| *Sanicula crassicaulis* | Pacific sanicle | u | a |
| *Sanicula tuberosa* | turkey-pea | u | u |
| *Tauschia arguta* | southern tauschia | u | a |
| *Tauschia hartwegii* (2478) | Hartweg's tauschia | r | r |
| *Yabea microcarpa* (2477) | yabea | a | a |
| **Apocynaceae** | **dogbane family** | | |
| *Nerium oleander* | oleander | r | r |
| **Asclepiadaceae** | **milkweed family** | | |
| *Asclepias fascicularis* | narrow-leaf milkweed | u | a |

---

1 Abundances for site and for region given as rare, uncommon, common or abundant.

2 Numbers in parentheses refer to voucher collections in the possession of Mr. Carl Wishner, Envicom Corporation.

| FLOWERING PLANTS - DICOTS<br>*Scientific Name* | *Common Name* | ABUNDANCE<br>Site | <br>Region |
|---|---|---|---|
| **Asteraceae** | **sunflower family** | | |
| *Acourtia microcephala* | sacapellote | c | a |
| *Achyrachaena mollis* | blow-wives | r | r |
| *Agoseris grandiflora* | mountain dandelion | r | u |
| *Ambrosia psilostachya* var. *californica* | western ragweed | u | a |
| *Artemisia californica* | California sagebrush | c | a |
| *Artemisia douglasiana* | mugwort | u | a |
| *Baccharis pilularis* ssp. *consanguinea* | coyote brush | c | a |
| *Baccharis salicifolia* | mule fat; seep-willow | u | a |
| *Brickellia californica* | California brickellbush | r | a |
| *Brickellia nevinii* | Nevin's brickellbush | r | u |
| *Carduus pycnocephalus* | Italian thistle | a | a |
| *Centauria melitensis* | tocalote | a | a |
| *Chaenactis artemisiifolia* | white pincushion | c | a |
| *Chaenactis glabriuscula* var. *g.* | yellow pincushion | c | a |
| *Chamomilla suaveolens* | pineapple weed, rayless chamomile | r | c |
| *Cirsium occidentale* var. *californicum* | cobweb thistle | r | u |
| *Cirsium vulgare* | bull thistle | u | a |
| *Conyza canadensis* | horseweed | a | a |
| *Coreopsis bigelovii* (2474) | -- | u | u |
| *Encelia californica* | coast encelia | c | a |
| *Ericameria linearifolia* | interior goldenbush | r | r |
| *Erigeron foliosus* var. *stenophyllus* | fleabane daisy | u | a |
| *Eriophyllum confertiflorum* var. *c.* | golden-yarrow | c | a |
| *Gnaphalium bicolor* | two-tone everlasting | u | a |
| *Gnaphalium californicum* | fragrant or green everlasting | c | a |
| *Helianthus gracilentus* | slender sunflower | r | c |
| *Hemizonia fasciculata* | slender tarweed | c | a |
| *Heterotheca grandiflora* | telegraph weed | c | a |
| *Heterotheca sessiliflora* ssp. *s.* | goldenaster | r | r |
| *Hypochaeris glabra* | cat's-ear | c | a |
| *Isocoma menziesii* var. *vernonioides* | coast isocoma | c | a |
| *Lactuca serriola* | prickly lettuce | c | a |
| *Lagophylla ramosissima* | hare leaf | r | u |
| *Lasthenia californica* | goldfield | c | a |
| *Lessingia filaginafolia* ssp. *latifolia* | California-aster | c | a |
| *Madia elegans* | common madia | c | c |
| *Malacothrix saxatilis* var. *tenuifolia* | cliff-aster | c | a |
| *Micropus californicus* var. *c.* | slender cottonweed | u | a |
| *Microseris douglasii* ssp. *platycarpha*[3] (2427) | -- | r | r |
| *Pentachaeta lyonii* (2473) | Lyon's pentachaeta | u | r |
| *Picris echioides* | bristly ox-tongue | c | c |
| *Rafinesquia californica* | California chicory | c | c |
| *Senecio flaccidus* var. *douglasii* | bush senecio | u | c |

[3] This subspecies has not been previously reported from the Santa Monica Mountains. The determination here made on the basis of fruits 4.5 mm long having equally long pappus scales and awns to 3 mm that are inrolled. Differentiation of *M. d.* ssp. *douglasii* is difficult, at best.

| FLOWERING PLANTS - DICOTS<br>*Scientific Name* | *Common Name* | ABUNDANCE<br>Site | <br>Region |
|---|---|---|---|
| **Asteraceae (cont.)** | | | |
| *Senecio vulgaris* | common groundsel | a | a |
| *Silybum marianum* | milk thistle | u | a |
| *Sonchus oleraceus* | common sow thistle | a | a |
| *Stebbinsoseris heterocarpa* | brown microseris | a | a |
| *Stephanomeria virgata* ssp. *v.* | wand chicory | c | a |
| *Stylocline gnaphaloides* | everlasting nest straw | u | u |
| *Uropappus lindleyi* | silver puffs | u | u |
| *Venegasia carpesioides* | canyon-sunflower | u | c |
| *Xanthium strumarium* | cocklebur | u | a |
| **Boraginaceae** | **borage family** | | |
| *Amsinckia menziesii* var. *intermedia* | common fiddleneck; rancher's fireweed | c | a |
| *Cryptantha clevelandii* | popcorn flower | c | a |
| *Cryptantha microstachys* (2480) | popcorn flower | c | a |
| *Cryptantha muricata* | popcorn flower | c | a |
| *Pectocarya linearis* var. *ferocula* | linear-leaf pectocarya | c | a |
| *Plagiobothrys nothofulvus* | popcorn flower | c | a |
| **Brassicaceae** | **mustard family** | | |
| *Athysanus pusillus* | -- | u | u |
| *Brassica nigra* | black mustard | a | a |
| *Capsella bursa-pastoris* | shepherd's purse | c | a |
| *Hirschfeldia incana* | shortpod mustard | a | a |
| *Lepidium latifolium* | whitetop | u | u |
| *Lepidium nitidum* | shining peppergrass | a | a |
| *Raphanus sativus* | radish | r | c |
| *Rorippa nasturtium-aquaticum* | water cress | u | a |
| *Thysanocarpus curvipes* | lacepod | c | a |
| **Caprifoliaceae** | **honeysuckle family** | | |
| *Lonicera subspicata* var. *denudata* | southern honeysuckle | c | a |
| *Sambucus mexicana* | blue elderberry | u | a |
| **Caryophyllaceae** | **pink family** | | |
| *Cerastium glomeratum* | mouse-ear chickweed | u | u |
| *Silene gallica* | windmill pink | a | a |
| *Stellaria media* | common chickweed | a | a |
| *Stellaria nitens* | shining chickweed | r | r |
| **Chenopodiaceae** | **goosefoot family** | | |
| *Atriplex semibaccata* | Australian saltbush | u | a |
| *Chenopodium ambrosioides* | Mexican tea | r | r |
| *Chenopodium californicum* | soap plant | u | a |
| *Salsola tragus* | Russian-thistle | a | a |
| **Convolvulaceae** | **morning-glory family** | | |
| *Calystegia macrostegia* ssp. *cyclostegia* | chaparral morning-glory | c | a |

## APPENDIX A (cont.)

| FLOWERING PLANTS - DICOTS<br>*Scientific Name* | *Common Name* | ABUNDANCE<br>Site | <br>Region |
|---|---|---|---|
| **Crassulaceae** | **stonecrop family** | | |
| *Crassula connata* | pygmyweed | c | a |
| *Dudleya cymosa* ssp. *ovatifolia*[4] | Santa Monica Mountains dudleya | r | r |
| *Dudleya lanceolata* | lance-leaf dudleya | u | a |
| *Dudleya pulverulenta* ssp. *p.* | chalk dudleya | r | u |
| **Cucurbitaceae** | **gourd family** | | |
| *Marah macrocarpus* var. *m.* | manroot | u | a |
| **Ericaceae** | **heath family** | | |
| *Arctostaphylos glauca* | bigberry manzanita | r | u |
| **Euphorbiaceae** | **spurge family** | | |
| *Eremocarpus setigerus* | turkey-mullein | c | a |
| *Euphorbia peplus* | petty spurge | r | r |
| **Fabaceae** | **pea family** | | |
| *Astragalus gambelianus* | -- | r | u |
| *Lathrys vestitus* var. *v.* | wild pea | r | c |
| *Lotus purshianus* | Spanish clover | a | a |
| *Lotus scoparius* var. *s.* | deerbush; California broom | u | a |
| *Lotus wrangelianus* | hosackia | a | a |
| *Lupinus bicolor* ssp. *microphyllus* | miniature lupine | a | a |
| *Lupinus microcarpus* var. *m.* | chick lupine | r | r |
| *Lupinus sparsiflorus* (2438) | -- | c | a |
| *Lupinus succulentus* | arroyo lupine | r | a |
| *Lupinus truncatus* | -- | r | u |
| *Medicago polymorpha* | California burclover | a | a |
| *Melilotus indicus* | sourclover | u | a |
| *Trifolium hirtum* (2493) | rose clover | r | u |
| *Trifolium variegatum* 'phase 1' (2430) | -- | c | a |
| *Trifolium willdenovii* | tomcat clover | r | r |
| *Vicia sativa* | spring vetch | r | u |
| *Vicia villosa* ssp. *v.* | winter or hairy vetch | a | a |
| **Fagaceae** | **oak family; beech family** | | |
| *Quercus agrifolia* var. *a.* | coast live oak; encina | r | a |
| *Quercus berberidifolia* | scrub oak | c | a |
| *Quercus lobata* | valley oak; roble | r | u |
| **Geraniaceae** | geranium family | | |
| *Erodium botrys* | broad-leaf filaree | r | a |
| *Erodium cicutarium* | red-stem filaree | a | a |
| *Erodium moschatum* | white-stem filaree | c | a |
| **Grossulariaceae** | **gooseberry family** | | |
| *Ribes aureum* var. *gracillimum* | golden currant | r | r |
| *Ribes malvaceum* ssp. *viridifolium* (2418) | chaparral currant | r | a |
| *Ribes speciosum* | fuchsia-flowered gooseberry | r | a |

[4] Plants at this location have been named *D. c.* ssp. *agourensis* Nakai.

| FLOWERING PLANTS - DICOTS<br>*Scientific Name* | *Common Name* | ABUNDANCE<br>Site | <br>Region |
|---|---|---|---|
| **Hydrophyllaceae** | **waterleaf family** | | |
| *Eucrypta chrysanthemifolia* var. *c.* | common eucrypta | c | a |
| *Nemophila menziesii* var. ? | baby blue-eyes | u | a |
| *Phacelia cicutaria* var. *hispida* | caterpillar phacelia | c | a |
| *Phacelia grandiflora* | | r | a |
| *Phacelia minor* | wild Canterbury bell | r | r |
| *Phacelia parryi* | | r | r |
| *Phacelia ramosissima* var. *latifolia* | branching phacelia | u | a |
| *Pholistoma auritum* var. *a.* | fiesta flower | c | a |
| **Juglandaceae** | **walnut family** | | |
| *Juglans californica* var. c. | southern California black walnut | r | u |
| **Lamiaceae** | **sage family** | | |
| *Lamium amplexicaule* | henbit, dead nettle | r | a |
| *Marrubium vulgare* | horehound | r | a |
| *Salvia apiana* | white sage | r | a |
| *Salvia columbariae* | chia | u | a |
| *Salvia leucophylla* | purple sage | r | a |
| *Salvia mellifera* | black sage | a | a |
| *Scutellaria tuberosa* ssp. *t.* | skullcap | r | r |
| *Stachys albens* | white hedge-nettle | r | u |
| *Trichostema lanatum* | woolly blue-curls, romero | r | c |
| *Trichostema lanceolata* | vinegar weed | c | a |
| **Malvaceae** | **mallow family** | | |
| *Malacothamnus fasciculatus* var. *laxiflorus* | chaparral mallow | c | a |
| *Malva parviflora* | cheeseweed | a | a |
| **Nyctaginaceae** | four o'clock family | | |
| *Mirabilis californicus* | wishbone bush | c | a |
| **Oleaceae** | **olive family** | | |
| *Fraxinus dipetala* | California ash | u | a |
| **Onagraceae** | **evening primrose family** | | |
| *Camissonia californica* | mustard evening primrose | c | a |
| *Camissonia intermedia* | sun cup | c | a |
| *Clarkia bottae* | punchbowl godetia | r | u |
| *Clarkia epilobioides* | -- | r | r |
| *Clarkia purpurea* ssp. *quadrivulnera* | four-spot | u | a |
| *Clarkia unguiculata* | elegant clarkia | c | a |
| *Epilobium canum* ssp. *angustifolium* | California fuchsia | c | a |
| **Orobanchaceae** | **broom-rape family** | | |
| *Orobanche fasciculata* | clustered broom-rape | r | r |
| **Oxalidaceae** | **oxalis or wood sorrel family** | | |
| *Oxalis albicans* ssp. *californica* | -- | r | r |
| **Paeoniaceae** | **peony family** | | |
| *Paeonia californica* | California peony | r | a |

| FLOWERING PLANTS - DICOTS<br>*Scientific Name* | *Common Name* | ABUNDANCE<br>Site | <br>Region |
|---|---|---|---|
| **Papaveraceae** | **poppy family** | | |
| *Dendromecon rigida* | bush poppy | r | c |
| *Stylomecon heterophylla* (2475) | wind poppy | r | r |
| **Plantaginaceae** | **plantain family** | | |
| *Plantago erecta* | California plantain | a | a |
| *Plantago major* | common plantain | r | r |
| **Platanaceae** | **plane tree; sycamore family** | | |
| *Platanus racemosa* | western sycamore | r | u |
| **Polemoniaceae** | **phlox family** | | |
| *Eriastrum sapphirinum* | sapphire star | r | c |
| *Gilia angelensis* | -- | c | a |
| *Linanthus liniflorus* ssp. *pharnaceoides* | -- | r | u |
| *Linanthus parviflorus* (2484, 2492) | -- | r | r |
| *Linanthus pygmaeus* ssp. *continentalis* (2471)[5] | -- | r | r |
| **Polygonaceae** | **buckwheat family** | | |
| *Chorizanthe staticoides* | Turkish rugging | r | a |
| *Eriogonum cinereum* | ashy-leaf buckwheat | u | a |
| *Eriogonum elongatum* var. *e.* | long-stem buckwheat | a | a |
| *Eriogonum fasciculatum* ssp. *foliolosum* | California buckwheat | a | a |
| *Polygonum arenastrum* | common knotweed, doorweed | r | c |
| *Pterostegia drymarioides* | threadstem | r | a |
| *Rumex crispus* | curly dock | c | a |
| *Rumex salicifolius* var. *crassus* | willow dock | r | u |
| **Portulaceae** | **purslane family** | | |
| *Calyptridium monandrum* | pussy-paws | u | u |
| *Claytonia perfoliata* | miner's-lettuce | c | a |
| **Primulaceae** | **primrose family** | | |
| *Anagallis arvensis*[6] | scarlet pimpernell; poor-man's weatherglass | a | a |
| *Dodecatheon clevelandii* ssp. ? | Padre's shooting star | r | u |
| **Ranunculaceae** | **buttercup family** | | |
| *Delphinium cardinale* | scarlet larkspur | u | c |
| *Delphinium parryi* ssp. *p.* | Parry's larkspur | u | u |
| *Ranunculus hebecarpus* | -- | a | a |
| **Rhamnaceae** | **buckthorn family** | | |
| *Ceanothus crassifolius* | hoaryleaf ceanothus | r | a |
| *Ceanothus cuneatus* var. *c.* | buckbrush | a | a |
| *Ceanothus oliganthus* var. *sorediatus* | -- | u | u |
| *Rhamnus californica* ssp. *c.* | California coffeeberry | u | a |
| *Rhamnus ilicifolia* | holly-leaf redberry | u | a |

5 Not previously reported from the Santa Monica Mountains.

6 An unusual blue flowered population occurs here, along with scarlet.

| | | ABUNDANCE Site | Region |
|---|---|---|---|
| **FLOWERING PLANTS - DICOTS** | | | |
| *Scientific Name* | *Common Name* | | |
| **Rosaceae** | **rose family** | | |
| *Adenostoma fasciculatum* | chamise | c | a |
| *Adenostoma sparsifolium* (2432) | red shank | r | r |
| *Aphanes occidentalis* (2470) | alchemilla | u | u |
| *Cercocarpus betuloides* var. *b.* | birch-leaf mountain mahogany | c | a |
| *Potentilla glandulosa* ssp. *g.* | -- | r | u |
| *Prunus ilicifolia* ssp. *i.* | islay; holly-leaved cherry | u | a |
| *Rosa californica* | California rose | u | u |
| **Rubiaceae** | **bedstraw family** | | |
| *Galium angustifolium* ssp. *a.* | narrow-leaved bedstraw | c | a |
| *Galium aparine* | goose grass | c | a |
| *Galium nuttallii* ssp. *n.* | San Diego bedstraw | u | a |
| **Salicaceae** | **willow family** | | |
| *Populus fremontii* ssp. *f.* | Fremont cottonwood | r | u |
| *Salix laevigata* | red willow | u | u |
| *Salix lasiolepis* | arroyo willow | u | a |
| **Saxifragaceae** | **saxifrage family** | | |
| *Lithophragma affine* ssp. *mixtum* | woodland star | u | u |
| *Saxifraga californica* | California saxifrage | r | u |
| **Scrophulariaceae** | **figwort family** | | |
| *Antirrhinum multiflorum* | bush snapdragon | u | u |
| *Castilleja exserta* ssp. *e.*[7] | purple owl's-clover | u | a |
| *Castilleja foliolosa* | woolly Indian paintbrush | r | u |
| *Collinsia heterophylla* (2428) | Chinese houses | u | a |
| *Cordylanthus rigidus* ssp. *r.* | bird's-beak | u | a |
| *Keckiella cordifolia* | heart-leaf penstemon | c | a |
| *Mimulus aurantiacus*[8] | orange bush monkeyflower | c | a |
| *Mimulus guttatus* | creek monkeyflower | u | a |
| *Pedicularis densiflora* | Indian warrior | u | a |
| *Penstemon heterophyllus* ssp. *australis* | foothill penstemon | u | a |
| *Veronica anagallis-aquatica* | brooklime, water speedwell | c | a |
| **Solanaceae** | **nightshade family** | | |
| *Datura wrightii* | jimson weed; tolguache | r | a |
| *Nicotiana glauca* | tree tobacco | u | a |
| *Solanum douglasii* | Douglas' or white nightshade | r | a |
| *Solanum xanti* var. *intermedium* | purple or chaparral nightshade | c | a |
| **Urticaceae** | **nettle family** | | |
| *Hesperocnide tenella* (2436, 2482) | western nettle | u | a |
| *Parietaria hespera* var. *h.* | pellitory | r | a |
| *Urtica dioica* ssp. *holoserica* | hoary nettle | r | a |

[7] The whitish form also known as *Orthocarpus purpurascens* var. *pallidus*.

[8] Treated as *Mimulus longiflorus* in earlier references.

| | | ABUNDANCE Site | Region |
|---|---|---|---|
| **Valerianaceae** | **valerian family** | | |
| *Plectritis ciliosa* ssp. *insignis* | plectritis | u | a |
| **Verbenaceae** | **vervain family** | | |
| *Verbena robusta* var. *scabrida* | western verbena | u | a |
| *Verbena tenuisecta*[9] (2529) | | r | r |
| **Violaceae** | **violet family** | | |
| *Viola pedunculata* | Johnny jump-up | u | u |
| **FLOWERING PLANTS-MONOCOTS** | | | |
| **Cyperaceae** | **sedge family** | | |
| *Eleocharis macrostachya* | -- | r | c |
| **Iridaceae** | **iris family** | | |
| *Sisyrinchium bellum* | blue-eyed-grass | u | c |
| **Juncaceae** | **rush family** | | |
| *Juncus bufonius* var. *b.* (2471) | toad rush | r | c |
| *Juncus bufonius* var. *congestus* (2439) | toad rush | r | c |
| *Juncus macrophyllus* | long-leaf rush | r | u |
| *Juncus mexicanus* | Mexican rush | r | u |
| **Liliaceae** | **Lily family** | | |
| *Bloomeria crocea* | goldenstar | r | u |
| *Calochortus catalinae* | Catalina mariposa lily | r | u |
| *Chlorogalum pomeridianum* var. *p.* | wavy-leaf soap plant | u | a |
| *Dichelostemma capitata* ssp. *c.* | blue dicks | u | a |
| *Fritillaria biflora* | chocolate lily | u | a |
| *Yucca whipplei* ssp. *intermedia* | our lord's candle | r | a |
| *Zigadenus fremontii* | star-lily | c | a |
| **Poaceae** | **grass family** | | |
| *Achnatherum coronatum* | giant stipa | r | a |
| *Avena barbata* | slender wild oat | a | a |
| *Bothriochloa barbinodis* | cane bluestem | r | r |
| *Bromus diandrus* | ripgut grass | a | a |
| *Bromus hordeaceus* | soft brome; soft chess | a | a |
| *Bromus madritensis* ssp. *rubens* | foxtail chess | a | a |
| *Bromus tectorum* | cheatgrass | r | c |
| *Distichlis spicata* | salt grass | r | r |
| *Hordeum murinum* ssp. *glaucum* | hare barley; foxtail barley | a | a |
| *Lamarckia aurea* | goldentop | u | a |
| *Leymus condensatus* | giant ryegrass | r | a |
| *Melica californica*[10] (2494) | California melic | r | a |
| *Melica imperfecta* | coast melic | u | a |
| *Muhlenbergia microsperma* | littleseed muhly | r | a |
| *Nassella lepida* | foothill needlegrass | c | a |
| *Nassella pulchra* | purple needlegrass | u | a |
| *Piptatherum miliaceum* | smilo grass | u | a |

[9] Occurring as a waif along Cornell Road, perhaps not naturalized; previously not reported in these mountains.

[10] Not previosly reported in these mountains, but known to occur along the north slope, especially from Agoura to Lake Sherwood.

## APPENDIX A (cont.)

| | | ABUNDANCE | |
|---|---|---|---|
| | | Site | Region |
| **Poaceae (cont.)** | | | |
| *Poa secunda* ssp. *s.* | one-sided bluegrass | u | a |
| *Schismus arabicus*[11] (2437) | Mediterranean grass | c | a |
| *Vulpia microstachys* var. *ciliata* (2476) | -- | c | a |
| *Vulpia microstachys* var. *m.* (2433, 2483) | -- | c | a |
| *Vulpia microstachys* var. *pauciflora* | -- | c | a |
| *Vulpia myuros* var. *hirsuta* | foxtail fescue | a | a |
| *Vulpia myuros* var. *m.* | rattail fescue | a | a |
| **Typhaceae** | **cattail family** | | |
| *Typha domingensis* | southern cattail | u | a |

11 The local flora reports only *Schismus barbatus*, however, material collected here is referrable to *S. arbicus*.

# APPENDIX B

## APPENDIX B

Observed and Expected Fauna[1]

### LEGEND

**ABUNDANCE**

c = common - observed or expected throughout the area in high numbers; should be easily seen on most site visits in appropriate habitat and season

f = fairly common - observed or expected in moderate numbers over most of the area; should be located during active searches in appropriate habitat and season

u = uncommon - observed or expected in low numbers in a portion or all of the site; may be seen on a few site visits

o = occasional - observed or expected only sporadically on the site; only casually observed during site visits, even in suitable habitat and season; no more than a few individuals are present at any time

s = scarce - observed or expected rarely; may be observed if site is visited frequently at appropriate season and in suitable habitat; usually individual observations, rarely more than one present at a given time

+ = presence noted by Envicom Corporation biologists by direct observation, identification of vocalization, or observation of diagnostic sign (scat, tracks, burrows, etc.)

@ = presence noted by MBA (1992)

* = non-native

**SEASONALITY (Birds Only)**

R = resident - expected on the site any time of year

S = summer - present only during summer nesting season

W = winter - present only during winter; nests elsewhere

V = visitor - nests off-site but may occur on the site from nearby areas

T = transient - seen in migration; unlikely to nest in the region

| FAMILY<br>*Scientific Name* | Common Name (Status)[2] | Abundance | |
|---|---|---|---|
| | | Site | Region |
| | **AMPHIBIANS** | | |
| SALAMANDRIDAE - Newts | | | |
| *Taricha t. torosa* | California newt (CSC) | s | u |
| PLETHODONTIDAE - Lungless Salamanders | | | |
| *Aneides lugubris* | arboreal salamander | s | s |
| + *Batrachoseps nigriventris* | black-bellied slender salamander | f | f |
| *Batrachoseps pacificus major* | garden (Pacific) slender salamander | o | o |
| *Ensatina e. eschscholtzii* | Monterey ensatina | s | s |
| BUFONIDAE - True Toads | | | |
| *Bufo boreas halophilus* | California (western) toad | f | c |

1 Includes observations by Envicom biologists in 1996, 1997, and 1998, and MBA (1992).

2 Status codes are defined at the end of the appendix.

**APPENDIX B (cont.)**

Observed and Expected Fauna

| FAMILY *Scientific Name* | Common Name (Status) | Abundance Site | Abundance Region |
|---|---|---|---|
| HYLIDAE - Treefrogs | | | |
| + *Pseudacris regilla* | Pacific chorus frog | o | f |
| *Hyla cadaverina* | California treefrog | s | u |
| RANIDAE - True Frogs | | | |
| *Rana catesbeiana* | bullfrog | s | u |
| **REPTILES** | | | |
| EMYDIDAE - Box and Water Turtles | | | |
| *Clemmys marmorata pallida* | southwestern (western) pond turtle (CSC, FSC) | | s |
| IGUANIDAE - Iguanid Lizards | | | |
| + *Sceloporus occidentialis biseriatus* | Great Basin (western) fence lizard | c | c |
| + *Uta stansburiana hesperis* | California side-blotched lizard | c | c |
| @ *Phrynosoma coronatum blainvillei* | San Diego coast horned lizard (CSC, FSC) | s | s |
| SCINCIDAE - Skinks | | | |
| + *Eumeces s. skiltonianus* | western skink | f | f |
| TEIIDAE - Whiptail Lizards | | | |
| @ *Cnemidophorus tigris multiscutatus* | coastal (western) whiptail (FSC) | s | o |
| ANGUIDAE - Alligator Lizards | | | |
| *Elgaria multicarinatus webbi* | San Diego (southern) alligator lizard | f | c |
| ANNIELLIDAE - California Legless Lizards | | | |
| *Anniella p. pulchra* | silvery legless lizard (CSC) | s | s |
| LEPTOTYPHLOPIDAE - Slender Blind Snakes | | | |
| *Leptotyphlops h. humilis* | southwestern blind snake | s | s |
| COLUBRIDAE - Colubrid Snakes | | | |
| *Diadophis punctatus modestus* | San Bernardino ringneck snake (FSC) | s | o |
| *Masticophis l. lateralis* | chaparral whipsnake (California striped racer) | f | c |
| *Masticophis flagellum piceus* | red coachwip (red racer) | s | o |
| *Coluber constrictor mormon* | western yellow-bellied racer | s | o |
| *Pituophis melanoleucus annectens* | San Diego gopher snake | f | c |
| *Salvadora hexalepis virgultea* | coast (western) patch-nosed snake (CSC,FSC) | s | s |
| *Lampropeltis zonata pulchra* | San Diego (California) mountain kingsnake (CSC, FSC) | s | o |
| *Lampropeltis getulus californiae* | California (common) kingsnake | u | f |
| *Tantilla planiceps* | California black-headed snake | s | s |
| *Trimorphodon biscutatus vandenburghi* | California lyre snake | s | s |

## APPENDIX B (cont.)

Observed and Expected Fauna

| FAMILY<br>*Scientific Name* | Common Name (Status) | Abundance | |
|---|---|---|---|
| | | Site | Region |
| *Hypsiglena torquata klauberi* | (San Diego) night snake | o | u |
| VIPERIDAE - Vipers | | | |
| *Crotalis viridis helleri* | southern pacific (western) rattlesnake | o | u |
| **BIRDS** | | | |
| ARDEIDAE - Bitterns and Herons | | | |
| *Ardea herodias* | great blue heron (SA) | s,V | s,V |
| *Butorides striatus* | green-backed heron | s,V | s,V |
| *Ardea alba* | great egret | s,V | s,V |
| *Egretta thula* | snowy egret | s,V | s,V |
| *Nycticorax nycticorax* | black-crowned night heron (SA) | s,V | s,V |
| ANATIDAE - Swans, Geese and Ducks | | | |
| *Aix sponsa* | wood duck | s,T | s,T |
| *Anas platyrhynchos* | mallard | s,T | c,R |
| CATHARTIDAE - New World Vultures | | | |
| + *Cathartes aura* | turkey vulture | u,R/V | f,R/V |
| ACCIPITRIDAE - Hawks | | | |
| *Elanus leucurus* | white-tailed kite (SA, CP) | s,R/o,W | o,R/f,W |
| *Circus cyaneus* | northern harrier (CSC) | s,W | o,W |
| + *Accipiter striatus* | sharp-shinned hawk (CSC) | o,W/u,T | u,W/f,T |
| + *Accipiter cooperii* | Cooper's hawk (CSC) | u,W/T | f,W/T |
| *Buteo lineatus* | red-shouldered hawk | o,R | f,R |
| + *Buteo jamaicensis* | red-tailed hawk | u,R | f,R |
| *Aquila chrysaetos* | golden eagle (CSC, CP) | s,V | o,V |
| FALCONIDAE - Falcons | | | |
| + *Falco sparverius* | American kestrel | u,R | f,R |
| *Falco mexicanus* | prairie falcon (CSC) | s,V/o,W | o,V/o,W |
| PHASIANIDAE - Grouse and Quail | | | |
| + *Callipepla californica* | California quail | f,R | f,R |
| CHARADRIIDAE - Plovers | | | |
| *Charadrius vociferus* | killdeer | o,W/s,R | c,W/u,R |
| COLUMBIDAE - Doves and Pigeons | | | |
| *Columba fasciata* | band-tailed pigeon | o,R | o,R |
| *Columba livia* | rock dove | u,R | u,R |
| + *Zenaida macroura* | mourning dove | f,R | f,R |
| CUCULIDAE - Cuckoos | | | |
| + *Geococcyx americanus* | greater roadrunner | u,R | u,R |
| TYTONIDAE - Barn Owls | | | |

**APPENDIX B (cont.)**

Observed and Expected Fauna

| FAMILY<br>*Scientific Name* | Common Name (Status) | Abundance | |
|---|---|---|---|
| | | Site | Region |
| *Tyto alba* | barn owl | o,R | f,R |
| STRIGIDAE - Typical Owls | | | |
| *Otus kennicottii* | western screech-owl | s,R | u,R |
| *Bubo virginianus* | great-horned owl | u,R | f,R |
| *Athene cunicularia* | burrowing owl (CSC) | s,R | s,R |
| CAPRIMULGIDAE - Goatsuckers (Nightjars) | | | |
| *Phalaenoptilus nuttallii* | common poorwill | o,S/o,T | o,S/u,T |
| APODIDAE - Swifts | | | |
| *Cypseloides niger* | black swift (CSC) | s,T | s,T |
| *Chaetura vauxi* | Vaux's swift | u,T | f,T |
| + *Aeronautes saxatalis* | white-throated swift | u,R | f,R |
| TROCHILIDAE - Hummingbirds | | | |
| *Archilochus alexandri* | black-chinned hummingbird | f,S | c,S |
| *Calypte costae* | Costa's hummingbird | u,S/s,W | f,S/o,W |
| + *Calypte anna* | Anna's hummingbird | c,R | c,R |
| *Selasphorus rufus* | rufous hummingbird | u,T | f,T |
| *Selasphorus sasin* | Allen's hummingbird | u,T | c,T |
| ALCEDINIDAE - Kingfishers | | | |
| *Ceryle alcyon* | belted kingfisher | s,R | o,R |
| PICIDAE - Woodpeckers | | | |
| *Melanerpes lewis* | Lewis' woodpecker (S) | s,W | s,W |
| + *Melanerpes formicivorus* | acorn woodpecker | f,R | c,R |
| *Sphyrapicus ruber* | red-breasted sapsucker | u,W/u,T | f,W/f,T |
| *Sphyrapicus nuchalis* | red-naped sapsucker | s,T/s,W | o,T/s,W |
| *Picoides nuttallii* | Nuttall's woodpecker | u,R | f,R |
| *Picoides pubescens* | downy woodpecker | o,R | o,R |
| + *Colaptes auratus* | northern flicker (red-shafted) | f,R | f,R |
| TYRANNIDAE - Tyrant Flycatchers | | | |
| *Tyrannus vociferans* | Cassin's kingbird | o,S/o,W | f,S/u,W |
| *Tyrannus verticalis* | western kingbird | o,S | u,S |
| *Myiarchus cinerascens* | ash-throated flycatcher | u,S/o,T | f,S/f,T |
| *Contopus sordidulus* | western wood-pewee | o,S/o,T | u,S/f,T |
| *Contopus borealis* | olive-sided flycatcher | s,T | u,T |
| + *Sayornis nigricans* | black phoebe | f,R | f,R |
| + *Sayornis saya* | Say's phoebe | u,W | f,W |
| *Empidonax hammondii* | Hammond's flycatcher | s,T | u,T |
| *Empidonax difficilis* | Pacific-slope flycatcher | f,S/c,T | f,S/c,T |
| ALAUDIDAE - Larks | | | |
| *Eremophila alpestris* | horned lark | s,T/S,W | c,T/f,W |
| HIRUNDINIDAE - Swallows | | | |
| *Tachycineta bicolor* | tree swallow | c,T/s,W | c,T/s,W |

**APPENDIX B (cont.)**

Observed and Expected Fauna

| FAMILY<br>*Scientific Name* | Common Name (Status) | Abundance | |
|---|---|---|---|
| | | Site | Region |
| *Tachycineta thalassina* | violet-green swallow | o,W/f,T | o,W/f,T |
| *Stelgidopteryx serripennis* | northern rough-winged swallow | c,S/c,T | c,S/c,T |
| *Hirundo pyrrohnota* | cliff swallow | f,S/c,T | f,S/c,T |
| *Hirundo rustica* | barn swallow | f,T | f,T |
| CORVIDAE - Crows, Jays, and Magpies | | | |
| + *Corvus brachyrhynchos* | American crow | f,R | f,R |
| + *Corvus corax* | common raven | f,R | c,R |
| + *Apehelocoma californica* | western scrub-jay | c,R | c,R |
| PARIDAE - Chickadees and Titmice | | | |
| *Baeolophus inornatus* | oak titmouse | u,R | f,R |
| AEGITHALIDAE - Bushtits | | | |
| + *Psaltriparus minimus* | bushit | c,R | c,R |
| SITTIDAE - Nuthatches | | | |
| *Sitta carolinensis* | white-breasted nuthatch | o,R | o,R |
| CERTHIIDAE - Creepers | | | |
| *Certhia americana* | brown creeper | s,W | o,W |
| TROGLODYTIDAE - Wrens | | | |
| *Salpinctes obsoletus* | rock wren | s,R | o,R |
| *Catherptes mexicanus* | canyon wren | s,R | u,R |
| + *Thryomanes bewickii* | Bewick's wren | u,R | f,R |
| *Troglodytes aedon* | house wren | o,R | f,R |
| MUSCICAPIDAE (part) - Kinglets and Gnatcatchers | | | |
| + *Regulus calendula* | ruby-crowned kinglet | f,W | c,W |
| *Regulus satrapa* | golden-crowned kinglet | s,W | s,W |
| *Polioptila caerulea* | blue-gray gnatcatcher | u,S | f,S |
| MUSCICAPIDAE (part) - Thrushes | | | |
| *Turdus migratorius* | American robin | u,R | c,R |
| *Ixoreus naevius* | varied thrush | s,W | s,W |
| *Myadestes townsendi* | Townsend's solitaire | s,W | o,W |
| *Catharus ustulatus* | Swainson's thrush | s,S | s,S |
| *Catharus guttatus* | hermit thrush | o,W | f,W |
| *Sialia mexicana* | western bluebird (S) | u,R/f,W | f,R/c,W |
| + *Chamaea fasciata* | wrentit | c,R | c,R |
| MIMIDAE - Mimic Thrushes | | | |
| *Mimus polyglottos* | northern mockingbird | f,R | c,R |
| + *Toxostoma redivivum* | California thrasher | f,R | f,R |
| MOTACILLIDAE - Wagtails and Pipits | | | |
| *Anthus rufescens* | American pipit | s,W | u,W |
| BOMBYCILLIDAE- Waxwings | | | |
| *Bombycilla cedrorum* | cedar waxwing | o,W | o,W |

## APPENDIX B (cont.)

Observed and Expected Fauna

| FAMILY *Scientific Name* | Common Name (Status) | Abundance Site | Abundance Region |
|---|---|---|---|
| PTILOGONATIDAE- Silky Flycatchers | | | |
| + *Phainopepla nitens* | phainopepla | u,R | u,R |
| LANIIDAE - Shrikes | | | |
| *Lanius ludovicianus* | loggerhead shrike (FSC, CSC) | s,R | u,R |
| STURNIDAE - Starlings | | | |
| *Sternus vulgaris* | European starling | f,R | c,R |
| VIREONIDAE - Vireos | | | |
| *Vireo solitarius* | solitary vireo | o,T | u,T |
| *Vireo huttonii* | Hutton's vireo | s,R | f,R |
| *Vireo gilvus* | warbling vireo | f,T | c,T |
| EMBERIZIDAE (part) - Wood Warblers | | | |
| + *Dendroica coronata* | yellow-rumped warbler | c,W | c,W |
| *Dendroica townsendi* | Townsend's warbler | u,T/W | u,T/W |
| *Dendroica occidentalis* | hermit warbler | s,T | u,T |
| *Dendroica petechia* | yellow warbler (CSC) | s,T | o,T |
| *Dendroica nigrescens* | black-throated gray warbler | o,T | f,T |
| *Wilsonia pusilla* | Wilson's warbler | o,T | u,T |
| *Vermivora ruficapilla* | Nashville warbler | o,T | u,T |
| *Vermivora celata* | orange-crowned warbler | o,S/o,W | f,S/f,W |
| *Oporornis tolmiei* | McGillivray's warbler | s,T | s,T |
| + *Geothlypis trichas* | common yellowthroat | o,R/o,T | u,R/f,T |
| *Icteria virens* | yellow-breasted chat (CSC) | s,T | s,T |
| EMBERIZIDAE (part) - Blackbirds, Orioles, and Tanagers | | | |
| *Euphagus cyanocephalus* | Brewer's blackbird | f,R | c,R |
| *Agelaius phoeniceus* | red-winged blackbird | o,R | f,R |
| + *Sturnella neglecta* | western meadowlark | f,R | f,R |
| *Molothrus ater* | brown-headed cowbird | o,R | f,R |
| *Icterus bullockii* | Bullock's oriole | u,S | f,S |
| *Icterus cucullatus* | hooded oriole | u,S | u,S |
| *Piranga ludoviciana* | western tanager | o,T | u,T |
| EMBERIZIDAE (part) - Sparrows | | | |
| + *Zonotrichia leucophrys* | white-crowned sparrow | c,W | c,W |
| + *Zonotrichia atricapilla* | golden-crowned sparrow | f,W | f,W |
| *Chondestes grammacus* | lark sparrow | c,W/f,R | c,W/f,R |
| *Amphispiza belli belli* | Bell's sage sparrow (FSC) | s,R | s,R |
| *Spizella passerina* | chipping sparrow | o,T | f,T (fall) |
| + *Aimophila ruficeps canescens* | rufous-crowned sparrow (FSC,CSC) | 0,R | s,R |
| *Ammodramus savannarum* | grasshopper sparrow (S) | s,S | s,S |
| *Passerella neglecta* | fox sparrow | o,W | f,W |
| *Melospiza melodia* | song sparrow | u,R | c,R |
| *Melospiza lincolnii* | Lincoln's sparrow | o,W | f,W |
| *Ammodramus sandwichensis nevadensis* | savannah sparrow | o,T/o,W | c,T/f,W |

**APPENDIX B (cont.)**

Observed and Expected Fauna

| FAMILY<br>*Scientific Name* | Common Name (Status) | Abundance<br>Site | <br>Region |
|---|---|---|---|
| EMBERIZIDAE (part) - Sparrows (cont.) | | | |
| + *Pipilo maculatus* | spotted towhee | f,R | c,R |
| + *Pipilo crissalis* | California towhee | c,R | c,R |
| *Junco hyemalis oreganus* | dark-eyed junco (Oregon) | f,W | f,W |
| EMBERIZIDAE (part) - Grosbeaks | | | |
| *Pheucticus melanocephalus* | black-headed grosbeak | o,S | f,S |
| *Guiraca caerulea* | blue grosbeak (S) | s,S | o,S |
| *Passerina amoena* | Lazuli bunting | o,S | u,S |
| FRINGILIDAE - Finches | | | |
| + *Carpodacus mexicanus* | house finch | c,R | c,R |
| *Carpodacus purpureus* | purple finch | s,W | o,W |
| *Carduelis tristis* | American goldfinch | u,R | c,R |
| + *Carduelis psaltria* | lesser goldfinch | c,R | c,R |
| *Carduelis lawrencei* | Lawrence's goldfinch | s,T/s,S | o,T/s,S |
| *Carduelis pinus* | pine siskin | o,W | o,W |
| PASSERIDAE - Weaver Finches | | | |
| *Passer domesticus* | house sparrow | f,R | c,R |
| **MAMMALS** | | | |
| DIDELPHIIDAE - Opossums | | | |
| *Didelphis marsupialis* | Virginia opossum | u | c |
| SORICIDAE - Shrews | | | |
| *Sorex o. ornatus* | ornate shrew | s | u |
| TALPIDAE - Moles | | | |
| *Scapanus latimanus* | broad-handed mole | u | u |
| PHYLLOSTOMIDAE - Leafnose Bats | | | |
| *Macrotis californicus* | California leaf-nosed bat (CSC, FSC) | s | s |
| VESPERTILIONIDAE - Plainnose Bats | | | |
| *Myotis thysanodes* | fringed myotis | s | o |
| *Myotis evotis* | long-eared myotis | s | u |
| *Myotis californicus* | California myotis | s | c |
| *Myotis (subulatus) leibii* | small-footed myotis | s | u |
| *Myotis yumanensis* | Yuma myotis | o | f |
| *Myotis volans* | hairy-winged (long-legged) myotis | s | u |
| *Lasiurus cinerea* | hoary bat | o | c |
| *Lasiurus borealis* | red bat | s | o |
| *Pipistrellus hesperus* | western pipistrelle | o | f |
| *Eptesicus fuscus* | big brown bat | o | c |
| *Plecotus townsendi pallescens* | pale big-eared bat (CSC) | s | s |
| *Antrozous pallidus* | pallid bat (CSC) | o | f |

APPENDIX B (cont.)

Observed and Expected Fauna

| | FAMILY<br>*Scientific Name* | Common Name (Status) | Abundance<br>Site | <br>Region |
|---|---|---|---|---|
| | MOLOSSIDAE - Freetail Bats | | | |
| | *Eumops perotis californicus* | California (western) mastiff bat (CSC, FSC) | s | s |
| | *Tadarida brasiliensis* | Brazilian (Mexican) freetail bat | s | f |
| | LEPORIDAE - Hares and Rabbits | | | |
| | *Lepus californicus bennettii* | San Diego black-tailed hare (FSC) | s | s |
| + | *Sylvilagus audubonii* | desert cottontail | f | c |
| | *Sylvilagus bachmani* | brush rabbit | o | f |
| | SCIURIDAE - Squirrels | | | |
| + | *Spermophilus beechyi* | California ground squirrel | c | c |
| | *Sciurus griseus* | western gray squirrel | s | u |
| | *Tamias merriami* | Merriam's chipmunk | s | o |
| | GEOMYIDAE - Pocket Gophers | | | |
| + | *Thomomys bottae* | Botta's pocket gopher | c | c |
| | HETEROMYIDAE - Pocket and Kangaroo Mice and Rats | | | |
| | *Perognathus californicus dispar* | California pocket mouse | u | u |
| | *Dipodomys a. agilis* | Pacific kangaroo rat | u | f |
| | CRICETIDAE - Mice, Rats, Lemmings, Voles | | | |
| | *Reithrodontomys megalotis longicaudis* | western harvest mouse | c | c |
| | *Peromyscus e. eremicus* | cactus mouse | o | o |
| | *Peromyscus californicus insignis* | parasitic (California) mouse | u | f |
| | *Peromyscus maniculatus gambelii* | deer mouse | f | c |
| | *Peromyscus boylii rowleyi* | brush mouse | f | f |
| | *Peromyscus truei multipinoris* | piñon mouse | s | o |
| + | *Neotoma lepida intermedia* (FSC) | (San Diego) desert woodrat (FSC) | u | o |
| | *Neotoma fuscipes macrotis* | dusky-footed woodrat | u | u |
| | *Microtus californicus sanctidiegi* | California vole | u | f |
| | MURIDAE - Old World Rats and Mice | | | |
| * | *Rattus norvegicus* | Norway rat | s | f |
| * | *Rattus rattus* | black rat | s | u |
| * | *Mus musculus* | house mouse | f | c |
| | CANIDAE - Dogs, Wolves, Foxes | | | |
| + | *Canis latrans ochropus* | coyote | c | c |
| * | *Canis familiaris* | domestic dog | s | o |
| | *Urocyon cinereoargenteus californicus* | gray fox | s | o |
| | PROCYONIDAE - Racoons, Coatis | | | |
| + | *Procyon lotor* | raccoon | f | f |
| | BASSARISCIDAE - Ringtails | | | |
| | *Bassariscus astutus* | ringtail (CP) | s | s |

## APPENDIX B (cont.)

Observed and Expected Fauna

| | FAMILY *Scientific Name* | Common Name (Status) | Abundance Site | Abundance Region |
|---|---|---|---|---|
| | MUSTELIDAE - Weasels, Skunks, etc. | | | |
| | *Mustela frenata* | long-tailed weasel | s | s |
| | *Taxidea taxus* | American badger (SA) | s | s |
| | *Spilogale (putorius) gracilis* | western spotted skunk | o | u |
| | *Mephitis mephitis* | striped skunk | f | c |
| | FELIDAE - Cats | | | |
| | *Felis concolor* | mountain lion | s | s |
| + | *Felis rufus* | bobcat | o | u |
| * | *Felis catus* | house cat | u | o |
| | CERVIDAE - Deer | | | |
| + | *Odocoileus h. hemionus* | mule deer | c | f |

Status Codes Definitions:

| | |
|---|---|
| CE | California Endangered |
| CT | California Threatened |
| CP | California Fully Protected |
| FE | Federally Endangered |
| FT | Federally Threatened |
| FPE | Federally Proposed Endangered |
| FSC | Federal Species of Concern |
| CSC | California Special Concern (CDFG, 1987) |
| SA | Special Animal (CDFG, 1994) |
| S | Sensitive (USDI:FWS, 1986) |
| SC | Special Concern (Tate, 1986) |
| B | National Audubon Society Blue List (Tate, 1986) |
| U | Uncommon (USDI:NPS, 1982) |
| u | Uncommon (De Lisle, *et al.*, 1986) |

# APPENDIX C

## APPENDIX C

## BUTTERFLY REPORT

### Introduction

As required pursuant to the guidelines for a Biota Report, herein are the results of field observations and capture of true butterflies (superfamily Papilionoidea) and skippers (Hesperioidea) undertaken by Envicom Corporation biologists at the Beautiful Homes property in the Santa Monica Mountains of Los Angeles County.

### Methods

On April 8, 10, and 17, and May 8, 16, and 29, 1997, diverse areas and habitat types on the property were examined afoot for the presence of true butterflies and skippers. Surveys on these dates coincided with warm, fair-weather afternoon conditions. Casual observations were made on other dates between December 16, 1996 and January 22, 1998, during the course of other biological investigations on the property. Identification of butterflies and skippers in the field was facilitated by comparison with color photographs included in the fold-out titled Butterflies of Greater Los Angeles (Mattoni 1990). Other sources consulted for identification in the field include Stewart (1997); Tilden and Smith (1986); Emmel and Emmel (1973); and Garth and Tilden (1986). Where possible and necessary for identification, individuals were captured in a standard butterfly net and transferred to a clear, acrylic plastic jewel box to enable viewing of the live specimen. In some cases, close-up photographs were taken of the specimens using a Nikon micro-nikkor P-auto 50 mm macro lens (up to 1/2 reproduction). Conscious effort was made to prevent physical damage to, and mortality of any individuals that were captured. All individuals captured were shortly released, unharmed.

In addition to field observations, an attempt was made to assess the full range of species that could reasonably be expected to occur on the project site, even if that occurrence might be rare or sporadic. The range of host or food plants available[1] for butterfly larval (caterpillar) feeding and growth on the project site was cross-referenced with the reported distributions of the butterflies and skippers of the region. Other taxa were considered potentially occurring because of their migratory ability, even though their larval foodplants were not present.

### Results and Discussion

Consideration of the range of food plants and habitats present at the project site in conjunction with the reported ranges and food plants indicated in the literature cited provides evidence to conclude that approximately 71 taxa of true butterflies and skippers are potentially present. These taxa are listed in **Table 1**. In some cases, the presence of larval individuals of taxa listed on Table 1 are evidently precluded from occurring on the project site because the foodplant is absent (e.g. senna sulfur, gulf fritillary, California dogface). Some are expected to occur in low numbers as larvae because the foodplant, although present, is not abundant (monarch, satyr angle-wing, red admiral). Numerous taxa might be expected to occur only very rarely, either as larvae or adults, because of low population density or restricted local occurrence, or rarity (e.g. several hairstreaks, sulfurs and coppers). Observational difficulties including short flight periods, observer skill, being at the right place at the right time, climatic variation, and species' biology dictate that certain taxa expected to occur might not be observed, despite considerable time and effort to do so.

In terms of verifying the presence of all 71 taxa listed in Table 1 as expected for the project site, the field study was not exhaustive. Twenty-four taxa were observed as indicated. Species

---

[1] Approximately 278 taxa of vascular plants are recorded for the property (Envicom Corp. 1998. Biota Report).

observed in abundance, probably because their food plant is plentiful, include sara orange-tip (mustards), California sister (willows), California ringlet and rural skipper (grasses), buckeye (monkeyflowers), acmon blue (buckwheats), and funereal duskywing (legumes). Gabb's checkerspot, whose larvae feed on various sunflower family members, and Comstock's fritillary, which feeds on Johnny jump-up were observed to be abundant, despite the literature indications that they would be expected to be rare in the region. One species, gorgon copper, which feeds on long-stem buckwheat was observed to be locally abundant only in the vicinity of the host plants. Mattoni suggests that this species may be extirpated from the Santa Monica Mountains, a conclusion not supported by our observations at the Beautiful Homes project site.

The Santa Monica Mountains hairstreak, an endemic butterfly was not observed.[2] The host plant, believed to be scrub oak[3] is abundant. Others have suggested that coast live oak may serve as a host. It is expected to occur on the basis that the site is central to the very limited distribution represented by three locations in the vicinity of Brent's Junction, Malibou Lake and Seminole Hill, as reported by Emmel and Mattoni (1989).

**Literature Cited**


Emmel, T.C and J.F. Emmel. 1973. The Butterflies of Southern California. Natural History Museum of Los Angeles County, Science Series 26:1-126.

Emmel, J.F and R.H.T. Mattoni. 1989. A new subspecies of *Satyrium auretorum* (Lycaenidae) from the Santa Monica Mountains of southern California. *J.Res. Lepidoptera* 28(1-2):100-104.

Garth, J.S. and J.W. Tilden. 1986. California Butterflies. Univ. Calif. Press. Berkeley and Los Angeles, CA.

Mattoni, R.H.T. 1990. Butterflies of Greater Los Angeles. Center for Conservation of Biodiversity/Lepidoptera Research Foundation, Beverly Hills, CA. (color fold-out).

Stewart, B. 1997. Common Butterflies of California. West Coast Lady Press, Pt. Reyes Station, CA.

Tilden, J.W. and A.C. Smith. 1986. A Field Guide to Western Butterflies. Peterson Field Guide Series No. 33, Houghton Mifflin Co., Boston, MA.


---

2 Identification of a number of non-descript hairstreaks expected is difficult. Hairstreaks captured in May in the vicinity of scrub oaks were identified as bronzed (southern buckthorn) hairstreak, which feed on buckbrush (*Ceanothus cuneatus*), also an abundant plant on site.

3 The name *Quercus dumosa* given therein is misapplied to the oaks in this region, which are now treated as *Quercus berberidifolia*.

## TABLE 1

## OBSERVED AND EXPECTED BUTTERFLIES AT BEAUTIFUL HOMES
## LOS ANGELES COUNTY, CALIFORNIA

**LEGEND:**

Observed = Species observed or caught in the field and released.
Expected = Species likely occurring on site because of proper habitat and available food plant or because species is known to be present in the vicinity.
Site Occurrence = Very rare, none or one. Rare, 2-4; occasional, 5-9; abundant 10-49; common 50 or more.
These numbers refer to relative abundance as maximum number of individuals which can be sighted on an optimal day during mid-flight period.

| **FAMILY / Subfamily**<br>***Scientific Name***<br>**Common Name** | **Regional Abundance** | **Site Occurrence** | **Host/Remarks** |
|---|---|---|---|
| PAPILIONIDAE / Papilioninae<br>- swallowtails | | | |
| *Papilio zelicaon zelicaon*<br>anise or zelicaon swallowtail | occasional | expected | Apiaceae. Flies all year. |
| *Papilio rutulus rutulus*<br>western tiger swallowtail | occasional | **observed** | *Plantanus racemosa, Populus* spp., *Salix* spp. Flies from February-October. |
| *Papilio eurymedon*<br>pale swallowtail | occasional | **observed** | *Ceanothus* spp., *Rhamnus* spp., *Prunus* spp. Flies from February-October. |
| PIERIDAE / Pierinae<br>- whites | | | |
| *Pontia beckerii*<br>Becker's white | rare | expected | Brassicaceae. Flies from February-August. |
| *Pontia protodice*<br>common or checkered white | occasional | **observed** | Brassicaceae. Flies all year. |
| *Artogeia (Pieris) rapae*<br>cabbage butterfly | common | **observed** | Brassicaceae. Flies all year. Introduced throughout all habitats. |
| PIERIDAE / Coliadinae<br>- sulfurs and yellows | | | |
| *Colias eurytheme eurtheme*<br>orange sulfur or alfalfa butterfly | occasional | expected | Fabaceae. Flies all year. |
| *Colias alexandra harfordii*<br>Harford's sulfur | rare | **expected** | *Astragalus* spp. Flies March-September. |
| *Zerene eurydice*<br>California dogface | rare | expected | *Amorpha californica.* Flies March-October. |
| *Phoebis sennae marcellina*<br>senna or cloudless sulfur | rare | expected | *Cassia (Senna)* spp. Flies March-October. |

TABLE 1 (cont.)

OBSERVED AND EXPECTED BUTTERFLIES AT BEAUTIFUL HOMES
LOS ANGELES COUNTY, CALIFORNIA

| FAMILY / Subfamily<br>*Scientific Name*<br>Common Name | Regional Abundance | Site Occurrence | Host/Remarks |
|---|---|---|---|
| NYMPHALIDAE / Argynninae - fritillaries | | | |
| *Speyeria callippe comstocki*<br>Comstock's fritillary | common | **observed** | *Viola pedunculata*. Flies May-June. |
| NYMPHALIDAE / Melitinae<br>- checker-spots, patches and crescents | | | |
| *Nymphalis antiopa antiopa*<br>mourning cloak | occasional | **observed** | Salicaceae. Flies all year. |
| *Charidryas (Chlosyne) gabbii gabbii*<br>Gabb's checker-spot | common | **observed** | Asteraceae. Flies from March-June. |
| *Euphydryas (Occidryas) chalcedona chalcedona*<br>chalcedon checker-spot | abundant | expected | Scrophulariaceae. Flies from May-June. |
| *Phycioides mylitta mylitta*<br>mylitta or thistle crescent | | | |
| HELICONIIDAE - long-wings | | | |
| *Agraulis vanillae incarnata*<br>gulf fritillary | rare | expected | *Passiflora* spp. Flies March-November. Possible fly-through individuals. |
| RIODINIDAE - metalmarks | | | |
| *Apodemia mormo virgulti*<br>Behr's metalmark | occasional | **observed** | *Eriogonum* spp. Flies from March-October. |
| *Calephelis nemesis californica*<br>dusky metalmark | rare | expected | *Baccharis* spp. *Encelia* spp. Flies from February-October. |
| LYCAENIDAE - gossamer-winged butterflies<br>/Eumaeinae - hairstreaks | | | |
| *Satyrium sylvinum desertorum*<br>southern sylvan or desert hairstreak | rare | expected | *Salix* spp. Flies from May-July. |
| *Satyrium auretorum spadix*<br>nut-brown hairstreak | rare | expected | *Quercus* spp. Flies from May-July. |
| *Satyrium auretorum fumosum*<br>Santa Monica Mountains hairstreak | very rare | expected | *Quercus* spp. Flies from May-July. |
| *Satyrium tetra*<br>grey hairstreak | very rare | expected | *Cercocarpus* spp. Flies from May-July. |

TABLE 1 (cont.)

OBSERVED AND EXPECTED BUTTERFLIES AT BEAUTIFUL HOMES
LOS ANGELES COUNTY, CALIFORNIA

| FAMILY / Subfamily<br>*Scientific Name*<br>Common Name | Regional Abundance | Site Occurrence | Host/Remarks |
|---|---|---|---|
| PIERIDAE / Anthocharinae<br>- orange-tips and marbles | | | |
| *Anthocharis sara sara*<br>sara orange-tip | abundant | **observed** | Brassicaceae. Flies from February-April, second generation April-June. |
| SATYRIDAE / Satyrinae<br>- satyrs and wood nymphs | | | |
| *Coenonympha californica californica*<br>California ringlet | common | **observed** | Poaceae. Flies from February-September. |
| *Cercyonis sthenele silvestris*<br>woodland or sylvan satyr | rare | expected | Poaceae. Flies from May-August. |
| DANAIDAE - milkweed butterflies | | | |
| *Danaus plexippus*<br>monarch | occasional | **observed** | *Asclepias* spp. Flies all year. Overwinters in swarms near coast. |
| NYMPHALIDAE - brush-footed butterflies / Limenitidinae - admirals and relatives | | | |
| *Basilarchia lorquini lorquini*<br>Lorquin's admiral | abundant | expected | *Salix* spp. *Prunus* spp. Flies from April-September. |
| *Adelpha bredowii californica*<br>California sister | abundant | **observed** | *Quercus* spp. Flies from March-October. |
| NYMPHALIDAE / Nyphalinae - tortoise-shells, angle-wings, ladies and peacocks | | | |
| *Nymphalis californica californica*<br>California tortoise-shell | rare | expected | *Ceanothus* spp. Flight period not specified. Migrates in spring. |
| *Polygonia satyrus satyrus*<br>satyr angle-wing | rare | expected | Urticaceae. Flies from June-April. |
| *Vanessa atalanta rubria*<br>red admiral | occasional | expected | Urticaceae. Flies from March-November. A usual fly-through. |
| *Vanessa cardui*<br>painted lady | occasional | **observed** | Malvaceae, Urticaceae. Flies from February-November. |
| *Vanessa virginiensis*<br>Virginia lady | rare | expected | *Gnaphalium* spp. Flies all year. |
| *Vanessa carye anabella*<br>west coast lady | occasional | expected | Malvaceae, Urticaceae. Flies all year. |
| *Junonia (Precis) coenia*<br>buckeye or peacock butterfly | abundant | **observed** | *Mimulus* spp. Flies from March-October. |

TABLE 1 (cont.)

OBSERVED AND EXPECTED BUTTERFLIES AT BEAUTIFUL HOMES
LOS ANGELES COUNTY, CALIFORNIA

| FAMILY / Subfamily<br>*Scientific Name*<br>Common Name | Regional Abundance | Site Occurrence | Host/Remarks |
|---|---|---|---|
| NYMPHALIDAE / Argynninae - fritillaries | | | |
| *Speyeria callippe comstocki*<br>Comstock's fritillary | common | **observed** | *Viola pedunculata*. Flies May-June. |
| NYMPHALIDAE / Melitinae<br>- checker-spots, patches and crescents | | | |
| *Nymphalis antiopa antiopa*<br>mourning cloak | occasional | **observed** | Salicaceae. Flies all year. |
| *Charidryas (Chlosyne) gabbii gabbii*<br>Gabb's checker-spot | common | **observed** | Asteraceae. Flies from March-June. |
| *Euphydryas (Occidryas) chalcedona chalcedona*<br>chalcedon checker-spot | abundant | expected | Scrophulariaceae. Flies from May-June. |
| *Phycioides mylitta mylitta*<br>mylitta or thistle crescent | | | |
| HELICONIIDAE - long-wings | | | |
| *Agraulis vanillae incarnata*<br>gulf fritillary | rare | expected | *Passiflora* spp. Flies March-November. Possible fly-through individuals. |
| RIODINIDAE - metalmarks | | | |
| *Apodemia mormo virgulti*<br>Behr's metalmark | occasional | **observed** | *Eriogonum* spp. Flies from March-October. |
| *Calephelis nemesis californica*<br>dusky metalmark | rare | expected | *Baccharis* spp. *Encelia* spp. Flies from February-October. |
| LYCAENIDAE - gossamer-winged butterflies<br>/Eumaeinae - hairstreaks | | | |
| *Satyrium sylvinum desertorum*<br>southern sylvan or desert hairstreak | rare | expected | *Salix* spp. Flies from May-July. |
| *Satyrium auretorum spadix*<br>nut-brown hairstreak | rare | expected | *Quercus* spp. Flies from May-July. |
| *Satyrium auretorum fumosum*<br>Santa Monica Mountains hairstreak | very rare | expected | *Quercus* spp. Flies from May-July. |
| *Satyrium tetra*<br>grey hairstreak | very rare | expected | *Cercocarpus* spp. Flies from May-July. |

**TABLE 1 (cont.)**

**OBSERVED AND EXPECTED BUTTERFLIES AT BEAUTIFUL HOMES**
**LOS ANGELES COUNTY, CALIFORNIA**

| FAMILY / Subfamily<br>*Scientific Name*<br>Common Name | Regional Abundance | Site Occurrence | Host/Remarks |
|---|---|---|---|
| LYCAENIDAE (cont.) | | | |
| *Satyrium saepium chalcis*<br>southern buckthorn or bronzed hairstreak | occasional | **observed** | *Ceanothus* spp. Nectars on *Eriogonum* and Asclepias spp. Flies May-July. |
| *Callophrys augustus iroides*<br>western elfin | occasional | expected | *Cuscuta* spp. Flies from February-June. |
| *Callophrys affinis perplexa*<br>California green hairstreak | occasional | **observed** | *Lotus* spp., *Eriogonum* spp. Flies from March-April. |
| *Strymon melinus pudica*<br>common hairstreak | occasional | expected | Polygonaceae. Flies from February-November. |
| LYCAENIDAE/ Lycaeninae - coppers | | | |
| *Gaeides (Lycaena) gorgon*<br>gorgon copper | very rare | **observed** | *Eriogonum elongatum*. Flies from May-June. |
| *Lycaena arota nubila*<br>cloudy copper | very rare | expected | *Ribes* spp. Flies from May-July. |
| LYCAENIDAE / Polyommatinae - blues | | | |
| *Brephidium exile*<br>pygmy blue | occasional | **observed** | *Atriplex* spp., *Chenopodium* spp. Flies from February-November. |
| *Leptotes marina*<br>marine blue | occasional | expected | Leguminosae, Plumbaginaceae. Flies from February-December. |
| *Hemiargus ceraunus gyas*<br>Edward's or gyas blue | occasional | expected | Fabaceae. Flies March-October. May be more common, but mistaken for marine blue. |
| *Hemiargus isola alce*<br>Mexican blue | occasional | expected | Fabaceae. Flies April-December. May be more common, but mistaken for marine blue. |
| *Plebejus acmon acmon*<br>acmon blue | abundant | **observed** | *Eriogonum* spp. Flies from February-November. |
| *Euphilotes battoides bernardino*<br>Bernardino blue | occasional | expected | *Erigonum* spp. Flies from May-June. |
| *Philotes sonorensi*<br>Sonoran blue | very rare | expected | *Dudleya lanceolata*. Flies February-April. Extirpated from range? |
| *Glaucopsyche lygdamus australis*<br>southern blue | abundant | expected | *Lotus* spp. Flies from February-April. |

**TABLE 1 (cont.)**

**OBSERVED AND EXPECTED BUTTERFLIES AT BEAUTIFUL HOMES**
**LOS ANGELES COUNTY, CALIFORNIA**

| FAMILY / Subfamily<br>*Scientific Name*<br>Common Name | Regional Abundance | Site Occurrence | Host/Remarks |
|---|---|---|---|
| LYCAENIDAE (cont.) | | | |
| *Celastrina argiolus echo*<br>echo blue | occasional | **observed** | Several diverse shrubby perennials. Flies Februrary-June. |
| HESPERIIDAE - true skippers<br>/ Hesperiinae -branded skippers | | | |
| *Lerodea eufala*<br>eufala skipper | occasional | expected | Poaceae. Flies July-October. |
| *Paratrytone melane melane*<br>umber skipper | occasional | expected | Poaceae, Cyperaceae. Flies April-September. Wet places. |
| *Ochlodes sylvanoides sylvanoides*<br>woodland skipper | occasional | expected | Poaceae. Flies from July-September. |
| *Ochlodes agricola agricola*<br>rural or farmer skipper | abundant | **observed** | Poaceae. Flies April-July. |
| *Hylephila phyleus*<br>fiery skipper | common | **observed** | *Cynodon dactylon*. Flies all year. |
| *Atalopedes campestris*<br>field skipper | rare | expected | Poaceae. Flies July-September. |
| *Polites sabuleti sabuleti*<br>sandhill skipper | occasional | expected | Poaceae. Flies April-November. |
| *Hesperia columbia*<br>Columbia skipper | rare | expected | Poaceae. Flies from March-May August-October. |
| *Hesperia comma leussleri*<br>Leussler's skipper | very rare | expected | Poaceae. Flies March-May and August-October. |
| HESPERIIDAE / Pyrginae - dusky-wings, checkered skippers and allies | | | |
| *Heliopetes ericetorum*<br>large white skipper | abundant | expected | Malvaceae, usually *Malacothamnus fasciculatus*. Flies from April-October. |
| *Pyrgus communis albescens*<br>southern checkered skipper | occasional | expected | Malvaceae. Flies February-October. |
| *Erynnis funeralis*<br>funereal duskywing | abundant | **observed** | Fabaceae. Flies from February-October. |
| *Erynnis tristis tristis*<br>mournful duskywing | abundant | expected | *Quercus* spp. Flies from February-September. |
| *Erynnis propertius propertius*<br>western oak or propertius duskywing | abundant | expected | *Quercus* spp. Flies from March-May. |

# APPENDIX D

## APPENDIX D

**Sensitive Species Impacts**

| Common Name[1] | Lyon's pentachaeta | Santa Monica Mountains dudleya | narrow-leaf goldenbush |
|---|---|---|---|
| Habitat present and species is reasonably expected to occur on-site? | observed | observed | observed |
| Species impacted directly by habitat loss? | yes | yes | yes |
| Habitat loss substantial? | yes | yes | yes |
| Species impacted indirectly on adjacent lands by edge effects? | yes | yes | yes |
| Potential to eliminate species on site? | no | yes | no |
| Potential to reduce population size below self-sustaining levels? | no | yes | no |
| Potential for substantial reduction in numbers of individuals? | yes | yes | no |
| Potential restriction of range of rare or endangered species? | yes | yes | no |
| Significant? | yes | yes | no |
| Mitigation | yes | yes | none |
| **Common Name** | **California cloak fern** | **Coville's lip fern** | **California dogface** |
| Habitat present and species is reasonably expected to occur on-site? | observed | observed | yes |
| Species impacted directly by habitat loss? | no | yes | yes |
| Habitat Loss Substantial? | no | yes | no |
| Species impacted indirectly on adjacent lands by edge effects? | no | no | yes |
| Potential to eliminate species on site? | no | yes | no |
| Potential to reduce population size below self-sustaining levels? | no | yes | no |
| Potential for substantial reduction in numbers of individuals? | no | yes | no |
| Potential restriction of range of rare or endangered species? | no | no | no |
| Significant? | no | yes | no |
| Mitigation | none | yes | none |

[1] Scientific names are not given. These are provided in Table 1 and elsewhere in the main text.

## APPENDIX D (cont.)

**Sensitive Species Impacts**

| Common Name | Harford's sulfer | Comstock's fritillary | Gabb's checkerspot |
|---|---|---|---|
| Habitat present and species is reasonably expected to occur on-site? | yes | observed | observed |
| Species impacted directly by habitat loss? | no | no | yes |
| Habitat loss substantial? | no | no | no |
| Species impacted indirectly on adjacent lands by edge effects? | no | no | yes |
| Potential to eliminate species on site? | no | no | no |
| Potential to reduce population size below self-sustaining levels? | no | no | no |
| Potential for substantial reduction in numbers of individuals? | no | no | no |
| Potential restriction of range of rare or endangered species? | no | no | no |
| Significant? | no | no | no |
| Mitigation | none | none | none |

| Common Name | Satyr anglewing | Santa Monica Mountains hairstreak | Cloudy copper |
|---|---|---|---|
| Habitat present and species is reasonably expected to occur on-site? | yes | yes | yes |
| Species impacted directly by habitat loss? | no | yes | yes |
| Habitat Loss Substantial? | no | no | no |
| Species impacted indirectly on adjacent lands by edge effects? | no | yes | yes |
| Potential to eliminate species on site? | no | no | no |
| Potential to reduce population size below self-sustaining levels? | no | no | no |
| Potential for substantial reduction in numbers of individuals? | no | no | no |
| Potential restriction of range of rare or endangered species? | no | no | no |
| Significant? | no | no | no |
| Mitigation | none | none | none |

## APPENDIX D (cont.)

### Sensitive Species Impacts

| Common Name | Monarch | Monterey ensatina | Arboreal salamander |
|---|---|---|---|
| Habitat present and species is reasonably expected to occur on-site? | observed | yes | yes |
| Species impacted directly by habitat loss? | yes | yes | yes |
| Habitat loss substantial? | no | no | no |
| Species impacted indirectly on adjacent lands by edge effects? | no | yes | yes |
| Potential to eliminate species on site? | no | no | no |
| Potential to reduce population size below self-sustaining levels? | no | no | no |
| Potential for substantial reduction in numbers of individuals? | no | no | no |
| Potential restriction of range of rare or endangered species? | no | no | no |
| Significant? | no | yes | yes |
| Mitigation | none | yes | yes |

| Common Name | Coast range newt | Southwestern pond turtle | silvery legless lizard |
|---|---|---|---|
| Habitat present and species is reasonably expected to occur on-site? | no | no | no |
| Species impacted directly by habitat loss? | no | no | no |
| Habitat Loss Substantial? | no | no | no |
| Species impacted indirectly on adjacent lands by edge effects? | no | no | no |
| Potential to eliminate species on site? | no | no | no |
| Potential to reduce population size below self-sustaining levels? | no | no | no |
| Potential for substantial reduction in numbers of individuals? | no | no | no |
| Potential restriction of range of rare or endangered species? | no | no | no |
| Significant? | no | no | no |
| Mitigation | none | none | none |

## APPENDIX D (cont.)

### Sensitive Species Impacts

| Common Name | California (coast) horned lizard | Coastal (western) whiptail | San Diego mountain kingsnake |
|---|---|---|---|
| Habitat present and species is reasonably expected to occur on-site? | observed | observed | yes |
| Species impacted directly by habitat loss? | yes | yes | yes |
| Habitat loss substantial? | yes | no | no |
| Species impacted indirectly on adjacent lands by edge effects? | yes | yes | yes |
| Potential to eliminate species on site? | yes | no | no |
| Potential to reduce population size below self-sustaining levels? | yes | no | no |
| Potential for substantial reduction in numbers of individuals? | yes | yes | no |
| Potential restriction of range of rare or endangered species? | no | no | no |
| Significant? | yes | yes | yes |
| Mitigation | yes | yes | yes |

| Common Name | San Bernardino ringneck snake | Coast patchnose snake | Southwestern blind snake |
|---|---|---|---|
| Habitat present and species is reasonably expected to occur on-site? | yes | yes | yes? |
| Species impacted directly by habitat loss? | yes | yes | no |
| Habitat Loss Substantial? | no | no | no |
| Species impacted indirectly on adjacent lands by edge effects? | yes | yes | no |
| Potential to eliminate species on site? | no | no | no |
| Potential to reduce population size below self-sustaining levels? | no | no | no |
| Potential for substantial reduction in numbers of individuals? | no | no | no |
| Potential restriction of range of rare or endangered species? | no | no | no |
| Significant? | yes | yes | no |
| Mitigation | yes | yes | none |

## APPENDIX D (cont.)

**Sensitive Species Impacts**

| Common Name | Western yellow-bellied racer | Red coachwhip | Great blue heron |
|---|---|---|---|
| Habitat present and species is reasonably expected to occur on-site? | yes | yes | yes |
| Species impacted directly by habitat loss? | yes | yes | no |
| Habitat loss substantial? | no | no | no |
| Species impacted indirectly on adjacent lands by edge effects? | yes | yes | no |
| Potential to eliminate species on site? | no | no | no |
| Potential to reduce population size below self-sustaining levels? | no | no | no |
| Potential for substantial reduction in numbers of individuals? | no | no | no |
| Potential restriction of range of rare or endangered species? | no | no | no |
| Significant? | yes | yes | no |
| Mitigation | yes | yes | no |

| Common Name | Black-crowned night-heron | sharp-skinned hawk | Cooper's hawk |
|---|---|---|---|
| Habitat present and species is reasonably expected to occur on-site? | no | yes | observed |
| Species impacted directly by habitat loss? | no | yes | yes |
| Habitat Loss Substantial? | no | no | no |
| Species impacted indirectly on adjacent lands by edge effects? | no | yes | yes |
| Potential to eliminate species on site? | no | yes | yes |
| Potential to reduce population size below self-sustaining levels? | no | no | no |
| Potential for substantial reduction in numbers of individuals? | no | yes | no |
| Potential restriction of range of rare or endangered species? | no | no | no |
| Significant? | no | yes | yes |
| Mitigation | none | yes | yes |

## APPENDIX D (cont.)

### Sensitive Species Impacts

| Common Name | Golden eagle | Northern harrier | White-tailed kite |
|---|---|---|---|
| Habitat present and species is reasonably expected to occur on-site? | yes | yes | yes |
| Species impacted directly by habitat loss? | no | yes | yes |
| Habitat loss substantial? | no | yes | yes |
| Species impacted indirectly on adjacent lands by edge effects? | yes | yes | no |
| Potential to eliminate species on site? | no | yes | yes |
| Potential to reduce population size below self-sustaining levels? | no | no | yes |
| Potential for substantial reduction in numbers of individuals? | no | no | no |
| Potential restriction of range of rare or endangered species? | no | no | no |
| Significant? | no | yes | yes |
| Mitigation | none | yes | yes |

| Common Name | Red-shouldered hawk | Prairie falcon | Barn owl |
|---|---|---|---|
| Habitat present and species is reasonably expected to occur on-site? | yes | no | yes |
| Species impacted directly by habitat loss? | yes | no | yes |
| Habitat Loss Substantial? | no | no | no |
| Species impacted indirectly on adjacent lands by edge effects? | yes | no | no |
| Potential to eliminate species on site? | yes | no | yes |
| Potential to reduce population size below self-sustaining levels? | yes | no | no |
| Potential for substantial reduction in numbers of individuals? | yes | no | no |
| Potential restriction of range of rare or endangered species? | no | no | no |
| Significant? | yes | no | no |
| Mitigation | yes | no | none |

APPENDIX D (cont.)

Sensitive Species Impacts

| Common Name | Western burrowing owl | Lewis' woodpecker | Southwestern willow flycatcher |
|---|---|---|---|
| Habitat present and species is reasonably expected to occur on-site? | no | yes | no |
| Species impacted directly by habitat loss? | no | yes | no |
| Habitat loss substantial? | no | yes | no |
| Species impacted indirectly on adjacent lands by edge effects? | no | yes | no |
| Potential to eliminate species on site? | no | yes | no |
| Potential to reduce population size below self-sustaining levels? | no | yes | no |
| Potential for substantial reduction in numbers of individuals? | no | yes | no |
| Potential restriction of range of rare or endangered species? | no | no | no |
| Significant? | no | yes | no |
| Mitigation | no | yes | none |

| Common Name | Western bluebird | Loggerhead shrike | Yellow warbler |
|---|---|---|---|
| Habitat present and species is reasonably expected to occur on-site? | yes | yes | yes |
| Species impacted directly by habitat loss? | yes | yes | no |
| Habitat Loss Substantial? | yes | yes | no |
| Species impacted indirectly on adjacent lands by edge effects? | yes | yes | no |
| Potential to eliminate species on site? | yes | yes | no |
| Potential to reduce population size below self-sustaining levels? | yes | yes | no |
| Potential for substantial reduction in numbers of individuals? | yes | yes | no |
| Potential restriction of range of rare or endangered species? | no | no | no |
| Significant? | yes | yes | no |
| Mitigation | yes | yes | none |

APPENDIX D (cont.)

Sensitive Species Impacts

| Common Name | Yellow-breasted chat | Ashy rufous-crowned sparrow | Bell's sage sparrow |
|---|---|---|---|
| Habitat present and species is reasonably expected to occur on-site? | yes | observed | no |
| Species impacted directly by habitat loss? | no | yes | no |
| Habitat loss substantial? | no | yes | no |
| Species impacted indirectly on adjacent lands by edge effects? | no | yes | no |
| Potential to eliminate species on site? | no | no | no |
| Potential to reduce population size below self-sustaining levels? | no | no | no |
| Potential for substantial reduction in numbers of individuals? | no | yes | no |
| Potential restriction of range of rare or endangered species? | no | no | no |
| Significant? | no | yes | no |
| Mitigation | none | yes | no |

| Common Name | California leaf-nosed bat | Spotted bat | Pale big-eared bat |
|---|---|---|---|
| Habitat present and species is reasonably expected to occur on-site? | unknown | unknown | unknown |
| Species impacted directly by habitat loss? | | | |
| Habitat Loss Substantial? | | | |
| Species impacted indirectly on adjacent lands by edge effects? | | | |
| Potential to eliminate species on site? | | | |
| Potential to reduce population size below self-sustaining levels? | | | |
| Potential for substantial reduction in numbers of individuals? | | | |
| Potential restriction of range of rare or endangered species? | | | |
| Significant? | | | |
| Mitigation | none | none | none |

## APPENDIX D (cont.)

### Sensitive Species Impacts

| Common Name | Pallid bat | Greater western mastiff bat | San Diego desert woodrat |
|---|---|---|---|
| Habitat present and species is reasonably expected to occur on-site? | unknown | unknown | observed |
| Species impacted directly by habitat loss? | | | yes |
| Habitat loss substantial? | | | no |
| Species impacted indirectly on adjacent lands by edge effects? | | | yes |
| Potential to eliminate species on site? | | | no |
| Potential to reduce population size below self-sustaining levels? | | | no |
| Potential for substantial reduction in numbers of individuals? | | | no |
| Potential restriction of range of rare or endangered species? | | | no |
| Significant? | | | no |
| Mitigation | none | none | none |

| Common Name | San Diego black-tailed hare | Ringtail | Long-tailed weasel |
|---|---|---|---|
| Habitat present and species is reasonably expected to occur on-site? | yes | yes | yes |
| Species impacted directly by habitat loss? | yes | no | yes |
| Habitat Loss Substantial? | yes | no | no |
| Species impacted indirectly on adjacent lands by edge effects? | yes | no | yes |
| Potential to eliminate species on site? | yes | no | no |
| Potential to reduce population size below self-sustaining levels? | yes | no | no |
| Potential for substantial reduction in numbers of individuals? | yes | no | no |
| Potential restriction of range of rare or endangered species? | no | no | no |
| Significant? | yes | no | no |
| Mitigation | yes | no | none |

## APPENDIX D (cont.)

**Sensitive Species Impacts**

| Common Name | American badger | Mountain lion |
|---|---|---|
| Habitat present and species is reasonably expected to occur on-site? | observed | yes |
| Species impacted directly by habitat loss? | yes | yes |
| Habitat loss substantial? | yes | no |
| Species impacted indirectly on adjacent lands by edge effects? | yes | yes |
| Potential to eliminate species on site? | yes | yes |
| Potential to reduce population size below self-sustaining levels? | yes | no |
| Potential for substantial reduction in numbers of individuals? | yes | yes |
| Potential restriction of range of rare or endangered species? | no | no |
| Significant? | yes | yes |
| Mitigation | yes | yes |

# APPENDIX E

## APPENDIX E

## GUIDELINE COMPLIANCE CHECKLIST

| Item | Preparer's Initials | Page |
|---|---|---|
| Setting | CW | 1-9 |
| Original U.S.G.S. Topographical Quad Sheet | RF | 4 |
| Project Site Photographs or Color Photocopies | CW | 5, 6 |
| Aerial Photograph | RF | 7 |
| Biota Survey of the Project Site | CW, RF | 9-27 |
| Flora and Fauna Lists in Systematic Order | CW, RF | Appendices A&B |
| Table of Sensitive Species Impacts Matrix | RF | Appendix D |
| Document Showing Contact with CNDDB | RF | Table 2 |
| Site/Grading Plans | | Figure 12 |
| Initial Study Questionnaire | | - |
| Impacts | KP, RF | 41 |
| Mitigation Measures | KP, RF | 51 |
| Mitigation Monitoring | RF | 61, Table 5 |
| Preparer's Resume/Qualifications | RF | Appendix F |

# APPENDIX F

ENVICOM
CORPORATION

## Carl Wishner

*Principal Biologist*

Mr. Wishner has over 15 years of professional experience in the study and analysis of biological and natural sciences. His technical proficiency is broad-based, including expertise in floristic and faunal surveys, focused surveys of sensitive, rare and endangered species, habitat inventory and evaluation, biological impact assessment, wetland identification, natural resource policy analysis and biological monitoring. Mr. Wishner pursued his education in the biological sciences receiving a BS (Cum Laude) and MS from Humboldt State University. He held the position of Lecturer in Botany at the University and worked for several years as a forestry technician for the Sequoia and Inyo National Forests in California.

As a recognized biological professional, Mr. Wishner has served, for the last two years, on the County of Los Angeles' Significant Ecological Areas Technical Advisory Committee (SEATAC), with responsibility to review proposed projects and make recommendations to the applicants, and to the Regional Planning Department and Board of Supervisors. Mr. Wishner also serves on the Board of the Los Angeles Chapter of the California Native Plant Society, and on the Scientific Advisory Committee for the Cold Creek Preserve and the Mountains Restoration Trust. As Principal Biologist within the Biological Resources Division of Envicom Corporation, he functions as the lead investigator for biological surveys. He coordinates the acquisition and presentation of technical data for a variety of biological reports.

Mr. Wishner's capabilities with endangered plant species concerns are considerable, having performed numerous surveys, impact analyses, and development of mitigation plans. Specific projects include a salvage and restoration plan for Lyon's pentachaeta at Sherwood Country Club, and a California Department of Fish and Game Mitigation Agreement for Conejo buckwheat and Verity's dudleya at Conejo Mountain. Mr. Wishner recently inventoried and assessed impacts from the El Chorro Golf Course to Blochman's and San Luis Obispo dudleyas for the County of San Luis Obispo. He also managed the inventory and analyses of botanical constraints for both the Santa Margarita and Hearst Ranches in San Luis Obispo County, as well as for Ahmanson and Jordan Ranches, several large areas in Ventura County. Mr. Wishner's botanical skills were instrumental in the establishment of the Soka University Botanical Research Center and Nursery, which specializes in the conservation and study of native plants of the south coastal region of California. Through his extensive familiarity with the native flora, he has established an impressive collection of seeds for the University, and continues to provide scientific advice and services for the Center.

Mr. Wishner has contributed to the development of habitat restoration plans for wetland areas in the Cuyama and Santa Clara Rivers of Ventura County, El Chorro Park in San Luis Obispo County, and for an upland restoration site at North American Rockwell's Santa Susana Field Laboratory (Rocketdyne). He is also knowledgeable in zoology, wildlife management, mycology, bryology, biogeography and biostatistical analysis (multivariate). Mr. Wishner has investigated wildlife movements in the Santa Susana Mountains of Ventura County; the effects of blasting on nesting birds-of-prey in the Santa Monica Mountains; the status of endangered reptiles and amphibians in the Santa Lucia Mountains of San Luis Obispo County; the condition of Critical Habitat for endangered mammals at Morro Bay; faunal inventory for La Purisima Mission State Historic Park and a valuation of damages assessment at Gaviota State Park for the State's Attorney General.

ENVICOM CORPORATION

In the arena of resource planning and public policy, Mr. Wishner has a number of General Plan documents to his credit including a map-based inventory of biological resource areas within the City of Los Angeles for the City's Framework Planning process. Mr. Wishner also provides services to litigants with civil suits involving the disposition and valuation of biological resources. Mr. Wishner is frequently requested to perform critical reviews of environmental reports, in many cases for projects involved in litigation. Mr. Wishner has been instrumental in recent cases involving properties which serve as nesting habitats for the California least tern in Ventura County, habitat for wintering bald eagles at Big Bear Lake (San Bernardino County), and habitats for Stephens' kangaroo-rat in Riverside County.

ENVICOM CORPORATION

**Richard E. Farris**
*Senior Biologist*

Mr. Farris has 17 years of experience as a field biologist, including more than 8 years as a professional consultant. He has comprehensive knowledge in wildlife biology and management, and has contributed to more than 150 environmental documents, including biological assessments, wetland studies, environmental constraints analyses, general plans, and Environmental Impact Reports and Statements. Mr. Farris earned his BS in Zoology and MS in Biological Sciences, with an emphasis in Ecology, from California State Polytechnic University, Pomona, where he taught laboratory courses in Invertebrate Zoology, General Biology, Ornithology, and Medical Parasitology.

Mr. Farris' technical expertise includes field investigations of plants and wildlife, sensitive species surveys, population studies, and habitat assessments. Through his education, scientific investigations, and independent study, Mr. Farris has built a thorough knowledge of the natural history of California, Oregon, and Arizona.

*Wildlife Inventories*

Mr. Farris has an excellent background in the birds of the region as a result of his education; volunteer participation in breeding bird surveys for the U.S. Fish and Wildlife Service; censuses for the National Audubon Society in Oregon and California; spring and fall shorebird surveys at Point Mugu Naval Air Station; and through his work as a biological consultant. He is an experienced bird bander, and has participated in a number of banding studies, including a population dynamics assessment of the federally-listed Threatened California gnatcatcher. He is also very knowledgeable in the status and distribution of amphibians, reptiles, and mammals of California, and is able to provide detailed inventories of these animal groups for any given site. Through his work, he has developed the unique ability to interpret animal sign and to recognize the vocalizations of many species.

*Wildlife Movement Studies*

Mr. Farris has designed and performed numerous studies of wildlife movement in the Transverse Ranges of southern California. These investigations have included topographical (gap) analysis, field surveys compiling data on wildlife tracks and sign, and the use of active infrared monitors to photograph animals using freeway underpasses and remote trails. He was one of the first investigators in the region to use active infrared monitors to detect and record wildlife movement, and for four months he operated a continuous 1.5 mile-long plot in the Santa Susana Mountains to record animal tracks. The purpose of these efforts has been to help applicants design projects that preserve habitat linkages and maintain wildlife diversity.

*Endangered Species*

Mr. Farris is intimately familiar with the statutory requirements of the California and Federal Endangered Species Acts. He has performed focused surveys for California red-legged frog, southwestern pond turtle, coast horned lizard, California gnatcatcher, least Bell's vireo, coastal cactus wren, and many other sensitive wildlife species. Mr. Farris has in-depth knowledge of the appropriate, and sometimes required, methodologies for conducting surveys for sensitive animal species. He is licensed by the U.S. Fish and Wildlife Service [10(a)1(A) permit] to perform California gnatcatcher surveys, and will soon be similarly certified to conduct southwestern willow flycatcher surveys.

ENVICOM
CORPORATION

*Special Studies*

Because of his extensive experience, Mr. Farris is often asked to design and conduct unique wildlife studies. In addition to those for wildlife movement, he has performed pitfall trap and cover surveys for amphibians and reptiles; collected benthic macroinvertebrates for water quality analyses; monitored the effects of blasting on nesting birds of prey; conducted nocturnal amphibian inventories; completed baseline bird censuses to monitor the success of a riparian restoration project; and others. His efforts have provided invaluable data for evaluating impacts and satisfying regulatory requirements.

*Botanical Work*

In addition to his skills as a wildlife biologist, Mr. Farris has assisted Envicom Corporation's Principal Biologist and botanist with focused searches for endangered plant species, such as Lyon's pentachaeta. Through their association, Mr. Farris has developed some skill in native plant identification. He has also been involved in the operation of a native plant garden and nursery in the Santa Monica Mountains, where his responsibilities have included plant identification; native plant seed collection and processing; design of integrated pest management plans; the management of a computer data base for native plant seed collections and their propagation; and directing the operation of the garden, nursery, and research facilities.

*Report Writing*

Mr. Farris has the ability to translate his observations into concisely written, easily understandable reports that combine the most up-to-date information with the appropriate level of analysis. Combined with his accumulated knowledge, one of Mr. Farris' assets is his ability to relate technical data in written reports to the general public.

ENVICOM
CORPORATION

## Katherine J. Patey

*Director, Biological Resources Division*

Ms. Patey has over 15 years of work experience and management on a wide variety of private and public projects involving natural resource management and policy; environmental impact assessment and mitigation; and wetland delineation, permitting, and mitigation. As Director of the Biological Services Division, her daily activities include client liaison, organization of project specifications, and coordinating both staff and subconsultant activities to ensure that project objectives are accomplished in accordance with client priorities. Ms. Patey reviews all reports prepared by the biological staff of Envicom Corporation and conducts independent research and reporting on other environmental projects. She maintains a high level of quality control by regularly conferring with project personnel to provide technical advice and to assist in solving project issues.

Prior to joining Envicom Corporation in 1989, Ms Patey was curator of environmental science with the Goulandris Natural History Museum. She has prepared several papers on wetland mitigation; served three years on the board of the Association of Environmental Professionals; and is an elected member in the Society of Women Geographers. Her educational background includes: Master of Environmental Science, Yale University School of Forestry and Environmental Science; and Bachelor of Science in Conservation of Natural Resources, University of California Berkeley (Phi Beta Kappa).

***Wetland Delineation, Permitting and Mitigation***

Ms. Patey's recent achievements include negotiating the wetland permits for the following clients: Big Sky Country Club in Ventura County; Department of Parks and Recreation in San Luis Obispo County; and Soka University of America in Los Angeles County. Issuance of the permits solved important project planning issues including access, flood control, and containment of irrigation water. Ms. Patey coordinated the production of mitigation plans that included the creation of willow riparian habitat, removal of exotic weedy species from a protected wetland, and enhancement of an existing seasonal wetland. She contributed special expertise in establishing success criteria, formulating the mitigation monitoring programs, and managing the preparation of construction specifications and bid documents. Ms. Patey is a serious student of both state and federal wetland regulations, and provides insights for expert testimony. Recent analysis includes interpretation of Section 404 water-dependency test and application of feasible alternatives for the US Justice Department (Forest Properties v. US Army Corps of Engineers) and review of the use of mitigation banking for the Office of the Attorney General (First American Trust v. California Department of Fish and Game). Other wetland mitigation plans managed by Ms. Patey include the Santa Paula River Weed Eradication Plan for Ventura County Rock and the Cuyama River Willow Habitat Restoration Plan for Ozena Valley Ranch.

***Natural Resource Management and Policy***

Ms. Patey successfully planned and executed a large scale environmental mitigation monitoring program for the County of San Luis Obispo's Dairy Creek Golf Course that included water quality sampling, protection of rare plants and wetland habitats, and implementation of erosion control measures. For this project, she developed and taught an environmental protection training program for onsite construction workers, coordinated a chemical waste minimization plan, and prepared monthly monitoring reports describing site activities and recommendations. Ms. Patey also managed the

preparation of the Goleta Beach Environmental Carrying Capacity Report for the County of Santa Barbara, including researching management options for the park, overseeing the production of detailed biological resource mapping, and coordinating field inventories. Additional projects, involving application of the Endangered Species Act (ESA), include: analysis of the Habitat Conservation Plan for Stephen's kangaroo rat in Riverside County (Office of the Attorney General, Morger v. California Department of Fish and Game); creation of a habitat preservation plan for state-listed plants (Ventura County Flood Control District); and development of mitigation for a large-scale residential project site containing Lyon's pentachaeta.

***Environmental Impact Assessment***

Ms. Patey managed the preparation of the Arrowhead Spring Water EIR; the Diary Creek Golf Course EIR; and the Lester (Bob) Hope/National Park Service Land Exchange EIS. She consolidated numerous technical reports from a multi-disciplinary team of environmental experts for use in each document to meet all legal and ethical standards under the California Environmental Quality Act (CEQA) and the National Environmental Quality Act (NEPA). In addition, she reviews all biological resource sections for each EIR/EIS prepared by Envicom Corporation and assists in the formulation of feasible mitigation to reduce significant impacts through an interactive process with technical staff.

# APPENDIX C-3

**Biota Report Resubmittal No.1 for the Beautiful Homes Site, Los Angeles County, prepared by Envicom Corporation; revised November 11, 1998**

# BIOTA REPORT

*Resubmittal No. 1*

# BEAUTIFUL HOMES SITE
## Los Angeles County

*Prepared for:*

**Beautiful City Holding Corporation**
28912 Roadside Drive
Agoura Hills, California 91301
Attn: Mr. Vance Moran

*Prepared by:*

**Envicom Corporation**
28328 Agoura Road
Agoura Hills, California 91301

March 10, 1998
*Revised* November 11, 1998

# I. INTRODUCTION

This Biota Report Resubmittal #1 for the proposed Live Oak Ranch[1] project (Los Angeles County, No. TT 52419, CUP 97-178 etc. al.) has been prepared pursuant to guidelines published by the Los Angeles County Significant Ecological Areas Technical Advisory Committee (SEATAC). The purpose of this submittal is twofold: 1) to provide responses to comments received during the April 6, 1998 SEATAC meeting on the project Biota Report; and 2) to present and analyze a revised project site plan designed to reduce impacts to sensitive resources. The Biota Report[2], which was an adjunct to the February 14, 1997 Biological Constraints Analysis Report, analyzed impacts of a 139-lot residential subdivision within the approximately 320-acre property. Only those impacts and mitigation measures that have changed as a result of the new plan are discussed herein. Comments and recommendations from SEATAC are presented on blue pages, with their respective responses on white pages.

During the April 6, 1998 SEATAC meeting, the committee concurred with Envicom Corporation's proposed lot deletions/reconfigurations to reduce impacts, stating that "lot deletions are good suggestions for mitigation to potential impacts of sensitive species" (See Comment #5). In response to SEATAC's endorsement of the lot deletions/reconfigurations, the applicant has re-designed the project with the intent of reducing direct impacts to sensitive species, while also reducing project impacts on visual resources, traffic, and flooding. As required by SEATAC, the new tract configuration and new impact analysis are included in this Resubmittal, as well as requested technical data. These include a discussion on aquatic resources, biological sensitivities, the potential of using horse grazing and/or mechanical means as a management tool for the long-term survival of Lyon's pentachaeta, fuel modification, and oak tree impacts.

# II. SITE CHARACTERISTICS SUMMARY

## LOCATION

The project site is located on the north flank of the Santa Monica Mountains, in the western portion of the range. Approximately 172.5 acres of the project site are located within Las Virgenes Significant Ecological Area (SEA) #6 (**Figure 1**). The USGS map location of the site is as follows: portions of the Thousand Oaks and Calabasas 7.5-minute quadrangles, Range 18W, Township 1N, in unsectioned parts of both maps. The site is bound on the north by Malibu Junction, on the west by Ladyface Mountain, on the south by Silver Creek Road and residential development, and east by undeveloped (private) mountainous terrain.

The site lies generally south of the junction of Cornell and Kanan Roads, and is bisected by Medea Creek for a distance of 2,370 feet as it flows in an area located between these roads. The eastern portion of the site surrounds Los Angeles County Fire Station No. 65 and two single family homes, as well as residential development between Caleta Road on the north, and Silver Creek Road, as well as to the south, however these are not part of the site. The City of Agoura Hills lies to the north, and various residential estate developments (approximately 1 dwelling unit per 1.5 acres and larger) lie to the south and southeast.

## LAND USE

The site covers approximately 320 acres which are primarily undeveloped. There are clustered adjacent inholdings including a fire station, scattered residential development, and several roads (i.e. Kanan and Cornell) which traverse the site dividing the property into three discontinuous portions; a central piece, an eastern piece, and a western piece. At some locations along Kanan and Cornell Roads, there are turnouts which have altered some of the

[1] The project name has been changed from "Beautiful Homes" to "Live Oak Ranch".

[2] Envicom Corporation, March 10, 1998. The Biological Constraints Analysis Report was approved by SEATAC on January 5, 1998.

natural landscape, and various unpaved roads. There is heavy-machinery operations on the western half of the site, which has disturbed the natural topography. Two areas between Kanan Road and Medea Creek are disturbed, and the northernmost of these two areas is a storage site for large dumpsters. Between Cornell and Kanan Roads, grading activities have occurred, and on the east side of Cornell, there are currently horse stables, corrals, a riding area, and wood cutting activities. At present, horse grazing also occurs on the eastern portion of the site.

The project site occupies mountainous terrain and alluvial floodplain within the Medea Creek watershed. This watershed is comprised of four sub-drainages: Medea Creek, Lindero, Palo Comado and Cheseboro canyons. These drainages originate from the south slope of the Simi Hills, and converge in the vicinity of Malibu Junction, just to the north of the project site. The majority of these drainages have been concrete-lined. From the lowest elevation on the property (the bed of Medea Creek) at approximately 800 feet, the parcel extends west to include a sizable area on the eastern slope of Ladyface, up to an elevation of approximately 1,900 feet. The eastern portion of the property encompasses a west-trending, tributary of Medea Creek, bounded generally on the north and south by prominent 1,100 to 1,200 foot ridgelines, with the site reaching a 1,400 foot peak in the extreme east corner.

### STATE AND FEDERALLY LISTED PLANTS

The state and federally listed Endangered Lyon's pentachaeta (*Pentachaeta lyonii*) occurs at specific locations on both the eastern and western portions of the property on the project site. Also, the federally-threatened Santa Monica Mountains dudleya (*Dudleya cymosa* ssp. *ovatifolia*) is known from a few rock outcrops in the western portion of the property.

## III. RESPONSE TO SEATAC COMMENTS AND RECOMMENDATIONS

**COMMENT**

Report is one of the best reviewed by SEATAC; recommend that graphics be bound together at end of document (for ease of reading).

***Response 1***

Envicom Corporation appreciates SEATAC's generous compliment regarding the quality of the Biota Report. In the future, we will group the graphics at end of report to increase the ease of reviewing the document.

**COMMENT 2**

Figure 8 does not clearly identify the middle sensitivities (i.e. S-2 & S-3 are not indicated).

***Response 2***

As summarized from the Biological Constraints Report, portions of the site were ranked into one of four sensitivity units. These sensitivity units have been mapped as shown on **Figure 2-(Revised Figure 8)**. The findings indicate that the least sensitive areas consist of previously graded, undeveloped land west of Kanan Road, and the flat area above Medea Creek.

Highest biological sensitivity (S-1):

- Habitat or known locations of plant species listed by state or federal agencies as endangered, threatened or rare, or species currently proposed for such listing for this site, includes Lyon's pentachaeta and Santa Monica Mountains dudleya.
- Locations of mature oak trees that are regulated by the County Oak Tree Ordinance and other native trees (e.g. sycamore), that provide exceptional wildlife values.
- Habitats known to provide exceptional resources, such as water, nesting sites, or abundant food; for the site, this has been limited to riparian habitats due to the intense regulatory scrutiny such habitats are given.

High-medium sensitive units (S-2):

- Areas supporting unique or unusual plants or communities including Coville's lip fern, cloak fern, linear-leaved goldenbush, and the stand of redshank chaparral. S-2 sensitivities are discrete units within the core habitat (below).

Medium sensitive areas (S-3):

- Areas that support the assemblages of sensitive wildlife species;
- Areas that are core habitat for wildlife movement, covering most of the site.

Least sensitive areas (S-4):

- Disturbed areas from grading and/or removal of natural vegetation. There are four such areas within the site: one west of Kanan Road in the northern portion of the site; an area south on Kanan, just east of the road; and the horse stables/corral, and woodcutting areas in the southeast portion of the property.

**COMMENT 3**

Review aquatic habitats, including survey for southwestern pond turtle, since arroyo chub (*Gila orcutti*), a species of special concern, could occur on-site (and *Gambusia* is probably present; reconsider riparian impacts more thoroughly.

*Response 3*

Aquatic Habitats

The aquatic habitat on the project site consists of the near-constant flows within the channel of Medea Creek, which continue southerly past the site along adjacent residential development. To determine the use of the stream ecosystem by sensitive aquatic species, ( i.e. fish, pond turtles) a survey of Medea Creek was conducted by San Marino Environmental Associates and Envicom Corporation on September 13, 1998 (**Appendix A**). Results indicate the stream does not support sensitive or native fish populations adjacent to the project site. The survey crew collected five exotic (non-native) species including largemouth bass, green sunfish, fathead minnow, black bullhead, and mosquito fish (gambusia). Of these, three are pioneer fish species. No other fish species were observed. In addition, neither southwestern pond turtle or arroyo chub were observed, nor are they expected based on the existing degraded conditions of the stream. Pond turtles, especially the young, are prey for the exotic large mouth bass, and the high stream temperatures, high organic pollution, and low oxygen levels are not favorable to the long-term survival of the arroyo chub.

The current eutrophication and pollution of Medea Creek is a result of watershed inputs from upstream residential, commercial, and urban uses. Given the already depressed ecosystem values and functions of the stream, any additional impacts from increased sedimentation and storm water pollutants would result in significant cumulative impacts. To alleviate the potential for significant impacts from the project, the applicant has redesigned a portion of the site adjacent to Medea Creek to avoid filling the floodplain. In addition, with the implementation of Best Management Practices and recommended mitigation measures, project impacts would be reduced to less than significant.

Reconsider Riparian Impacts

The riparian habitat on site includes the oak/willow woodland of Medea Creek and the riparian scrub/chaparral of tributaries. The new site plan avoids a large percentage of the riparian vegetation onsite, including the 5.9-acres of oak/willow woodland within the Medea Creek floodplain. Direct impacts to riparian chaparral (existing 3.8 acres) have been reduced from 2.2 acres to 0.67 acre, a 69.5 percent decrease. However, direct impacts to riparian scrub (existing 0.9 acres) have been increased from 0.4 acres to 0.65 acres, a 38.5 percent increase. In terms of indirect impacts, development in the southeast canyon, within the SEA, has been modified, reducing impacts from occurring on this sensitive drainage. Based on an analysis of the revised site plan, and with the implementation of mitigation to compensate for impacts (i.e. further avoidance, replacement, creation and/or preservation) project impacts to riparian habitat are less than significant.

**COMMENT 4**

Provide additional data on horse use of the site and grazing as a management tool; discuss mechanical control as a method to sustain Lyon's pentachaeta.

*Response 4*

Currently, a number of mature horses and colts roam and graze year-round on the eastern portion of the project site in association with the stables. Additionally, intermittent uninvited horse enthusiastics also use the site for riding. Based on a

discussion with one of the horse owners who uses the stables, approximately ten (10) mature horses and several colts are now present on the eastern portion of the site. The number of onsite horses has varied over time. As the horses graze on both grasses and shrubs, their activity seems to suppress vegetation that could out-compete Lyon's pentachaeta. The horses typically do not feed on flowers, including the Lyon's pentachaeta, therefore seeds remain to regenerate the populations.

Based on our observations, horse grazing may be considered as one option for the management and long-term viability of Lyon's pentachaeta. Another option is to use mechanical means to keep the shrubs and grasses from spreading and over-growing the small Lyon's pentachaeta. This would involve using hand and power tools to remove, thin, and prune selective vegetation within and adjacent to existing populations of Lyon's pentachaeta.

**COMMENT 5**

Lot deletions are good suggestions for mitigation to potential impacts of sensitive species.

***Response 5***

The project applicant used overlays of biological constraints, including sensitive plant species, sensitive plant communities, and riparian corridors to guide site planning in an effort to reduce significant biological impacts. Direct impacts to sensitive plant species, the Medea Creek floodplain, oak trees, wildlife movement have been lessened with the new plan. Remaining, direct and indirect impacts on sensitive resources are reviewed in Section IV and V.

**COMMENT 6**

Fuel modification must be sensitive to the presence of sensitive species (and incorporated into tract design); fuel modifications should be reduced wherever possible.

***Response 6***

The standard fuel modification zones in relationship to the proposed habitable structures onsite could potentially result in significant impacts to vegetation and wildlife habitat. To reduce significant impacts, it is recommended that the applicant place the footprint of each dwelling unit at the maximum distance feasible from the adjacent natural landscape. This will decrease the extent of intrusion within natural areas, as the County Fire Department requires a 200 foot buffer of various vegetation types and densities between habitable structures and native vegetation. In terms of protecting sensitive plant species from fuel modification, the current County Fuel Modification Guidelines state that sensitive plant species do not necessarily need to be removed in the implementation of brush clearance.

**COMMENT 7**

Review oak habitat impacts and discussion.

***Response 7***

Throughout the site, in all three pieces of the property, the combined area of the existing oak tree canopy consists of 3.3 acres. This measurement corresponds to the dripline of the 96 oak trees onsite. Within the SEA portion of the project site, oak trees are located in the northwest corner where no development is proposed. Therefore, within the SEA proper no oak trees would be removed or impacted. In addition, no structure or roads would intrude into the dripline of any oak tree within the SEA. The proposed oak trees removals are located in the central and eastern portion of the site. In general, as oak trees maintain a unique structure of plant and animal life, or micro-

ecosystem, the loss of the areal extent of a tree results in the displacement of numerous species. Under the previous site plan, direct impacts to oak tree canopy habitat would have resulted in the loss of 2.8 acres (this included oak trees within the SEA). Under the revised plan, this has been reduced to 0.8 acres, a 71 percent reduction from the original plan.

The loss of large, mature oak trees would result in significant impacts to wildlife. To reduce habitat impacts from the loss of oak trees, it is recommended that the applicant implement a 5:1 replacement ratio, which would be above the 2:1 minimum required by the County Oak Tree Ordinance.

**COMMENT 8**

List of acceptable plant species (and exotic species to avoid) for landscaping purposes to be provided to homeowners is not likely to be implemented.

*Response 8*

This comment reflects a common predicament in most residential areas, even master planned communities where the Homeowners Association (HOA) have control over decisions regarding each persons homesite. The applicant proposes to approach this problem by instituting a Master Landscape Plan. The plan will address planting requirements such as lists of acceptable native plants and non-invasive ornamentals. In addition, the plan will include the design, implementation, and maintenance of all landscaping, common landscape areas, undeveloped building pads, and private grounds of occupied residence. The Plan will be incorporated by reference into the CC&Rs of the HOA, each land homeowner, or into the land use conditions of any other entity responsible for holding the land.

**COMMENT 9**

Provide new tract configuration and new impact analysis.

*Response 9*

This information is presented in Section IV and V, including several revised mitigation measures.

## IV. REVISED TRACT PLAN AND COMPARATIVE IMPACT ANALYSIS

Taking into account a variety of physical, biological, and land planning considerations, the applicant developed a "maximum use" site plan. This site plan was reviewed by a variety of responsible agencies and members of the public with each indicating areas most suitable for development based on individual interests, such as visual resources, cultural resources, traffic, and biological resources. As a result of this process, and by reviewing Envicom Corporation's Biological Constraints Map, the applicant prepared a revised site plan. This updated site plan has both similarities and differences to the previous plan. **Figure 4** shows the new design, and **Figure 5** shows the previous site plan. The attributes of the revised plan are described below:

- concentrates development in the northwest portion, within one of the least sensitive areas onsite. The northern boundary of this cluster has been shifted to the south to avoid numerous oak trees, also leaving a path for wildlife movement from east to west. As with the previous plan, the southern edge of this development "cluster" intrudes on populations of Lyon's pentachaeta;
- decreases the development footprint in the southwest corner (Previous Phase 3), adding these units to the northwest corner. This accomplishes a reduction in impacts to sensitive plant species, stream channels, cultural resources, and visual resources;
- re-configures the central development areas between Cornell Road/Caleta Road and Kanan Road to avoid oak trees and the Medea Creek floodplain (previous Phase 2 and 4);
- reduces the development envelop in the southeastern canyon (a portion of previous Phase 6 - lots 137-139) to preserve sensitive habitat, plant species, wildlife movement area, and a riparian stream corridor;
- deletes isolated lots 90-92 of previous Phase 5 to reduce fragmentation of habitat;

Analysis of the revised site plan indicates that impacts to sensitive resources and general biological functions and values have been reduced from the previous plan, although not completely eliminated. Impacts that will still result from implementation of the project are discussed below.

### IMPACT ANALYSIS

The new tentative tract map has a total project envelope of 64.7 acres, which represents a decrease of 7.3 acres (10.2%) of direct impacts to natural areas from the previous plan. Therefore, the new tract would impact 20.2 percent of the total 320-acre project site. The remaining 255.3 acres of the site is proposed to be placed in dedicated private open space or dedicated to another entity. Land use would emphasize the preservation of biological resources. Open space areas would include Medea Creek and its floodplain, and areas surrounding the proposed onsite development.

Within the proposed project site, approximately 35.5 acres would be graded for building pad areas, which includes 15.5 acres for landscaped slopes and open graded areas (not including small slopes or building pads). Impervious areas are estimated to total 29.2 acres, with 14.1 acres of roadways, 1.5 acres of cribwalls, 9.1 acres of residential home sites, and 4.5 acres of driveways, patios, yardscape, and hardscape. Project grading would involve 752, 700 cubic yards of cut and fill to balance onsite.[3]..

[3] As calculated by Wagner Pacific, Inc. November 10, 1998.

*Impacts to Vegetation*

The new tract would replace approximately 64.7 acres of undeveloped land with residential structures, landscaped areas, and infrastructure. **Figure 6 (Revised Figure 13)** illustrates the extent of intrusion on the vegetation communities. The acreage of habitats that would be affected in both the previous plan and the revised plan are listed below in **Table 2** and **3** for comparison.

**TABLE 2**

**Previous Site Plan - Vegetation Impacts**

| Habitat Type | Existing (acres) | Impact (acres) | Loss (percent) |
|---|---|---|---|
| Grassland | 86.9 | 19.0 | 21.9 |
| Chaparral/North-facing | 116.2 | 20.2 | 17.4 |
| Chaparral/South-facing | 88.0 | 13.7 | 15.6 |
| Riparian/Chaparral | 3.8 | 2.2 | 57.9 |
| Riparian/Scrub | 0.9 | 0.4 | 44.4 |
| Riparian Woodland (Medea Creek) | 5.9 | 0.00 | 0.00 |
| Oak Tree Habitat | 3.3 | 2.8 | 84.8 |
| Already Disturbed Area | 15.0 | 13.7 | 91.3 |
| **TOTAL** | **320.0** | **72.0** | |

**TABLE 3**

**Revised Site Plan – Vegetation Impacts**

| Habitat Type | Existing (acres) | Impact (acres) | Loss (percent) |
|---|---|---|---|
| Grassland | 86.9 | 20.5 | 23.6 |
| Chaparral/North-facing | 116.2 | 9.95 | 8.6 |
| Chaparral/South-facing | 88.0 | 19.8 | 22.5 |
| Riparian/Chaparral | 3.8 | 0.67 | 17.63 |
| Riparian/Scrub | 0.9 | 0.65 | 72.2 |
| Riparian Woodland (Medea Creek) | 5.9 | 0.00 | 0.00 |
| Oak Tree Habitat | 3.3 | 0.80 | 24.2 |
| Already Disturbed Area | 15.0 | 12.33 | 82.2 |
| **TOTAL** | **320.0** | **64.7** | |

Under the revised plan, there would be a loss of 52.37 acres of the total 315 acres of the onsite natural plant communities[4]. As typical with any development project in a natural area, the net loss of habitat results in significant impacts to natural plant and native animal species. The direct loss of individual animals (from moralities through site preparation), and the displacement of animals into adjacent areas, (where they would be subject to predation and would compete with resident animals), continues to be of concern. Such changes have the potential to disrupt wildlife community function to the point where the diversity of species could drop, resulting in significant impacts to wildlife as a result of habitat loss. The reduced project footprint has assisted in reducing significant impacts to waters, riparian habitat, and listed plant species, which conforms to regulations under CEQA, Section 404 of the Clean Water Act, and Section 1603 Fish and Game Code. Therefore, in this respect the revised project has partially satisfied land planning objectives.

***Impacts to Sensitive Species***

- Sensitive Plant Species - Direct impacts to sensitive plant species have been modified under the revised site plan. **Figure 7 (Revised Figure 14)**, which is an overlay of the revised project footprint and the sensitive plant populations, illustrates the proposed impact areas. **Table 4** lists each sensitive plant species, the existing total habitat onsite, and the acreage of impact. With the implementation of recommended mitigation measures, significant impacts to sensitive plant species would be reduced, but not completely avoided.

  To determine direct impacts to Lyon's pentachaeta, the extent of existing habitat (10.6 acres) was overlain by the proposed project building envelope. The current plan would directly impact 3.28 acres, or 31 percent of the existing population. Regarding indirect impacts, the project would intrude into 8.15 acres of the 28.2 acre Lyon's pentachaeta buffer zone, which is compromised of a 50-foot buffer surrounding each population, as shown in **Figure 8**. The direct loss and conversion of buffer zone to a built environment would result in significant impacts to the federally and state listed endangered Lyon's pentachaeta.

**TABLE 4**

Sensitive, Rare, and Endangered Plant Species Impact Analysis

| Plant | Total Acreage on Project Site | Impacted Acreage (within envelope) | Percent of Total |
|---|---|---|---|
| Lyon's pentachaeta - *State and federally listed endangered* | 10.6 | 3.28 | 31% |
| Santa Monica Mountains dudleya- *Federally threatened* | 0.24 | 0.24 | 100% |
| California cloak fern- *Species of note* | 1.7 | 0.0 | 0.0% |
| Coville's lip fern - *Species of note* | 0.05 | 0.05 | 100% |
| Red shank- *Species of note* | 0.22 | 0.0 | 0.0% |
| Nevin's brickellia- *Sensitive plant species* | 0.17 | 0.0 | 0.0% |
| Linear-leaved golden bush- *Species of note* | 39.4 | 2.17 | 5.5% |

[4] The total 64.7 acres impacted by the proposed project, minus the already disturbed area of 12.33 acres, equals 52.37 acres. The project site contains 320 acres, of which 15 acres are disturbed, leaving 305 acres of natural habitat. Use of the already developed area is preferred.

- Sensitive Wildlife Species -Significant direct and indirect effects remain the same as under the previous plan. This is because there is a net loss of habitat for the numerous sensitive species present throughout the site.

- Sensitive Habitats - There is a reduction in direct impacts to waters and riparian scrub under the new plan. In addition, the new project avoids significant impacts on riparian woodland of the Medea floodplain. With proposed mitigation measures, impacts to waters and riparian habitat would be reduced to less than significant

*Effects on the Integrity of the SEA*

The eastern portion of the project site contains approximately 172.5 acres of the 434-acre Las Virgenes SEA. The currently proposed project would convert approximately 29.3 acres of the SEA, or 6.8 percent, to residential dwelling units, and related structures and facilities. The previous project would remove approximately 26 acres, or 6 percent of the SEA. The applicant proposes to designate the remainder of the site (255.4 acres including the 143.2 acres of SEA) as dedicated open space in either HOA ownership or the ownership of another entity. Within the SEA portion of the project site, modification of development in the southwest canyon, and clustering helps to alleviate fragmentation impacts, however, the extension of residential sites, which would intrude on sensitive habitat results in exchanging an impact in one specific location for impacts in another location.

With respect to the SEA Design Compatibility Guidelines, published in the Los Angeles County General Plan, the following conclusions were reached:

*Guideline 1 – "The development is designed to be highly compatible with biotic resources within the SEA, and may include the setting aside of appropriate and sufficient undisturbed areas."*

Partially Compatible – In order to be highly compatible, the project threshold for significance is avoidance of all direct and indirect impacts to federally and state listed species, sensitive habitats, and sensitive wildlife species supported within the SEA. In addition, the development must be clustered in such a manner to avoid fragmentation impacts. Under the current plan, within the SEA proper, some of the sensitive plant populations are avoided. To achieve less than significant impacts, the project would need to be further redesigned to avoid all populations of listed and sensitive species and habitats (**Table 4**). The applicant will need to demonstrate that impacts have been reduced to the maximum extent feasible in order to obtain a California Endangered Species Act (CESA) Permit/MOU for the loss of Lyon's pentachaeta from the California Department of Fish and Game. The permit will likely include a variety of required mitigation measures to compensate for impacts. In addition, this Biota Report includes several mitigation measures to reduce impacts. For purposes of analysis under a biological framework, and not a permitting framework, impacts remain significant because of the limited distribution of this species.

In terms of fragmentation, the linear-like footprint of the proposed project in the eastern portion of the SEA would extend the range of indirect impacts. With project reorientation in this area, fragmentation impacts would be reduced to less than significant.

*Guideline 2 – "The development is designed to maintain waterbodies, watercourses, and their tributaries in a natural state."*

Compatible – Medea Creek, including the floodplain, is completely avoided by the proposed development. Other unnamed tributaries to Medea Creek that occur on the property are mostly avoided, with the exception of small areas of drainages

supporting chaparral and scrub plant species. The intermittent drainage on the southeast side would be bridged to reduce direct impacts to the stream.

*Guideline 3 – "The development is designed so that wildlife movement corridors (migratory paths or habitat linkages) are left in a natural undisturbed state."*

Partially Compatible – Currently, the project site provides somewhat unrestricted movement and use of natural habitat for wildlife, including a full range of amphibians, reptiles, small and larger mammals, insects, and birds. Existing impediments to movement between each portion of the site include Kanan and Cornell Roads, existing structures and residential units, and on-going wood cutting and soil stockpiling activities. With project implementation, artificial corridors of movement will be created, within and through the developed sites. There is little scientific data to conclude that such "corridors" provide the same biological function as completely unrestricted natural habitat.

In an effort to partially compensate for the loss of natural habitat movement areas, and to provide for the opportunity to continue the exchange of animals between undeveloped areas, the project design includes a strip of open space in the northwest that connects to the eastern portion of the site. This will allow a range of wildlife to use this area, however this strip is highly constricted compared to the existing site conditions.

In addition to the east-west strip in the north, there is the possibility that wildlife may use a second proposed corridor located in the central portion of the site, however this is a tenuous connection because of the proposed housing and existing roads. To increase the suitability of this second corridor in the central portion of the site, some lots would need to be reconfigured. Another area of concern is the extension of residential units in the eastern portion of the site that will further contribute to a decrease in the internal movement of wildlife. It is anticipated that wildlife can continue to use the undeveloped portion of the site on the east and west, along a north-south ridgeline, however as mentioned the extension of residential units will reduced the capacity of these connection.

*Guideline 4 – "The development retains sufficient natural vegetative cover or open spaces to buffer critical resource areas from the proposed uses."*

Partially compatible – To protect critical resources, resource agencies and planning documents generally require a 50-100 foot buffer between structures including yards, and undisturbed areas. As listed and sensitive plant populations would be either immediately adjacent to, or within proposed development footprints, the revised project is not fully compatible with this guideline.

*Guideline 5 – "Fences and walls, where necessary, are provided to buffer important habitat areas from development."*

Compatible – The applicant will require the use of fences to buffer adjacent natural areas in private open space from encroachment within individual units beyond the prescribed develop envelop. The type of fences that will buffer development may include wrought iron, chain-link, or block walls. No blocking fences, however will be allowed that block wildlife movement, for example through the identified wildlife corridors. Mitigation measures, such as the use of split-rail fences will ensure impacts from fencing are less than significant.

*Guideline 6 – "Roads and utilities serving the proposed development are located and designed so as not to conflict with critical resources, habitat areas, or migratory paths."*

Partially Compatible – The proposed project would place all utilities underground, mostly within the street pavement areas. No additional impacts

beyond the indicated development areas would occur, therefore the project utilities will not conflict with critical resources. The roads, however, would impact sensitive plant resources, reduce wildlife movement for most species, especially the smaller animals, and remove existing habitat areas.

*Impacts from Accessory Structures*

The proposed project plan currently does not show any accessory structures on individual parcels. It is anticipated that private and/or public facilities may be constructed in the future, such as an active use park or trailhead. This are would be limited, and not located within habitat of listed plant species, therefore no significant impacts from accessory structures are expected.

*Cumulative Projects*

With the 7.3 acres of reduction in project size, cumulative impacts for the revised tract map have been slightly reduced. However, given the net loss of habitat and impacts to a regionally listed plant species, cumulative impacts remain significant.

*Indirect Impacts*

Indirect impacts to biological resources for any development in an existing mostly undeveloped area, such as the proposed project, would result in significant impacts as described in the Biota Report.

## V. MITIGATION MEASURES

The discussion regarding mitigation and the value of preserving open space to reduce significant impacts remains the same as stated in the Biota Report. All mitigation measures, except those specified below, remain unchanged.

As part of the mitigation analysis, the current site plan was reviewed in reference to sensitive resources to determine project redesign options that could mitigate some of the residual, significant biological impacts. Those lots that intrude into sensitive plant locations should be re-examined to determine the feasibility of reducing habitat conversion (see Figures 7 and 8).

As stated from the Biota Report, some of the more general impacts, such as loss of habitat for sensitive wildlife and effects on the integrity of the SEA, cannot be mitigated through project reconfiguration. This is because these impacts are based upon the conversion of natural areas to residential use, and widespread resources cannot be pinpointed to isolated populations, as can be done with sensitive plant species. Mitigation of more generalized impacts would require substantial project redesign. Indirect impacts are a consequence of any type of development and cannot be avoided, although there are means to minimize or compensate for such impacts.

### LYON'S PENTACHAETA

- The project shall implement appropriate means to maintain the preserved populations of Lyon's pentachaeta. This may include mechanical means such as using hand or power tools to prune, thin, and remove vegetation that would out-compete Lyon's pentachaeta. If feasible for the applicant, another option is to use horses under a grazing management plan.

- Responsibility for implementing the long-term aspects of the Management Plan for Lyon's pentachaeta will be vested with the project site's HOA or any future the owner of the dedicated open space. The owners of the natural dedicated open space areas will comply with all relevant state and federal regulations and conditions. The applicant shall endow a fund for implementing the Management Plan for Lyon's pentachaeta on the site. The amount of the endowment will be determined of the basis of anticipated minimum operational cost and projected returns on the principal into the future, subject to approval by an independent third party. This will be a one-time endowment by the applicant to the HOA or any other future owner. The HOA or other responsible entity shall then be responsible for all future costs.

- Following the initial endowment, future homeowners or controlling entity will contribute to specific-purpose supplemental fund each, which will be available to implement the Management Plan for Lyon's pentachaeta. The amount of annual contribution shall be determined as adequate to provide for 1) past cost overruns; and 2) expected or identified contingencies over the minimum operational cost of the Management Plan. The special-purpose supplement fund will be used only for the intended purpose.

*Introduction of Exotic Plants*

- Planting requirements on privately held parcels and common areas shall be recorded within the CC&Rs of the HOA and each homeowner. A Master Landscape Plan shall be developed including a plant of acceptable ornamental and native species to be used. On an annual basis, starting with the installation of the first landscaping and lasting three years after complete build out, a qualified biologist will examine the dedicated open space and common areas to determine if invasive ornamentals have escaped to adjacent natural areas, and if so, recommend alternative plants and methods to control an existing problem.

## SUMMARY OF RESIDUAL SIGNIFICANT IMPACTS

The revised project plan represents an improvement over the previous plan in many aspects including protection of waters and riparian habitat, increased avoidance of sensitive plants, reduced direct impacts on natural vegetation, and preservation of oak trees. The remaining significant impacts after mitigation include:

- a loss of habitat for sensitive wildlife and plant species;
- impacts to SEA integrity;
- interference with wildlife movement;
- potential introduction of non-native animals, including predators and Argentine ants;
- increase of existing human intrusions into adjacent open space and their effects (e.g. increased fire frequency, littering, plant and animal collection, etc.);
- short-term effects of noise (construction) on wildlife; and
- cumulative contribution to the incremental loss of habitat in the Santa Monica Mountains.

# APPENDIX A

## MEDEA CREEK FISH SURVEY

San Marino Environmental Associates

# MEMORANDUM REPORT

15 September, 1998

---

To: Mr. Carl Wishner
Envicom Corporation
28328 Agoura Road
Agoura Hills, California 91301

From: Thomas R. Haglund, Ph.D.
Principal Senior Scientist, SMEA

Re: Medea Creek Fish Survey

---

On 13 September, Thomas R. Haglund and a San Marino Environmental Associates field technician, accompanied by Carl Wishner of Envicom Corporation conducted a survey of Medea Creek, Ventura County. The purpose of the survey was to determine whether or not the creek contained any fishes. The survey was initiated just south of Cornell Way and continued downstream for approximately 0.75 mile. The survey was conducted using a 6 x 15 foot, ¼ inch mesh nylon minnow seine. All stream habitats were seined. The creek was dominated by pool habitat with interspersed short stretches of riffle and occasional runs. Riffle substrate was dominantly cobble, while sand covered by mud dominated the pools. The mud in the pools was anaerobic and the system appears nutrient enriched. The water was stained but not turbid prior to the initiation of seining. Aquatic insects were uncommon except in the limited stream reaches with emergent vegetation and algae. Introduced crayfish (*Procambarus clarkii* (Girard)?) were very abundant.

A total of five fish species were collected: largemouth bass, green sunfish, fathead minnow, black bullhead, and mosquitofish. No native fish species were collected and based on the abundance of the centrarchids, none would be expected. Both largemouth bass and green sunfish are aggressive. Largemouth bass were very abundant while green sunfish and mosquitofish were common. Fathead minnows were uncommon and only a single black bullhead was captured.



560 South Greenwood Avenue San Marino, California 91108-1270 (626) 792-2382 Fax (626) 792-8233

The following table indicates the species captured, their scientific name and the size range of the individuals captured.

| Common Name | Scientific Name | Size Range |
|---|---|---|
| Largemouth Bass | *Micropterus salmoides* | most specimens were 60-85mm SL<br>two larger specimens were captured<br>138mm and 143mm SL |
| Green Sunfish | *Lepomis cyanellus* | 21mm - 146mm SL |
| Fathead Minnow | *Pimephales promelas* | 45mm - 60mm SL |
| Mosquitofish | *Gambusia affinis* | Not measured |
| Black Bullhead | *Ameiurus melas* | 58mm SL |

Of the five species captured only the green sunfish and the mosquitofish had a array of age classes which suggested that they were breeding in this section of stream. Green sunfish can reproduce at 50-70 mm SL and they usually mature a the beginning of their third year. Based on studies of green sunfish growth in reservoirs, the largest specimen captured was probably 4+ years. Green sunfish are considered a pioneer species which can survive high temperatures and low oxygen levels.

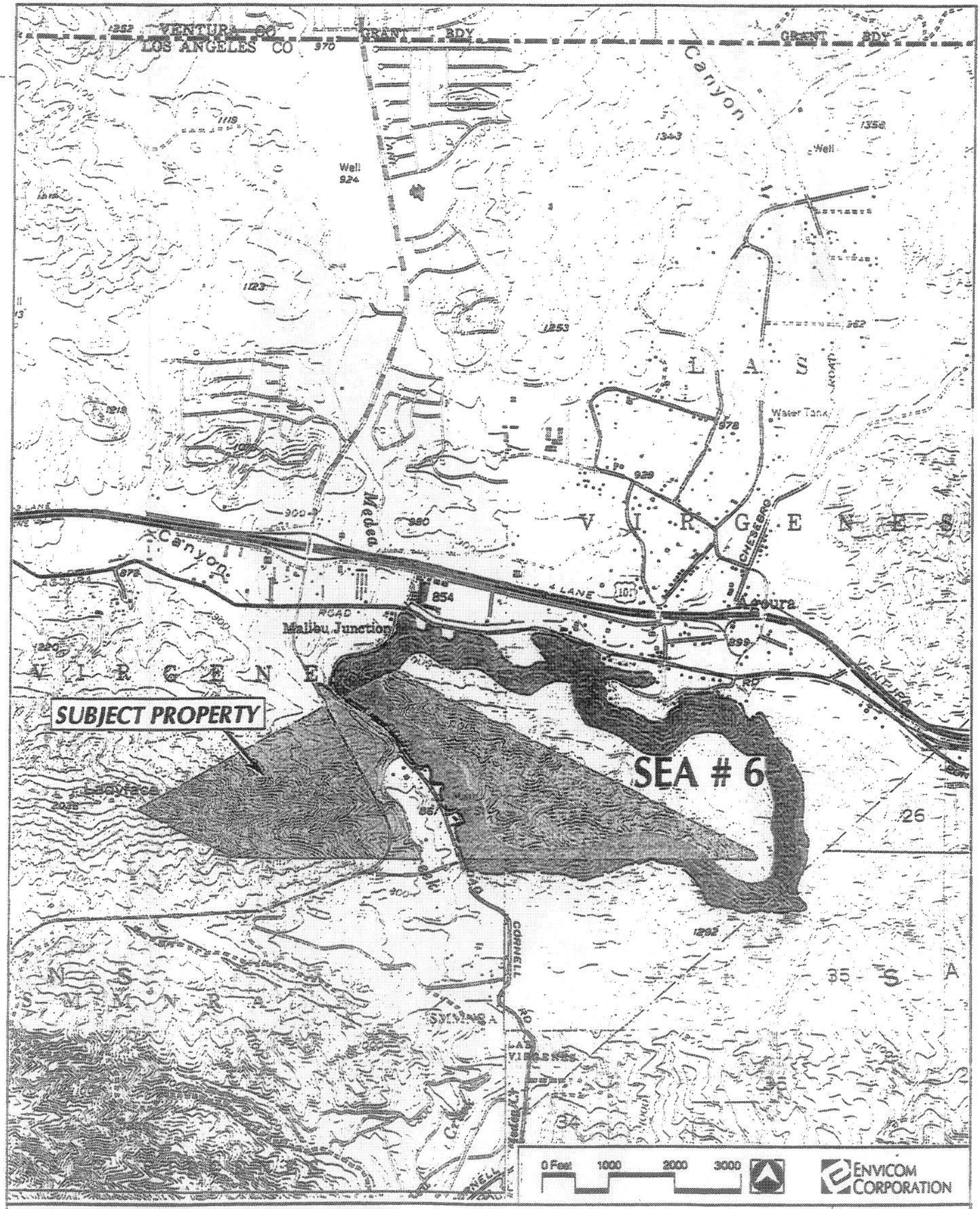
Largemouth typically spawn for the first time during their second or third spring, at about 180-210mm TL. Thus the largest bass that were captured were approaching reproductive size. Although only adult fathead minnows were captured; they, like the green sunfish are a pioneer species which tolerates low dissolved oxygen, high organic pollution, high turbidities, and high temperatures. Black bullheads are also good colonizers and tolerate warm water.

If you have any questions please call Thomas Haglund (818-906-3440).

Yours,

Thomas R. Haglund

Thomas R. Haglund/SMEA




**SUBJECT PROPERTY AND SEA #6**

FIGURE 1

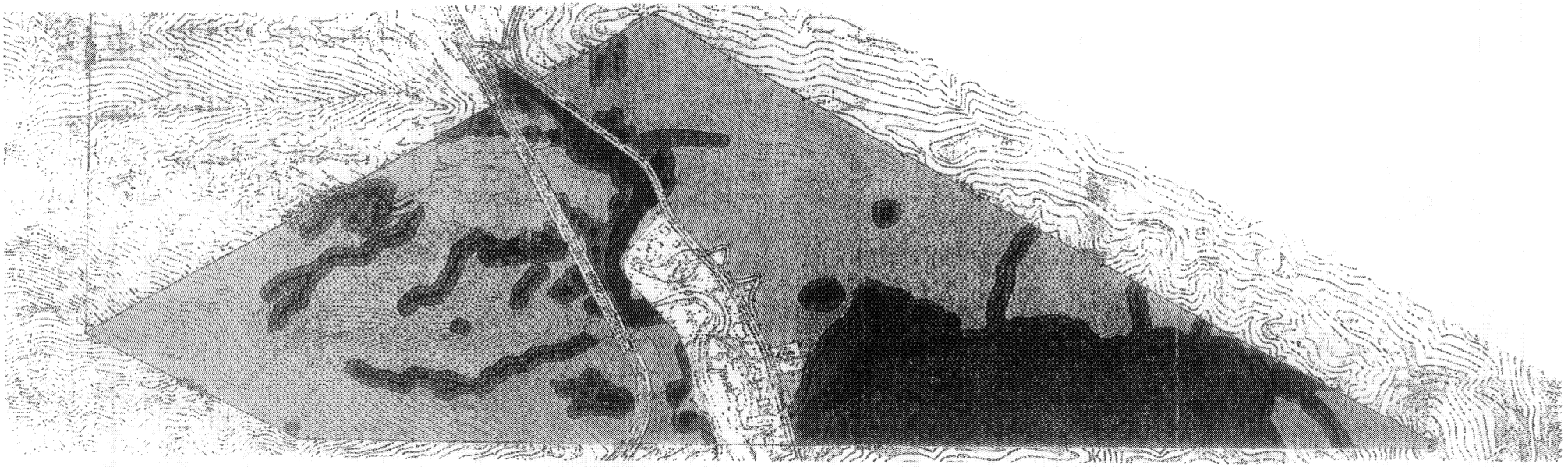
HIGHEST SENSITIVITY (S-1)*

HIGH-MEDIUM SENSITIVITY (S-2)

MEDIUM SENSITIVITY AREAS (S-3)

LOWEST SENSITIVITY AREAS (S-4)

*For more detailed explanations of categories see text



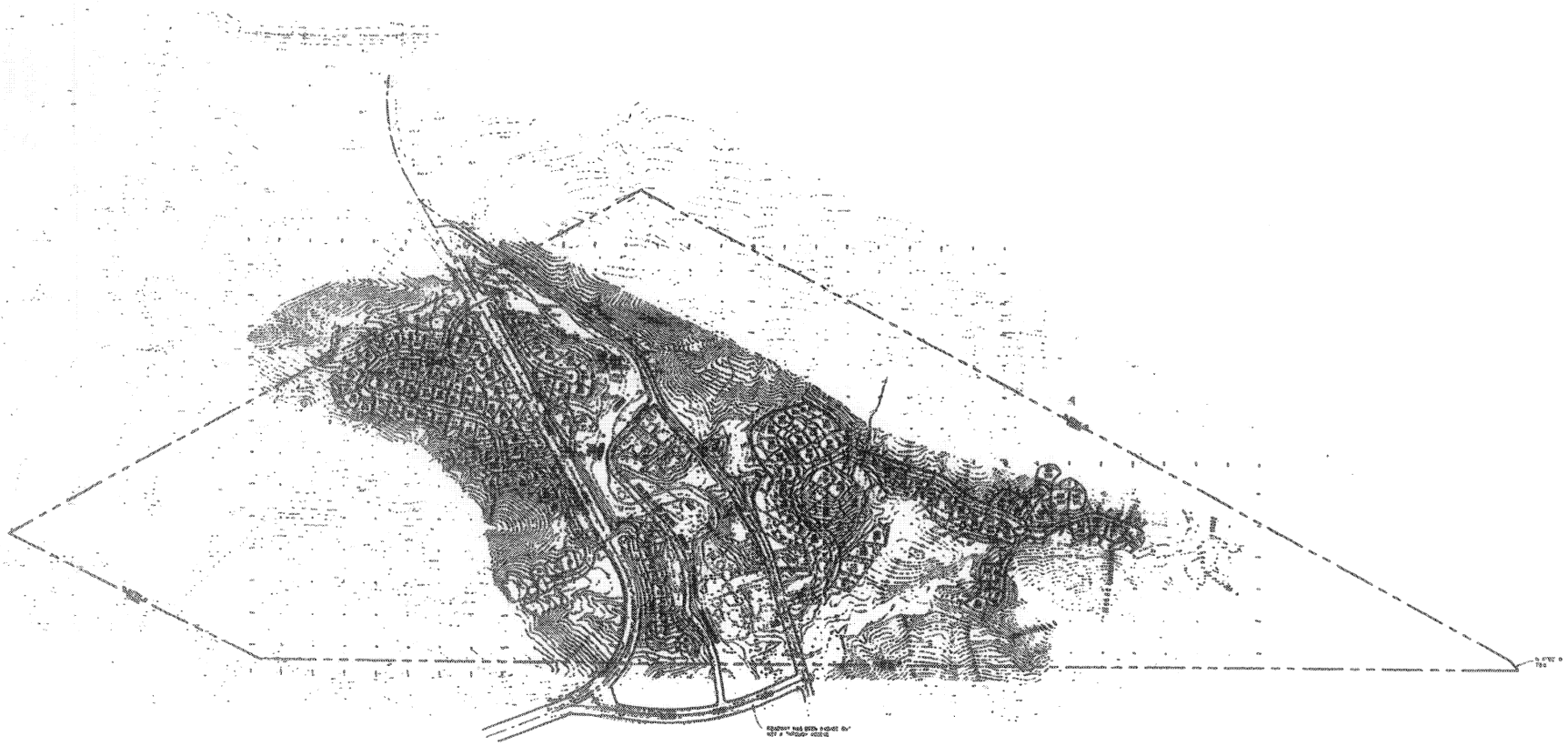
# BIOLOGICAL SENSITIVITY

ENVICOM CORPORATION

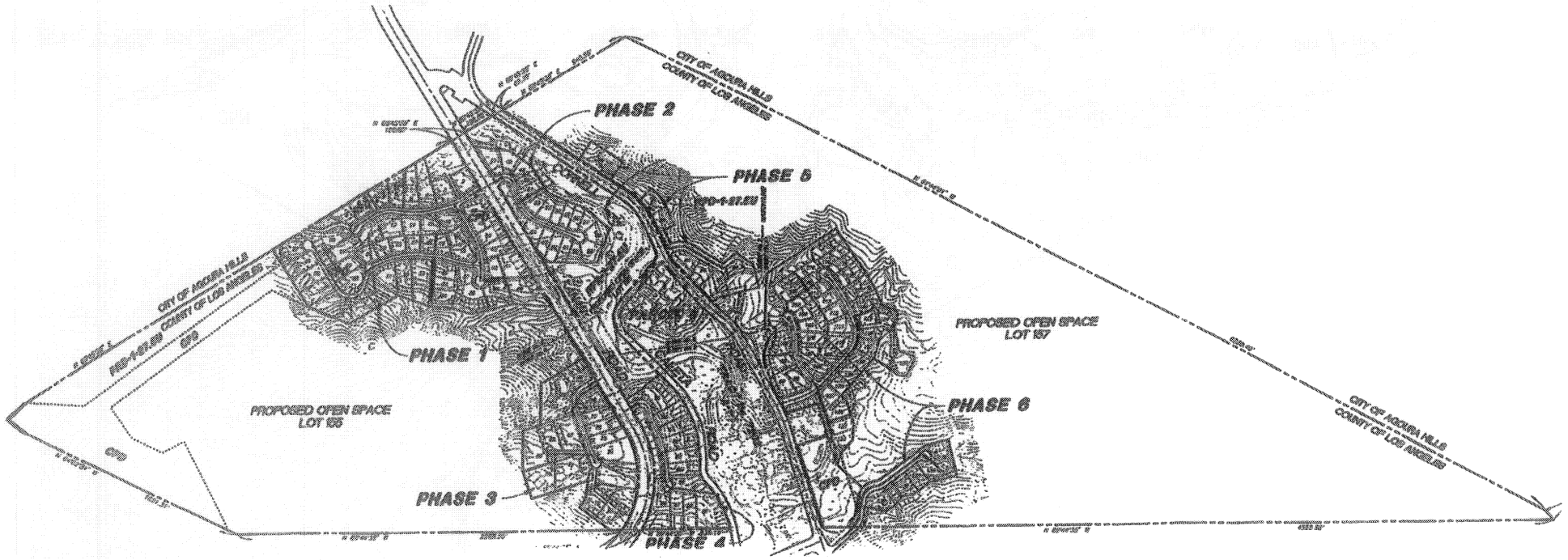
FIGURE 02

(Revised Fig. 08)

Intentional Blank Page



## Revised Site Plan




**Original Site Plan**

ENVICOM CORPORATION

05

(Revised FIG.12)

## Explanation of Map Symbols

### UPLANDS

- G — Grassland, with sparse scrub
- ChS — Chaparral; South Slopes
- ChN — Chaparral; North Slopes
- Seep

### RIPARIAN

- Rf — Forest (Willow)
- Rs — Scrub (Mulefat, willow)
- Rc — Chaparral
- Rec — Giant Wildrye

### TREES

- Ql — Valley Oak
- Qa — Coast Live Oak
- Pl — Sycamore
- I — Introduced

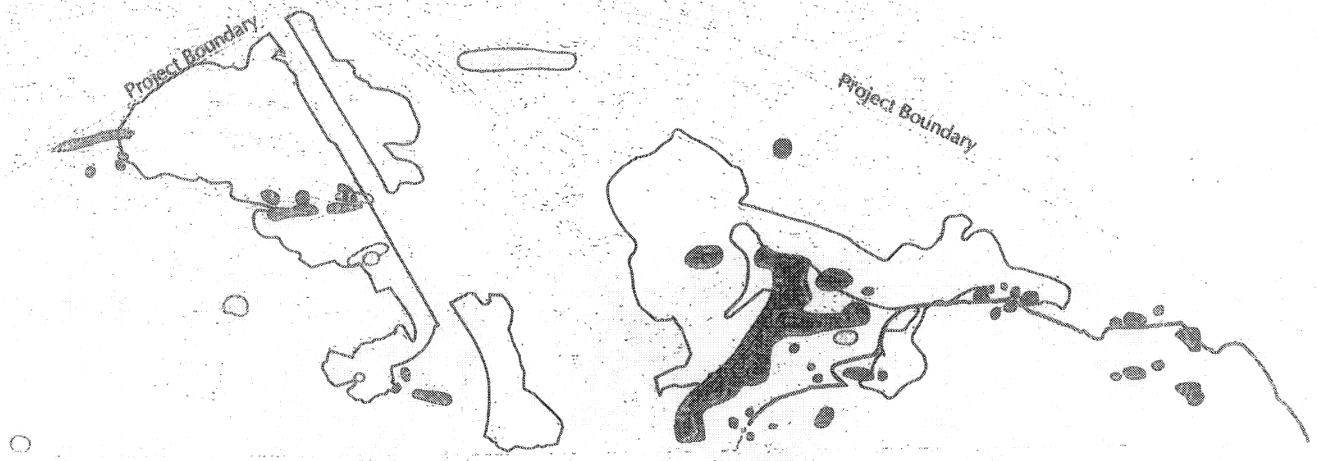
### OTHER

- d — Disturbed
- Project Footprint

# GENERALIZED VEGETATION WITH PROJECT FOOTPRINT

ENVICOM CORPORATION

FIG 06
(Revised Fig. 13)




| | | | |
|---|---|---|---|
| Lyon's Pentachaeta | Redshank | Linear-Leaved Goldenbush | Coville's Lip Fern |
| Cloak Fern | Santa Monica Mountains Dudleya | Nevin's Brickellia | Project Footprint |

**SENSITIVE SPECIES WITH PROJECT FOOTPRINT**

ENVICOM CORPORATION

0 300 600

FIGURE 07

(Revised Fig.14)

**DISTRIBUTION OF LYON'S PENTACHAETA**

# APPENDIX C-4

**Biota Report Resubmittal No. 2 for the Beautiful Homes Site, Los Angeles County, prepared by Envicom Corporation; revised February 9, 1999**

# BIOTA REPORT

*Resubmittal No.2*

# BEAUTIFUL HOMES SITE
## Los Angeles County

*Prepared for:*

BEAUTIFUL CITY HOLDING CORPORATION
28912 Roadside Drive
Agoura Hills, California 91301

Attn: Vance Moran

*Prepared by:*

ENVICOM
CORPORATION
28328 Agoura Road
Agoura Hills, California 91301

March 10, 1998
*Revised* February 8, 1999

## INTRODUCTION

The Constraints Analysis for the present project, formerly known as "Beautiful Homes" was prepared in February, 1997. A Biota Report was reviewed by SEATAC in April, 1998. Pursuant to their comments at that time, the original tract was redesigned, and the Biota Report was resubmitted to the committee, along with responses to comments from the first SEATAC meeting. Resubmittal No. 1 was reviewed on December 7, 1998. This Biota Report Resubmittal No. 2 addresses comments from that meeting, as well as presents important design changes which have been made to further reduce or eliminate biological impacts that have been identified. The previous plan addressed in Resubmittal No. 1 (figure 4 therein) called for residential 132 lots, whereas, the present plan proposes 123 lots. The details of the current plan are shown on Exhibit 1 (sent under separate cover).

### Comment 1

Be specific as to which *Pentachaeta lyonii* management technique (page 5) will be used (i.e., mechanical, horse grazing or both).

#### *Response 1*

In Resubmittal No. 1, we attempted to provide additional data on horse grazing of the site, and discuss mechanical control as a method to sustain Lyon's pentachaeta. We concluded that horse grazing may be an option for the management and long-term viability of Lyon's pentachaeta, and that mechanical means using hand and power tools to selectively remove competing vegetation would be another option.

The applicant has indicated that the use of horses as mitigation for Lyon's pentachaeta is not ideal. Therefore, fuel modification in areas occupied by Lyon's pentachaeta would rely upon mechanical, or more properly, *manual*[1] control of competing shrubs and herbaceous species. The specifications for implementing such manual control would be included in the approved Fuel Modification Plan for the tract.

### Comment 2

Provide the rationale (page 6) for the 5:1 ratio for oak replacement (e.g., increased canopy cover).

#### *Response 2*

A replacement ratio of 5:1 is in excess of the required 2:1 ratio that is typically specified by the County Forester within Oak Tree Permits. Also, limitations of the amount of available, and most importantly, *suitable habitat* for the replacement trees renders the higher ratio impractical, and therefore, it is no longer proposed by the applicant. Because oak trees add spatial heterogeneity to other habitats including grassland, scrub, and chaparral, and thereby foster greater wildlife diversity than those areas without oak trees, areas for replacement trees would be chosen to best achieve those benefits, rather than to serve as simple amenities within the interior of the subdivision. The locations are currently envisioned in low areas and slopes along Medea Creek, and at the bases of the slopes along Cornell Road, north and south of the development. The detailed specifications for replacement would be developed as part of the Master Landscape Plan for the development.

According to the most recent oak tree assessment, there are 83 trees on the tract that are less than Heritage size, and nine heritage trees, for a grand total of 92 oak trees. Sixteen removals are associated with the lots and internal roadways within the developed areas of

[1] Intended to include the use of hand-tools, and motorized tools such as chain saws, weed-whips, or small mowers with wheels, but excludes use of tractors and discing equipment.

the tract. An additional 18 trees are anticipated to be removed in order to widen Kanan and Cornell roads to accommodate a bicycle lane; a condition being imposed by the County. Three trees are recommended for removal by the Oak Tree Consultant for safety considerations related to observed poor health.

A total of 37 oak trees would be removed, including three because of poor health. The number of replacement oak trees would be two for each of 34 non-heritage size trees removed, and ten for each of three additional Heritage size oak trees, for a total of 98 replacements. The ratio of coast live oaks to valley oaks removed is approximately 2:1, which should also be the replacement ratio. Table 1 lists the proposed oak trees to be removed and species:

**TABLE 1**

**Oak Trees to be Removed**

| *Valley Oaks* | *Coast Live Oaks* |
|---|---|
| 34.1, 34.2, 39, 40, 43, 89, 108*, 150, 152.1, 165*, 176 | 3, 6, 9, 10, 16*, 17, 19, 26, 53, 65, 145, 151, 152, 162, 163, 164, 166, 168, 169, 170, 174, 178, 178.1 |
| *Total=11* | *Total=23* |

* indicates Heritage size tree.

**Comment 3**

The Master Landscape Plan (Page 6 and elsewhere) needs to be developed and reviewed by a qualified biologist: The plan shall include appropriate measures to exclude the use of invasive, exotic species.

***Response 3***

The reference to a Master Landscape Plan derives from the response to comment 8 in Resubmittal No 1. Therein, the applicant proposed to approach the problem of avoiding unacceptable exotic species by "instituting a Master Landscape Plan." Furthermore, "the plan will address planting requirement such as lists of acceptable native plants and non-invasive ornamentals, and in addition will include the design, implementation, and maintenance of all landscaping, common landscape areas, undeveloped building pads, and private grounds of occupied residences." Compliance would be enforceable through the CC&Rs of the HOA. In response to the present comment, the applicant's proposal adds the requirement that the Master Landscape Plan be developed and reviewed by a qualified biologist; and, the plan shall include appropriate measures to exclude the use of invasive, exotic species. In addition, the Master Landscape Plan shall be integrated with the approved Fuel Modification Plan.

**Comment 4**

The discussed buffer areas around some populations of *Pentachaeta lyonii* (page 9) will be meaningless where portions of these populations are located within the developed area.

***Response 4***

The present plan has attempted to avoid including Lyon's pentachaeta populations and buffer areas within the footprint of the proposed development. There are no cases where the buffers are not contiguous with designated open spaces, or areas occupied by Lyon's pentachaeta.

**Comment 5**

The fragmentation discussion (page 10) does not adequately address the excessive linear design on the east nor the non-clustered extension of lots to the south into the linear-leaved goldenbush chaparral also in the east; the linear design increases habitat disruption and drainages should remain undisturbed.

***Response 5***

The linear design extending "H" Street and its associated retaining wall to the east into identified areas of Lyon's pentachaeta has been deleted from the project, shortening the length of the eastward extension from the cul-de-sac by approximately 700 feet. The effective shortening of the eastward extension is therefore approximately 325 feet. The non-clustered extension of lots to the south into the linear-leaved goldenbush chaparral has been retained. The access to the south extension would involve a box culvert under earthen fill along approximately 200 feet of the eastern drainage, as required by Public Works, rather than constructing a free-span bridge. This impact, as well habitat disruption caused by the southern extension would still occur, and this remains as a significant impact.

**Comment 6**

It is agreed that some lots do need to be reconfigured (page 11, Guideline 3) to provide a more sensitively designed project for biological resources.

***Response 6***

The present plan has reduced the number of lots from 132 to 123, in order to reduce impacts to sensitive biological resources. The present project would result in a reduction of impacts to grassland, riparian scrub and oak tree habitats, and increased impacts to chaparral and disturbed areas over the previously proposed project (**Table 2**). The overall impacted acreages (approximately 64 acres, including an additional 4.7 acres anticipated from the widening of Kanan Road)) for the previous and present projects are approximately the same.

**TABLE 2**

**Present Site Plan - Vegetation Impacts**

| *Habitat Type* | *Existing Acres* | *Impacted Acres* | *Loss (percent)* |
|---|---|---|---|
| Grassland | 86.9 | 16.2 | 18.6 |
| Chaparral/North-facing | 116.2 | 12.2 | 10.5 |
| Chaparral/South-Facing | 88.0 | 20.3 | 23.0 |
| Riparian Chaparral | 3.8 | 0.7 | 18.4 |
| Riparian Scrub | 0.9 | 0.4 | 44.4 |
| Riparian Woodland (Medea Creek) | 5.9 | 0.0 | 0.0 |
| Oak Tree Habitat | 3.3 | 0.6 | 18.2 |
| Disturbed | 15.0 | 13.7 | 91.3 |
| *Total* | *320.0* | *64.1* | |

**Present Site Plan - Sensitive Plant Species Impacts**

| *Plant* | *Total Acreage on Site* | *Impacted Acreage* | *Percent of Total* |
|---|---|---|---|
| Lyon's pentachaeta | 9.61 | 1.33 | 13.8 |
| Santa Monica Mountains dudleya | 0.31 | 0.31 | 100.0 |
| Calif. cloak fern | 1.76 | 0.0 | 0.0 |
| Coville's lip fern | 0.09 | 0.09 | 100.0 |
| Red shank | 0.28 | 0.0 | 0.0 |
| Nevin's brickellbush | 0.20 | 0.0 | 0.0 |
| Linear-leaved goldenbush | 39.5 | 4.0 | 10.1 |

Substantial reduction in the amount of habitat occupied by Lyon's pentachaeta impacted by the development has been achieved by the present site design. In the previous design, an estimated 31 percent (3.3 acres) of Lyon's pentachaeta would have been impacted directly. The present plan would impact 1.33 acres (13.8 percent) directly.[2] Impacts to approximately 0.31 acres of Santa Monica Mountains dudleya habitat would remain (see also response to comment 9). Impacts to habitat of linear-leaved goldenbush would be slightly increased from 2.2 to approximately 4.0 acres (8.6 percent). Impacts to Coville's lip fern involving only a few individuals occupying approximately 1/10 acre would remain. No impacts to California cloak fern, red shank, or Nevin's brickellbush would occur with the present plan, as would have been the case also with the previous plan.

**Comment 7**

There needs to be further study of *Pentachaeta lyonii* autecology in order to devise appropriate management techniques for the species (page 13).

***Response 7***

Comment noted. Studies are needed on demography, the influence of disturbance on seedling establishment, soil seed bank longevity, metapopulation dynamics, dispersal mechanisms, identification of insect pollinators, competition with introduced weeds, and techniques to maintain habitat openings that provide ecologic stability for Lyon's pentachaeta. Such long-term and costly studies are beyond the capability of being implemented by the applicant. The applicant will commit to develop, implement and monitor the results of a Fuel Modification Plan, using the best scientific information currently available, which addresses the specific habitat requirements and life cycle of Lyon's pentachaeta, and with the intent of preserving the population within those areas only.

**Comment 8**

Reword statement (last sentence) concerning SEA Guideline 4 (page 11) to more accurately indicate impacts from proposed development.

***Response 8***

Guideline 4 requires that "the development retains sufficient natural vegetative cover or open spaces to buffer critical resource areas from the proposed uses." The last statement on page 11 in Resubmittal No. 1 is amended to read "As listed and sensitive plant

[2] A mapping error reflected in Figure 7 of the Biota Report and revised Figure 14 of the Resubmittal No.1 has been corrected in the present Resubmittal No. 2. By so doing, the total actual acreage of Lyon's pentachaeta is estimated to be 9.73 acres.

populations would be either immediately adjacent to, or within proposed development footprints, the revised project is not compatible with this guideline." See response to comment 6 for additional discussion.

**Comment 9**

Discussion of impacts to and any proposed mitigation measures for *Dudleya cymosa* ssp. *ovatifolia* are not presented.

***Response 9***

Specific discussion of impacts to Santa Monica Mountains dudleya was inadvertently omitted in Resubmittal No. 1. Reference to Figure 7 (and Table 4) therein clearly shows the project footprint affecting two sites of occurrence in the western section, however. In these cases, the north-facing rock outcrops support an estimated fifty individual plants; the only known occurrences on the property. The 'Agoura form' of this species is known to occur in relative abundance from the type location along the Cornell Road cut-off, north of the project site, westward along the prominent band of andesite-dacite breccia to Westlake Reservoir. Impacts to this federally-threatened species are considered unavoidably adverse, but not likely to jeopardize the continued existence of the species (or form). Mitigation proposed by the applicant would include an attempt to relocate the affected individuals to substrates and aspects to the west, at slightly higher elevation on the slopes of Ladyface, or on the north-facing slopes in the southeast portion of the property. This measure must be considered experimental, however, and significant residual impacts are likely to remain.

**Comment 10**

The project design needs to reflect all mitigation measures to which the applicant will commit; clearly list all committed appropriate mitigation measures for biological impacts.

***Response 10***

The applicant will commit to the following mitigation measures for biological impacts:

- Designate 258 acres as Open Space under the long-term management of the HOA.[3] Open spaces will be subject to the following restrictions:
  - No ORV use, including motorcycles, ATVs, SUVs, or bicycles.
  - No hunting.
  - No weapons, including firearms, airguns, BB guns, slingshots, paintball guns, crossbows, bows, or any other device that shoots a projectile used to hunt or maim animals or people.
  - No camping, fires, trailers.
  - No ancillary structures such as corrals, sheds, gazebos, decks, pools, treehouses, etc.
- Translocate impacted individuals of Santa Monica Mountains dudleya to new locations with suitable aspect and substrates at higher elevation on Ladyface. This measure is considered experimental.
- Chain link fencing or other wildlife excluding fences shall be used only around the immediate vicinity of residences and conforming yards. Fencing passable by wildlife shall be used for common areas (open space, landscaping etc.), and no fencing shall be allowed outside of designated lots.

[3] This measure replaces the previous measure to dedicate the open spaces full fee.

- The applicant will prepare a Fuel Modification Plan that incorporates the following elements:
  - Preservation and avoidance of sensitive plant populations
  - Development of fuel modification zones for each hazard area
  - Listing of abatement measures, such as removal of deadwood, irrigation, mowing, maintenance of oak trees, etc., for each hazard area
  - Preservation of native plants with low fuel volume
  - LACFD approval
- A Master Landscape Plan shall be developed by the applicant. The plan will address planting requirement such as lists of acceptable native plants and non-invasive ornamentals, and in addition will include the design, implementation, and maintenance of all landscaping, common landscape areas, undeveloped building pads, and private grounds of occupied residences. Compliance would be enforceable through the CC&Rs of the HOA. The Master Landscape Plan shall be reviewed by a qualified biologist. It shall include appropriate measures to exclude the use of invasive, exotic species. The Master Landscape Plan shall be integrated with the approved Fuel Modification Plan.
- All landscaping shall be done with either low fuel native plant species known to occur in the local area, or LACFD approved species that are non-invasive, with reference to the CalEPPC and other listings
- The HOA shall provide to all homeowners a list of acceptable plant species for use in landscaping, and a list of exotic species to avoid. Any invasive species used in landscaping shall be removed.
- All outdoor lighting shall be shielded and directed away from adjacent open space areas, as determined by a lighting expert.
- Any street lighting shall be of a type that is low intrusion or has no impact on wildlife, such as sodium-type fixtures.
- Excessive outdoor lighting shall be avoided, and only the minimal required to satisfy local ordinances shall be installed.
- No chemical pesticides shall be introduced into natural areas, either during or after construction.
- All chemical pesticide use shall be restricted to developed lots and shall not be used within 100 feet of natural areas.
- No chemical pesticides or fertilizers shall be used within 100 feet of streamcourses or drainages.
- No poison traps shall be used to control rodents in open space and common ground areas.
- The HOA shall inform the residents of their responsibilities with regard to the proper use of pesticides.

**Comment 11**

The project design should offer protection to sensitive species and should cluster lots currently proposed in linear, eastern portion.

***Response 11***

The current project design has reduced the level of impacts to Lyon's pentachaeta from 31.0 to 13.8 percent of the total acreage, establishes a 258 acre open space and two corridors for wildlife movement, one under and one over Kanan Road, and requires a Master Landscape Plan which is integrated with an approved Fuel Modification Plan, which must also address the protection of Lyon's Pentachaeta within the fuel modification zones. In addition, the current project design has shortened the eastward extension of "H" Street, thereby avoiding impacts to locations of Lyon's pentachaeta in that area. See response to comment 5, above.

# APPENDIX C-5

**Oak Tree Report, Live Oak Ranch, Tentative Tract No. 52419, Los Angeles County, prepared by Tree Life Concern, Inc., September 13, 2004**

# OAK TREE REPORT

## LIVE OAK RANCH
## Tentative Tract No. 52419
## (Near Kanan and Cornell Roads)
## Los Angeles County
**[L.A.County Project No. 97-178]**

PREPARED FOR:

**SAGE COMMUNITY GROUP**
**3 CORPORATE PLAZA, SUITE 102**
**NEWPORT BEACH, CA 92660**
**Attn: Ms. Diane Fradkin**

PREPARED BY:

**TREE LIFE CONCERN, INC.**
**(Robert W. Wallace)**
**8458 Eton Avenue**
**Canoga Park, CA 91304**
Ph.: (818)341-5576
Fx.: (818)341-0143

SEPTEMBER 13, 2004

CONCERN INC.

*"Dedicated to the Protection and Preservation of Trees"*

September 13, 2004

**SAGE COMMUNITY GROUP, INC.**
3 Corporate Plaza, Ste. 102
Newport Beach, CA 92660
Attn: Ms. Diane Fradkin

RE: **Oak Tree Report - LIVE OAK RANCH** – (Corner of Kanan and Cornell Roads)
(Los Angeles County Project No. 97-178) Vesting Tentative Tract No. 52419
For Subdivision Purposes (81 Single Family Homes) and Oak Removal Permit

## PROJECT LOCATION

This 320 acre site is located in Los Angeles County just south of the City of the Agoura Hills boundary (see MB 558-A7). The extreme north end of the project begins at a point approximately 100 yards south of the intersection of Kanan Road and Cornell Road. Medea Creek crosses Kanan Road at that location. The project extends southward along both sides (east and west) of Kanan Road to Silver Creek Road. An additional portion of the project occupies the area east of and surrounding the Fire Station on Cornell Road.

## THE REPORT

This report is broken down into several subsections which include:

1. **Tree Location Map** transposed onto the Site Plan showing the location of oak trees (8" dia. or larger) and a number assigned to each tree

2. **Summary of Field Inspection** with information regarding:
   A. Form (Tree number corresponding to the number on the Tree Location Map, species of oak, and size)
   B. Physical condition

2. **Summary of Field Inspection (Con't)**
   C. Recommended treatment
   D. Rating: Oak tree vigor is rated alphabetically (Example: a. Excellent, b. Good, c. Fair, d. Poor, e. Nearly Dead, f. Dead)

**THE REPORT (Cont'd)**

3. **Summary of Data** (Refer to Table 1) a summary of impacts in terms of trees present, trees impacted.

4. **Schedule of Proposed Removals** (Table 2)

5. **Oak Tree Preservation Program** which includes notes on general tree care. Specific attention is addressed to:
   A. Control of diseases and pests
   B. Protection of oak trees during grading and construction
   C. Method and frequency of pruning
   D. Special instructions on watering
   E. Grading restrictions near the dripline plus 5' (Protective Zone)
   F. Mitigation Measures

6. **Impacted Tree List**

7. **Tree Removals for Construction (chart)**

8. **Photographs**

9. A copy of the article, **"How to Keep an Oak Alive"** is attached for your reference.

## BACKGROUND INFORMATION

- The proposed construction on this site will consist of 81 single family homes and infrastructure, 4 landscaped lots and 5 open space lots. Construction is proposed on 54 acres with the remaining 266 acres (83% of the site) to be designated as open space. This site is comprised of typical native chaparral and Valley oak woodland traversed by Medea Creek and its riparian habitat.

- There are 136 numbered oaks shown on the Tree Location Map (TLM). Six of these (#1H,2,15,16,17,133, 134H) are growing outside the project boundary. The attached (TLM) indicates that most of the oaks are scattered throughout the project area.

- All oak species with a trunk diameter at breast height (DBH) of 8" or larger are regulated under the County's Oak Tree Ordinance. Ordinance-sized Valley oaks (*Quercus lobata*) and California Live oaks (*Q. agrifolia*) were found throughout the site. No Scrub oaks (8" or larger) were found on this site although there were smaller (under 8" dia.), multi-trunk Scrub oaks (*Q. berberidifolia*) found in several on-site locations. As stated in this report, project implementation is anticipated to directly remove 18 oak trees which are located inside the project footprint, i.e., grading, infrastructure and house pad installation. These removals are unavoidable and necessary for this proposed project to be successfully constructed and completed. If feasible, oaks listed for removal may be boxed and relocated on-site.

- There are 17 oak trees that will be encroached upon during grading and construction. Each encroachment is termed an "impact". An encroachment occurs when any construction activity (grading or otherwise) extends within the Protective Zone (PZ) of an oak. The PZ constitutes the entire dripline plus 5' (the dripline is an invisible line from the edge of the outer canopy straight down to the ground. This is a critical area for native oaks. Data has shown that a significant portion of the feeder-root system is typically found in this zone. The work near these oaks will be closely monitored by the project arborist. A list of "Impacted Trees" is attached. Each of these trees will be fenced prior to construction and all work within the PZ monitored. If encroachments within the PZ are deemed significant by the Project Arborist, an addendum letter detailing the work will be presented to Los Angeles County to address the proposed impact prior to construction activities.

## BACKGROUND INFORMATION (Cont'd)

- In accordance with the attached mitigation plan, 99 oak trees will be planted throughout the site (see Mitigation Measures). The 17 oak trees that will be encroached upon (listed as "impacts") will be monitored by a project arborist to ensure that minimal rootzone disturbance occurs and to help enhance the survival of each of these trees.

- Pruning and cabling of several of the oaks on this site has been recommended for tree preservation purposes. Refer to the Summary of Field Inspection worksheets for specific tree maintenance data.

- There are 101 oaks that will not be impacted by this project. Most of these will be "fenced" during construction to ensure their protection from possible equipment damage (refer to the Tree Location Map for fencing locations).

**Heritage Oaks**

There are 19 Heritage oaks(#1,8,17,20,25,29V,63,65V,70,91,97,100,110,113,114, 124V,126,129V,134V) among the trees listed in this report. These are oaks with a DBH (diameter at breast height) of 36" or larger. Two Heritage oaks (#25, 29V) are proposed to be removed for construction purposes.

- Each Heritage Oak will be indicated by a capital "H" after its identification number, i.e., H129.

- Each Valley oak will be indicated by a capital "V" after its identification number.

- No designation after the tree number will indicate a California Live oak.

**SUMMARY OF DATA**

Total number of oak trees shown on TLM over 8" dia. on map - - - - - - - 136

Total number of dead oak trees - - - - - - - - - - - - - - - - - - - - - - - - - - - - 0

Total number of oak trees to be removed (excl. dead trees) - - - - - - - - - - 18
(#14,18,19V,22,23,25H,26,27,28,29HV,30,31,32,37V,41,43,98V,132V)

Total number of oak trees to be impacted by construction (within their Protective Zones) - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 17
(#1H,7,20H,21,24,35,36V,38V,42,48V,65HV,97H,99,100H,107,130,131)

Total number of oak trees not dead, not to be removed, and/or not to be impacted - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 101
(#2,3,4,5,6,8H,9,10,11V,12,13,15,16,17H,33,34,39,40V,44V,45V,46V,47V, 49V,50V,51V,52V,53V,54V,55V,56V,57V,58V,59V,60,61,62V,63H,64V, 66,67V,68V,69,70H,71V,72V,73V,74,75,76,77,78,79,80,81,82,83,84,85,86, 87,88,89,90,91H,92V,93V,94,95,96,101,102V,103,104,105,106V,108,109, 110H,111,112V,113H,114H,115,116,117,118V,119V,120,121,122,123, 124HV,125,126H,127,128,129H,133,134HV,135V,136V)

Robert W. Wallace
Registered Consulting Arborist

# SUMMARY OF FIELD INSPECTION
## (DATA ON INDIVIDUAL OAKS)

# SUMMARY OF FIELD INSPECTION - OAK TREES

| Tree number | FORM: Quercus Agrifolia | FORM: Quercus Lobata | SIZE: Trunk Diameter (inches") 4.5 Ft Above Base | SIZE: Height (feet) | SIZE: Spread (feet) | PHYSICAL CONDITION: Tree Declining | Drought Stressed | Weak Main Crotch(s) | Broken Hanging Limb(s) | Fire Damage | Sparse Foliage | Cavity(s) in tree | Trunk Damage | Hollow Trunk | Mainstem Dieback | Insect Damaged | Diseased | Soil buildup at Base | Leaning | Regrown Stump | Surface Roots | Safety Hazard | TREATMENT: Safety Prune (crown reduction) | Remove Deadwood | Raise Canopy | Insect Treatment | Disease Treatment | Cable / Brace | Replenish Nutrients | RATING: Health | Aesthetics & Conformity | Balance | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | X | | 19 18 | 20 | 40 | | | X | | | | | | | | | | | | | X | | | | | | | | A | A | A | Growing near creek |
| 2 | X | | 30 BMC | 30 | 35 | | | X | | | | | | | | | | | | | | | | | | | | | B | A | A | Growing near creek |
| 3 | X | | 15 16 | 38 | 50 | | | X | | | | X | X | | | | | | | | | | X | X | | | | 1 | | B | A | B | Old crotch split |
| 4 | X | | 21 | 30 | 25 | | | X | | | | X | X | | | | | | X | | | | X | X | | | | 2 | | B | A | C | Attach one cable to east section of Oak #3 |
| 5 | X | | 17 | 30 | 26 | | | | | | | | | | | | | | | | | | | | | | | | | B | A | A | |
| 6 | X | | 18 | 28 | 26 | | | | | | | | | | | | | | | | | | | | | | | | | B | A | C | |
| 7 | X | | 30 | 50 | 42 | | | | | | X | | | | | | | | | | | | X | X | | | | | | C | A | B | |
| 8 | X | | 29 20 | 55 | 65 | | | | | | | | | | | | | | | | | | X | X | | | | | | B | A | B | |
| 9 | X | | 12 | 13 | 25 | | | | | | | X | X | X | | | | | | | | | | | | | | | | C | C | D | Split trunk on ground |
| 10 | X | | 25 | 30 | 30 | | | X | | | | | | | | | | | X | | | | | | | | | 1 | | A | A | B | |
| 11 | | X | 23 | 35 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | D | A | A | Recent growth flush and epicormic sprouting |
| 12 | X | | 14 | 24 | 28 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | C | Growing tight against #11 |
| 13 | X | | 8 7 6 5 | 20 | 20 | | | | | | X | | | | X | | | | | | | | | | | | | | | C | B | B | May uproot |
| 14 | X | | 12 BMC 6, 6, 4 | 18 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | |
| 15 | X | | 24 BMC | 40 | 30 | | | | | | | | | | | | | X | | | | | | | | | | | | A | A | A | |

**RATING CODE**

A = EXCELLENT
B = GOOD
C = FAIR
D = POOR
E = NEARLY DEAD
F = DEAD

* SEE PHOTO
R = Remove
I = Impacted
T = Transplantable
NT = Not Transplantable
BMC = Below main crotch

Tree Life Concern Inc.

# SUMMARY OF FIELD INSPECTION - OAK TREES

| FORM | | | | | | PHYSICAL CONDITION | | | | | | | | | | | | | | | | TREATMENT | | | | | | | RATING | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SIZE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tree number | Quercus Agrifolia | Quercus Lobata | Trunk Diameter ( inches" ) 4.5 Ft Above Base | Height ( feet' ) | Spread ( feet' ) | Tree Declining | Drought Stressed | Weak Main Crotch(s) | Broken Hanging Limb(s) | Fire Damage | Sparse Foliage | Cavity(s) in tree | Trunk Damage | Hollow Trunk | Mainstem Dieback | Insect Damaged | Diseased | Soil buildup at Base | Leaning | Regrown Stump | Surface Roots | Safety Hazard | Safety Prune (crown reduction) | Remove Deadwood | Raise Canopy | Insect Treatment | Disease Treatment | Cable / Brace | Replenish Nutrients | Health | Aesthetics & Conformity | Balance | |
| 16 | X | | 21 6 | 50 | 32 | | | | | | | | | | | | | | | | | | X | | | | | | | A | A | A | Heavy limb sections |
| 17 | X | | 30 21 | 50 | 65 | | | X | | | | | | | | | | | | | | | X | | | | | 1 | | A | A | A | Heavy limb sections |
| 18 | X | | 10 9 | 20 | 22 | | | X | | | | | | | | | | | | | | | | | | | | | | A | A | A | |
| 19 | | X | 22 BMC | 40 | 40 | | | | | | | | | | | | | X | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 20 | X | | 22 21 | 25 | 28 | | | X | | X | | X | | X | | | | | | | | | | | | | | | | B | A | C | May collapse |
| 21 | X | | 30 BMC | 28 | 30 | | | | | | X | | | | | | | | | | | | | | | | | | | D | A | A | |
| 22 | X | | 7 6 3 | 18 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | |
| 23 | X | | 8 BMC | 16 | 14 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | |
| 24 | | X | 8 7 3.5 | 18 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | |
| 25 | X | | 31 18 | 45 | 55 | | | X | | | | | | | | | | | | | | | X | | | | | | | A | A | B | |
| 26 | X | | 19 | 30 | 30 | | | | | | | | | | | | | | X | | | | | | | | | | | B | A | C | Growing under #25 |
| 27 | X | | 10 10 | 32 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 28 | X | | 8 8 | 27 | 18 | | | X | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 29 | | X | 40 | 65 | 50 | | | | | | | | | | | | | | | | | | | | | | | | | B | A | A | |
| 30 | X | | 13 7 | 28 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | A | B | B | Okay to transplant (OK) |

**RATING CODE**

A = EXCELLENT
B = GOOD
C = FAIR
D = POOR
E = NEARLY DEAD
F = DEAD

* SEE PHOTO
R = Remove
I = Impacted
T = Transplantable
NT = Not Transplantable
BMC = Below main crotch

Tree Life Concern Inc.

# SUMMARY OF FIELD INSPECTION - OAK TREES

| Tree number | FORM: Quercus Agrifolia | FORM: Quercus Lobata | SIZE: Trunk Diameter (inches") 4.5 Ft Above Base | SIZE: Height (feet') | SIZE: Spread (feet') | PHYSICAL CONDITION: Tree Declining | Drought Stressed | Weak Main Crotch(s) | Broken Hanging Limb(s) | Fire Damage | Sparse Foliage | Cavity(s) in tree | Trunk Damage | Hollow Trunk | Mainstem Dieback | Insect Damaged | Diseased | Soil buildup at Base | Leaning | Regrown Stump | Surface Roots | Safety Hazard | TREATMENT: Safety Prune (crown reduction) | Remove Deadwood | Raise Canopy | Insect Treatment | Disease Treatment | Cable / Brace | Replenish Nutrients | RATING: Health | Aesthetics & Conformity | Balance | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31 | X | | 16 | 28 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 32 | X | | 14 | 25 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | B | A | B | Growing out of slope |
| 33 | X | | 12 6 | 25 | 18 | | | X | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 34 | X | | 11 | 18 | 17 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Growing on embankment |
| 35 | | X | 7 7 6 | 25 | 20 | | | | | | | | | | | | | X | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 36 | | X | 7 7 | 18 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 37 | | X | 10 | 28 | 22 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 38 | | X | 14 8 | 30 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 39 | | X | 7 1 | 30 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 40 | | X | 11 | 30 | 12 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 41 | X | | 8 7 | 18 | 18 | | | | | | | | | | | | | X | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 42 | X | | 5 12 9 | 25 | 28 | | | X | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) Slope |
| 43 | X | | 7 6 | 22 | 16 | | | X | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) Slope |
| 44 | | X | 13 | 34 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) Transplant with #45 |
| 45 | | X | 10 | 34 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) Transplant with #44 |

**RATING CODE**

A = EXCELLENT
B = GOOD
C = FAIR
D = POOR
E = NEARLY DEAD
F = DEAD

* SEE PHOTO
R = Remove
I = Impacted
T = Transplantable
NT = Not Transplantable
BMC = Below main crotch

Tree Life Concern Inc.

# SUMMARY OF FIELD INSPECTION - OAK TREES

| FORM | | | | | | PHYSICAL CONDITION | | | | | | | | | | | | | | | | TREATMENT | | | | | | | RATING | | | RATING CODE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SIZE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tree number | Quercus Agrifolia | Quercus Lobata | Trunk Diameter ( inches" ) 4.5 Ft Above Base | Height ( feet' ) | Spread ( feet' ) | Tree Declining | Drought Stressed | Weak Main Crotch(s) | Broken Hanging Limb(s) | Fire Damage | Sparse Foliage | Cavity(s) in tree | Trunk Damage | Hollow Trunk | Mainstem Dieback | Insect Damaged | Diseased | Soil buildup at Base | Leaning | Regrown Stump | Surface Roots | Safety Hazard | Safety Prune (crown reduction) | Remove Deadwood | Raise Canopy | Insect Treatment | Disease Treatment | Cable / Brace | Replenish Nutrients | Health | Aesthetics & Conformity | Balance | A = EXCELLENT<br>B = GOOD<br>C = FAIR<br>D = POOR<br>E = NEARLY DEAD<br>F = DEAD<br>* SEE PHOTO<br>R = Remove<br>I = Impacted<br>T = Transplantable<br>NT = Not Transplantable<br>BMC = Below main crotch |
| 46 | | X | 9 | 30 | 15 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 47 | | X | 8 8 | 35 | 17 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 48 | | X | 10 9 | 45 | 18 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 49 | | X | 11 | 35 | 18 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 50 | | X | 11 | 35 | 17 | | | | | | | | X | | | | | | X | | | | | | | | | | A | A | B | Okay to transplant (OK)<br>Minor trunk damage |
| 51 | | X | 13 | 35 | 14 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 52 | | X | 10 | 25 | 18 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 53 | | X | 13 | 40 | 25 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 54 | | X | 6 6 | 35 | 14 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 55 | | X | 11 9 | 35 | 25 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK)<br>Slope |
| 56 | | X | 8 | 27 | 15 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK)<br>Slope |
| 57 | | X | 7 8<br>9 | 28 | 25 | | | X | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 58 | | X | 7 8<br>9 | 35 | 18 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 59 | | X | 8 9 | 30 | 25 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK)<br>Transplant with #60 |
| 60 | X | | 17 | 30 | 25 | | | | | | | | | | | | | | | | | | | | | | | | A | A | B | Okay to transplant (OK)<br>Transplant with #59 |

Tree Life Concern Inc.

# SUMMARY OF FIELD INSPECTION - OAK TREES

| FORM | | | | | | PHYSICAL CONDITION | | | | | | | | | | | | | | | | TREATMENT | | | | | | | RATING | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tree number | Quercus Agrifolia | Quercus Lobata | SIZE: Trunk Diameter ( inches" ) 4.5 Ft Above Base | Height ( feet' ) | Spread ( feet' ) | Tree Declining | Drought Stressed | Weak Main Crotch(s) | Broken Hanging Limb(s) | Fire Damage | Sparse Foliage | Cavity(s) In tree | Trunk Damage | Hollow Trunk | Mainstem Dieback | Insect Damaged | Diseased | Soil buildup at Base | Leaning | Regrown Stump | Surface Roots | Safety Hazard | Safety Prune (crown reduction) | Remove Deadwood | Raise Canopy | Insect Treatment | Disease Treatment | Cable / Brace | Replenish Nutrients | Health | Aesthetics & Conformity | Balance | |
| 61 | X | | 11 | 25 | 20 | | | | | | | | | | | | | | | | | | | | | | | | A | A | B | Okay to transplant (OK) |
| 62 | | X | 12 | 35 | 25 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 63 | X | | 40 | 50 | 70 | | | | | | | | | | | | | | | | | | X | X | | | | 3 | | A | A | B | |
| 64 | | X | 29 | 40 | 55 | | | | | | | | | | | | | | X | | | | X | X | | | | | | A | A | C | Okay to transplant (OK) |
| 65 | | X | 47 | 60 | 75 | | | X | | | | | | | | | | | | | | | X | X | | | | 3 | | A | A | A | Too large to relocate |
| 66 | | X | 10 9 6 2 | 30 | 24 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Okay to transplant (OK) |
| 67 | | X | 10 4 2 | 27 | 20 | | | | | | | | | | | | | | | | | | | | | | | | A | A | B | OK |
| 68 | | X | 9 5 5 | 24 | 20 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | |
| 69 | X | | 8 | 32 | 15 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK - Not tagged (vines) |
| 70 | X | | 22 19 15 | 34 | 55 | | | X | | | | | | | | | | | | | | | X | X | | | | 3 | | A | A | A | Too large to relocate |
| 71 | | X | 7 6 5 | 28 | 18 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK |
| 72 | | X | 13 | 30 | 20 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK |
| 73 | | X | 7 5 | 27 | 14 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK |
| 74 | X | | 19 8 | 28 | 30 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK - Rocky |
| 75 | X | | 11 11 7 | 24 | 20 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK |

**RATING CODE**

A = EXCELLENT
B = GOOD
C = FAIR
D = POOR
E = NEARLY DEAD
F = DEAD

* SEE PHOTO
R = Remove
I = Impacted
T = Transplantable
NT = Not Transplantable
BMC = Below main crotch

Tree Life Concern Inc.

# SUMMARY OF FIELD INSPECTION - OAK TREES

| Tree number | Quercus Agrifolia | Quercus Lobata | SIZE: Trunk Diameter ( inches" ) 4.5 Ft Above Base | SIZE: Height ( feet' ) | SIZE: Spread ( feet' ) | PHYSICAL CONDITION: Tree Declining | Drought Stressed | Weak Main Crotch(s) | Broken Hanging Limb(s) | Fire Damage | Sparse Foliage | Cavity(s) in tree | Trunk Damage | Hollow Trunk | Mainstem Dieback | Insect Damaged | Diseased | Soil buildup at Base | Leaning | Regrown Stump | Surface Roots | Safety Hazard | TREATMENT: Safety Prune (crown reduction) | Remove Deadwood | Raise Canopy | Insect Treatment | Disease Treatment | Cable / Brace | Replenish Nutrients | RATING: Health | Aesthetics & Conformity | Balance | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 76 | X | | 10 10 8, 8, 4 | 28 | 18 | | | X | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK (Okay to transplant) |
| 77 | X | | 9 9 6 | 22 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK (Okay to transplant) |
| 78 | X | | 18 | 32 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK (Okay to transplant) |
| 79 | X | | 16 9 9 7 | 35 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Not transplantable - in creek |
| 80 | X | | 9 7 | 21 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | B | A | C | Not transplantable - in creek |
| 81 | X | | 16 | 32 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | B | Not transplantable - Too close to #80 |
| 82 | X | | 12 | 27 | 15 | | | | | | | | | | | | | | X | | | | | | | | | | | A | B | C | Not transplantable - Too close to #80 |
| 83 | X | | 24 19 6 | 38 | 55 | | | | | | | | | | | | | | | | | | X | X | | | | 3 | | A | A | A | Not transplantable - Too big |
| 84 | X | | 8 | 28 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK (Okay to transplant) |
| 85 | X | | 16 | 35 | 32 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Not transplantable - at edge of creek |
| 86 | X | | 13 9 | 33 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | B | OK (Okay to transplant) |
| 87 | X | | 17 | 40 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Not transplantable - Too close to #86 |
| 88 | X | | 27 | 50 | 65 | | | | | | | | | | | | | | | | | | X | X | | | | 3 | | A | A | A | OK (Okay to transplant) |
| 89 | X | | 12 8 | 27 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK (Okay to transplant) Not tagged (Poison oak) |
| 90 | X | | 9 8 7 | 28 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK (Okay to transplant) Not tagged (Poison oak) |

**RATING CODE**

- A = EXCELLENT
- B = GOOD
- C = FAIR
- D = POOR
- E = NEARLY DEAD
- F = DEAD

* SEE PHOTO
R = Remove
I = Impacted
T = Transplantable
NT = Not Transplantable
BMC = Below main crotch

Tree Life Concern Inc.

# SUMMARY OF FIELD INSPECTION - OAK TREES

| FORM | | | | | | PHYSICAL CONDITION | | | | | | | | | | | | | | | | TREATMENT | | | | | | | RATING | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SIZE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tree number | Quercus Agrifolia | Quercus Lobata | Trunk Diameter ( inches" ) 4.5 Ft Above Base | Height ( feet' ) | Spread ( feet' ) | Tree Declining | Drought Stressed | Weak Main Crotch(s) | Broken Hanging Limb(s) | Fire Damage | Sparse Foliage | Cavity(s) in tree | Trunk Damage | Hollow Trunk | Mainstem Dieback | Insect Damaged | Diseased | Soil buildup at Base | Leaning | Regrown Stump | Surface Roots | Safety Hazard | Safety Prune (crown reduction) | Remove Deadwood | Raise Canopy | Insect Treatment | Disease Treatment | Cable / Brace | Replenish Nutrients | Health | Aesthetics & Conformity | Balance | |
| 91 | X | | 72 | 65 | 100 | | | X | | | | | | | | | | | | | | | X | X | | | | 5 | | A | A | A | Not transplantable |
| 92 | | X | 21 | 50 | 55 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Not transplantable |
| 93 | | X | 8 7 6 5 | 40 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK (okay to transplant) Growing in creek |
| 94 | X | | 10 | 16 | 13 | | | | | | | | | | | | | | X | | | | | | | | | | | B | B | D | Partially uprooted |
| 95 | X | | 9 6 | 28 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK (okay to transplant) Not tagged - Poison oak |
| 96 | X | | 30 | 50 | 45 | | | | | | | | | | | | | | X | | | | | | | | | | | A | A | B | Not transplantable Too big |
| 97 | X | | 17, 1: 15 14 13 | 24 | 50 | | | X | | | | | | | | | | | | | | | X | X | | | | | | A | A | A | Not transplantable Too big |
| 98 | | X | 23 | 45 | 40 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK (okay to transplant) |
| 99 | X | | 28 | 40 | 55 | | | | | | | | | | | | | | X | | | | X | X | X | | | | | A | A | C | Not transplantable Leaning |
| 100 | X | | 44 | 65 | 85 | | | | | | | | | | | | | | X | | | | X | X | | | | | | B | A | D | Not transplantable Conk at base - leaning |
| 101 | X | | 8 | 18 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK (okay to transplant) |
| 102 | | X | 31 | 50 | 55 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Not transplantable Growing in creek |
| 103 | X | | 26 | 50 | 60 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Not transplantable Too big |
| 104 | X | | 6 6 5 | 18 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK (okay to transplant) |
| 105 | X | | 10 | 25 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK (okay to transplant) |

**RATING CODE**

A = EXCELLENT
B = GOOD
C = FAIR
D = POOR
E = NEARLY DEAD
F = DEAD

* SEE PHOTO
R = Remove
I = Impacted
T = Transplantable
NT = Not Transplantable
BMC = Below main crotch

Tree Life Concern Inc.

# SUMMARY OF FIELD INSPECTION - OAK TREES

| FORM | | | SIZE | | | PHYSICAL CONDITION | | | | | | | | | | | | | | | | TREATMENT | | | | | | | RATING | | | RATING CODE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tree number | Quercus Agrifolia | Quercus Lobata | Trunk Diameter ( inches" ) 4.5 Ft Above Base | Height ( feet' ) | Spread ( feet' ) | Tree Declining | Drought Stressed | Weak Main Crotch(s) | Broken Hanging Limb(s) | Fire Damage | Sparse Foliage | Cavity(s) In tree | Trunk Damage | Hollow Trunk | Mainstem Dieback | Insect Damaged | Diseased | Soil buildup at Base | Leaning | Regrown Stump | Surface Roots | Safety Hazard | Safety Prune (crown reduction) | Remove Deadwood | Raise Canopy | Insect Treatment | Disease Treatment | Cable / Brace | Replenish Nutrients | Health | Aesthetics & Conformity | Balance | A = EXCELLENT<br>B = GOOD<br>C = FAIR<br>D = POOR<br>E = NEARLY DEAD<br>F = DEAD<br>* SEE PHOTO<br>R = Remove<br>I = Impacted<br>T = Transplantable<br>NT = Not Transplantable<br>BMC = Below main crotch |
| 106 | | X | 12 | 50 | 18 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | REMARKS |
| 107 | X | | 21 | 28 | 30 | | | | | | | | X | | | | | | | | | | | | | | | | A | B | A | OK (okay to transplant)<br>Edge of creek |
| 108 | | X | 8 7 | 18 | 15 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Growing under power lines<br>Not transplantable |
| 109 | | X | 7 6 | 28 | 14 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK (okay to transplant) |
| 110 | X | | 19 14 9 | 28 | 30 | | | | | | | | | | | | | X | | | | | | | | | | | A | A | A | OK (okay to transplant)<br>Transplant with #108 |
| 111 | X | | 6 6 3 | 15 | 12 | | | | | | | | | | | | | | | | | | | | | | | | A | C | A | Not transplantable<br>Under power lines at edge of road |
| 112 | | X | 14 | 35 | 24 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK (okay to transplant) |
| 113 | X | | 17 15 14 | 27 | 30 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK (okay to transplant) |
| 114 | X | | 42 | 50 | 70 | | | X | | X | | X | X | X | | | | | | | | X | X | X | | | 1 | | B | A | A | Not transplantable<br>Growing on slope - rocky |
| 115 | X | | 15 | 27 | 27 | | | | | | | | | | | | | | X | | | | | | | | | | C | A | B | Not transplantable<br>Heavy over street - Prune ASAP |
| 116 | X | | 20 | 30 | 30 | | | | | | | | | | | | | | | | | | | | | | | | B | A | C | Not transplantable<br>Under #16 - rocky |
| 117 | X | | 27 | 28 | 30 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Not transplantable<br>rocky terrain |
| 118 | | X | 17 | 28 | 18 | | | | | X | | X | X | X | | | | | | | | | | | | | | | A | A | A | Not transplantable<br>Edge of creek |
| 119 | | X | 31 | 40 | 45 | | | | | X | | X | X | X | | | | | | | | | | | | | | | C | B | B | Not transplantable |
| 120 | X | | 6 6 3 | 20 | 12 | | | | | | | | | | | | | | | | | | | | | | | | A | A | B | Not transplantable |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK (okay to transplant) |

Tree Life Concern Inc.

# SUMMARY OF FIELD INSPECTION - OAK TREES

| FORM | | | | | | PHYSICAL CONDITION | | | | | | | | | | | | | | | | TREATMENT | | | | | | | RATING | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tree number | Quercus Agrifolia | Quercus Lobata | SIZE: Trunk Diameter (inches") 4.5 Ft Above Base | Height (feet') | Spread (feet') | Tree Declining | Drought Stressed | Weak Main Crotch(s) | Broken Hanging Limb(s) | Fire Damage | Sparse Foliage | Cavity(s) in tree | Trunk Damage | Hollow Trunk | Mainstem Dieback | Insect Damaged | Diseased | Soil buildup at Base | Leaning | Regrown Stump | Surface Roots | Safety Hazard | Safety Prune (crown reduction) | Remove Deadwood | Raise Canopy | Insect Treatment | Disease Treatment | Cable / Brace | Replenish Nutrients | Health | Aesthetics & Conformity | Balance | |
| 121 | X | | 6 6 | 18 | 18 | | | | | | | | | | | | | | | | | | | | | | | | A | A | C | OK (okay to transplant) |
| 122 | X | | 12 9 6 | 28 | 25 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Not transplantable<br>Too close to #123 |
| 123 | X | | 18 7 4 | 35 | 25 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK (okay to transplant) |
| 124 | | X | 48 | 55 | 55 | | | | | | | | X | | | | | | | | | X | | | | | | | A | B | C | Not transplantable<br>Too big - Recent limb failure |
| 125 | X | | 30 | 40 | 45 | | | | | | | | | | | | | | | | | X | | | | | | | A | A | B | Not transplantable<br>Too big - Old limb failures |
| 126 | X | | 29 29 25 | 45 | 75 | | | X | | | | | | | | | | | | | | | | | | | | | A | A | B | Not transplantable<br>29" section on ground |
| 127 | X | | 17 | 28 | 28 | | | | | | | | | | | | | | | | | | | | | | | | A | A | B | OK (okay to transplant)<br>Growing under power lines |
| 128 | X | | 13 9 | 28 | 25 | | | | | | | | | | | | | | | | | | | | | | | | A | A | B | OK (okay to transplant)<br>Growing under power lines |
| 129 | | X | 36 BMC | 50 | 55 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Not transplantable<br>Too big (Grown into fence) |
| 130 | X | | 11 11 6 | 28 | 28 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Not transplantable<br>Grown into fence |
| 131 | X | | 14 9 8 | 26 | 30 | | | | | | | | | | | | | | | | | | | | | | | | A | B | A | OK (okay to transplant)<br>Under power lines |
| 132 | | X | 6 5 5 | 28 | 14 | | | | | | | | | | | | | | | | | | | | | | | | A | B | A | OK (okay to transplant)<br>Under power lines |
| 133 | | X | 8 6 | 28 | 13 | | | | | | | | | | | | | | | | | | | | | | | | A | B | A | OK (okay to transplant)<br>Under power lines |
| 134 | | X | 35 | 50 | 75 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | Not transplantable<br>Too big |
| 135 | | X | 7 5 | 27 | 13 | | | | | | | | | | | | | | | | | | | | | | | | A | A | A | OK (okay to transplant) |

**RATING CODE**

A = EXCELLENT
B = GOOD
C = FAIR
D = POOR
E = NEARLY DEAD
F = DEAD

* SEE PHOTO
R = Remove
I = Impacted
T = Transplantable
NT = Not Transplantable
BMC = Below main crotch

Tree Life Concern Inc.

# SUMMARY OF FIELD INSPECTION - OAK TREES

| FORM | | | | | | PHYSICAL CONDITION | | | | | | | | | | | | | | | | | TREATMENT | | | | | | | RATING | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SIZE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tree number | Quercus Agrifolia | Quercus Lobata | Trunk Diameter ( Inches" ) 4.5 Ft Above Base | Height ( feet' ) | Spread ( feet' ) | Tree Declining | Drought Stressed | Weak Main Crotch(s) | Broken Hanging Limb(s) | Fire Damage | Sparse Foliage | Cavity(s) in tree | Trunk Damage | Hollow Trunk | Mainstem Dieback | Insect Damaged | Diseased | Soil buildup at Base | Leaning | Regrown Stump | Surface Roots | Safety Hazard | Safety Prune (crown reduction) | Remove Deadwood | Raise Canopy | Insect Treatment | Disease Treatment | Cable / Brace | Replenish Nutrients | Health | Aesthetics & Conformity | Balance | REMARKS |
| 136 | | X | 7 3 5 | 30 | 18 | | X | | | | X | | | | X | | | | | | | | | | | | | | | D | A | A | Epicormic sprouting on main sections |

**RATING CODE**

A = EXCELLENT
B = GOOD
C = FAIR
D = POOR
E = NEARLY DEAD
F = DEAD

* SEE PHOTO
R = Remove
I = Impacted
T = Transplantable
NT = Not Transplantable
BMC = Below main crotch

# SUMMARY OF DATA AND
# **SCHEDULE OF PROPOSED REMOVALS**

**TABLE 1 : SUMMARY OF DATA (Oak trees)**

| | |
|---|---|
| Total number of Oak trees listed on map ____ (oaks 8" dia. or larger)..... | 136 |
| Total number of dead (or nearly dead) Oak trees at site..... | 0 |
| Total number of Oak trees to be removed (#14,18,19V,22,23,25H,26,27,28,29HV,30,31,32,37V,41,43,98V,132V)..... | 18 |
| Total number of Oak trees to be impacted by construction (within dripline)(#1H,7,20H,21,24,35,36V,38V,42,48V,65HV,97H,99,100H,107,130,131)..... | 17 |
| Total number of Oak trees not dead, not to be removed, and/or not to be impacted (refer to Summary of Data sheet)..... | 101 |
| Oaks Requiring Pruning Permit (clearance pruning permit may be requested at a later date)..... | 0 |

**TABLE 2 : SCHEDULE OF PROPOSED REMOVALS (Oak trees)**

| | | | | My Recommendation: | | |
|---|---|---|---|---|---|---|
| Tree No. | Health Rating | General location | Reason for removal | Save | Remove | Re-locate |
| 14 | A | At northern portion of site | Grading and construction of Lot 2 | | X | |
| 18 | A | A northern portion of site | For construction of Street "B" | | X | |
| 19V | A | A northern portion of site | For construction of Street "A" | | X | |
| 22 | A | West side Kanan Road | For development of Pad 39 | | X | |
| 23 | A | West side Kanan Road | For development of Pad 39 | | X | |
| 25H | A | West side Kanan Road | For slope development near Pad 22 | | X | |
| 26 | B | West side Kanan Road | For slope development and construction of Street "D" | | X | |
| 27 | A | West side Kanan Road | For slope development in Landscape Lot 89 | | X | |
| 28 | A | West side Kanan Road | For slope development in Landscape Lot 89 | | X | |
| 29HV | B | West side Kanan Road | For slope development in Landscape Lot 89 | | X | |

## TABLE 1 : SUMMARY OF DATA (Oak trees)

| | |
|---|---|
| Total number of Oak trees listed on map ___ (oaks 8" dia. or larger)..... | 136 |
| Total number of dead (or nearly dead) Oak trees at site..... | 0 |
| Total number of Oak trees to be removed (#14,18,19V,22,23,25H,26,27,28,29HV,30,31,32,37V,41,43,98V,132V)..... | 18 |
| Total number of Oak trees to be impacted by construction (within dripline)...(#1H,7,20H,21,24,35,36V,38V,42,48V,65HV,97H, 99,100H,107,130,131)..... | 17 |
| Total number of Oak trees not dead, not to be removed, and/or not to be impacted...(refer to Summary of Data sheet)..... | 101 |
| Oaks Requiring Pruning Permit (clearance pruning permit may be requested at a later date)..... | 0 |

## TABLE 2 : SCHEDULE OF PROPOSED REMOVALS (Oak trees)

| Tree No. | Health Rating | General location | Reason for removal | My Recommendation: Save | Remove | Re-locate |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| 30 | A | West side of Kanan Road | For slope development in Landscape Lot 89 | | X | |
| 31 | A | West side of Kanan Road | For slope development in Landscape Lot 89 | | X | |
| 32 | B | West side of Kanan Road | For construction of Street "D" | | X | |
| 37V | A | East side of Kanan Road | For slope development and drain installation | | X | |
| 41 | A | East side of Kanan Road | For retaining wall construction | | X | |
| 98 | A | Between Kanan Rd. and Cornell Rd. | For construction of Street "F" (within fill area) | | X | |
| 98 | A | Between Kanan Rd. and Cornell Rd. | For construction of Street "F" (within fill area) | | X | |
| 132V | A | East side of Cornell Road | For deceleration land construction | | X | |

# OAK PRESERVATION AND MITIGATION PROGRAM

## OAK PRESERVATION AND MITIGATION PROGRAM

It is the goal of the County of Los Angeles Tree Ordinance, Part 16, Section 22.56.2050, to curb the destruction of our beautiful native oaks, preserve the natural environment, and protect the county's plant life heritage.

The following are some helpful recommendations and comments to help preserve the oaks in this report:

### A. Control of Diseases and Pests

The 136 oak trees in this report generally have an acceptable level of indigenous oak insect pests. A Pest Control Advisor should monitor the on-site oaks for damaging levels of insect pests. I found basal conks at the base of one oak (#100H). This is an indication of internal decay and/or a structurally weakened root system.

During my visual inspection I found no sign of Oak Root Fungus (*Armillaria mellea*) or Bleeding Canker Disease (*Phytophthora cactorum*).

Several of the oaks on this site have been decayed by old fire-damage wounds and/or limb failures. A number of them are hollow and very susceptible to windthrow, trunk collapse or main limb failure. Trees with notable trunk or limb decay were not included in the transplant list. These trees may survive relocation but are not likely to live a normal lifespan.

### B. Protective Fencing During Grading Operations

Equipment damage to the limbs, trunks and roots must be avoided. Even slight trunk injuries can result in long-term, life threatening pathogenic maladies. Heavy equipment operations within the PZ of an oak can damage the feeder root system. No storage of equipment or debris within the Protective Zone (dripline plus 5') will be allowed. No dumping of construction waste water i.e., paint, stucco, concrete, clean-up, etc. within Protective Zones.

**B. Protective Fencing During Grading Operations (Cont'd)**

Temporary Protective Fencing will be necessary under the protective zones of numerous oaks on this site within the construction envelope (refer to the TLM for recommended fence positioning). Generally, fencing shall be placed at the PZ of any oak or groups of oaks within 50' of proposed construction activity. Where construction is necessary within the dripline or PZ, placement of the Fencing shall be directed by the Project Arborist. Protective fencing must remain in place during construction projects and shall not be moved or removed without prior approval of the City Tree Consultant and under the direct supervision of the Project Arborist. All other oaks which are growing outside and beyond the area of construction will not require fencing. Fencing must be installed before construction begins and shall not be removed until construction is completed or unless this Oak Tree Consultant is present to monitor all tree impacts.

**C. Pruning Requirements**

These oaks have never been pruned and many are in an over-weighted condition making them susceptible to main crotch failures or limb failures. In this Valley Oak Woodland setting, there are numerous trees with over-weighted branch structures. There is evidence of numerous limb failures and collapsed trees in this woodland. This is a normal and natural process and trees which are to remain in unimproved woodland settings will require no maintenance. However, where larger oaks become fixtures in a public landscaped environment, regular maintenance pruning to accomplish end-weight reduction is imperative for public safety. Healthy oaks, if not maintained, will eventually grow beyond their ability to support themselves and fail at a weak point. This is commonly at a branch union or the main crotch. Weight reduction pruning and/or cabling is vitally important in an oak tree preservation program. Refer to the Summary of Field Inspection worksheets for specific tree pruning recommendations.

## C. Pruning Requirements (Cont'd)

If possible, complete pruning of the larger California Live oaks or Valley oaks, is recommended for tree health and weight reduction (inspect for occupied woodpecker nests prior to removal of larger dead snags). The pruning will invigorate the trees and help prevent limb or main crotch failures. Any cuts over 2" diameter would require a "Pruning Permit" from the County. After pruning, the installation of support cables to prevent future main crotch failures may be recommended (refer to the Summary of Field Inspection for specific tree and cable numbers). All cables should be a minimum of 5/16" diameter EHS (Extra High Strength) and attached with 5/8" diameter, galvanized thru-bolts. Heavy-duty 3/8" thimbles are to be utilized at each attachment point. These recommendations are presented for consideration by the current and/or future property owners.

Generally, mature oaks in a residential setting should be pruned every four to six years or at the recommendation of a Certified Arborist. It is advised that mature oaks in residential, park, or public space be inspected on an annual basis for tree health and safety (structural integrity).

## D. Watering of Oaks

Care should be taken to avoid placing any sprinkler devices within watering distance to the trunks. Generally, sprinklers should not reach within 15' of a mature oak trunk. Grass or ground covers must never be planted next to the trunks. Too much moisture near the base of an oak is generally believed to be their leading cause of death in residential settings. Oak Root Fungus tends to thrive in an over-irrigated setting. Oak trees survive and thrive on annual rainfall alone and generally do not need supplemental irrigation except during periods of extended drought. Watering should take place at or near the dripline only. Landscape plans should leave the area within the dripline of an oak tree in a native or natural setting if possible.

Dry-site oaks such as these would benefit from a deep-watering during the months of June and/or November during years of drought. Any transplanted oaks or oaks that will be growing in residential settings should be carefully monitored and inspected by a Certified Arborist once per year at a minimum to ensure proper irrigation. Over watering of native oaks can be deadly to this species.

## E. Grading Restrictions Near the Dripline

Care must be taken to limit grade changes near the trunk areas. The grade should not be lowered or raised. Note: even a 2" raise of grade against an oak trunk could result in an Oak Root Fungus infection. Refer to the Impacted Tree List for specific detail of tree encroachments and/or grade changes. Encroachments of differing degrees will occur within the PZ's of 16 oak trees. At least three oaks (#20H, 38V &130) will require low retaining walls to maintain the natural grade near the trunks. Much of this work will require hand-excavation.

## F. Mitigation Measures and Comments

The general purpose and intent of the Los Angeles County Tree Protection Ordinance to preserve and protect all native oak tree species over 8" DBH (diameter at breast height). The ordinance does allow for their removal in certain circumstances where it is necessary to enable reasonable use of the subject property and if the presence of the trees will prevent the practical use and no reasonable alternative can be accommodated due to the unique physical development constraints on the property.

Tree removals may be approved by the County if the request will not be contrary to or in conflict with the general purpose and intent of the Tree Protection Ordinance. Mitigation for removals will be required.

1. Eighteen oak trees(#14,18,19V,22,23,25H,26,27,28,29HV,30,31,32,37V,41, 43,98V,132V) are to be removed for construction purposes. The County of Los Angeles requires that each of the 16 protected (non-heritage) oak trees removed for construction be replaced on a 2:1 ratio with two 24" box size oak trees. This would result in at least thirty-six 24" box size oaks being planted on-site as mitigation. In addition, the Ordinance requires that each of the two Heritage oaks that are proposed for removal be replaced on a diameter-inch per diameter-inch basis. These two Heritage oaks (#25H (31"+18") and 29HV (40") have a combined diameter of 89 diameter inches (see chart, Tree Removals for Construction).

**F. Mitigation Measures (Cont'd)**

Following are the suggested mitigation for these losses:

a. Install 50 fifteen-gallon size oak trees @1" diameter each.
b. Install 15 twenty-four inch box size oaks @2" diameter each.
c. Install 2 forty-eight inch box size oaks (in prominent locations) @5" diameter each.

Total = 67 trees equaling 90 diameter inches

These (67 + 32 = 99) mitigation plantings should be divided evenly between Valley oak (*Quercus lobata*) and California Live oak (*Quercus agrifolia*).

These 99 mitigation oak trees shall be carefully maintained and monitored for a five year period. A watering system must be installed and the trees will be monitored at quarterly intervals for the first two years and biannually for the next three years. A Letter of Compliance will be submitted by the Project Arborist at the end of that time period describing the condition of each tree and recording their chances for long-term survival. The applicant shall be responsible for monitoring and maintaining these mitigation trees for the five year period and no longer. These replacement trees and planting locations shall be approved in advance by a County Forester. The number of mitigation trees required for this project may be off-set by the number of oak trees specified in the proposed landscape plan.

The proposed landscape plan must specify that these mitigation oaks are properly installed, staked/guyed and watered to ensure their survival. An irrigation system designed for newly planted oaks is mandatory for successful tree establishment. Drip-system irrigation is ideal for managing water distribution near oaks.

If a mitigation oak dies during the monitoring period, not as a result of negligence, the applicant shall replace the tree with one (minimum 24" box size) oak tree.

A final determination of the required tree mitigation for this site will be finalized and approved by the LAC Forestry Department.

**F. Mitigation Measures (Cont'd)**

2. "Fencing" of the oaks mentioned under "B"(above) must be in place prior to any construction activities. The project arborist must be present during the fence placement or repositioning. The fencing should be type chain link. Refer to "B" Protective Fencing for additional fencing information.

3. Construction activities that require "encroachment" within any Protective Zone must be monitored on-site by the Oak Tree Consultant.

4. All driveways and/or parking areas which encroach within any Protective Zone must be constructed of permeable materials such as: interlocking cement brick, open-pavers, decomposed granite, gravel, or a similar product that will allow rain-water penetration and sufficient oxygen transfer to the rootzone in this area.

5. Seventeen oaks (#1H,7,20H,21,24,35,36V,38V,42,48V,65HV,97H,99,100H,107, 130,131) will be Impacted by construction within their Protective Zones and/or driplines. This work must be "monitored" by the Oak Tree Consultant. Any trenching or excavating in these areas must be accomplished with hand-tools only. Any roots encountered over 1" diameter must be clean-cut at a 45 degree angle and treated by the Project Arborist

6. Do not park any construction vehicles or workers vehicles under any oaks on this site. A parking area away from oaks should be designated for this purpose.

7. Pruning Permit must be obtained from Los Angeles County prior to cutting any limbs 2" diameter or larger. The project arborist will designate the pruning requirements and monitor all clearance pruning activities.

   All required clearance pruning to accommodate construction and/or provide vehicle clearances must be monitored by the project arborist. The degree of pruning and the style of cuts must be determined and performed in accordance with International Society of Arboriculture, Pruning Standards and ANSI A-300 Pruning Guidelines.

**F. Mitigation Measures (Cont'd)**

8. The installation of the proposed retaining wall within the driplines of Oaks 20H, 38V and 130 (Impacted Tree List) will be monitored by the project arborist. Use care to employ hand-excavation where necessary while performing soil removal or backfill work in these situations.

9. An Oak Tree Information Packet including the County's Tree Ordinance and the Oak Tree Report must be available on-site during construction. The applicant and contractor should be familiar with the contents of these documents.

10. Any roots encountered over 1" diameter will be clean cut at a 45 degree angle and treated by the project arborist.

11. One off-site oak (#1) will be impacted by the deceleration lane construction along the west side of Kanan Road. This work should be monitored.

12. The leaf-litter build-up under the on-site oak canopies is ideal for tree growth and root development. Do not alter or remove if possible.

14. Do not remove the identification tags numbering each oak on this site.

15. No construction materials are to be stored or discarded within the PZ of any oak. Rinse water, concrete residue, liquid contaminates (paint, thinners, gasoline, oils, etc.) of any type shall not be deposited in any form at the base of an oak.

# IMPACTED TREE LIST &

# TREE REMOVALS FOR CONSTRUCTION

## IMPACTED TREE LIST

**For Project Construction Impacts (17 oaks)**

#1 Construction of deceleration zone for project entry to site at Street "A" - Encroachment 5' within east dripline quadrant - * This work must be monitored by the Project Arborist

**#7** Encroachment 4' within the south dripline during grading for Street "A" *

#20H Grading for slope development at southwest quadrant. Install retaining wall at this point to maintain natural grade level. Grading for Street "A"north quadrant

#21 For slope and pad development – encroachment into south canopy quadrant (Lot 43) *

#24 Impacted by grading and slope development within west side PZ *

#35 Impacted by grading and slope development within dripline *

#36 Impacted by grading and slope development within the east dripline *

#38 Impacted by grading and slope development within the west dripline – install retaining wall to maintain natural grade *

#42 Drain installation within the PZ to the dripline at the northwest quadrant *

#48V Drain construction at northwest quadrant *

65HV Grading within western dripline for slope development and for drain construction

97H Grading and slope development at northwest quadrant near Street "D" east of Kanan Road *

99 Encroached upon by Street "F" construction at the east quadrant – Impacted by the storm drain construction along the north quadrant (and Kanan Road deceleration lane along the west side). These impacts combined are significant and will require careful monitoring *

**IMPACTED TREE LIST (Cont'd)**

100H To be encroached upon during Street "F" construction within the southwest dripline to a point 15' from the main trunk *

107 Impacted by acceleration land along east side of Kanan Road within west dripline

130 Impacted by grading along the east quadrant within the dripline. A retaining wall will likely be required to maintain the original grade near the trunk. This wall construction must be monitored by the Project Arborist *

131 Construction of deceleration land along east side of Cornell Road *

| TREE REMOVALS FOR CONSTRUCTION (18 removals) | |
|---|---|
| Tree No. | Diameter in inches |
| 14 | 12+6 = 18 |
| 18 | 10+9 = 19 |
| 19V | 22 |
| 22 | 7+6+3 = 16 |
| 23 | 8 |
| 25H | 31+18 = 59 |
| 26 | 19 |
| 27 | 19+10 = 29 |
| 28 | 8+8 = 16 |
| 29HV | 40 |
| 30 | 13+7 = 20 |
| 31 | 16 |
| 32 | 14 |
| 37V | 10 |
| 41 | 7+6 = 13 |
| 43 | 8+7 = 15 |
| 98V | 23 |
| 132V | 6+5+5= 16 |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | **TOTAL = 373 DIA. INCHES** |

Total Diameter Inch Calculation = 373

# PHOTOGRAPHS

Photo #9 - Looking northeast - Tree #19 to be removed for road construction
#20 & 21 Impacted by Pad development Lot 44

Photo #10 - Looking south at oaks to be removed for lot development-

**Photo #11 - Looking south at oak to be impacted by slope development and grading**

**Photo #12 - Looking south - To be removed for grading and road construction**

Photo #13 - Looking south - Oak to be removed

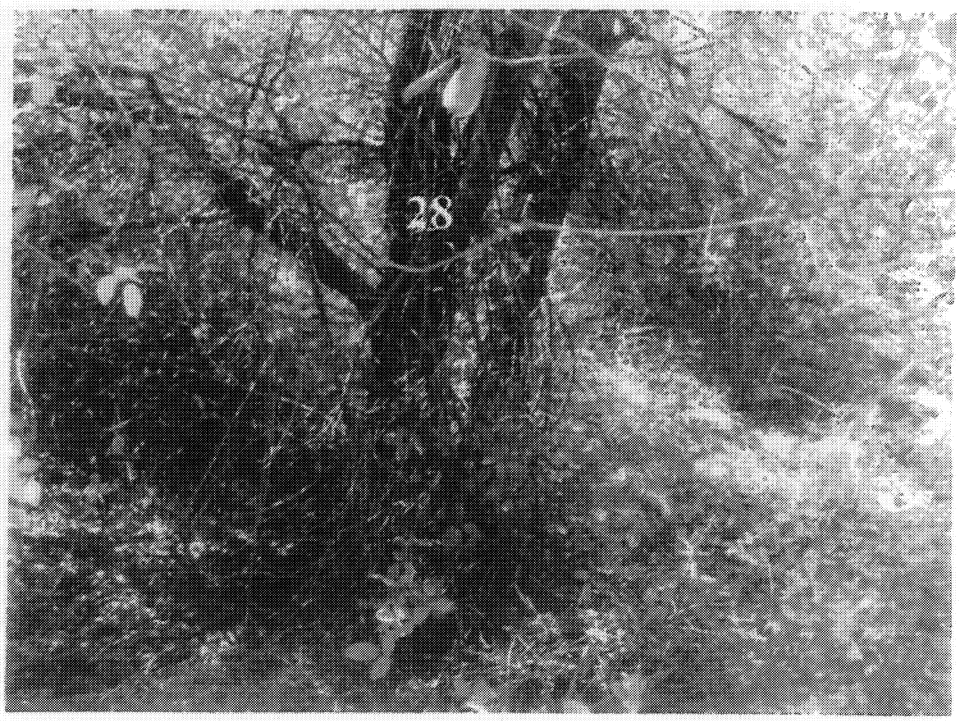



Photo #14 - Looking westward - Oak to be removed

Photo #15 - Looking south (remove #29,30 & 31 for construction

Photo #16 - Looking southward

Photo #21 - Looking southeastward (remove #37 for graded slope construction)

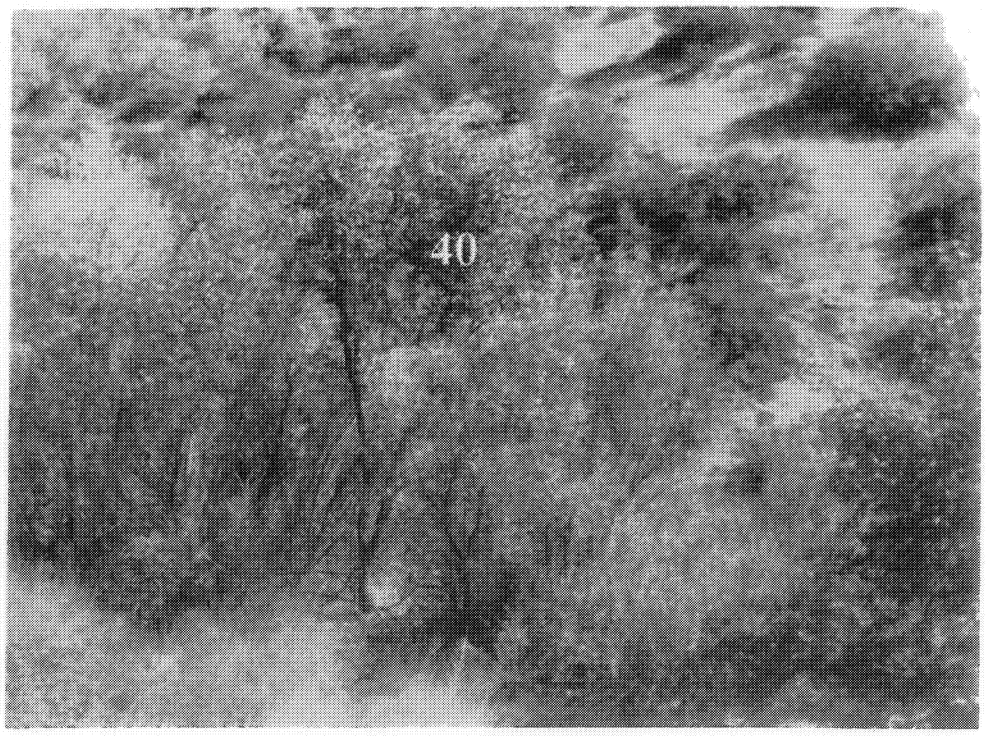



Photo #22 - Looking southeast -

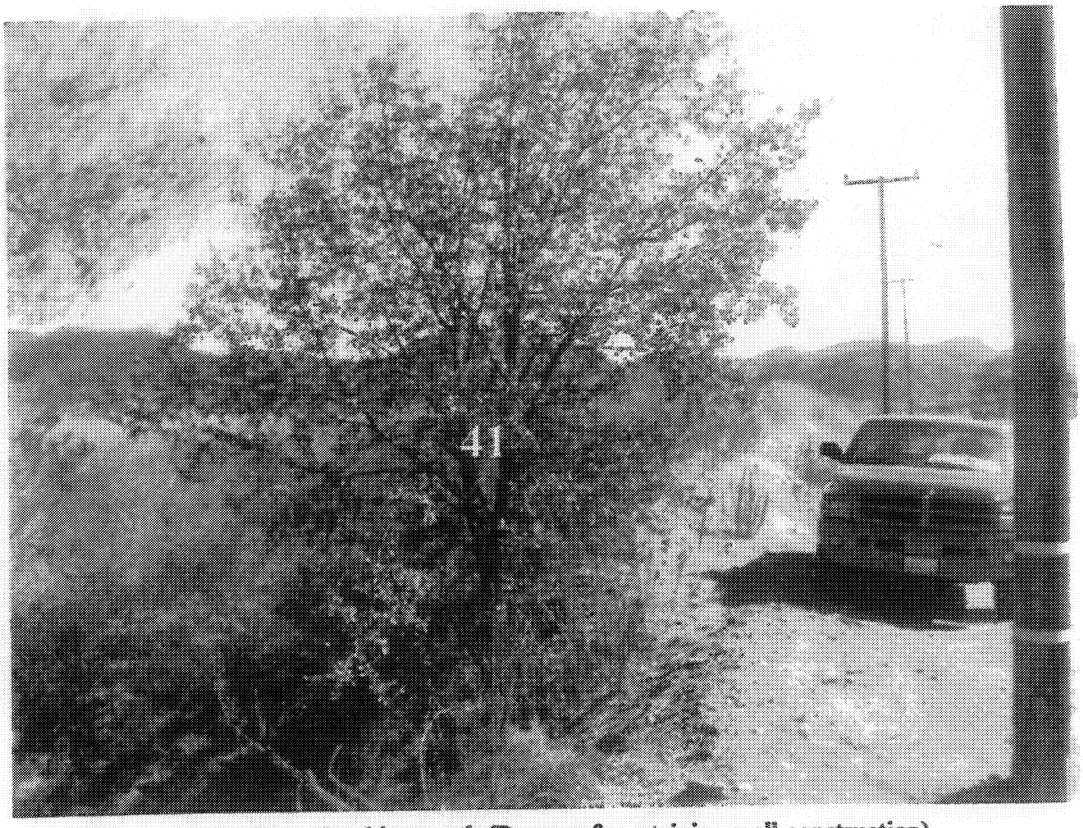



Photo #23 - Looking south (Remove for retaining wall construction)

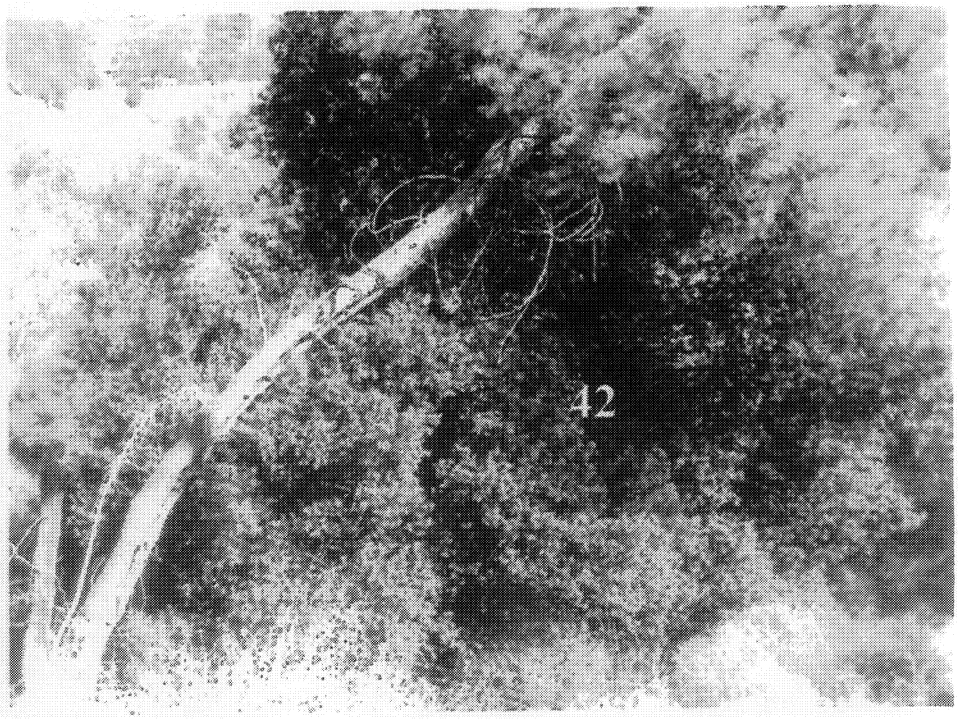



Photo #24 - Looking east from edge of Kanan Road

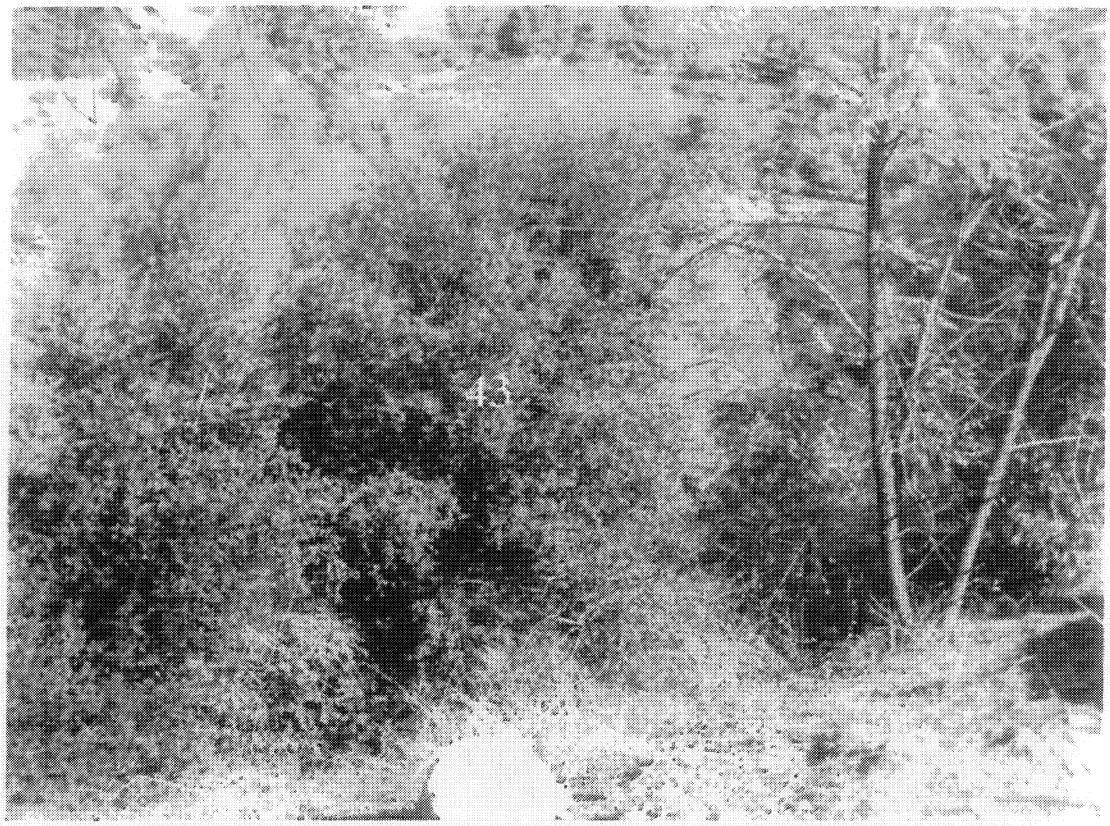



Photo #25 - Looking east from Kanan Road (remove for retaining wall const.)

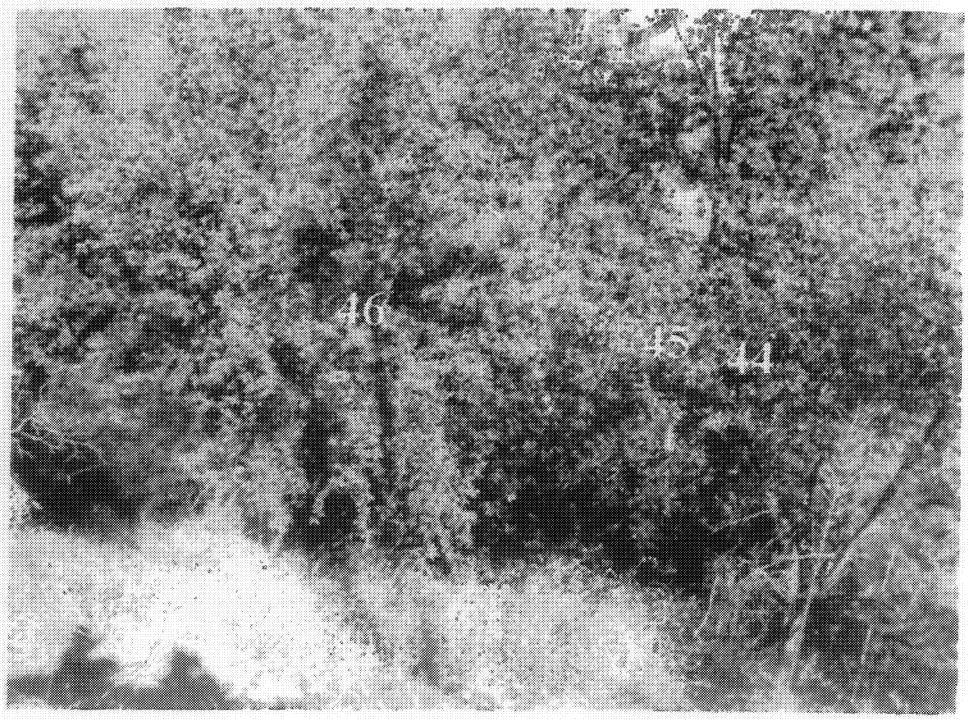



Photo #26 - Looking east from Kanan Road

Photo #37 - Looking south along Kanan Road (impacted by deceleration lane construction)

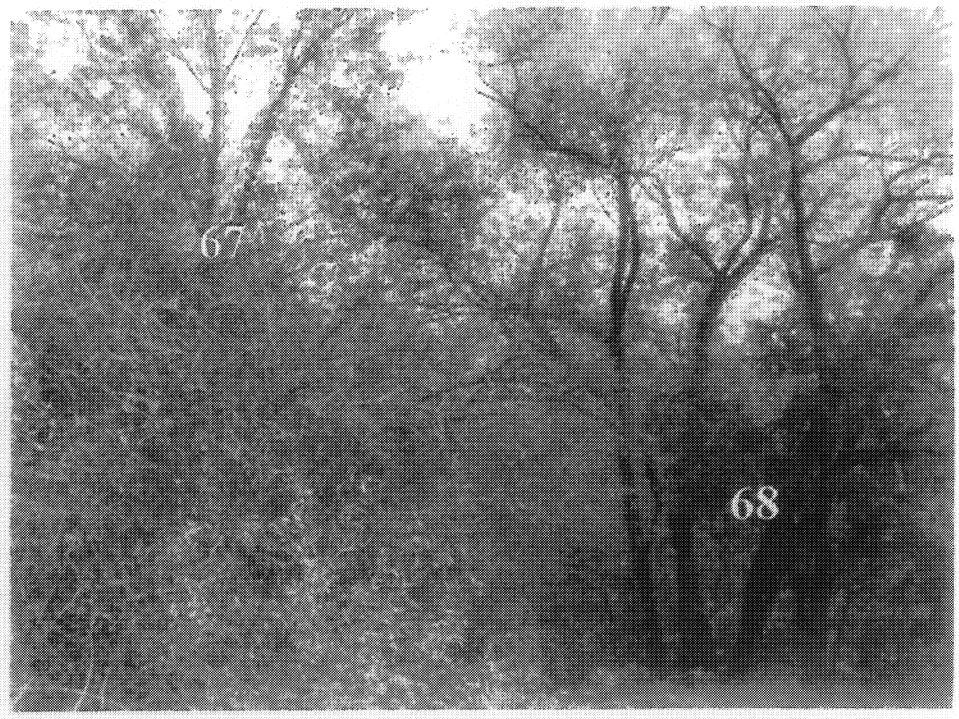



Photo #38 - Looking eastward along Medea Creek drainage

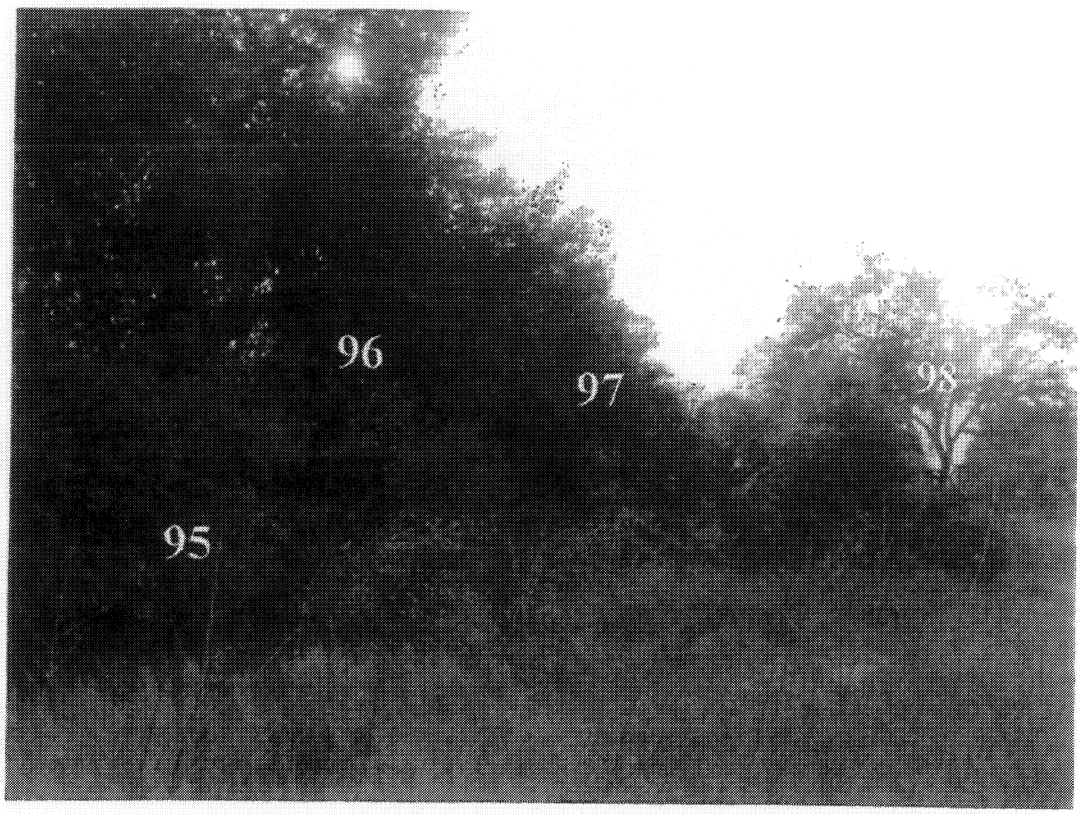



**Photo #47 - Looking west at oaks east of Kanan Road (Remove #98 for graded slope construction)**

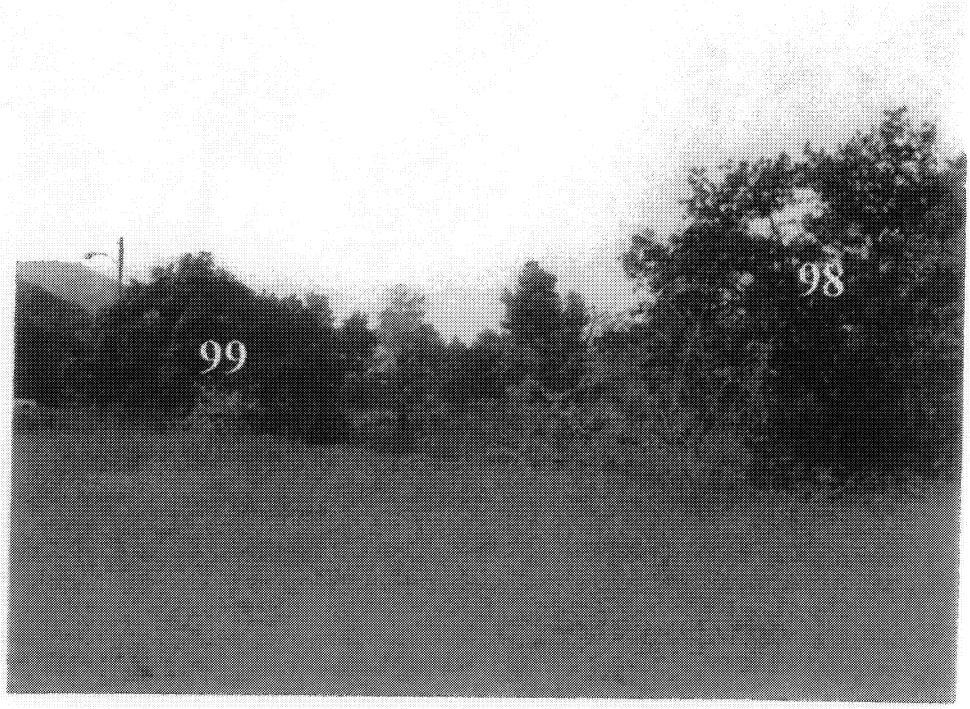



**Photo #48 - Looking northward- Oaks between Kanan Road and Cornell Road (#99 impacted by storm drain installation)**

Photo #51 - Looking northwest at oaks east along Kanan Road

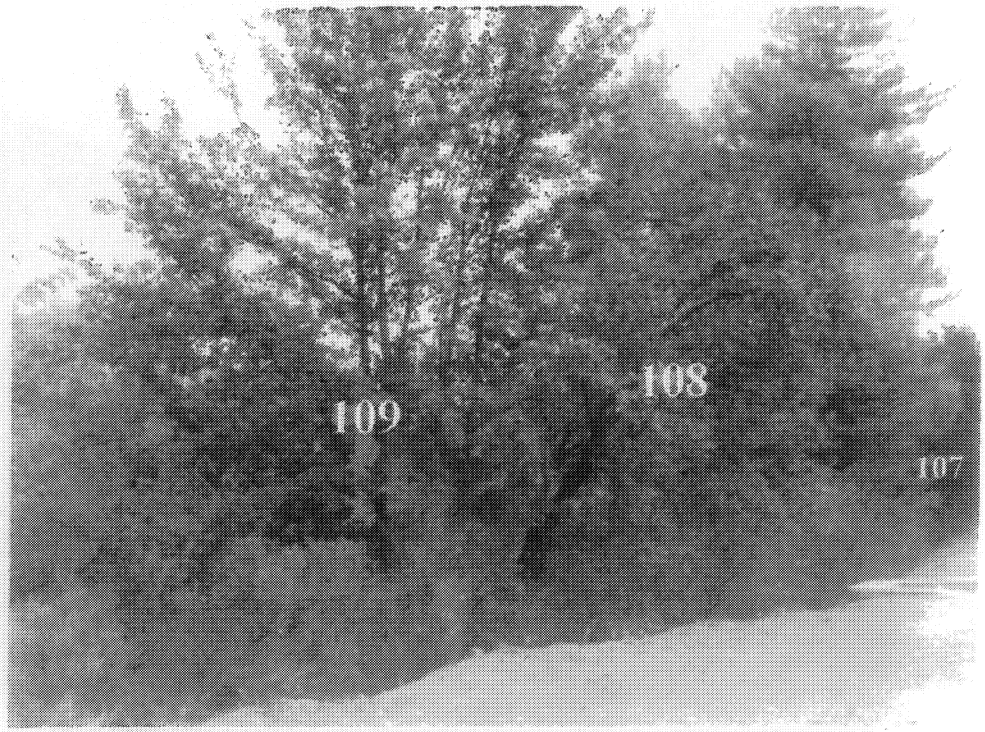



Photo #52 - Looking southward at oaks growing at edge of Kanan Road

Photo #59 - Looking southeastward at oaks along east side of Cornell Road
(Oak #132 is to be removed for deceleration lane - Oak #131 will be impacted)

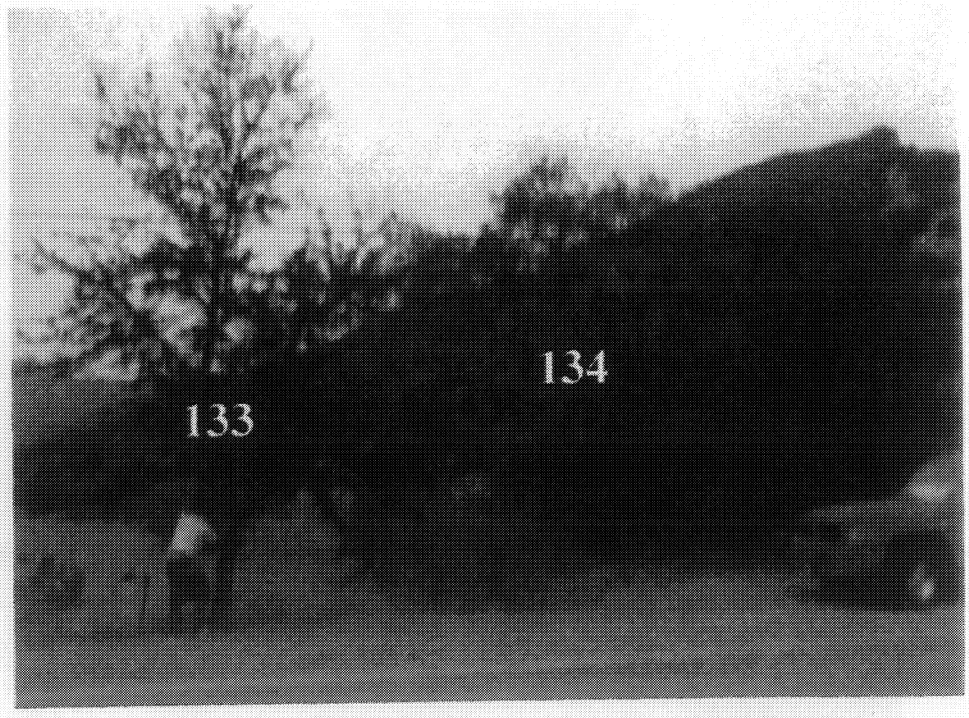



Photo #60 - Looking eastward at off-site oaks east of Cornell Road

# APPENDIX

## APPENDIX

### GLOSSARY OF TERMS

Terminolgy utilized in Summary of Field Inspection worksheets

1. Tree Number – The number on the TLM coincides with the tag number attached to each tree in the study area.

2. Trunk Diameter - Most of the oaks were measured at 4 ½ feet above grade or diameter at breast height (DBH). Those trees where measurement at 4 ½ feet would not produce an accurate width due to a tree crotch or anomaly at that height, were then measured below the main crotch (BMC). This will usually result in a more accurate picture of the actual size of a tree. All oak trees where the main stem equaled 8" diameter or more were included in the study as required by the Tree Protection Ordinance. Multi trunk oaks included in the study must have at least two trunks equaling 12" diameter, i.e., 5" + 7" or 6" + 6".

3. Height & Canopy Spread – Tree height was calculated using a clinometer. In areas of rough terrain or where canopies were crowded, heights were estimated. The canopy spreads were measured by rangefinder or measuring tape. In areas of difficult terrain or where tree canopies were naturally pleached, the spreads were estimated.

4. Tree Declining – The health and condition of the tree is declining. This could be the result of many influences such as: nearing end of life span, disease, drought, insect attack, nutrient deficiency, cultural impacts (over-watering, etc.). For the purposes of this report an X in this column is usually referring to an irreversible condition.

5. Mainstem Dieback – An area of deadwood at the upper or outer edge of the canopy. This is usually a symptom of tree decline. In many cases the tree may recover on its own or with the help of remedial measures.

6. Soil Buildup at Base – Soil has been raised naturally (as on a slope) or unnaturally by construction or landscaping activities. Oak trees are very sensitive to grade changes, particularly near the root collar. Many oaks die from slight grade changes that obscure the root collar by even a few inches.

**Rating**

7. Health – This is an assessment of each tree's overall condition and vigor based on a visual, above-ground inspection (A.Excellent, B. Good, C. Fair, D. Poor, E. Nearly Dead, F. Dead)

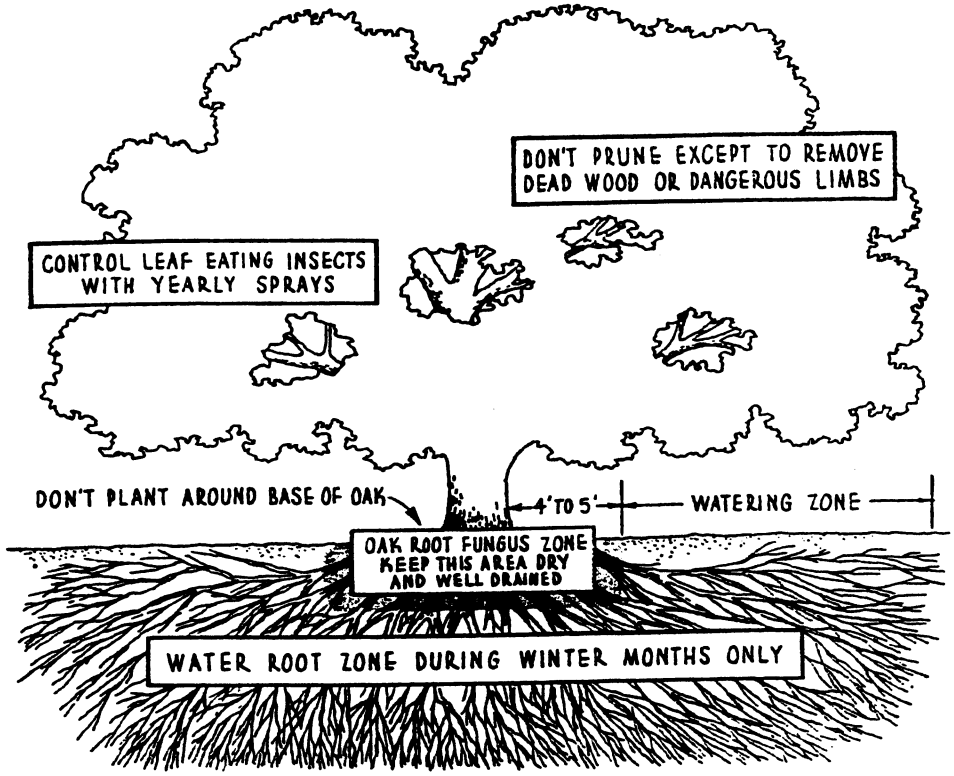
8. Aethetics and Conformity – An appraisal of the tree's form and its association with adjacent trees or objects (wall, homes, etc.). Example: an oak may be poorly balanced and deformed due to growing in close proximity (or under) a larger oak. This tree would receive a "D" (Poor) rating in this column.

9. Balance – This rating is based on the archetypical form (stout, straight trunk) for the species being appraised. Oaks with an unnatural lean of 20 degrees greater or an oblique (disproportioned) canopy would receive a "C" or "D" rating.

10. Protective Zone (PZ) = The zone of protection around an oak tree where all proposed construction activities are to be documented, authorized and monitored. The County of Los Angeles, Oak Tree Ordinance describes this zone as that point 5 feet outside the dripline (outer edge of canopy) peripherally or 15 feet from the trunk, whichever is farther. Any construction activity that enters into this zone is considered encroachment and does require a Permit and/or Oak Tree Report.

11. Dripline = That invisible line extending from the outer edge (circumference) of the tree canopy downward to the earth.

# "HOW TO KEEP AN OAK ALIVE"




**The handsome** *coast live oak is an asset to your property, worthy of a little extra care*

SOUTHERN CALIFORNIA PROBLEM . . .

# *How to keep a live oak alive*

**Although it has proved** to be one of our most picturesque garden trees, the coast live oak poses some tricky problems of garden care. Now that Southern California is going into the tenth year of a long-term drought, the decline and loss of these oaks in gardens calls for some review of the rules for their care.

## Watch for oak root fungus

Inspect your oak tree for oak root fungus each year. It prevails in many areas. It's an easy disease to identify and, if you do find it on your tree, there are ways to stop it. If it hasn't gone too far, you can take steps to prevent further damage.

If clusters of mushrooms appear at the base of the tree in late fall and winter, these usually indicate an advanced stage of the disease. Cleavage lines in the bark at the base of the trunk are a strong indication of severe damage. You can also identify this disease by the wide, cream colored, fan-shaped fungus layer that grows between the bark and wood.

To determine which are the damaged areas, you have to cut the bark in small test areas around the root crown and pull it away from the trunk and roots. In active stages of development, the fresh, watery, soft tissues of the fungus invade the wood and bark and give off a sharp, mushroom odor.

Controlling this oak root fungus disease is difficult, but if you can check the early stages of infection, the life of the tree can be prolonged.

Carefully remove the diseased roots and tissue. Then disinfect the cuts, and feed the tree. The photographs on pages 158 and 159 show how you can check the growth of this fungus by digging away the soil from the trunks and root crowns. The exposure to air and the drying will aid considerably in arresting the advance of the fungus.

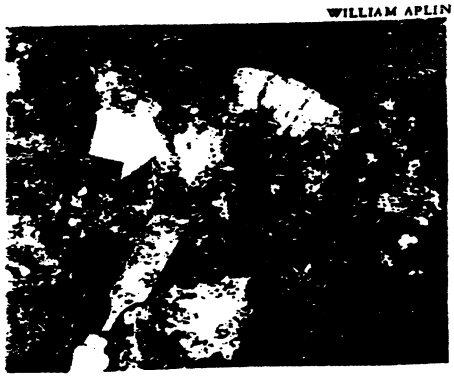
## Live oaks prefer winter watering

You help prevent or arrest oak root fungus growth when you try to water your oak trees in a manner to which they were accustomed before you took over their maintenance. Under their natural

## How to recognize oak root fungus

WILLIAM APLIN

1. *Deep splits such as these in the bark at the base of trunk are often strong indications of an active oak root fungus*



2. *This cream colored, fan-shaped growth under tree bark and on exposed roots shows oak root fungus active*

WILLIAM APTIN

**Surgical control** *of oak root fungus means cutting away all infected bark or wood, disinfecting and keeping the areas exposed*

**Galvanized metal** *is used to hold soil back in this tree well. Very economical and easy to install. Will last for many years*

growing conditions, they usually receive the majority of their moisture during the winter months. They are not as happy when they receive a lot of water during the dry summer months.

In years of normal rainfall, the soil usually takes in sufficient moisture during the winter months to carry these trees over the balance of the year. But during the last 10 years, lack of rainfall has practically eliminated any water table that might help even these deep-rooted trees.

In gardens, the walks, structures of all kinds, and lack of natural mulches also cut off much natural absorption. This lack has brought on a progressive deterioration of the roots as well as the tops.

In a weakened condition, the oaks are much more susceptible to some diseases and insects. The best possible remedy seems to be deep winter irrigation to provide the trees with a more normal water supply.

For deep irrigations from December to April, you might use a soil soaker or a sprinkler, or run water in a deep trench just inside the drip line for a period of 10 to 12 hours each winter month as long as drought conditions exist. Another possibility is to use sub-irrigating attachments that can be pushed into the soil around the trees and allowed to run for at least 6 or 8 hours in four or five positions at the drip line of the tree.

## Should you plant around the base?

Common sense seems to indicate that trees without underplanting can lead a more normal life; they don't have to put up with shallow waterings that tend to keep the root areas moist at all times.

These waterings create out-of-season moisture problems and are an invitation to oak root fungus troubles.

If you must plant around the base of oaks, use plant material that goes dormant during the summer months—shade loving natives such as evergreen currant *(Ribes viburnifolium)*, fuchsia flowered gooseberry *(Ribes speciosum)*, island alum root *(Heuchera maxima)*, and wild strawberry *(Fragaria chiloensis)*. Even these should be planted at least 6 feet from the tree trunk.

Moisture loving plants, such as tuberous begonias, camellias, rhododendrons, and ferns should never be planted near oaks—constant moisture at the base of the trunk makes the tree vulnerable to crown rot and oak root fungus, and rots primary as well as feeder roots.

You will hear pros and cons on the matter of growing a lawn under oaks. In deep, sandy, well drained soil, you probably will not run into trouble if: (1) you provide a natural grade away from the tree; and (2) you divert water from sprinklers away from the trunk.

Heavy adobe or clay soils present additional problems. A dense turf or compacted soil can greatly reduce aeration in the soil. Reduced aeration, plus excessive water, favors development of harmful soil organisms such as oak root fungus, which may be present in an inactive state until stimulated by favorable growing conditions or even mechanical root injury.

## Heavy pruning can be hard on oaks

Don't prune your trees just to make them look more attractive. Pruning excessively or thinning limbs to expose the stem pattern may kill the tree. Prune only to remove dead wood or dangerous branches.

Experience has shown that any pruning of coast live oaks should be done only during July and August. A relatively low amount of new growth takes place at this time, compared to the heavy flush in the spring months. Also, there is least likelihood of mildew, which usually has a decided weakening effect on oaks during the spring months.

Heavy pruning and mildew attacks have often been mentioned as principal reasons for oak trees' decline in vigor. The excessive pruning often begins a vicious cycle of forced new growth, which becomes subject to attack by diseases—primarily a powdery mildew which occurs on the new shoots and leaves. This is called tip mildew. The surface of these new shoots and leaves becomes covered with a powdery, white growth.

These diseased shoots develop as a cluster of shortened, fleshy, main stem and lateral branches bearing tiny stunted leaves. They later turn brown and dry, and shrivel up.

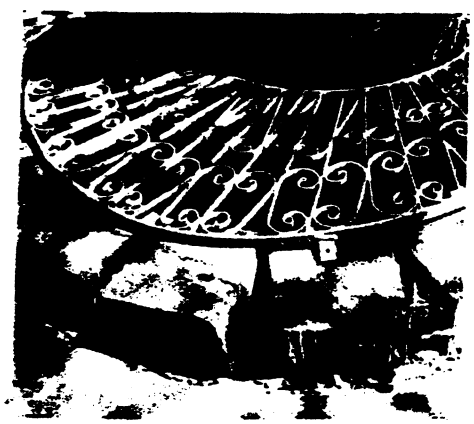
## Control the destructive insects

Three oak insects seem to cause the greatest amount of trouble: the larvae of the leaf eating California oak moth, the twig killing larvae of the oak twig girdler, and the common nuisance, the crown whitefly.

**Oak moth.** This is the most common and the most serious insect contributing to the decline of oak trees. It can consume the full leaf or portions of it, leaving only a network of veins. With serious infestations the entire tree, or a portion of it, may be defoliated.

The larvae that do the chewing are about an inch long and olive green with a prominent black and yellow stripe on the side

**Exposed roots** *at the base of oak trees will help prevent fungus attacks on healthy trees and further spread on diseased ones*



**Tree well** *of 6-inch redwood posts and ornamental grating protect base of oak in a patio 6 feet above the natural soil level*

and back. Two broods usually develop—in spring and summer. The adult moths appear and lay their eggs in October and November. The eggs hatch during the later winter and spring months. Then the spring-hatched larvae become mature moths and lay another crop of eggs, which in turn hatch and become leaf-eating larvae for the second time during the year.

To get effective control of both the adults and larvae on large trees, it is necessary to spray thoroughly with a power sprayer. Most spray companies use 50 per cent wettable DDT powder at the rate of 2 pounds per 100 gallons of water.

Others use malathion or chlordane alone or as additives. The spray should be applied when leaf damage is noted, from the middle of March through April or May, and then possibly again when the moths are flying in June, July, or August. In gardens where fish pools are located under oak trees, use cryolite (it doesn't kill fish), or cover the pool with a sheet of polyethylene film during the spraying.

**Oak twig girdler.** This is the next most damaging insect. In the photograph shown below, the injury is indicated by patches of dead leaves on various parts of the tree. On a severely infested tree, all the leaves may be dead. The leaves die because their source of water and nutrients has been cut off by this insect's twig girdling. Usually, the damaged twigs will be less than half an inch in diameter.

WILLIAM APLIN

**Patches of dead** *leaves throughout tree are indication of oak twig girdler. Sprays to control are only effective in May and June*

You can find the twig girdler's burrow by peeling the bark from a dead twig. Since the mature larva works inside the twig, the only way to control its activity is to destroy it when it emerges in May and June. Since the life cycle occupies two years, there is only about 1 month in 24 in which the insect is outside the twig and can be contacted with a spray.

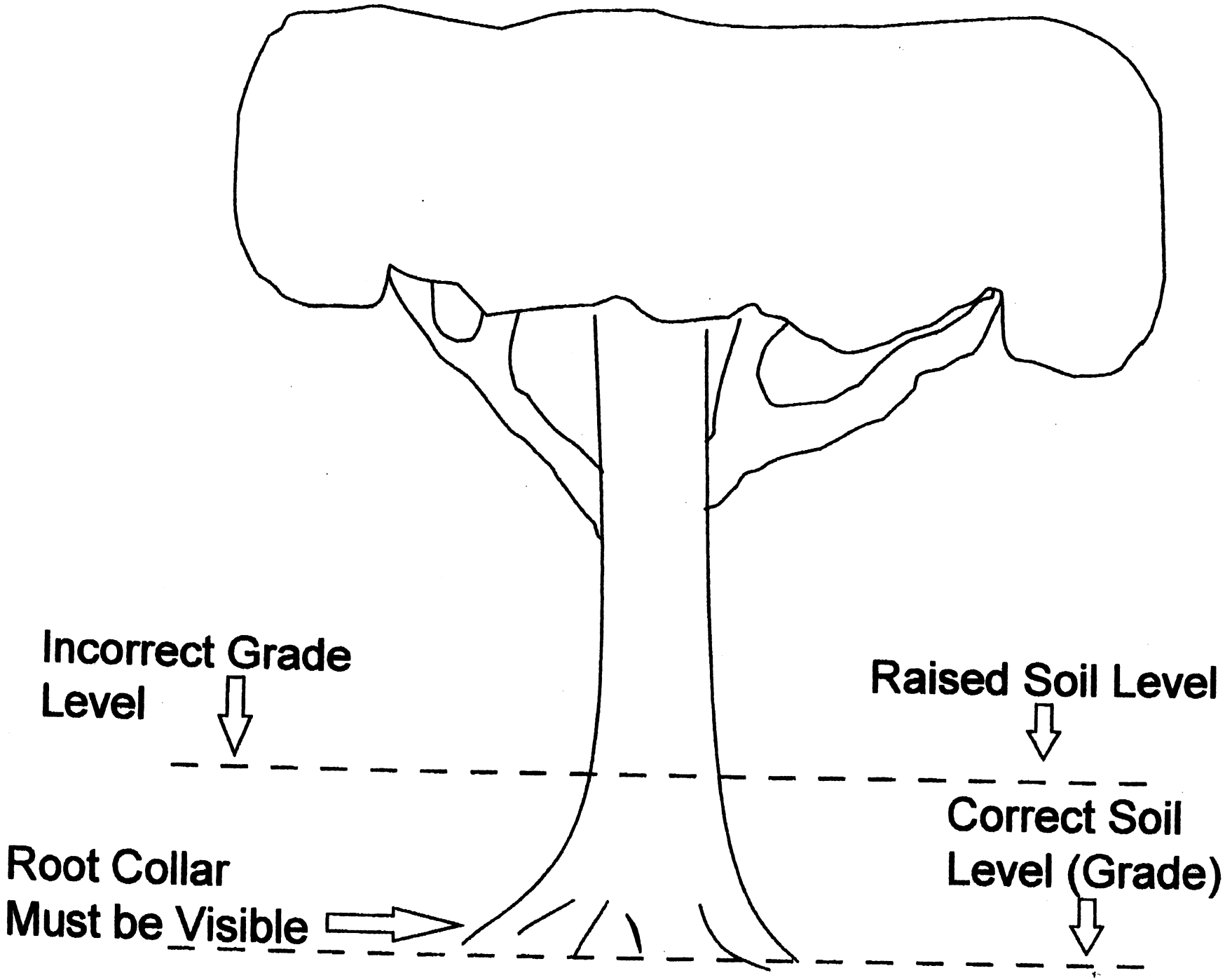
Presently, DDT in the same formula used on oak moth is used as a control spray. Cryolite is not effective. Best control is obtained when you continue this program over a period of at least 3 to 4 years. Where there is heavy infestation, 2 yearly sprayings are recommended. The first of these should be applied during the latter part of May or the first part of June, and the second during the latter half of June and the first half of July.

**Crown whitefly.** Swarms of this tiny, white, gnat-like insect appear mostly during the spring months and suck sap from the leaves. When they take over a healthy tree, little harm is done. But when they attack sickly or damaged trees, they add their bit to the decline of the tree. In most cases the damage is slight, and specific control measures are rarely necessary. Spraying these insects in early spring has often been found more harmful than beneficial to tender foliage.

Spraying a large 50 to 75-foot oak tree is no job for the home sprayer. Only power sprayers have the capacity to reach into these large trees and apply the spray where it's needed. Commercial spray companies have become well acquainted with the oak tree insects and understand their type of damage and the best timing of controls.

Your money will be well spent if you hire a commercial spray operator to spray at the proper times. He can usually work out your oak tree spraying program on a yearly basis, watching your trees and coming in whenever spraying is necessary. Your trees will be sprayed even while you're on a trip or vacation. Some spray companies include free consultation with their contract.

For more help on live oak problems, read *If you own a native California oak* in the April 1955 *Sunset*.


Incorrect Grade Level
Raised Soil Level
Correct Soil Level (Grade)
Root Collar Must be Visible

# RESUME

**ROBERT W. WALLACE**
**ARBORICULTURAL CONSULTANT**
8458 Eton Avenue
Canoga Park, CA 91304
(818) 341-5576
Liability Insured

## DEGREES AND LICENSES

Certified Crop Advisor (California/National) - 2001
California State licensed Pest Control Advisor (since 1979)
International Society of Arboriculture - Certified Arborist (since 1989)
California Pesticide Applicator's license (since 1979)
A.S. Degree in Horticulture (1982) - Pierce Junior College, Woodland Hills, California - 1983
Qualified as a Tree Surgeon by the City of Los Angeles – 1969 & 1989

## AFFILIATIONS AND MEMBERSHIPS

| | |
|---|---|
| Owner | Tree Life Concern, Inc. – 1989 to present |
| Member | American Society of Consulting Arborists - 1990 |
| Member | California Agricultural Production Consultants Assoc. - 1979 |
| Member | California Native Plant Society |
| Member | California Oak Foundation |
| Member | Professional Association of Pesticide Applicators |
| Member | Western Chapter International Society of Arboriculture - 1989 |

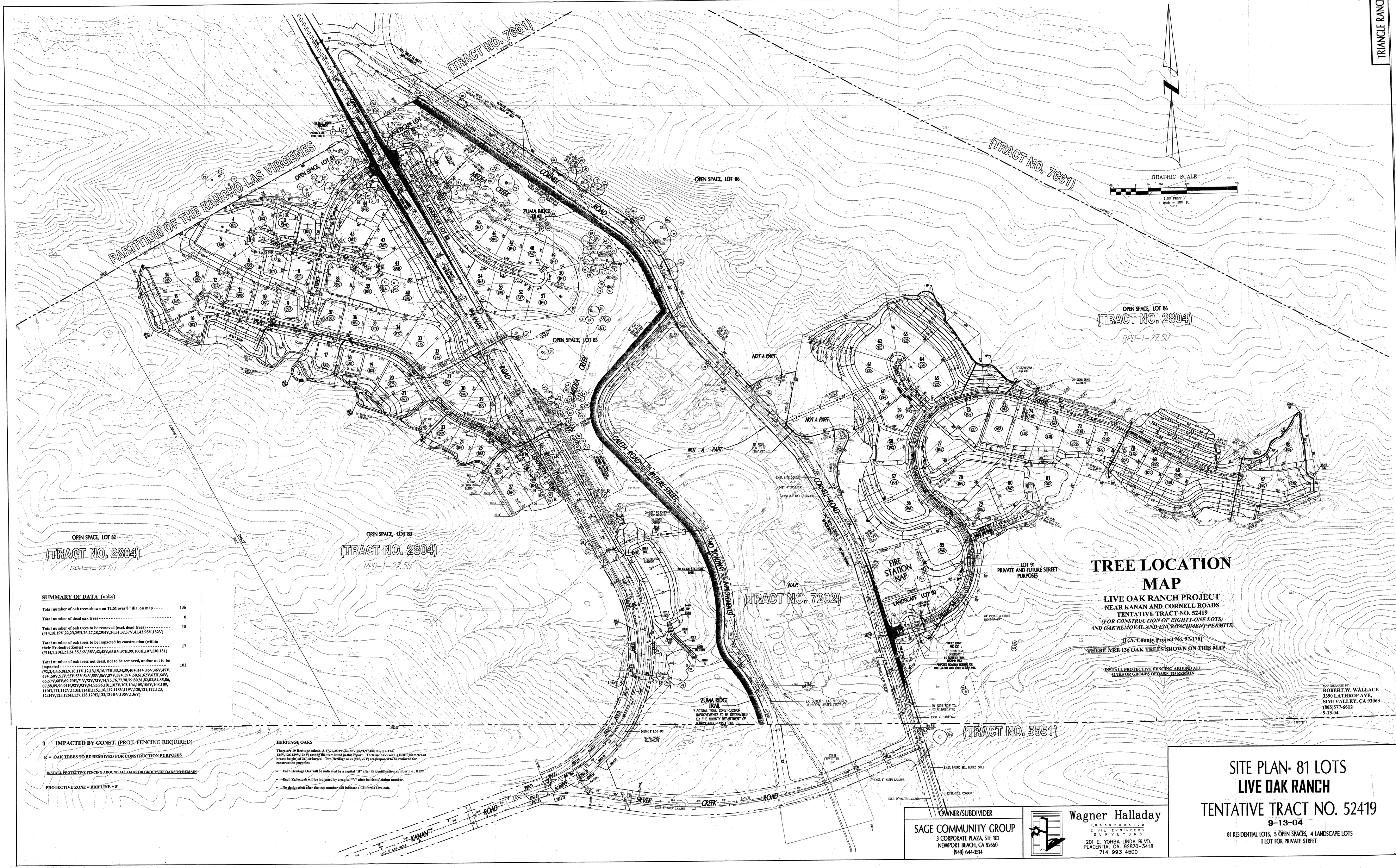
## PROFESSIONAL RECOGNITION

| | |
|---|---|
| City of Beverly Hills | Tree Expert |
| County of Los Angeles | Oak Tree Consultant |
| City of Los Angeles | Qualified Oak Tree Experts |
| City of Santa Clarita | Oak Tree Consultant |
| City of Calabasas | Oak Tree Consultant |
| Faculty Member (1991-1994) | Learning Tree University, Chatsworth, CA., Classes taught; Preserving the California Oak Tree, Environmentally Safe Pest Control, Tree Pruning |
| Tree People (Los Angeles) | Lecturer (Pruning, Insect and Disease I.D.) Monitor "Dr. Tree Hotline" |
| Seminar speaker | Professional Assoc. of Pesticide Applicators (PAPA) WCISA Regional Conference (Common Pests in So. Cal.) |

## WORK EXPERIENCE

| | |
|---|---|
| 1993 - 2001 | City Arborist Consultant (1 of 4) - City of Calabasas, CA |
| 1989 - Present | Arboricultural Consultant/Owner Tree Life Concern, Inc. Expert Witness and Litigation Consultant |
| 1979 - 1989 | Owner/Operator Wagner Pest Control Company - Diagnosis and treatment of insect, disease, weed, and nutrient deficiency problems for large estate landscapes, corporations, and residential properties; horticultural consultant |
| 1978 - 1979 | Foreman - Line Clearing Crew, Farrens Tree Surgeons, GA |
| 1975 - 1978 | Tree Trimmer Working Foreman, City of Los Angeles, CA |
| 1974 - 1975 | Tree Surgeon - City of Los Angeles |
| 1970 - 1974 | USAF |
| 1969 - 1970 | Tree Surgeon - City of Los Angeles |
| 1968 - 1969 | Tree Trimmer Assistant - City of Los Angeles |
| 1958 - 1968 | Groundman - Family Tree Business, Canoga Park, CA |

TRIANGLE RANCH




## TREE LOCATION MAP

**LIVE OAK RANCH PROJECT**
**NEAR KANAN AND CORNELL ROADS**
**TENTATIVE TRACT NO. 52419**
*(FOR CONSTRUCTION OF EIGHTY-ONE LOTS)*
*AND OAK REMOVAL AND ENCROACHMENT PERMITS)*

L.A. County Project No. 97-178

THERE ARE 136 OAK TREES SHOWN ON THIS MAP

INSTALL PROTECTIVE FENCING AROUND ALL OAKS OR GROUPS OF OAKS TO REMAIN


MAP PREPARED BY
ROBERT W. WALLACE
3390 LATHROP AVE.
SIMI VALLEY, CA 93063
(805)577-6612
9-13-04


### SUMMARY OF DATA (oaks)

| | |
|---|---|
| Total number of oak trees shown on TLM over 8" dia. on map | 136 |
| Total number of dead oak trees | 0 |
| Total number of oak trees to be removed (excl. dead trees) (#14,18,19V,22,23,25H,26,27,28,29HV,30,31,32,37V,41,43,98V,132V) | 18 |
| Total number of oak trees to be impacted by construction (within their Protective Zones) (#11H,7,20H,21,24,35,36V,38V,42,48V,65HV,97H,99,100H,107,130,131) | 17 |
| Total number of oak trees not dead, not to be removed, and/or not to be impacted (#2,3,4,5,6,8H,9,10,11V,12,13,15,16,17H,33,34,39,40V,44V,45V,46V,47V, 49V,50V,51V,52V,53V,54V,55V,56V,57V,58V,59V,60,61,63V,63H,64V, 66,67V,68V,69,70H,71V,72V,73V,74,75,76,77,78,79,80,81,82,83,84,85,86, 87,88,89,90,91H,92V,93V,94,95,96,101,102V,103,104,105,106V,108,109, 110H,111,112V,113H,114H,115,116,117,118V,119V,120,121,122,123, 124HV,125,126H,127,128,129H,133,134HV,135V,136V) | 101 |

1 = IMPACTED BY CONST. (PROT. FENCING REQUIRED)

R = OAK TREES TO BE REMOVED FOR CONSTRUCTION PURPOSES

INSTALL PROTECTIVE FENCING AROUND ALL OAKS OR GROUPS OF OAKS TO REMAIN

PROTECTIVE ZONE = DRIPLINE + 5'

**HERITAGE OAKS**

There are 19 Heritage oaks(#1,8,17,33,35,25V,53,65V,70,91,97,100,110,113,115, 125V,126,129V,134V) among the trees listed in this report. Thus my oaks with a DBH (diameter at breast height) of 36" or larger. Two Heritage oaks (#25, 29V) are proposed to be removed for construction purposes.

- Each Heritage Oak will be indicated by a capital "H" after its identification number, i.e., H128.
- Each Valley oak will be indicated by a capital "V" after its identification number.
- No designation after the tree number will indicate a California Live oak.

OWNER/SUBDIVIDER
SAGE COMMUNITY GROUP
3 CORPORATE PLAZA, STE 102
NEWPORT BEACH, CA 92660
(949) 644-3514


Wagner Halladay
INCORPORATED
CIVIL ENGINEERS
SURVEYORS
201 E. YORBA LINDA BLVD.
PLACENTIA, CA. 92870-3418
714 993 4500


# SITE PLAN- 81 LOTS
# LIVE OAK RANCH
## TENTATIVE TRACT NO. 52419
**9-13-04**

81 RESIDENTIAL LOTS, 5 OPEN SPACES, 4 LANDSCAPE LOTS
1 LOT FOR PRIVATE STREET

# 3 9-13-04
# oversize

# *DRAFT ENVIRONMENTAL IMPACT REPORT*

## *TECHNICAL APPENDICES*

# *Vesting Tentative Tract No. 52419*

***Volume 2 of 2***

**County of Los Angeles**

**Los Angeles County Project No. 97-178**

March, 2005

# Draft Environmental Impact Report

## Technical Appendices
## Volume 2 of 2

**Vesting Tentative Tract No. 52419**
**Triangle Ranch**

County of Los Angeles Project No. 97-178
SCH 1998111091

Tentative Tract No. 52419
Conditional Use Permit
Oak Tree Permit

County of Los Angeles
Department of Regional Planning
320 West Temple Street
Los Angeles, California 90012

March 2005

# Technical Appendices
# Volume 2 of 2

## TABLE OF CONTENTS

C-6 PCR Services Corporation, Investigation of Jurisdictional Waters of the United States on the Live Oak Ranch Property, October 16, 2003

C-7 Ivy Landscape Architects, Inc., Plant Palette; April 6, 1999

C-8 PCR Services Corporation, Quino Checkerspot Butterfly Survey Report, Live Oak Ranch, June 22, 1999

C-9 PCR Services Corporation, Least Bell's Vireo Survey report, Live Oak Ranch, August 24, 1999

C-10 TW Biological Services, Southwestern Willow Flycatcher Survey Report, Live Oak Ranch, September 19, 1999

C-11 Impact Sciences Inc., and The Planning Associates , Focused surveys for the federally endangered Lyon's pentachaeta (Pentachaeta lyonii A. Gray) and the Threatened Santa Monica Mountains Dudleya (Dudleya cymosa ovatifolia (Britton) Moran) on the Triangle Ranch, Los Angeles County, California, June 2003

C-12 Dizin Landscape Architects, Comprehensive Mixed Oak Woodland Revegetation Plan (map), May 2004

C-13 Thomas Leslie Corporation, Tentative Tract No. 52419 (Triangle Ranch), undated memo (Appendix C-13).

D. Traffic Report

Kimley-Horn and Associates, Inc., Traffic Impact Study for Triangle Ranch; March 1999 (Revised September 2003)

E. Drainage Concept Plan

Wagner Halladay, Inc., Drainage Concept, Hydrology Calculations and Standard Urban Stormwater Mitigation Plan, Tract 52419 (Revised), Triangle Ranch, October 15, 2004

**Technical Appendices**
**Volume 2 of 2**

**TABLE OF CONTENTS (Contd.)**

F. Noise Impact Analysis

Giroux and Associates Environmental Consultants, Noise Impact Analysis, Triangle Ranch, Tract No. 52419, County of Los Angeles, California, October 8, 2003

G. Water Quality

G-1 US Environmental Protection Agency, Region 9, Total Maximum Daily Loads for Nutrients, Malibu Creek Watershed, Published March 21, 2003

G-2 California Regional Water Quality Control Board, Los Angeles, Total Maximum Daily Loads for Bacteria, Malibu Creek Watershed, January 29, 2004

H. Preliminary Water System Design Report

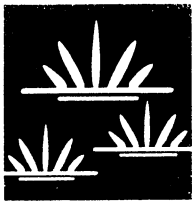
Las Virgenes Municipal Water District, Los Angeles, Preliminary Water Design Report for Tentative Tract No. 52419 Triangle Ranch, March 2004

# APPENDIX C-6

**Investigation of Jurisdictional Waters of the United States on the Triangle Ranch Property, prepared by Glenn Lukos Associates, October 16, 2003**

GLENN LUKOS ASSOCIATES

Regulatory Services



October 16, 2003

Mr. Hardy Strozier
The Planning Associates
3151 Airway Avenue, Suite R-1
Costa Mesa, California 92626

SUBJECT: Jurisdictional Delineation of the Triangle Ranch Project in Agoura Hills, Los Angeles County, California.

Dear Mr. Strozier:

This letter report summarizes our preliminary findings of U.S. Army Corps of Engineers (Corps) and California Department of Fish and Game (CDFG) jurisdiction for the above-referenced property.[1]

The Triangle Ranch project site in Los Angeles County [Exhibit 1] comprises approximately 377 acres and contains three blue-line drainages (as depicted on the U.S. Geological Survey (USGS) topographic maps Calabasas and Thousand Oaks, California [dated 1952 and 1650, and photorevised in 1967 and 1981, respectively) [Exhibit 2]. On August 6 and 18, 2003, regulatory specialists of Glenn Lukos Associates, Inc. (GLA) examined the project site to review the results of a jurisdictional delineation conducted by GLA in 1997, and, where necessary, update/modify the limits of Corps jurisdiction pursuant to Section 404 of the Clean Water Act. In addition, GLA reviewed the limits and as appropriate, updated the limits for areas subject to the jurisdiction of CDFG pursuant to Division 2, Chapter 6, Section 1600 of the Fish and Game Code. Enclosed is a 200-scale map [Exhibit 3] which depicts the areas of Corps and CDFG jurisdiction. Photographs to document the topography, vegetative communities, and general widths of each of the waters are provided as Exhibit 4. Wetland data sheets are attached as Appendix A.

Corps jurisdiction at the site totals approximately 4.54 acres (197,660 square feet), of which 2.11 acres (91,785 square feet) consist of jurisdictional wetlands.
CDFG jurisdiction at the site totals approximately 7.18 acres (312,590 square feet), of which approximately 5.13 acres (223,520 square feet) consist of vegetated riparian habitat.

[1] This report presents our best effort at estimating the subject jurisdictional boundaries using the most up-to-date regulations and written policy and guidance from the regulatory agencies. Only the regulatory agencies can make a final determination of jurisdictional boundaries. If a final jurisdictional determination is required, GLA can assist in getting written confirmation of jurisdictional boundaries from the agencies.

29 Orchard ▪ Lake Forest ▪ California 92630-8300
Telephone: (949) 837-0404 Facsimile: (949) 837-5834

## I. METHODOLOGY

Prior to beginning the field delineation a 200-scale color aerial photograph, a 200-scale topographic base map of the property, and the previously cited USGS topographic map were examined to determine the locations of potential areas of Corps/CDFG jurisdiction. In addition, the delineation map and report prepared in 1997 were also reviewed. Suspected jurisdictional areas were field checked for the presence of definable channels and/or wetland vegetation, soils and hydrology. Suspected wetland habitats on the site were evaluated using the methodology set forth in the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual[2] (Wetland Manual). While in the field the jurisdictional area was recorded onto a 200-scale color aerial photograph using visible landmarks. Other data were recorded onto wetland data sheets.

The Soil Conservation Service (SCS)[3] has mapped the following soil types as occurring in the general vicinity of the project site:

***Calleguas Shaly Loam, 30 to 50 Percent Slopes (CaF)***

The Calleguas series consist of well-drained shaly loams less than 20 inches deep to sandstone or shale. These soils formed in upland areas and have slopes of 9 to 50 percent.

***Rincon Silty Clay Loam, 2 to 9 Percent Slopes (RcC)***

The Rincon series consist of gently sloping to moderately sloping soil of the old alluvial fans and terraces. The upper 16 inches exhibit dark-gray (10YR 4/1) silty clay loam and very dark gray (10YR 3/1) silty clay loam when moist. Permissibility is slow with medium surface runoff. The Rincon series is used for citrus crops, field crops, urban development, and for range.

***San Benito Clay Loam, 30 to 50 Percent Slopes (ScF2)***

The San Benito series consist of well-drained clay loams 40 to 60 inches deep over softly consolidated sediments formed in upland areas and have slopes of 9 to 75 percent. The San Benito clay loam is a steep soil of the uplands with rapid surface runoff and severe erosion hazard. This soil is used mainly for range and for watershed.

---

[2] Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, U.S. Army Engineer Waterways Experimental Station, Vicksburg, Mississippi.

[3] SCS is now known as the National Resource Conservation Service or NRCS.

None of these soil units are identified as hydric in the SCS's publication, Hydric Soils of the United States[4].

## II. JURISDICTION

### A. Army Corps of Engineers

Pursuant to Section 404 of the Clean Water Act, the Corps regulates the discharge of dredged and/or fill material into waters of the United States. The term "waters of the United States" is defined in Corps regulations at 33 CFR Part 328.3(a) as:

> *(1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;*
> *(2) All interstate waters including interstate wetlands;*
> *(3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect foreign commerce including any such waters:*
> *(i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or*
> *(ii) From which fish or shell fish are or could be taken and sold in interstate or foreign commerce; or*
> *(iii) Which are used or could be used for industrial purpose by industries in interstate commerce...*
> *(4) All impoundments of waters otherwise defined as waters of the United States under the definition;*
> *(5) Tributaries of waters identified in paragraphs (a) (1)-(4) of this section;*
> *(6) The territorial seas;*
> *(7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) (1)-(6) of this section.*

---

[4] United States Department of Agriculture, Soil Conservation Service. 1991. Hydric Soils of the United States, 3rd Edition, Miscellaneous Publication Number 1491. (In cooperation with the National Technical Committee for Hydric Soils.)

> *Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 123.11(m) which also meet the criteria of this definition) are not waters of the United States.*
>
> *(8) Waters of the United States do not include prior converted cropland.*[5] *Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA.*

In the absence of wetlands, the limits of Corps jurisdiction in non-tidal waters, such as intermittent streams, extend to the OHWM which is defined at 33 CFR 328.3(e) as:

> *...that line on the shore established by the fluctuation of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.*

Pursuant to Article I, Section 8 of the U.S. Constitution, federal regulatory authority extends only to activities that affect interstate commerce. In the early 1980s the Corps interpreted the interstate commerce requirement in a manner that restricted Corps jurisdiction on isolated (intrastate) waters. On September 12, 1985, EPA asserted that Corps jurisdiction extended to isolated waters that are used or could be used by migratory birds or endangered species, and the definition of "waters of the United States" in Corps regulations was modified as quoted above from 33 CFR 328.3(a).

On January 9, 2001, the Supreme Court of the United States issued a ruling on *Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers, et al.* (SWANCC). In this case the Court was asked whether use of an isolated, intrastate pond by migratory birds is a sufficient interstate commerce connection to bring the pond into federal jurisdiction of Section 404 of the Clean Water Act.
The written opinion notes that the court's previous support of the Corps' expansion of jurisdiction beyond navigable waters (*United States v. Riverside Bayview Homes, Inc.*) was for a

---

[5] The term "prior converted cropland" is defined in the Corps' Regulatory Guidance Letter 90-7 (dated September 26, 1990) as "wetlands which were both manipulated (drained or otherwise physically altered to remove excess water from the land) and cropped before 23 December 1985, to the extent that they no longer exhibit important wetland values. Specifically, prior converted cropland is inundated for no more than 14 consecutive days during the growing season...." [Emphasis added.]

wetland that abutted a navigable water and that the court did not express any opinion on the question of the authority of the Corps to regulate wetlands that are not adjacent to bodies of open water. The current opinion goes on to state:

> *In order to rule for the respondents here, we would have to hold that the jurisdiction of the Corps extends to ponds that are not adjacent to open water. We conclude that the text of the statute will not allow this.*

Therefore, we believe that the court's opinion goes beyond the migratory bird issue and says that no isolated, intrastate water is subject to the provisions of Section 404(a) of the Clean Water Act (regardless of any interstate commerce connection). However, the Corps and EPA have issued a joint memorandum which states that they are interpreting the ruling to address only the migratory bird issue and leaving the other interstate commerce clause nexuses intact.

The term "wetlands" (a subset of "waters of the United States") is defined at 33 CFR 328.3(b) as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support...a prevalence of vegetation typically adapted for life in saturated soil conditions." In 1987 the Corps published a manual to guide its field personnel in determining jurisdictional wetland boundaries. In 1989 the Federal Interagency Committee for Wetland Delineation developed an updated methodology which was adopted by the Corps, U.S. Fish and Wildlife Service (USFWS), U.S. Environmental Protection Agency (EPA), and SCS which replaced the 1987 Wetland Delineation Manual.[6] The use of this 1989 manual was perceived by many to excessively increase the jurisdictional limits of wetlands. After several congressional hearings, EPA, Corps, SCS, and USFWS published proposed 1991 revisions to the 1989 manual.[7] A few days afterwards, the President signed the Energy and Water Development Appropriations Act of 1992 which, in effect, prohibits the use of the 1989 manual. Because the 1991 proposed revisions to the 1989 manual have not yet been adopted, the only remaining valid methodology is the 1987 Wetland Delineation Manual.[8] The methodology set forth in the 1987 Wetland Delineation Manual generally requires that, in order to be considered a wetland, the vegetation, soils, and hydrology of an area exhibit at least minimal hydric characteristics. While

---

[6] Federal Interagency Committee for Wetland Delineation. 1989. Federal Manual for Identifying and Delineating Jurisdictional Wetlands. U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and USDA Soil Conservation Service, Washington, DC Cooperative technical publication.

[7] Government Printing Office. 1991. Federal Register, "1989 Federal Manual for Identifying Jurisdictional Wetlands; Proposed Revisions." August 14, 1991, Vol. 56, No. 157, pp 40446-40480.

[8] This delineation was performed using, where appropriate, the 1987 Wetland Manual. It is unlikely that any actions will be taken on a revised wetland manual in the near future. If a new manual is adopted, it may be necessary to review our delineation to determine its compliance with any changes set forth.

the manual provides great detail in methodology and allows for varying special conditions, a wetland should normally meet each of the following three criteria:

- more than 50 percent of the dominant plant species at the site must be typical of wetlands (i.e., rated as facultative or wetter in the National List of Plant Species that Occur in Wetlands[9]);

- soils must exhibit physical and/or chemical characteristics indicative of permanent or periodic saturation (e.g., a gleyed color, or mottles with a matrix of low chroma indicating a relatively consistent fluctuation between aerobic and anaerobic conditions); and

- hydrologic characteristics must indicate that the ground is saturated to within 12 inches of the surface for at least five percent of the growing season during a normal rainfall year[10].

### B. Regional Water Quality Control Board

The Regional Board will potentially have jurisdiction on the site pursuant to Section 401 of the Clean Water Act as well as under the Porter-Cologne Act. Under Section 401, the Regional Board will consider impacts to each drainage and/or wetland subject to Corps jurisdiction under Section 404. All of the drainages on the site, regardless of their Section 404 jurisdictional status, would be subject to the Regional Board pursuant to the Porter-Cologne Act.

### C. California Department of Fish and Game

Pursuant to Division 2, Chapter 6, Sections 1600-1603 of the California Fish and Game Code, the CDFG regulates all diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake which supports fish or wildlife.

CDFG defines a "stream" (including creeks and rivers) as "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having surface or subsurface flow that supports or has supported riparian vegetation." CDFG's definition of "lake" includes "natural lakes or man-made reservoirs."

---

[9] Reed, P.B., Jr. 1988. National List of Plant Species that Occur in Wetlands. U.S. Fish and Wildlife Service Biological Report 88(26.10).

[10] For most of low-lying southern California, five percent of the growing season is equivalent to 18 days.

CDFG jurisdiction within altered or artificial waterways is based upon the value of those waterways to fish and wildlife. CDFG Legal Advisor has prepared the following opinion:

- Natural waterways that have been subsequently modified and which have the potential to contain fish, aquatic insects and riparian vegetation will be treated like natural waterways...

- Artificial waterways that have acquired the physical attributes of natural stream courses and which have been viewed by the community as natural stream courses, should be treated by [CDFG] as natural waterways...

- Artificial waterways without the attributes of natural waterways should generally not be subject to Fish and Game Code provisions...

Thus, CDFG jurisdictional limits closely mirror those of the Corps. Exceptions are CDFG's exclusion of isolated wetlands (those not associated with a river, stream, or lake), the addition of artificial stock ponds and irrigation ditches constructed on uplands, and the addition of riparian habitat supported by a river, stream, or lake regardless of the riparian area's federal wetland status.

## III. RESULTS

### A. Corps Jurisdiction

Corps jurisdiction associated with the Triangle Ranch project site totals approximately 4.54 acres (197,660 square feet) of waters of the United States, of which 2.11 acres (91,785 square feet) consist of wetlands. Table 1 below details the areas of total Corps jurisdiction. The boundaries of the waters of the United States are depicted on Exhibit 3.

**Table 1. Corps Jurisdiction**

| DRAINAGE | Total Waters of the U.S. (square feet) | Jurisdictional Wetlands (square feet) | Other Jurisdictional Waters (square feet) |
|---|---|---|---|
| A | 121,285 | 91,785 | 29,500 |
| B | 22,030 | 0 | 22,030 |
| B-1 | 200 | 0 | 200 |
| C | 7,465 | 0 | 7,465 |
| C-1 | 500 | 0 | 500 |
| C-2 | 780 | 0 | 780 |
| C-3 | 160 | 0 | 160 |
| D | 36,145 | 0 | 36,145 |
| D-1 | 400 | 0 | 400 |
| D-2 | 1,360 | 0 | 1,360 |
| D-3 | 160 | 0 | 160 |
| D-4 | 2,100 | 0 | 2,100 |
| E | 1,550 | 0 | 1,550 |
| E-1 | 0 | 0 | 0 |
| E-2 | 0 | 0 | 0 |
| E-3 | 0 | 0 | 0 |
| E-4 | 0 | 0 | 0 |
| F | 0 | 0 | 0 |
| F-1 | 0 | 0 | 0 |
| F-2 | 0 | 0 | 0 |

| DRAINAGE | Total Waters of the U.S. (square feet) | Jurisdictional Wetlands (square feet) | Other Jurisdictional Waters (square feet) |
|---|---|---|---|
| G | 0 | 0 | 0 |
| H | 0 | 0 | 0 |
| I | 495 | 0 | 495 |
| J | 1,310 | 0 | 1,310 |
| K | 340 | 0 | 340 |
| L | 980 | 0 | 980 |
| L-1 | 400 | 0 | 400 |
| M | 0 | 0 | 0 |
| **Total** | 197,660 | 91,785 | 105,875 |
| **Total (ACRES)** | 4.54 | 2.11 | 2.43 |

**1. Drainage A (Portion of Medea Creek):**

Approximately 2.78 acres (121,285 square feet) of Corps jurisdiction, of which 2.11 acres (29,500 square feet) consist of jurisdictional wetlands, are associated with Drainage A (Medea Creek). This drainage course is the largest on the property and all other jurisdictional drainages described below are tributary to Drainage A. The width of the OHWM within Drainage A ranges from 28 to 80 feet. Surface water is present year-round within this portion of the drainage and the widths of surface flow averaged approximately 10 to 25 feet [Exhibit 4, Photograph 1]. The banks of Drainage A are slightly incised (less than two feet) over most of its length through the project area, although there are some portions of the lower half where one or both banks are quite gentle, with no head cutting visible. The areas within the OHWM and above the surface water are heavily cobbled, with sand and gravel occupying the intervening spaces. The upper portion of Drainage A within the project area also supports numerous mature arroyo willows (*Salix lasiolepis, FACW*) and Fremont's cottonwood (*Populus fremontii, FACW*); however, the understory is mostly poorly developed. The arroyo willows and cottonwoods provide a consistent canopy which no doubt serves to limit understory growth, and the frequent signs of surface flow in these areas also suggests that surface flows help to eliminate any new perennial or woody growth. It is likely that the willows that do

exist within the OHWM became established during a period of only moderate or insignificant storm flows. These trees are now sufficiently mature such that, at least during most "ordinary" storm events, they are able to persist. Old debris racks that collected during a large storm event are still evident along the upper and middle portions of Drainage A, although they are not indicative of "ordinary" storm events [Exhibit 4, Photograph 2].

All areas within the OHWM on Drainage A are wetland except for those areas supporting permanent open water. The wetland area supports a near 100-percent coverage of hydrophytic vegetation and is likely to be inundated within twelve inches of the surface for at least 14 consecutive days at least every other year. (Soil colors were not of utility due to the well-drained sandy and gravelly nature of the soil.)

**2. Drainage B**

Approximately 0.51 acre (22,230 square feet) of Corps jurisdiction is associated with Drainage B and its tributary. The width of the OHWM averages 8 to 12 feet at its lower half and narrows to 1 to 2 feet along its upper half and within the tributary, with flows ultimately reaching a confluence with Medea Creek immediately west of Kanan Road [Exhibit 4, Photograph 3]. The channel bottom is heavily cobbled and the banks are intact except for a small stretch along the middle portion of the drainage where they are slightly incised. There are no wetlands associated with Drainage B.

Drainage B-1 is located immediately west of Kanan Road and collects run-off from the road for approximately 200 linear feet. The width of the OHWM is one foot, with flows draining directly into Drainage B near the confluence with Medea Creek.

**3. Drainage C**

Approximately 0.20 acre (8,905 square feet) of Corps jurisdiction is associated with Drainage C and its tributaries. The width of the OHWM within Drainage C ranges between one and ten feet. The channel bottom is heavily cobbled or rocky. Drainage C passes beneath Kanan Road via a 24-inch corrugated metal pipe (cmp) located at the base of an approximate 12-foot-tall standpipe, and ultimately drains into Medea Creek. There are no wetlands associated with Drainage C.

Drainage C-1 collects roadside stormwater runoff via an 18-inch cmp and drains into Drainage C immediately adjacent to the 24-inch cmp and standpipe. The OHWM width of Drainage C-2 ranges from one to five feet. C-2 enters into Drainage C at a point approximately 600 feet upstream from Kanan Road. The OHWM of Drainage C-3 ranges from one to three feet. There are no wetlands associated with any of the tributaries to Drainage C.

**4. Drainage D**

Approximately 0.92 acre (40,165 square feet) of Corps jurisdiction is associated with Drainage D and its tributaries. The width of the OHWM within Drainage D ranges between four and 23 feet, with flows ultimately draining into Medea Creek through a culvert. Drainage D supports very sparse mule fat and consists of a dry, compacted, cobbly substrate [Exhibit 4, Photograph 4]. Drainages D-1, D-2, D-3, and D-4 each averaged one- to three-foot-wide OHWMs, with the exception of the lower portion of D-4, which exhibited an OHWM as wide as six feet. There are no wetlands associated with the tributaries to Drainage D.

**5. Drainage E**

Approximately 0.04 acre (1,550 square feet) of Corps jurisdiction is associated with Drainage E. Drainage E collects runoff from the disturbed graded area located immediately west of Kanan Road, approximately 1,000 feet south of Cornell Road's intersection with Kanan. The width of the OHWM within Drainage E ranges from one to eight feet, with flows passing under Kanan Road through a 24-inch cmp and ultimately reaching a confluence with Medea Creek. The channel bottom is cobbled and incised from one to two feet deep [Exhibit 4, Photograph 5]. The shallow banks immediately south of the disturbed graded area support arroyo willows (*Salix lasiolepis,* FACW) and mule fat (*Baccharis salicifolia,* FACW); however a soil pit taken within the vegetated area did not indicate the presence of hydric soils (2.5Y 3/2). Upland grasses dominate the remainder of Drainage E to the west of Kanan Road. There are no wetlands associated with Drainage E.

Drainages E-1, E-2, E-3, and E-4 each carry runoff into the graded area, where indicators associated with the presence of an OHWM promptly cease to exist. Above this end point their OHWM widths range from 1 to 3 feet. As such, there is no Corps jurisdiction associated with Tributaries, E-1, E-2, E-3, and E-4.

**6. Drainage F**

The width of the OHWM within Drainage F ranges from one to two feet. The channel bottom is slightly incised into the canyon bottom and the OHWM ceases to exist approximately 100 feet to the west of the 18-inch cmp [Exhibit 4, Photograph 6], located at the downhill end of the canyon, immediately west of Kanan Road. Tributaries F-1 and F-2 are similar in morphology to the main drainage, however, F-1's OHWM ranges from one to four feet in width, while F-2 is only one foot wide.

Due to the lack of connectivity that Drainage F has to Medea Creek, there is no Corps jurisdiction associated with Drainage F.

**7. Depressional Feature G**

No Corps jurisdiction is associated with Depressional Feature G. This feature is located at the bottom of a small canyon abutting the embankment at Kanan Road. Due to its location, temporary ponding is evidenced by the presence of cracked surface soil. Vegetation within the feature consists of canary grass (*Phalaris paradoxa,* UPL) and rabbit's foot grass (*Polypogon monspeliensis,* FACW); however, a soil pit taken within the depressional feature indicated that no hydric soils were present based on a high-chroma matrix (2.5Y 3/3). There is no OHWM within the feature.

**8. Drainage H**

The width of the OHWM within Drainage H ranges from 1 to 3 feet. The channel bottom exhibits cobbled sections interspersed with sandy areas supporting annual grasses. At the location of Kanan Road, flows from Drainage H are conveyed via a 24-inch cmp to the (downstream) eastern side of the road. At this location, the drainage supports arroyo willow (*Salix lasiolepis,* FACW), mule fat (*Baccharis salicifolia,* FACW), Mexican rush (*Juncus mexicanus,* FACW), wild rye (*Leymus triticoides,* FACU), and rabbit's foot grass (*Polypogon monspeliensis,* FACW); however, a soil pit taken within the location did not indicate the presence of hydric soils in the upper twelve inches based on the lack of redoxymorphic features (2.5Y 4/2).

At the time of observation, the area downstream from the patch of vegetation no longer supports an OHWM or connection to Medea Creek [Exhibit 4, Photograph 7]. As such, no Corps jurisdiction is associated with Drainage H.

**9. Drainage I**

Approximately 0.01 acre (495 square feet) of Corps jurisdiction is associated with Drainage I. The width of the OHWM within Drainage I ranges between one and two feet, with flows ultimately draining into Medea Creek through a storm drain. The channel bottom is heavily cobbled but is not incised. The stream banks support only non-native grasses and there are no wetlands associated with Drainage I.

**10. Drainage J**

Approximately 0.03 acre (1,310 square feet) of Corps jurisdiction is associated with Drainage J. The width of the OHWM within Drainage J ranges between one and five feet, with flows ultimately

draining across Cornell Road into Medea Creek. The stream banks support only non-native grasses along with one coast live oak (*Quercus agrifolia,* UPL) located near the bottom of the channel. There are no wetlands associated with Drainage J.

## 11. Drainage K

Approximately 0.01 acre (340 square feet) of Corps jurisdiction is associated with Drainage K. The width of the OHWM within Drainage K ranges between one and two feet, with flows ultimately draining into Medea Creek through a storm drain. The channel bottom is unique to this property in that it is not heavily cobbled but rather is composed of a mineral soil and sand. This character may be an artifact of a recent landslide or some other disturbance, as evidenced by the slope to the immediate north of this drainage which exhibits a large section devoid of vegetation. The opposite bank does support non-native grasses, an occasional golden bush (*Isocoma menziesii,* UPL), one coast live oak (*Quercus agrifolia,* UPL), and one California sycamore (*Platanus racemosa,* FACW). There are no wetlands associated with Drainage K.

## 12. Drainage L

Approximately 0.03 acre (1,380 square feet) of Corps jurisdiction is associated with Drainage L and its single tributary. The width of the OHWM within Drainage L ranges from one to three feet, with flows ultimately draining into Medea Creek through a storm drain. The channel bottom is heavily cobbled and supports non-native grasses at the time of this delineation. Tributary L-1 is similar in morphology to the main drainage, and F-1's OHWM also ranges from one to three feet in width. There are no wetlands associated with Drainage L and its tributary.

## 13. Drainage M

The width of the OHWM within Drainage M ranges between one and six feet. The channel bottom is alternately heavily cobbled and sandy or gravelly. At its upper end the channel's banks are incised one to two feet and at the lower end the cuts extend as deep as four feet. There are no wetlands associated with Drainage M.

At the time of observation, the area downstream from the drainage had been disturbed and no longer supports an OHWM or connection to Medea Creek. As such, no Corps jurisdiction is associated with Drainage M.

## B. Regional Water Quality Control Board Jurisdiction

Due to the lack of connectivity that Drainage C, Tributaries E-1, E-2, and E-3, and Drainage M exhibit with Medea Creek, they are determined to be isolated waters and not subject to Regional Water Quality Control Board's jurisdiction pursuant to Section 401 due to the lack of Section 404 jurisdiction. These areas would still be considered waters of the State and subject to Regional Water Quality Control Board jurisdiction under Porter-Cologne.

The remaining drainages addressed in this report are subject to the Regional Water Quality Control Board's jurisdiction pursuant to Section 401 of the Clean Water Act, as well as under the Porter-Cologne Act.

## C. CDFG Jurisdiction

CDFG jurisdiction associated with the Triangle Ranch project site totals approximately 7.18 acres (312,590 square feet), of which 5.13 acre (223,520 square feet) consists of riparian vegetation, and includes all areas within Corps jurisdiction. Table 2 below describes the areas of total CDFG jurisdiction and riparian habitat associated with each drainage.

**Table 2. CDFG Jurisdiction**

| DRAINAGE | Total CDFG Jurisdiction (square feet) | Riparian Vegetation (square feet) | Unvegetated Jurisdictional (square feet) |
|---|---|---|---|
| A | 195,370 | 195,370 | 0 |
| B | 22,030 | 0 | 22,030 |
| B-1 | 200 | 0 | 200 |
| C | 7,665 | 220 | 7,465 |
| C-1 | 500 | 0 | 500 |
| C-2 | 780 | 0 | 780 |
| C-3 | 160 | 0 | 160 |
| D | 44,995 | 8,850 | 36,145 |
| D-1 | 400 | 0 | 400 |

| DRAINAGE | Total CDFG Jurisdiction (square feet) | Riparian Vegetation (square feet) | Unvegetated Jurisdictional (square feet) |
|---|---|---|---|
| D-2 | 1,360 | 0 | 1,360 |
| D-3 | 160 | 0 | 160 |
| D-4 | 2,100 | 0 | 2,100 |
| E | 6,050 | 4,500 | 1550 |
| E-1 | 380 | 0 | 380 |
| E-2 | 785 | 0 | 785 |
| E-3 | 220 | 0 | 220 |
| E-4 | 920 | 0 | 920 |
| F | 1,070 | 0 | 1,070 |
| F-1 | 865 | 0 | 865 |
| F-2 | 220 | 0 | 220 |
| G | 0 | 0 | 0 |
| H | 5,165 | 3,330 | 1,835 |
| I | 495 | 0 | 495 |
| J | 5,060 | 3,750 | 1,310 |
| K | 7,840 | 7,500 | 340 |
| L | 980 | 0 | 980 |
| L-1 | 400 | 0 | 400 |
| M | 6,420 | 0 | 6,420 |
| **Total** | 312,590 | 223,520 | 89,090 |
| **Total (ACRES)** | 7.18 | 5.13 | 2.05 |

**1. Drainage A (Portion of Medea Creek):**

Approximately 4.49 acres (195,370 square feet) of CDFG jurisdiction are associated with Drainage A or Medea Creek. A small, unidentified portion of this area is represented by open water; however, the riparian canopy is complete across the creek along a great majority of the creek, so the actual area of open water was not determined. The width of the riparian canopy, including the streambed, ranges from 60 to 110 feet [Exhibit 4, Photograph 1]. The banks of Drainage A are slightly incised (less than two feet) throughout most of the project area, although there are some portions on the southern half where one or both banks are quite gentle, with no head cutting visible. The areas of streambed located above the surface water are heavily cobbled, with sand occupying the intervening spaces. The upper portion of Drainage A within the project area also supports numerous mature arroyo willows (*Salix lasiolepis,* FACW) and Fremont's cottonwood (*Populus fremontii,* FACW); however, the understory is mostly poorly developed. The arroyo willows and cottonwoods provide a consistent canopy which no doubt serves to limit growth, and the frequent signs of surface flow in these areas also suggests that heavy flows help to eliminate the establishment of any new perennial or woody growth. The limited understory growth consists of wild rose (*Rosa californica*, UPL), Mexican rush (*Juncus mexicanus,* FACW), and mule fat (*Baccharis salicifolia,* FACW), Valley oaks (*Quercus lobata,* UPL) are occasionally found at the outer edge of the riparian canopy. In areas where the stream banks lie beneath a less well-developed willow canopy, cattails (*Typha domingensis,* OBL) often form dense stands [Exhibit 4, Photograph 8].

**2. Drainage B**

Approximately 0.51 acre of CDFG jurisdiction is associated with Drainage B and its tributary. The width of the streambed averages 8 to 12 feet at its lower half and narrows to 1 to 2 feet along its upper half and within the tributary. The channel bottom is heavily cobbled and the banks are intact except for a small stretch along the middle portion of the drainage where they are slightly incised. There is no riparian habitat associated with Drainage B.

Tributary B-1 is located immediately west of Kanan Road and collects run-off from the road for approximately 200 linear feet. The width of the streambed is one foot and there is no riparian habitat associated with Drainage B-1.

**3. Drainage C**

Approximately 0.20 acre (8,905 square feet) of CDFG jurisdiction is associated with Drainage C and its tributaries. Drainage C's streambed ranges between one and ten feet wide. The streambed is heavily cobbled or rocky and supports occasional mule fat near the lower reach. Drainage C passes

beneath Kanan Road via a 24-inch corrugated metal pipe (cmp) located at the base of an approximate 12-foot tall standpipe. The total area of riparian habitat within Drainage C is 0.005 acre (221 square feet).

Drainage C-1 is a two to eight foot wide channel that collects roadside stormwater runoff via an 18-inch cmp and drains into Drainage C immediately adjacent to the 24-inch cmp described above. Drainage C-2's streambed ranges from one to five feet wide (see Photograph E, Exhibit 4). Drainage C-2 enters into Drainage C at a point approximately 600 feet upstream from Kanan Road. Drainage C-3 is a tributary to Drainage C-2 and the width of its streambed ranges from one to three feet. There is no riparian habitat associated with any of the tributaries to Drainage C.

**4. Drainage D**

Approximately 1.12 acre (49,015 square feet) of CDFG jurisdiction is associated with Drainage D and its tributaries, of which 0.20 acre (8,850 square feet) consists of riparian vegetation. Drainage D's streambed ranges between four and 23 feet wide. Riparian vegetation [i.e., mule fat (*Baccharis salicifolias,* FACW) and arroyo willow (*Salix lasiolepis,* FACW)] was present occasionally within these areas [Exhibit 4, Photograph 4]. The total area of riparian habitat within Drainage D is 0.20 acre (8,850 square feet).

Drainages D-1, D-2, D-3, and D-4 each averaged one- to three-feet-wide streambeds, with the exception of the lower portion of D-4, which exhibits a streambed width as great as six feet. There is no riparian habitat associated with the tributaries to Drainage D.

**5. Drainage E**

Approximately 0.19 acre (8,355 square feet) of CDFG jurisdiction is associated with Drainage E and its tributaries, of which 0.10 acre (4,500 square feet) consists of riparian vegetation. Drainage E collects runoff from the disturbed graded area located immediately west of Kanan Road, approximately 1,000 feet south of Cornell Road's intersection with Kanan. Drainage E's streambed ranges from one to eight feet wide and begins approximately 700 feet west of Kanan Road. The channel bottom is cobbled and incised from one to two feet deep [Exhibit 4, Photograph 5]. The shallow banks immediately south of the disturbed graded area support arroyo willows (*Salix lasiolepis,* FACW) and mule fat (*Baccharis* salicifolia) within an area approximately 15 wide by 300 feet long. Further downstream from the vegetation patch, exotic upland grasses are found throughout the entire field that Drainage E traverses before draining into a 24-inch cmp at Kanan Road. The total area of riparian habitat within Drainage E is 0.10 acre (4,500 square feet).

Drainages E-1, E-2, E-3, and E-4 each carry runoff into the graded area, where indicators associated with a bed and bank promptly cease to exist. Above this end point the streambed widths range from one to three feet. There is no riparian habitat associated the tributaries to Drainage E.

**6. Drainage F**

Approximately 0.05 acre (2,155 square feet) of CDFG jurisdiction is associated with Drainage F and its tributaries. Drainage F's streambed ranges from one to two feet wide. The streambed is slightly incised into the canyon bottom and evidence of a bed, bank, and channel ceases to exist approximately 100 feet to the west of the 18-inch cmp [Exhibit 4, Photograph 6], located at the downhill end of the canyon, immediately west of Kanan Road. Tributaries F-1 and F-2 are similar in morphology to the main drainage, however, F-1's streambed width ranges from one to four feet, while F-2 is only one foot wide. There is no riparian habitat associated with Drainage F.

**7. Depressional Feature G**

There is no CDFG jurisdiction associated with Drainage G. Drainage G consists solely of a small patch of canary grass (*Phalaris paradoxa,* UPL) and rabbit's foot grass (*Polypogon monspeliensis,* FACW), and is not associated with any streambed, pond or lake and is therefore not subject to CDFG jurisdiction.

**8. Drainage H**

Approximately 0.12 acre (5,165 square feet) of CDFG jurisdiction is associated with Drainage H, of which 0.08 acre (3,330 square feet) consists of riparian vegetation. The width of streambed ranges from one to three feet. The streambed exhibits cobbled sections interspersed with sandy areas supporting annual grasses. Downstream, immediately below the outlet of the 24-inch cmp and to the east of Kanan Road, Drainage H supports arroyo willow (*Salix lasiolepis,* FACW), mule fat (*Baccharis salicifolia,* FACW), Mexican rush (*Juncus mexicanus,* FACW), wild rye (*Leymus triticoides,* FACU), and rabbit's foot grass (*Polypogon monspeliensis,* FACW). The area of riparian vegetation measures approximately 37-feet by 90-feet.

At the time of observation, the area downstream from the patch of vegetation no longer supports a bed, bank or channel [Exhibit 4, Photograph 7].

**9. Drainage I**

Approximately 0.01 acre (495 square feet) of CDFG jurisdiction is associated with Drainage I, with its streambed ranging in width from one to two feet. The streambed is heavily cobbled but is not

incised. The stream banks support only non-native grasses and there is no riparian habitat associated with Drainage I.

### 10. Drainage J

Approximately 0.12 acre (5,060 square feet) of CDFG jurisdiction is associated with Drainage J, of which 0.09 acre (3,750 square feet) consists of riparian vegetation. The width of the streambed ranges between one and five feet. The streambed is heavily cobbled and is occasionally composed of solid bedrock. The stream banks support only non-native grasses along with one coast live oak (*Quercus agrifolia,* UPL) located near the bottom of the channel. The total area of riparian habitat is 0.09 acre (3,750 square feet).

### 11. Drainage K

Approximately 0.18 acre (7,840 square feet) of CDFG jurisdiction is associated with Drainage K, of which 0.17 acre (7,500 square feet) consists of riparian habitat. The width of the streambed ranges between one and two feet. The channel bottom is unique to this property in that it is not heavily cobbled but rather is composed of a mineral soil and sand. This character may be an artifact of a recent landslide or some other disturbance, as may be evidenced by the slope to the immediate north of this drainage which exhibits a large section devoid of vegetation. The opposite bank does support non-native grasses, an occasional golden bush (*Isocoma menziesii,* UPL). Toward the lower reach, Drainage K supports one California sycamore (*Platanus racemosa,* FACW), and one coast live oak (*Quercus agrifolia,* UPL). The total area of riparian habitat is 0.17 acre (7,500 square feet).

### 12. Drainage L

Approximately 0.03 acre (1,380 square feet) of CDFG jurisdiction is associated with Drainage L and its single tributary. The Drainage L streambed ranges from one to three feet in width. The channel bottom is heavily cobbled and supported non-native grasses at the time of this delineation. Drainage L-1 is similar in morphology to the main drainage, and L-1's streambed also ranges from one to three feet in width. There is no riparian vegetation associated with Drainage L and its tributary.

### 13. Drainage M

Approximately 0.15 acre (6,420 square feet) of CDFG jurisdiction is associated with Drainage M and its streambed ranges between one and six feet wide. The channel bottom is alternately heavily cobbled and sandy or gravelly. At its upper end the channel's banks are incised one to two feet and

at the lower end the cuts extend as deep as four feet. There is no riparian vegetation associated with Drainage M.

At the time of observation, the lower 200 feet of Drainage M had been disturbed and no longer supports a bed, bank, or channel prior to reaching Cornell Road.

## IV. DISCUSSION

### A. Impact Analysis

Based on the current Alternate Site Plan "B" for Triangle Ranch Tentative Tract No. 52419, the Project would impact 0.11 acre (4,910 square feet) of Corps jurisdiction, none of which consists of jurisdictional wetlands, and 0.45 acre (19,765 square feet) of CDFG jurisdiction, of which 0.18 acre (8,050 square feet) consists of vegetated riparian habitat.

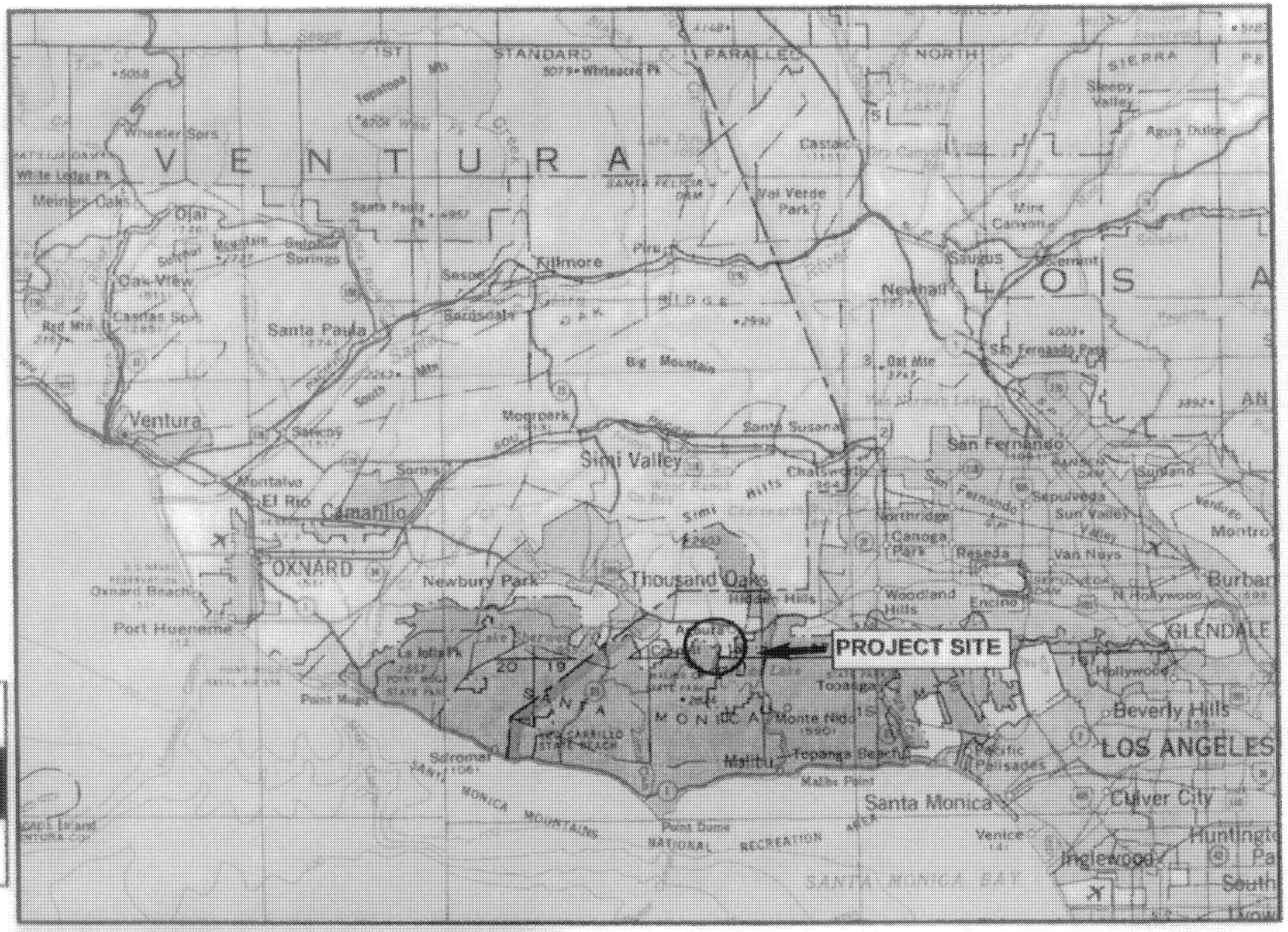
If you have any questions about this letter report, please contact Thienan Ly at (949) 837-0404 or by email at tly@wetlandpermitting.com.

Sincerely,

GLENN LUKOS ASSOCIATES, INC.

Thienan Ly
Regulatory Specialist

s:0365-11c.rpt

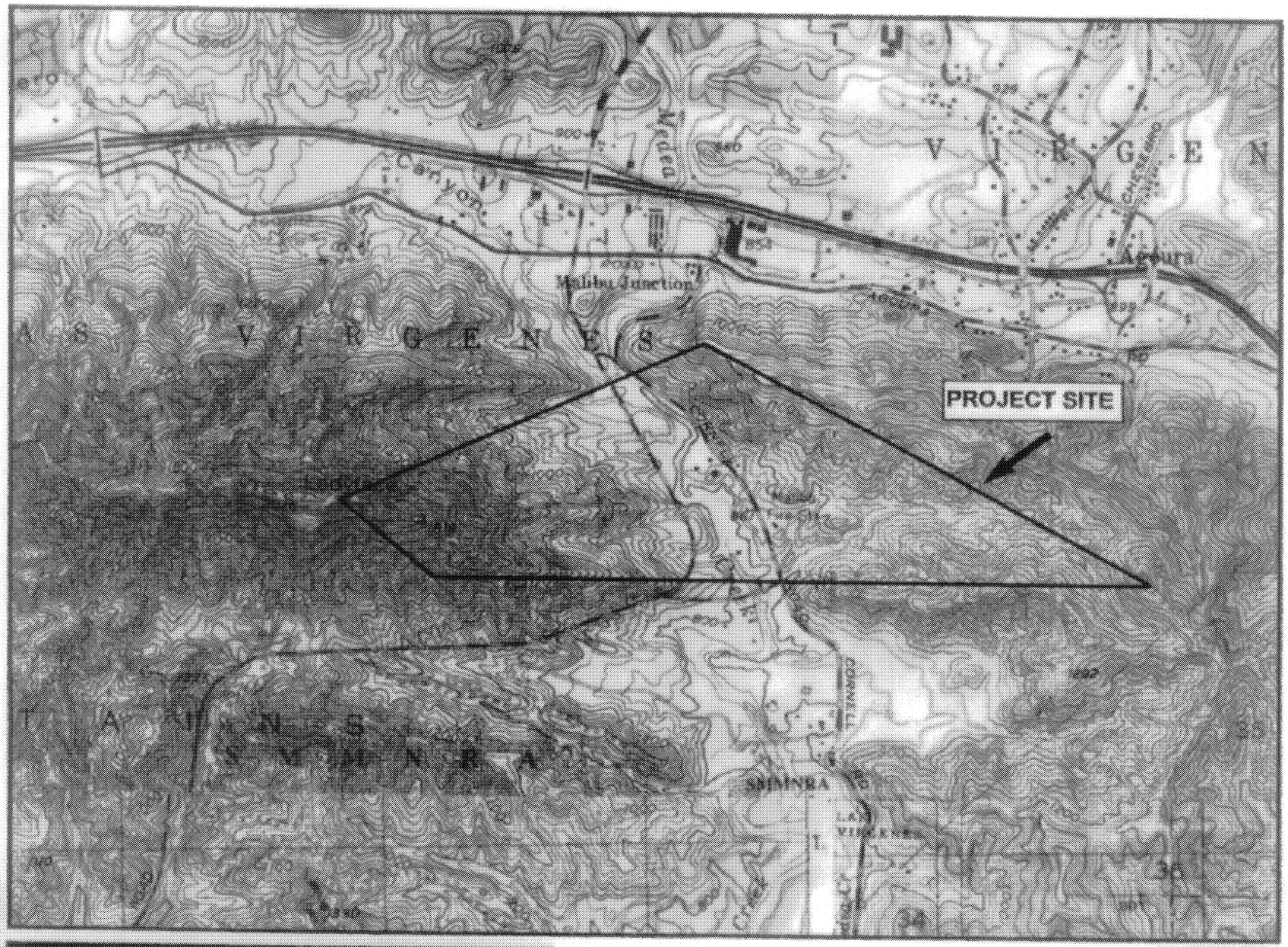



**LIVE OAK RANCH**

Regional Map

GLENN LUKOS ASSOCIATES

**EXHIBIT 1**



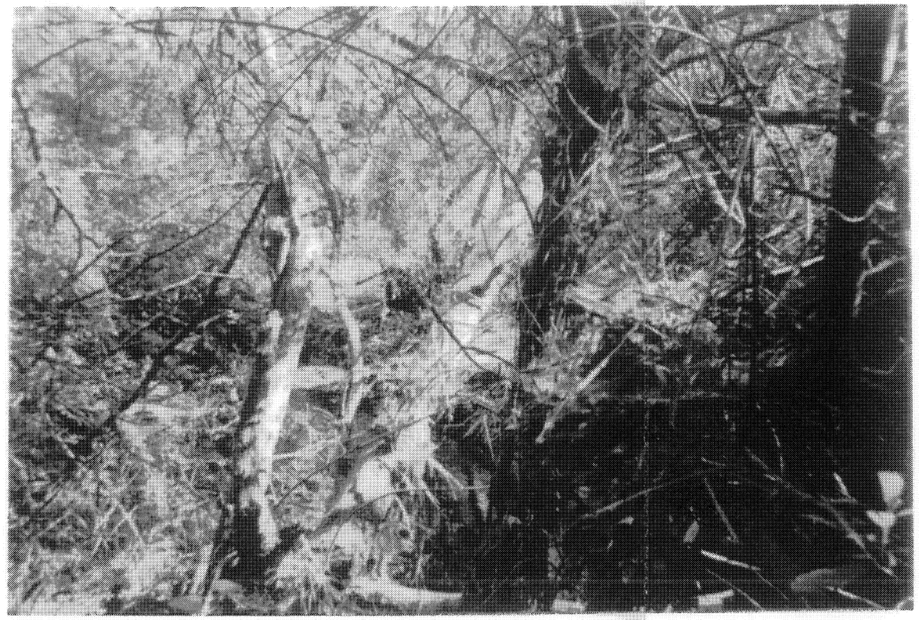

**LIVE OAK RANCH**

Vicinity Map

GLENN LUKOS ASSOCIATES

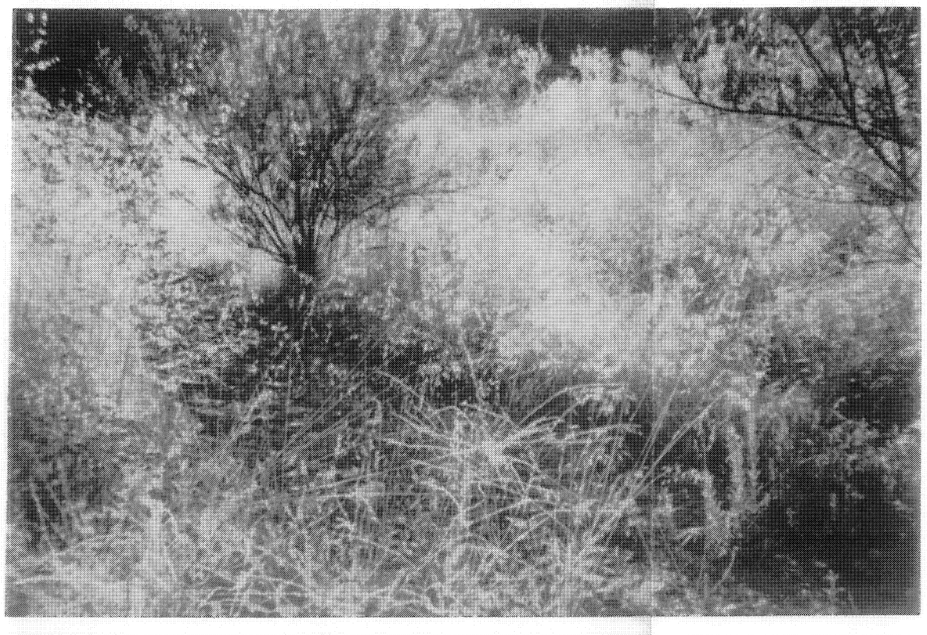
**EXHIBIT 2**

Photograph 1: Medea Creek looking south, exhibiting an unvegetated channel with hydrophytic vegetation along the banks.



Photograph 2: Debris racks within Medea Creek, not indicative of the ordinary high water mark within this drainage.

Photograph 3: Confluence of Drainage B with Medea Creek west of Kanan Road.



Photograph 4: Sparse mulefat occuring along Drainage D.

GLENN LUKOS ASSOCIATES

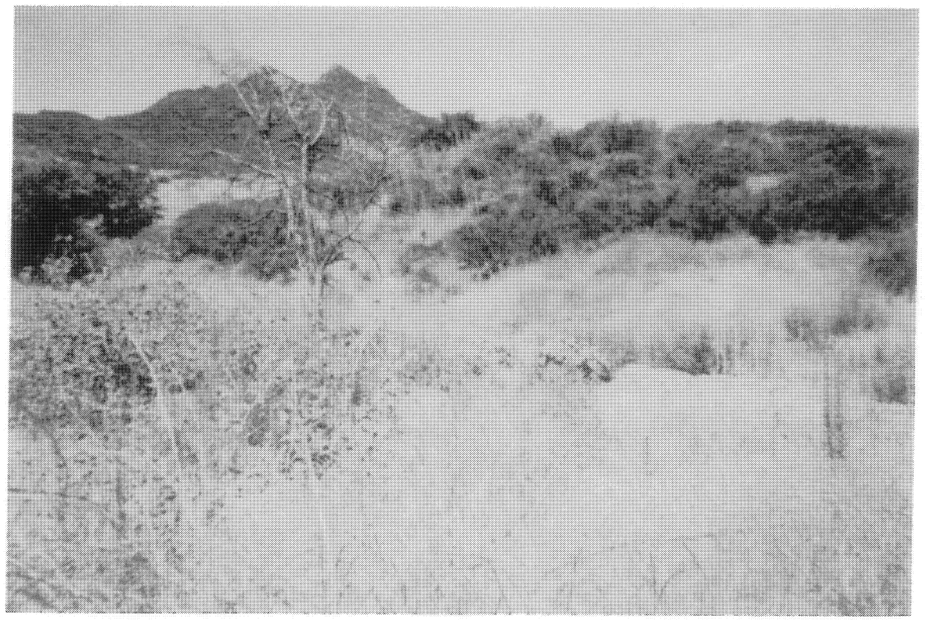
LIVE OAK RANCH

Site Photographs

Exhibit 4

Photograph 5: Drainage E, exhibiting a one-foot-wide unvegetated channel.

Photograph 6: Standpipe located at the base of Drainage F, west of Kanan Road. At the time of observation, Drainage F did not support an ordinary high water mark



Photograph 7: Portion of Drainage H east of Kanan Road where the OHWM is no longer discernable.

Photograph 8: Portion of Medea Creek where cattails have formed along the banks.

GLENN LUKOS ASSOCIATES

LIVE OAK RANCH

Site Photographs

Exhibit 4

#1

# DATA FORM
## ROUTINE WETLAND DETERMINATION
## (1987 COE Wetlands Delineation Manual)

| | |
|---|---|
| Project/Site: Live Oak Ranch | Date: 8/18/03 |
| Applicant/Owner: Sage | County: LA |
| Investigator: T. Ly & E. Bonkamp | State: CA |
| Do Normal Circumstances exist on the site? (Yes) No | Community ID: |
| Is the site significantly disturbed (Atypical Situation)? (Yes) No | Transect ID: |
| Is the area a potential Problem Area? Yes (No) | Plot ID: |
| (If needed, explain on reverse.) | |

### VEGETATION

| Dominant Plant Species | Stratum | Indicator | Dominant Plant Species | Stratum | Indicator |
|---|---|---|---|---|---|
| 1. Salix lasiolepis | T | FACW | 9. | | |
| 2. Baccharis salicifolia | S | FACW | 10. | | |
| 3. Juncus mexicanus | H | FACW | 11. | | |
| 4. Polypogon monspeliensis | H | FACW+ | 12. | | |
| 5. Leymus triticoides | H | FAC+ | 13. | | |
| 6. | | | 14. | | |
| 7. | | | 15. | | |
| 8. | | | 16. | | |

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100% (4/4)

Remarks:

Meets vegetation criteria

### HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

X No Recorded Data Available

Field Observations:

Depth of Surface Water: none (in.)

Depth to Free Water in Pit: none (in.)

Depth to Saturated Soil: none in upper 16" (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- X Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- X FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

Meets criteria for hydrology even though it does not appear that site receives very much water.

## SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

**Profile Description:**

| Depth (inches) | Horizon | Matrix Color (Munsell Moist) | Mottle Colors (Munsell Moist) | Mottle Abundance/Contrast | Texture, Concretions, Structure, etc. |
|---|---|---|---|---|---|
| 0-6 | | 2.5Y 4/2 | none | / | fine sandy loam |
| 6-16 | | 2.5Y 3/2 | none | / | same |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**Hydric Soil Indicators:**

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: No mottles found within matrix. Soil does not meet hydric soils criteria.

## WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? Yes (No)

(Circle)
Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

D&M Site has been disturbed downstream from point of sampling. Had there been flows coming through, hydrology & soil indicators would be stronger.

#2

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Live Oak Ranch
Applicant/Owner: Sage
Investigator: T. Ly & E. Bomkamp

Date: 8/18/03
County: LA
State: CA

Do Normal Circumstances exist on the site? (Yes) No
Is the site significantly disturbed (Atypical Situation)? (Yes) No
Is the area a potential Problem Area? Yes (No)
(If needed, explain on reverse.)

Community ID: _____
Transect ID: _____
Plot ID: _____

## VEGETATION

| Dominant Plant Species | Stratum | Indicator |
|---|---|---|
| 1. Salix lasiolepis | T | FACW |
| 2. Baccharis salicifolia | S | FACW |
| 3. | | |
| 4. | | |
| 5. | | |
| 6. | | |
| 7. | | |
| 8. | | |
| 9. | | |
| 10. | | |
| 11. | | |
| 12. | | |
| 13. | | |
| 14. | | |
| 15. | | |
| 16. | | |

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 2/2 = 100%

Remarks: Meets hydrophytic vegetation criteria

## HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
X No Recorded Data Available

Field Observations:

Depth of Surface Water: none (in.)
Depth to Free Water in Pit: none (in.)
Depth to Saturated Soil: none (in.)
none in upper 16"

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
X Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
X FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks: Meets hydrology criteria although site does not appear to receive very much water. Pit taken within dripline of vegetation adjacent to 2-foot wide channel.

## SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

| Depth (inches) | Horizon | Matrix Color (Munsell Moist) | Mottle Colors (Munsell Moist) | Mottle Abundance/Contrast | Texture, Concretions, Structure, etc. |
|---|---|---|---|---|---|
| 0-12 | | 2.5Y 3/2 | none | / | loam |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: No mottles found w/i matrix; Does not meet hydric soils criteria.

## WETLAND DETERMINATION

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes (No) (Circle) | (Circle) |
| Wetland Hydrology Present? | (Yes) No | |
| Hydric Soils Present? | Yes (No) | Is this Sampling Point Within a Wetland? Yes (No) |

Remarks: Upstream portion of site has been disturbed by construction of road. Drainage appears to reestablish its ottwm alongside road.

Approved by HQUSACE 3/92

#3

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Live Oak Ranch
Applicant/Owner: Sage
Investigator: T. Ly & E. Bonkamp

Date: 8/28/03
County: LA
State: CA

Do Normal Circumstances exist on the site? (Yes) No
Is the site significantly disturbed (Atypical Situation)? Yes (No)
Is the area a potential Problem Area? Yes (No)
(If needed, explain on reverse.)

Community ID:
Transect ID:
Plot ID:

VEGETATION

| Dominant Plant Species | Stratum | Indicator |
|---|---|---|
| 1. Polypogon monspeliensis | H | FACW+ |
| 2. phalaris paradoxa | H | UPL |
| 3. | | |
| 4. | | |
| 5. | | |
| 6. | | |
| 7. | | |
| 8. | | |
| 9. | | |
| 10. | | |
| 11. | | |
| 12. | | |
| 13. | | |
| 14. | | |
| 15. | | |
| 16. | | |

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).

Remarks: Vegetation was sparse and appeared to concentration on edge of depression

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
___ No Recorded Data Available

Field Observations:

Depth of Surface Water: none (in.)
Depth to Free Water in Pit: none (in.)
Depth to Saturated Soil: none (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
X FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks: Extremely hard surface that appears to pond very temporarily due to road runoff. Does not meet hydrology conditions

## SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

| Depth (inches) | Horizon | Matrix Color (Munsell Moist) | Mottle Colors (Munsell Moist) | Mottle Abundance/Contrast | Texture, Concretions, Structure, etc. |
|---|---|---|---|---|---|
| 0-3 | | 2.5Y 3/3 | none | / | loamy clay |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: Could not dig beyond 3" due to hard surface
No mottles seen in upper layer. No hydric soils.

## WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? Yes (No)
Hydric Soils Present? Yes (No)

(Circle)
Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

# APPENDIX C-7

**Plant Palette, prepared by Ivy Landscape Architects, Inc.; April 6, 1999**

LIVE OAK RANCH
Agora Hills, California
April 6, 1999
Prepared by: IVY Landscape Architects, Inc.

# PLANT PALETTE

| SCIENTIFIC NAME | COMMON NAME |
|---|---|
| **FUEL MODIFICATION ZONE / DEVELOPMENT PERIMETER** | |
| TREES | |
| Quercus agrifolia var. a. | Coast Live Oak; encina |
| Quercus lobata | Valley Oak; robie |
| Juglans californica var. c. | Southern California Black Walnut |
| Fraxinus dipetala | California Ash |
| Plananus racemosa | Western Sycamore |
| Populus fremontii ssp.f. | Freemont Cottonwood |
| Prunus ilicifolia ssp. i. | Holly-Leaf Cherry |
| SHRUBS | |
| Malosma laurina | Laurel Sumac |
| Rhus ovata | Sugar Bush |
| Nerium oleander | Oleander |
| Baccharis pilularis ssp. consanguinea | Coyote Brush |
| Baccharis salicifolia | Mule Fat; Sweep-Willow |
| Encelia californica | Coast Encelia |
| Pentachaeta lyonii | Lyon's Pentachaeta |
| Crassula connata | Pygmyweed |
| Arctostaphylos glauca | Bigberry Manzanita |
| Lupinus bicolor ssp. microphyllus | Miniature Lupine |
| Lupinus sparsiflorus | N.C.N. |
| Lupinus microcarpus var. m. | Chick Lupine |
| Lupinus succulentus | Arroyo Lupine |
| Lupinus truncatus | N.C.N. |
| Ribes aureum var. gracillimum | Golden Currant |
| Ribes malvaceum ssp. viridifolium | Chaparral Currant |
| Ribes speciosum | Fuchsia-Flowered Gooseberry |
| Salvia aplana | White Sage |
| Salvia columbariae | Chia |
| Salvia leucophylla | Purple Sage |
| Salvia mellifera | Black Sage |
| Trichostema lanatum | Wolly Blue-Curls,Romero |
| Malva parviflora | Cheeseweed |
| Ceanothus crassifolius | Hoaryleaf Ceanothus |
| Ceanothus cuneatus var. c. | Buckbrush |
| Ceanothus oliganthus var. sorediatus | N.C.N. |
| Rhamnus californica ssp. c. | California Coffeeberry |
| Rhamnus ilicifolia | Holly-leaf Redberry |
| Cercocarpus betuioides var. b. | Birch-Leaf Mountain Mahogany |

| | |
|---|---|
| Rosa californica | California Rose |
| Keckiella cordifolia | Heart-Leaf Penstemon |
| Mimulus aurantiacus | Orange Bush Monkeyflower |
| Mimulus guttatus | Creek Monkeyflower |
| Penstemon heterophyllus ssp. australis | Foothill Penstemon |
| Yucca whipplei ssp. intermedia | Our Lord's Candle |

GROUND COVERS

| | |
|---|---|
| Artemisia californica | California Sagebrush |
| Atriplex semibaccata | Australian Saltbush |
| Epilobium canum ssp. angustifolium | California fuchsia |
| Verbena tenuisecta | N.C.N. |

**DEVELOPMENT INTERIOR**

TREES

| | |
|---|---|
| Quercus agrifolia var. a. | Coast Live Oak; encina |
| Fraxinus dipetala | California Ash |
| Plananus racemosa | Western Sycamore |
| Populus fremontii ssp.f. | Freemont Cottonwood |
| Prunus ilicifolia ssp. i. | Holly-Leaf Cherry |

SHRUBS

| | |
|---|---|
| Arctostaphylos edmundsii | Little Sur Manzanita |
| Arctostaphylos hookeri | Monterey Manzanita |
| Baccharis pilularis | Dwarf Coyote Brush |
| Ceanothus griseus horizontalis | Carmel Creeper |
| Ceanothus 'Joyce Coulter' | N.C.N. |
| Ceanothus maritimus | N.C.N. |
| Galvezia speciosa | Island Bush Snapdragon |
| Mahonia aquifolium 'Compacta' | Oregon Grape |
| Ribes speciosum | Fuchsia-Flowering Gooseberry |
| Ribes viburnifolium | Catalina Perfume |
| Diplacus species | Monkey Flower |
| Iris douglassiana | N.C.N. |
| Romneya coulteri | Matilija Poppy |

GROUND COVERS

| | |
|---|---|
| Cotoneaster dammeri 'Lowfast' | Bearberry Cotoneaster |
| Cotoneaster salicifolius 'Repens' | Willowleaf Cotoneaster |
| Mahonia repens | Creeping Mahonia |
| Heuchera maxima | Island Alum Root |
| Penstemon species | Fountain Grass |

## RIPARIAN

### TREES

| | |
|---|---|
| Quercus agrifolia var. a. | Coast Live Oak; encina |
| Plananus racemosa | Western Sycamore |
| Prunus ilicifolia ssp. i. | Holly-Leaf Cherry |
| Sambucus mexicana | Blue Elderberry |
| Salix laevigata | Red Willow |

### SHRUBS

| | |
|---|---|
| Keckiella cordifolia | Heart-Leaf Penstemon |
| Rhus ovata | Sugar Bush |
| Ribes aureum var. gracillimum | Golden Currant |
| Ribes speciosum | Fuchsia-Flowered gooseberry |
| Rhamnus californica ssp. c. | California Coffeeberry |
| Rhamnus ilicifolia | Holly-Leaf Redberry |

### GROUND COVERS

| | |
|---|---|
| Lonicera subspicata var. denudata | Southern Honeysuckle |
| Nemophila menziesii var. | Baby Blue-eyes |
| Verbena robusta var. scabrida | Western Verbena |

# APPENDIX C-8

**Quino Checkerspot Butterfly Survey Report, Live Oak Ranch, prepared by PCR Services Corporation; June 22, 1999**

# Live Oak Ranch

**City of Agoura Hills**
**Los Angeles County, California**

# QUINO CHECKERSPOT BUTTERFLY SURVEY REPORT

*Prepared for:*
**Sage Community Group**
**3 Imperial Promenade, Suite 150**
**Santa Ana, CA 92707**

*Prepared by:*
**PCR Services Corporation**
**One Venture, Suite 150**
**Irvine, CA 92618**

Contact: Stephan H. Sprague
Wildlife Biologist

**June 22, 1999**

## TABLE OF CONTENTS


Page

1.0 INTRODUCTION . . . . . 1
Site Location . . . . . 1
Site Description . . . . . 4

2.0 QUINO CHECKERSPOT BUTTERFLY SURVEYS . . . . . 8
Methodology . . . . . 8
Results . . . . . 8

3.0 REFERENCES AND RELEVANT STUDIES . . . . . 10

APPENDIX A: FLORAL AND FAUNAL COMPENDIA FOR LIVE OAK RANCH . . . . . A-1

APPENDIX B: SITE PHOTOGRAPHS . . . . . B-1

APPENDIX C: PERMITEE SIGNATURE PAGE . . . . . C-1

APPENDIX D: FIELD NOTES . . . . . D-1

## LIST OF FIGURES


| Figure | | Page |
|---|---|---|
| 1 | Regional Map | 2 |
| 2 | Vicinity Map | 3 |
| 3 | Vegetation Communities Map | 5 |
| 3 | QCB Host Plant Locations | 9 |

# 1.0 INTRODUCTION

The Quino checkerspot butterfly (*Euphydryas editha quino*)(QCB) is fully protected under the Federal Endangered Species Act of 1973. This report presents the findings of a protocol survey effort for this species on the Live Oak Ranch property in the City of Agoura Hills, Los Angeles County, California. No Quino checkerspot butterflies were observed on the subject property.

## Site Location

The Live Oak Ranch site encompasses 320.3 acres approximately located ¼ mile west of California Highway 101 in Los Angeles County adjacent to the City of Agoura Hills, California (Figure 1 on page 2). Access to the site is from Kanan Road south from the Ventura Freeway (U.S. Highway 101). The site is also bordered on the North by Malibu Junction, on the west by Ladyface Mountain, on the south by Silver Creek Road (currently inaccessible) along with residential development, and the east by undeveloped private lands. The center of the site is located at 34 08 N Latitude, 118° 45' 30" west longitude (Figure 2 on page 3). Medea Creek bisects the property as it runs southward between Cornell and Kanan roads, through the Santa Monica Mountains ultimately emptying into Malibu Lake.

The proposed development will consist of 123 single-family homes (lot #'s 1-123) on 71.1 acres of the 320.3-acre property. The lots vary in size from ¼ acre to over ½ acre. Four small lots (total 1.9 acres) near the proposed entrance would be landscaped and vegetated with native flora. The remaining 247.3 acres will be undisturbed and dedicated to open space. The preserved open space consists mainly of steep rockland and dense chaparral slopes, sparse non-native grasslands, coastal sage scrub, and high quality willow riparian habitat adjacent to Medea Creek. A portion of the proposed project (Area 2) is located within the Las Virgenes Significant Ecological Area (SEA) as defined by the Los Angeles County Significant Ecological Area Technical Advisory Committee (SEATAC). The applicant has completed a Biota Report in accordance with SEATAC requirements which will be incorporated into the Environmental Impact report for the project.

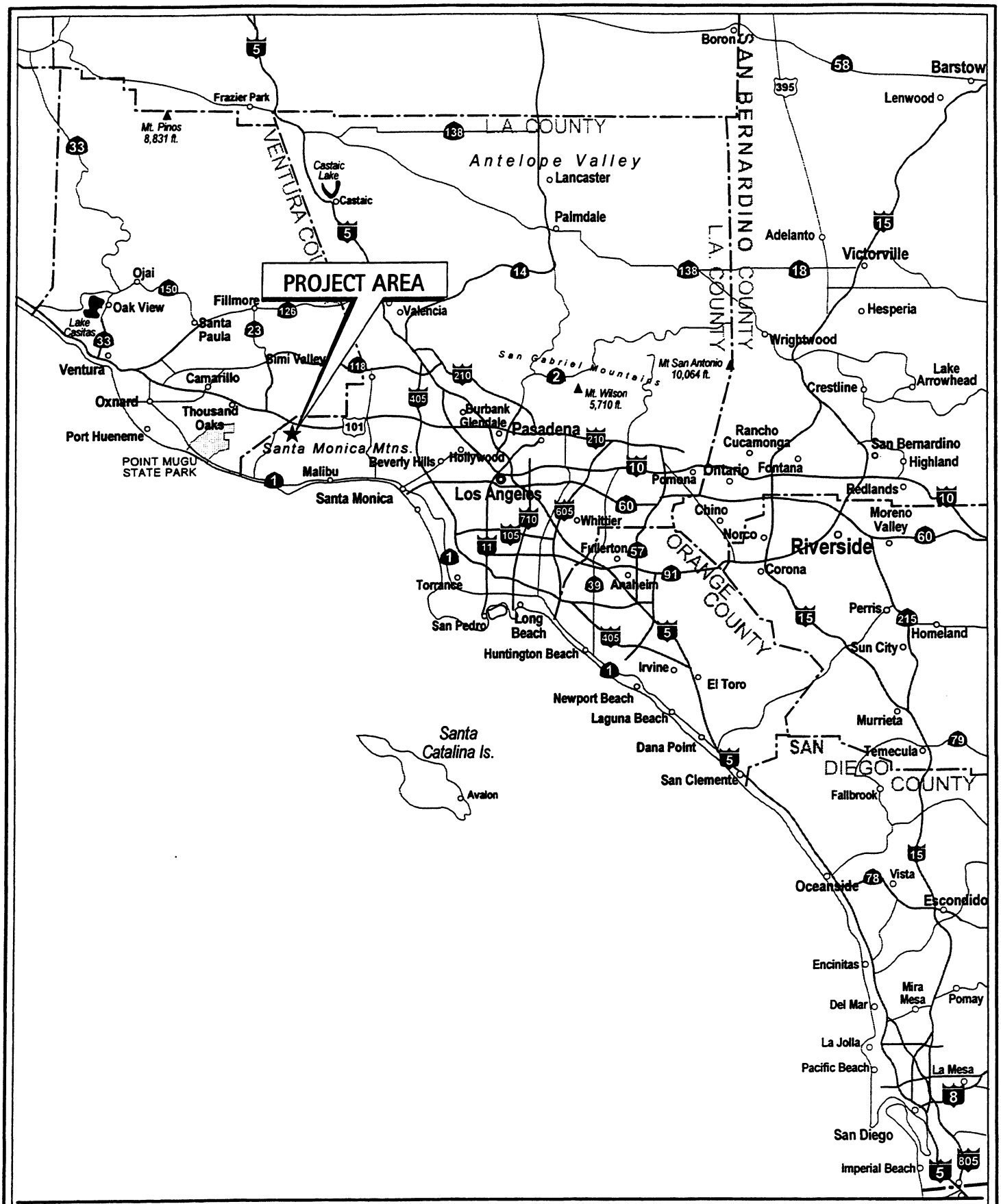
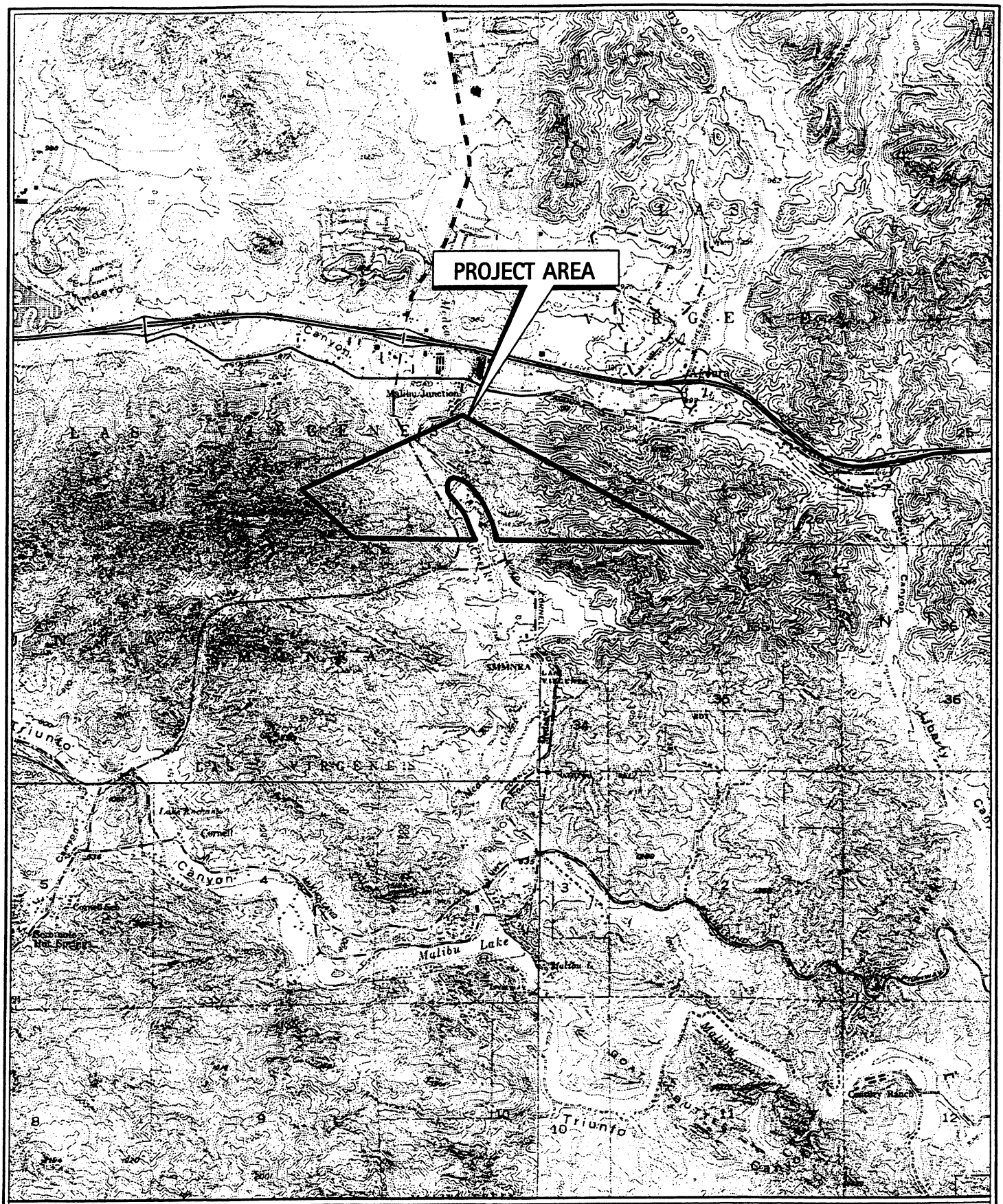



Figure 1
Live Oak Ranch
Regional Map




SOURCE: USGS Quadrangles Calabasas and Thousand Oaks, Photorevised 1981

PCR

N

Figure 2
**Live Oak Ranch**
**Vicinity Map**

## Site Description

Vegetation on the Live Oak property is predominantly composed of a willow riparian forest, oak woodland, coastal sage scrub-grassland, chaparral, and disturbed. (Figure 3 on page 5) A compendium of floral and faunal species observed in the study area are included as Appendix A. Photographic representations of vegetative habitats onsite are included as Appendix B. A brief description of the plant communities onsite follows.

### Willow Riparian Forest

The Medea Creek drainage channel supports approximately 5.9 acres of well-developed Southern Arroyo Willow Riparian Forest (CNDDB Element Code 61320) dominated by arroyo willow (*Salix lasiolepis*) and red willow (*S. laevigata*). Areas of the channel apparently subject to high velocity, scouring flows support mulefat (*Baccharis salicifolia*), mugwort (*Artemisia douglasiana*), western ragweed (*Ambrosia psilostachya* var. *californica*), poison hemlock (*Conium maculatum*) and fennel (*Foeniculum vulgare*).

### Oak Woodland

Approximately 3.3 acres of mixed Coast Live Oak Woodland (CNDDB Element Code 71160) and Valley Oak Woodland (CNDDB Element Code 71130), approaching the southern limit of its range, are scattered across the project site. They do not form extensive woodlands with substantial canopy cover. Previously prepared biota reports mention a mature western sycamore (*Platanus racemosa*), several valley oaks (*Quercus lobata*) and several coast live oaks (*Q. agrifolia*) adjacent to the Medea Creek but isolated by roadways. Their presence may indicate an historically more extensive distribution of alluvial bottomland forest (i.e., Sycamore Alluvial Woodland) than remains today, but this small, disjunct assemblage no longer merits consideration as a distinct plant community onsite. Three mature coast live oaks are also noted to have formerly occupied a drainage on the slopes of Ladyface Mountain, to the west of Kanan Road, in a now-filled area of the project site. The project area, and the Santa Monica Mountains generally, are known to support oak and walnut woodlands and walnut woodland is considered a sub-community of oak woodland; however, no walnuts are present on the project site. An oak tree survey of the project site was performed and a report prepared in accordance with County Ordinance requirements.

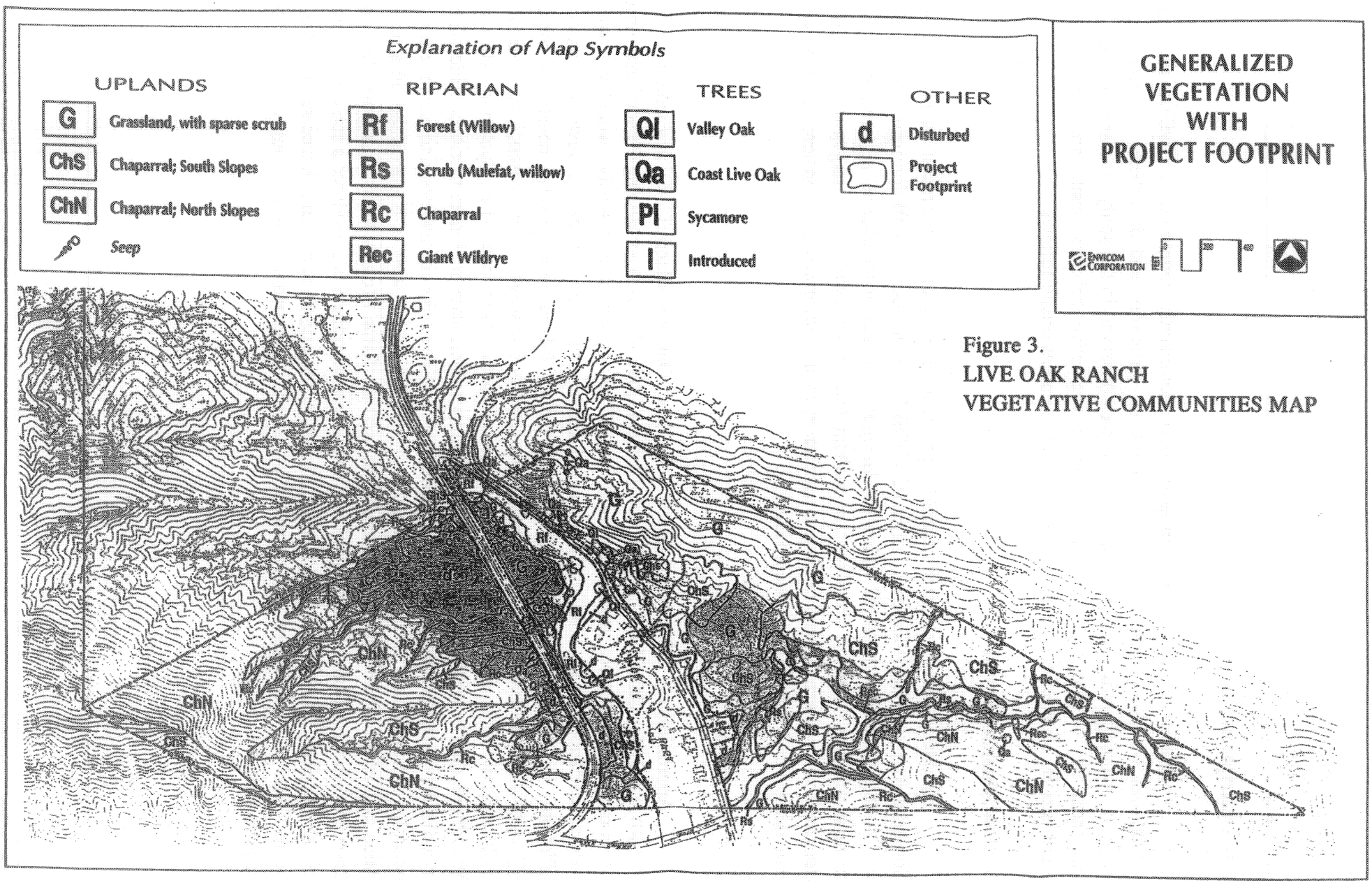



Figure 3.
LIVE OAK RANCH
VEGETATIVE COMMUNITIES MAP

## Coastal Sage Scrub - Grassland

The previously prepared biota reports for the project site identify steep, south-facing slopes across the eastern half of the project site as rock lands, with sparse vegetation dominated by Bigelow's spike-moss (*Selaginella bigelovii*), wishbone bush (*Mirabilis californicus*), a few ferns, and succulents (*Dudleya* spp.). North-facing rock lands were observed to be more mesic and exhibit denser cover by mosses, ferns and succulents. This plant assemblage appears to most closely conform to the *Manual of California Vegetation* Brittlebush Series, described as a variant of the coastal sage scrub communities (especially Riversidean Sage Scrub) and often found along steep, rocky upland slopes of the inner South Coast ranges.

Mixed grasslands and coastal sage scrub elements have developed along gentler south-facing slopes where sufficient soil accumulation and correspondingly more mesic conditions support their growth. Envicom biologists attempted to quantitatively distinguish stands of coastal sage scrub from chaparral and grasslands at the request of SEATAC. However, they concluded that scrub and grassland communities on the project site intergrade in a mosaic containing varying densities of both communities, as is typical in Southern California, and it was determined insufficient differentiation or uniformity of plant species existed to permit refinement of community boundaries. Coastal sage scrub species are scattered throughout the site and do not form distinct stands. Dominant scrub species include California buckwheat (*Eriogonum fasciculatum*), coast encelia (*Encelia californica*), coast goldenbush (*Isocoma menziesii* ssp. *vernonioides*), California-aster (*Lessingia filaginifolia* ssp. *latifolia*), and California sagebrush (*Artemisia californica*), and most closely approximate Riversidean Sage Scrub (Element Code 32700). Native perennial bunch grasses and non-native grasses represent elements of Valley Needlegrass Grassland (CNDDB Element Code 42110) and Non-Native Grassland (Element Code 4200), but form an ecotone with scrub species, together with native and introduced forbs. Considered as a single community, scrub-grasslands occupy approximately 86.9 acres on the project site.

## Chaparral

Areas of Chamise Chaparral or Chamisal (CNDDB Element Code 37200) intergrade with sage scrub and grasslands throughout the project site and occupy approximately 204 acres. Chaparral forms intermittent patches of relatively dense cover along south-facing slopes in the eastern project site, where dominant species include chamise (*Adenostoma fasciculatum*), laurel sumac (*Malosma laurina*), bush mallow (*Malacothamnus fasciculatus* var. *laxifolius*), buck brush (*Ceanothus cuneatus*), black sage (*Salvia mellifera*) and birch-leaf mountain mahogany (*Cercocarpus betuloides*).

The densest chaparral cover is found along the more mesic north-facing slopes in the eastern half of the site, particularly along drainages and sheltered slopes, and exhibit greater species diversity. Species include scrub oak (*Quercus berberidifolia*), California ash (*Fraxineum dipetala*), chaparral currant (*Ribes malvaceum* ssp. *viridifolium*), fuchsia-flowered gooseberry (*Ribes speciosum*), holly-leaf redberry (*Rhamnus ilicifolia*), poison oak (*Toxicodendron diversilobum*), orange bush monkeyflower (*Mimulus aurantiacus*), heart-leaf penstemon (*Keckiella cordifolia*), honeysuckle (*Lonicera subspicata* var. *denudata*), and wild cucumber (*Marah macrocarpus*). Chaparral along north-facing slopes most closely conforms to Holland's Scrub Oak Chaparral (CNDDB Element Code 37900); approximately 116 acres of the total area mapped as chaparral support this assemblage.

Chaparral stands in the western half of the project site also exhibit consistent differences between north- and south-facing slopes, albeit with some variations. A single small stand of red shank (*Adenostoma sparsifolium*) occurs only along a ridge line and its north face east of Ladyface Mountain; it is not considered as a separate red shank chaparral plant community due to its small size. A single stand of bigberry manzanita (*Arctostaphylos glauca*) was also observed to be confined to a small area on north-facing slopes southwest of Ladyface Mountain. This is an indicator species for chamisal and is therefore not considered as a separate community.

**Disturbed**

Approximately 15 acres on the project site are characterized as disturbed, encompassing turnouts along Kanan and Cornell Roads, a heavy machinery operation along Kanan Road in the western portion of the property, and two small areas between Kanan and Cornell Roads. Developed areas along the southern boundary also slightly encroach on the project site.

## 2.0 QUINO CHECKERSPOT BUTTERFLY SURVEYS

### Methodology

All surveys for the federally endangered Quino checkerspot butterfly were conducted by Stephan Sprague under U.S. Fish and Wildlife Service (USFWS) permit number TE838015-0. Methods employed were in conformance with the USFWS *Survey Protocol for the Endangered Quino Checkerspot Butterfly (Euphydryas editha quino) for the 1999 Field Season, issued January 25, 1999.* Adult surveys were conducted at least every seven (7) days form the date of flight initiation until the end of the flight season. Flight season dates are determined by USFWS monitored reference populations. Surveys were conducted between the hours of 0900 hours and 1600 hours, within all portions of the study area containing suitable habitat. Weather conditions were always determined to be suitable for surveys. Surveys were conducted by slowly walking over the entire habitat area, with special emphasis on searching for larvae, perching females, hilltopping males, and host plants. All observations were mapped onto either 1:24000 USGS topographic maps or 1:400 aerial photographs of the project site. Additional observations were documented when available including sex, age, breeding status, and behavioral characteristics.

| | | | Weather | | | | |
|---|---|---|---|---|---|---|---|
| **Date** | **Time** | **Temp** | **Start** | **Middle** | **End** | **Results** | **Surveyor** |
| 03/10/99 | 0930-1330 | 68°/68° | pc | pc | pc | No QCB observed | Stephan Sprague |
| 03/17/99 | 0930-1200 | 55°/65° | oc | oc | oc | No QCB observed | Stephan Sprague |
| 03/24/99 | 1000-1300 | 68°/72° | clear | clear | clear | No QCB observed | Stephan Sprague |
| 03/31/99 | 0906-1200 | 65°/64° | oc | oc | oc | No QCB observed | Stephan Sprague |
| 04/07/99 | | | rain | rain | rain | No QCB observed | Stephan Sprague |
| 04/14/99 | 0918-1322 | 70°/85° | clear | clear | clear | No QCB observed | Stephan Sprague |
| 04/21/99 | 0900-1330 | 78°/85° | clear | clear | clear | No QCB observed | Stephan Sprague |
| 04/28/99 | 1000-1400 | 68°/70° | pc | pc | pc | No QCB observed | Stephan Sprague |
| 05/05/99 | 0910-1300 | 72°/88° | clear | clear | clear | No QCB observed | Stephan Sprague |

### Results

The presence of QCB butterflies is dependent upon the availability of their host plants. Several populations of plantain and owl's clover were identified onsite as shown in Figure 4 on page 9. No Quino checkerspot butterflies were identified on the Live Oak Ranch property during any of the eight focused surveys.

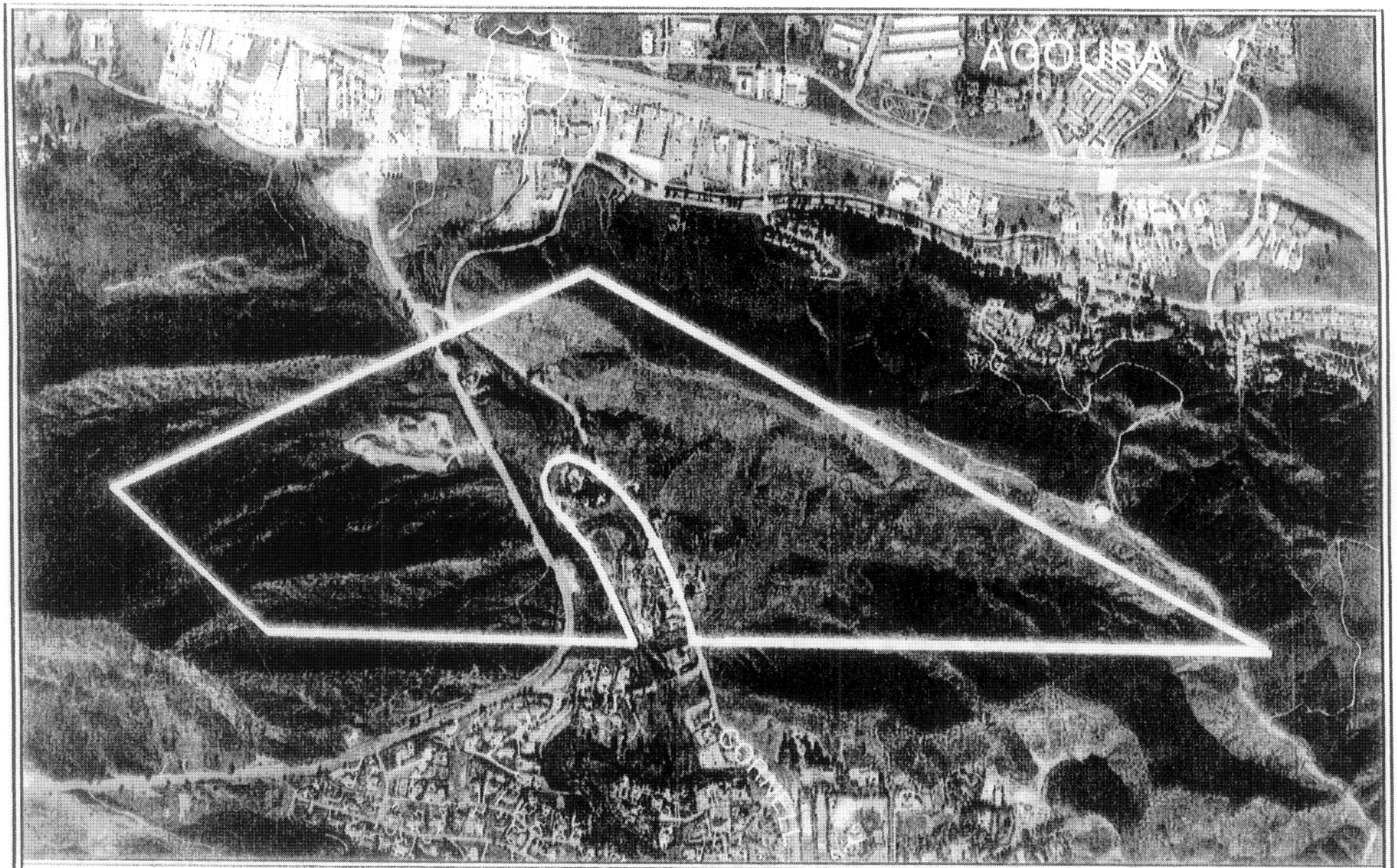



Figure 4
Live Oak Ranch
QCB Host Plant Locations

## 3.0 REFERENCES AND RELEVANT STUDIES


Garth, J. and J. Tilden. 1986. *California Butterflies.* Berkeley: University of California Press.

Hickman, J. C. 1993. *The Jepson Manual: Higher Plants of California.* Berkeley: University of California Press.

Holland, R.F. 1986, updated 1992. *Preliminary Descriptions of the Terrestrial Natural Communities of California.* Unpublished report. State of California Resources Agency, California Department of Fish and Game, Non-Game Heritage Division, Sacramento, CA.

McCauley, M. 1985. *Wildflowers of the Santa Monica Mountains.* Canoga Park: Canyon Publishing.

Munz, P. A. 1974. *A Flora of Southern California.* Berkeley: University of California Press.

Munz, P. A., and D. D. Keck. 1959. *A California Flora.* Berkeley: University of California Press.

Robbins, W. W., M. K. Bellue, and W. S. Ball. 1951. *Weeds of California.* State of California Department of Agriculture. Sacramento, CA.

Sawyer, John O. and T. Keeler-Wolf. 1995. *A Manual of California Vegetation.* Sacramento: California Native Plant Society.

University of California. *The Grower's Weed Identification Handbook.* Communication Services Publications, Publication 4030, Division of Agriculture and Natural Resources: University of California, Berkeley.

U.S. Fish and Wildlife Service. January 25, 1999. *Survey Protocol for the Endangered Quino Checkerspot Butterfly (Euphydryas editha quino) for the 1999 Field Season.* Unpublished paper.

U. S. Geological Survey. Thousand Oaks 7.5' Topographic Quadrangle. 1966, Photo revised 1980.

# APPENDIX A: FLORAL AND FAUNAL COMPENDIA FOR LIVE OAK RANCH

*Note:* The following species lists are not intended to represent exhaustive compendia for the entire project site. They are included as an indication of the dominant plant species and representative faunal species observed on site.

| VASCULAR PLANTS | |
|---|---|
| **Scientific Name** | **Common Name** |
| **Ferns and Fern Allies** | |
| **Pteridaceae** | **Brake Family** |
| *Pellaea andromedifolia* | coffee fern |
| **Selaginellaceae** | **Spike-Moss Family** |
| *Selaginella bigelovii* | Bigelow's spike-moss |
| **Gymnosperms** | |
| **Pinaceae** | **Pine Family** |
| *Pinus* sp. | pine |
| **Angiosperms (Dicotyledons)** | |
| **Anacardiaceae** | **Sumac or Cashew Family** |
| *Toxicodendron diversilobum* | poison oak |
| **Apiaceae** | **Carrot Family** |
| *Apiastrum angustifolium* | wild celery |
| * *Foeniculum vulgare* | fennel |
| *Lomatium dasycarpum* | woolly-fruited lomatium |
| **Asteraceae** | **Sunflower Family** |
| *Ambrosia psilostachya* | western ragweed |
| *Artemisia californica* | California sagebrush |
| *Artemisia douglasiana* | mugwort |
| *Baccharis pilularis* | coyote brush |
| *Baccharis salicifolia* | mulefat |
| * *Centaurea melitensis* | tocalote |
| *Chaenactis glabriuscula* | yellow pincushion |
| * *Chamomilla suaveolens* | pineapple weed |
| * *Cirsium vulgare* | bull thistle |
| *Eriophyllum confertiflorum* | golden yarrow |
| *Filago californica* | California fluffweed |
| *Gnaphalium bicolor* | bicolored cudweed |
| *Gnaphalium californicum* | California everlasting |

| VASCULAR PLANTS | |
|---|---|
| **Scientific Name** | **Common Name** |
| *Gnaphalium canescens* | felty everlasting |
| *Hemizonia* sp. | tarweed |
| * *Hemizonia pungens* | common spikeweed |
| *Pentachaeta lyonii* | Lyon's pentachaeta |
| *Senecio flaccidus* | shrubby butterweed |
| * *Silybum marianum* | milk thistle |
| * *Sonchus asper* ssp. *asper* | prickly sow thistle |
| * *Sonchus oleraceus* | common sow thistle |
| *Xanthium spinosum* | spiny cocklebur |
| **Boraginaceae** | **Borage Family** |
| *Amsinckia menziesii* | common fiddleneck |
| *Pectocarya linearis* ssp. *ferocula* | slender pectocarya |
| *Plagiobothrys collinus* | California popcorn flower |
| **Brassicaceae** | **Mustard Family** |
| * *Brassica nigra* | black mustard |
| * *Capsella bursa-pastoris* | shepherd's purse |
| *Lepidium nitidum* | shining peppergrass |
| *Rorippa nasturtium-aquaticum* | water-cress |
| **Caprifoliaceae** | **Honeysuckle Family** |
| *Lonicera subspicata* | southern honeysuckle |
| *Sambucus mexicana* | Mexican elderberry |
| **Crassulaceae** | **Stonecrop Family** |
| *Crassula connata* | pygmy-weed |
| *Dudleya lanceolata* | lance-leaved dudleya |
| *Dudleya pulverulenta* | chalk dudleya |
| **Cucurbitaceae** | **Gourd Family** |
| *Marah macrocarpus* | wild cucumber |
| **Fabaceae** | **Legume Family** |
| *Astragalus trichopodus* | Santa Barbara locoweed |
| *Lotus scoparius* | deerweed |
| *Lotus strigosus* | strigose lotus |
| * *Medicago polymorpha* | California bur clover |
| **Fagaceae** | **Oak Family** |
| *Quercus agrifolia* | coast live oak |
| *Quercus dumosa* | coastal scrub oak |
| *Quercus lobata* | valley oak |

| VASCULAR PLANTS | |
|---|---|
| **Scientific Name** | **Common Name** |
| **Geraniaceae** | **Geranium Family** |
| * *Erodium botrys* | broad-lobed filaree |
| * *Erodium cicutarium* | red-stemmed filaree |
| * *Erodium moschatum* | white-stemmed filaree |
| **Hydrophyllaceae** | **Waterleaf Family** |
| *Nemophila menziesii* | baby blue-eyes |
| *Pholistoma auritum* var. *auritum* | fiesta flower |
| **Juglandaceae** | **Walnut Family** |
| *Juglans californica* var. *californica* | Southern California black walnut |
| **Lamiaceae** | **Mint Family** |
| * *Marrubium vulgare* | horehound |
| *Salvia apiana* | white sage |
| *Salvia columbariae* | chia |
| *Salvia mellifera* | black sage |
| *Trichostema lanatum* | woolly bluecurls |
| **Malvaceae** | **Mallow Family** |
| *Malacothamnus* sp. | bushmallow |
| * *Malva parviflora* | cheeseweed |
| **Nyctaginaceae** | **Four O'Clock Family** |
| *Mirabilis californica* | California wishbone bush |
| **Onagraceae** | **Evening Primrose Family** |
| *Clarkia purpurea* | winecup clarkia |
| **Paeoniaceae** | **Peony Family** |
| *Paeonia californica* | California peony |
| **Papaveraceae** | **Poppy Family** |
| *Eschscholzia californica* | California poppy |
| **Plantaginaceae** | **Plantain Family** |
| *Plantago erecta* | western plantain |
| **Platanaceae** | **Sycamore Family** |
| *Platanus racemosa* | western sycamore |
| **Polygonaceae** | **Buckwheat Family** |
| *Eriogonum fasciculatum* | California buckwheat |
| * *Rumex crispus* | curly dock |
| **Portulacaceae** | **Purslane Family** |
| *Claytonia perfoliata* | miner's lettuce |

| VASCULAR PLANTS | |
|---|---|
| **Scientific Name** | **Common Name** |
| **Primulaceae** | **Primrose Family** |
| * *Anagallis arvensis* | scarlet pimpernel |
| **Ranunculaceae** | **Buttercup Family** |
| *Delphinium parryi* | Parry's larkspur |
| **Rosaceae** | **Rose Family** |
| *Adenostoma fasciculatum* | chamise |
| *Rosa californica* | California wild rose |
| **Rubiaceae** | **Madder Family** |
| *Galium angustifolium* | narrow-leaved bedstraw |
| **Salicaceae** | **Willow Family** |
| *Salix lasiolepis* | arroyo willow |
| **Scrophulariaceae** | **Figwort Family** |
| *Castilleja exserta* | purple owl's-clover |
| *Collinsia heterophylla* | Chinese houses |
| *Mimulus brevipes* | wide-throated monkey-flower |
| *Mimulus guttatus* | common monkey-flower |
| *Veronica peregrina* ssp. *xalapensis* | purslane speedwell |
| **Solanaceae** | **Nightshade Family** |
| * *Nicotiana glauca* | tree tobacco |
| *Solanum douglasii* | Douglas' nightshade |
| **Verbenaceae** | **Vervain Family** |
| *Verbena lasiostachys* | western verbena |
| **Violaceae** | **Violet Family** |
| *Viola pedunculata* | johnny-jump-up |
| **Angiosperms (Monocotyledons)** | |
| **Iridaceae** | **Iris Family** |
| *Sisyrinchium bellum* | blue-eyed-grass |
| **Liliaceae** | **Lily Family** |
| *Chlorogalum pomeridianum* | soap plant |
| *Dichelostemma capitatum* | blue dicks |
| *Yucca whipplei* | Our Lord's candle |
| **Poaceae** | **Grass Family** |
| *Achnatherum coronatum* | giant needlegrass |
| * *Avena fatua* | wild oat |
| * *Bromus hordeaceus* | soft chess |
| * *Bromus madritensis* ssp. *rubens* | foxtail chess |
| *Hordeum vulgare* | barley |

| INVERTEBRATES | | |
|---|---|---|
| **Scientific Name** | **Common Name** | **Status** |
| **Gryllidae** | **Crickets** | |
| *Gryllus* sp. | Field cricket | |
| **Pentatomidae** | **Stink Bugs** | |
| *Chlorochroa uhleri* | | |
| **Tenebrionidae** | **Darkling Beetles** | |
| *Eleodes acuticauda* | darkling beetles | |
| **Hesperiidae** | **Skippers** | |
| *Hylephila phyleus* | fiery skipper | |
| *Erynnis funeralis* | funereal dusky wing | |
| **Papilionidae** | **Swallowtail Butterflies** | |
| *Papilio rutulus* | western tiger swallowtail | |
| **Pieridae** | **Whites, Sulphurs, and Orangetips** | |
| *Anthocharis sara* | sara orangetip | |
| **Satyridae** | **Satyrids** | |
| *Coenonympha californica* | California ringlet | |
| **Nymphalidae** | **Brush-Footed Butterflies** | |
| *Euphydryas chalcedona hennei* | Henne's checkerspot | |
| *Charidryas gabbii* | Gabb's checkerspot | |
| *Vanessa cardui* | painted lady | |
| **Lycaenidae** | **Blues and Hairstreaks** | |
| *Glaucopsyche lygdamus australis* | southern blue | |
| *Icaricia acmon* | acmon blue | |
| *Callophrys perplexa =dumetorum* | perplexing hairstreak | |
| **Riodinidae** | **Metalmarks** | |
| *Apodemia mormo virgulti* | Behr's metalmark | |
| **Vespidae** | **Paper Wasps & Potter Wasps** | |
| *Polistes apachus* | | |
| *Polistes dorsalis californicus* | | |
| **Sphecidae** | **Thread-Waisted Wasps** | |
| *Ammophila* sp. | thread-waisted wasp | |
| **Apidae** | **Honey Bees and Bumble Bees** | |
| *Apis mellifera* | honey bee | |
| *Bombus sonorus* | Sonoran bumble bee | |

| FISH | |
|---|---|
| **Scientific Name** | **Common Name** |
| **Centrarchidae** | **Sunfish and Bass** |
| *Micropterus salmoides* | largemouth bass |
| *Lepomis cyanellus* | green sunfish |

| AMPHIBIANS | |
|---|---|
| **Scientific Name** | **Common Name** |
| **Hylidae** | **Tree Frogs** |
| *Pseudacris regilla* | Pacific chorus frog |

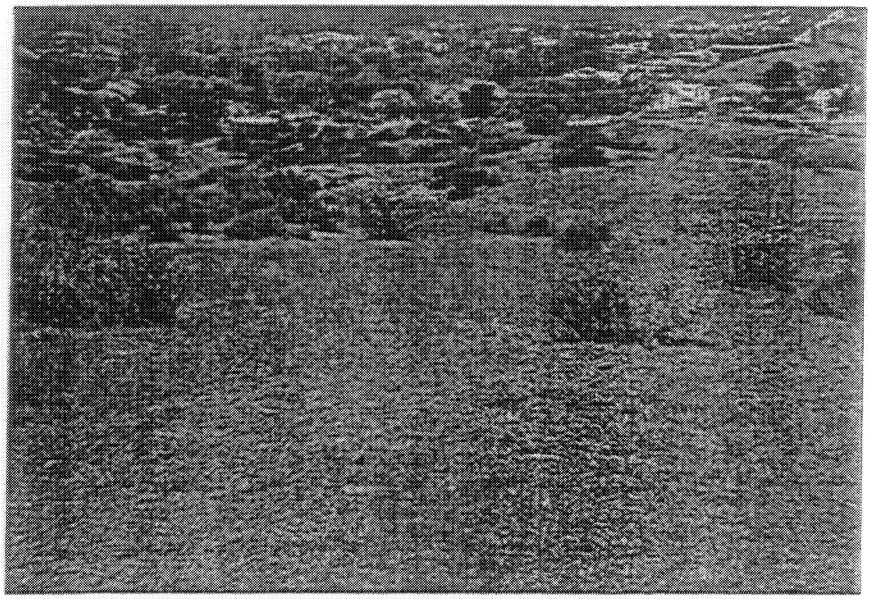
| REPTILES | |
|---|---|
| **Scientific Name** | **Common Name** |
| **Iguanidae** | **Iguanid Lizards** |
| *Sceloporus occidentalis* | western fence lizard |
| *Uta stansburiana* | side-blotched lizard |
| *Phrynosoma coronatum* | coast horned lizard |

| BIRDS | | |
|---|---|---|
| **Scientific Name** | **Common Name** | **Status** |
| **Ardeidae** | **Herons** | |
| *Nycticorax nycticorax* | black-crowned night-heron | |
| **Anatidae** | **Waterfowl** | |
| *Anas platyrhynchos* | mallard | |
| **Cathartidae** | **New World Vultures** | |
| *Cathartes aura* | turkey vulture | |
| **Accipitridae** | **Hawks** | |
| *Elanus leucurus* | white-tailed kite | |
| *Buteo jamaicensis* | red-tailed hawk | |
| *Aquila chrysaetos* | golden eagle | |
| **Phasianidae** | **Pheasants and Quails** | |
| *Callipepla californica* | California quail | |
| **Columbidae** | **Pigeons and Doves** | |
| *Zenaida macroura* | mourning dove | |
| **Cuculidae** | **Cuckoos and Roadrunners** | |
| *Geococcyx californianus* | greater roadrunner | |
| **Trochilidae** | **Hummingbirds** | |
| *Calypte anna* | Anna's hummingbird | |
| *Calypte costae* | Costa's hummingbird | |
| **Picidae** | **Woodpeckers** | |
| *Picoides nuttallii* | Nuttall's woodpecker | |
| **Tyrannidae** | **Tyrant Flycatchers** | |
| *Sayornis nigricans* | black phoebe | |
| *Myiarchus cinerascens* | ash-throated flycatcher | |
| **Corvidae** | **Jays and Crows** | |
| *Aphelocoma californica* | Western scrub jay | |
| *Corvus brachyrhynchos* | American crow | |
| *Corvus corax* | common raven | |
| **Paridae** | **Titmice** | |
| *Baeolophus inornatus* | oak titmouse | |
| **Aegithalidae** | **Bushtits** | |
| *Psaltriparus minimus* | bushtit | |
| **Troglodytidae** | **Wrens** | |
| *Thryomanes bewickii* | Bewick's wren | |
| *Troglodytes aedon* | house wren | |
| **Muscicapidae** | **Kinglets, Gnatcatchers, Thrushes, and Babblers** | |
| *Turdus migratorius* | American robin | |
| *Chamaea fasciata* | wrentit | |

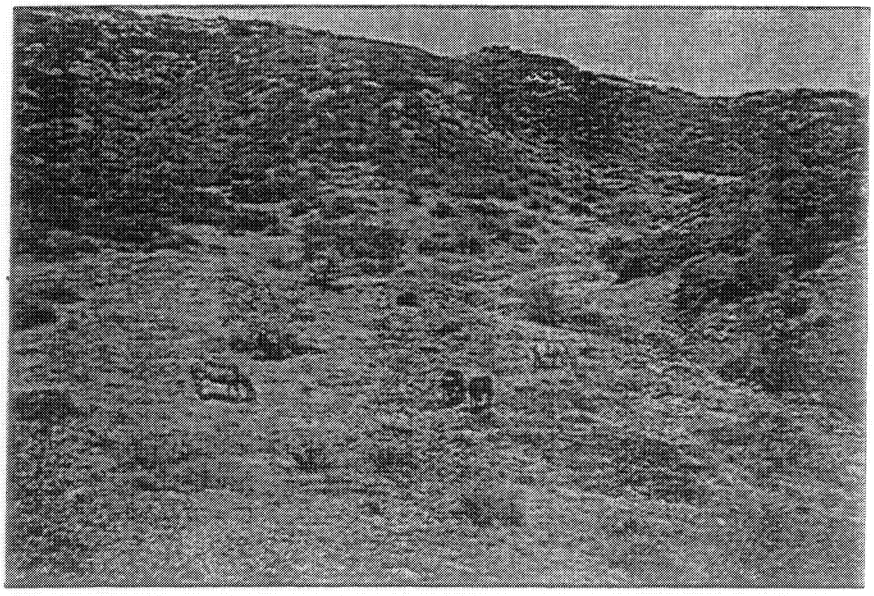
| BIRDS | | |
|---|---|---|
| **Scientific Name** | **Common Name** | **Status** |
| **Mimidae** | **Thrashers** | |
| *Mimus polyglottos* | northern mockingbird | |
| *Toxostoma redivivum* | California thrasher | |
| **Sturnidae** | **Starlings** | |
| * *Sturnus vulgaris* | European starling | |
| **Emberizidae** | **Wood Warblers, Tanagers, Buntings, & Blackbirds** | |
| *Dendroica coronata* | yellow-rumped warbler | |
| *Pipilo crissalis* | California towhee | |
| *Pipilo maculatus* | spotted towhee | |
| *Aimophila ruficeps* | rufous-crowned sparrow | |
| *Chondestes grammacus* | lark sparrow | |
| *Zonotrichia leucophrys* | white-crowned sparrow | |
| **Fringillidae** | **Finches** | |
| *Carduelis psaltria* | lesser goldfinch | |

| MAMMALS | |
|---|---|
| **Scientific Name** | **Common Name** |
| **Leporidae** | **Hares and Rabbits** |
| *Lepus californicus* | Black-tailed jackrabbit |
| *Sylvilagus audubonii* | desert cottontail |
| **Sciuridae** | **Squirrels** |
| *Spermophilus beecheyi* | California ground squirrel |
| **Geomyidae** | **Pocket Gophers** |
| *Thomomys bottae* | Botta's pocket gopher |
| **Canidae** | **Wolves and Foxes** |
| *Canis latrans* | coyote |
| **Equidae** | **Horses and Burros** |
| * *Equus caballus* | horse |

# APPENDIX B: SITE PHOTOGRAPHS



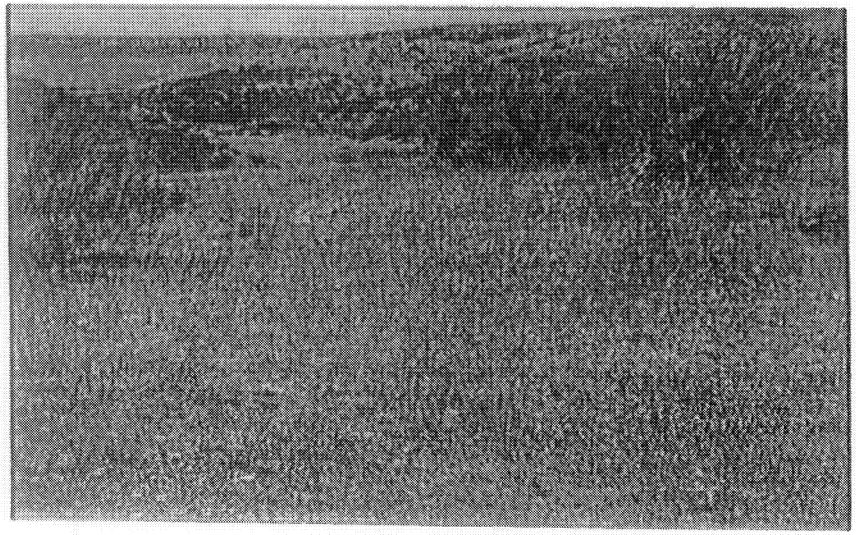
Site Photograph facing west.



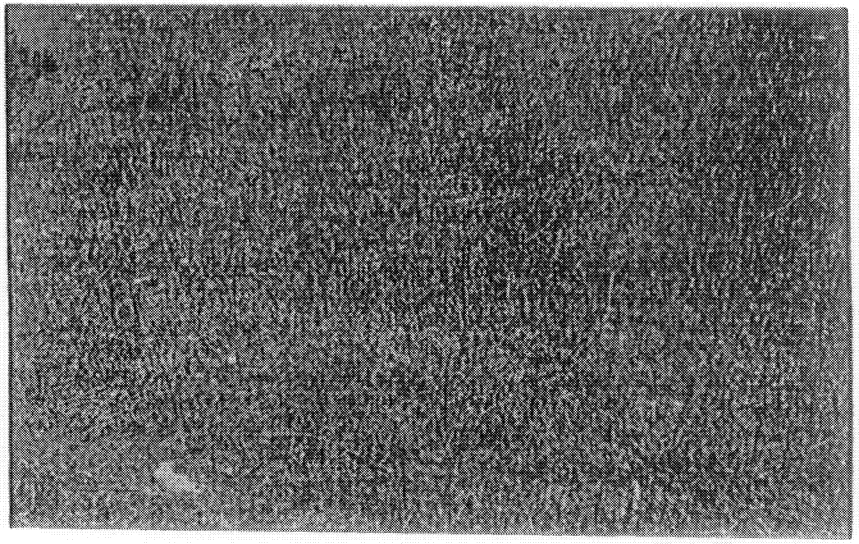
Site Photograph facing east.

PCR

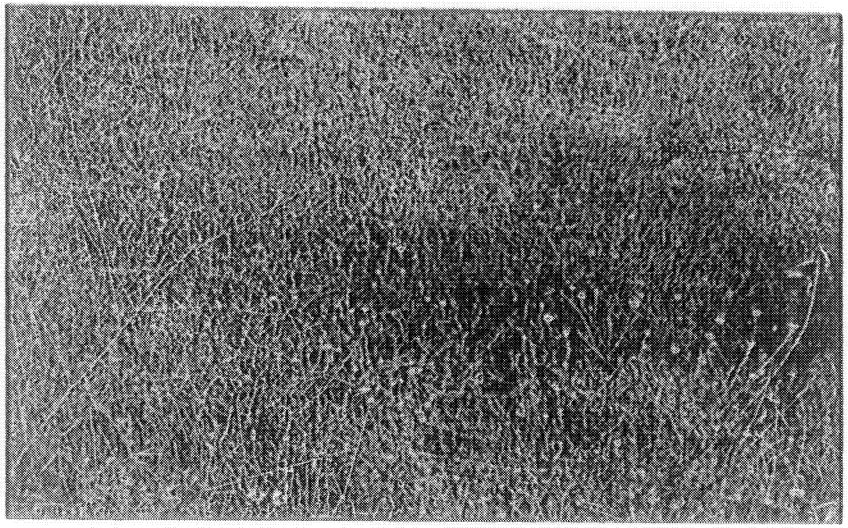
Figure B-1
Live Oak Ranch
Site Photographs



Photograph representing typical habitat for QCB host plants.



Photograph representing host plant populations.



Photograph representing host plant populations.

PCR

Figure B-2
Live Oak Ranch
Site Photographs

# APPENDIX C: PERMITEE SIGNATURE PAGE

June 22, 1999

U.S. Fish and Wildlife Service
CARLSBAD FIELD OFFICE
2730 Loker Avenue West
Carlsbad, CA 92008

Re: **Signature Page for the Live Oak Ranch Quino Checkerspot Butterfly Surveys**

Dear To whom it may concern:

In accordance with Permit Number TE838015-0, this signature page confirms that I, Stephan H. Sprague, have reviewed and concur with the findings of the above referenced report. I agree with the dates, times, and survey results as presented in the report.

If you have any questions or require further information, please contact me at (949) 753-7001.

Sincerely,

Stephan H. Sprague
Wildlife Biologist

# APPENDIX D: FIELD NOTES

ıino Checkerspot General Form  Survey type: Habitat Assessment/Adult Survey

rveyor: Sprague  Date: 3/10/99 (mm/dd/yyyy)  Site Visit No: (1) 2 3 4 5 6 7 8 9 10

tal site acres: _____  Site Name: Sage/LiveOak  Site Location: Agoura Hills

| me (24 hr) | Sky | Wind (Beaufort) | Temp F or C |
|---|---|---|---|
| gin 930 | clear/ (partcloudy)/overcast/fog/drizzle/shower | <1 (1-3) 4-7 8-12 >12 | 68° |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| 130 | clear/ (partcloudy)/overcast/fog/drizzle/shower | <1 (1-3) 4-7 8-12 >12 | 68° |

tal hours surveyed: 4

ɔused Survey Acres: _____  Elev Min: _____ft Max: _____ft

scribe, map, and estimate areas surveyed below.

| ost Plants[a] | Patch Size ($ft^2$) | No Plants/$ft^2$ | Sparse/Dense[b] | Map ID[c] | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

rval or nectar resources. Identify species. b. Sparse= plants not touching; dense = plants touching c. Corresponds to polygon on a map.

rrounding land uses (including adjoining properties):

North _____ Distance _____ ft./mile
South _____ Distance _____ ft./mile
East _____ Distance _____ ft./mile
West _____ Distance _____ ft./mile

bitat onsite (circle): (open soils) (hilltop) (ridge) (Plantago) Castilleja (soil crusts) (old roads)
ɔtar (clay soils) (rock outcrops)

nditions: (e.g., (grazing) agriculture (sowbugs/earwigs) recent fire (grading)
ıer: _____

| Butterflies Observed (larvae or adults) | Number | Comments |
|---|---|---|
| Pale Swallowtail (*Papilio eurymedon*) | | |
| Anise Swallowtail (*P. zelicaon*) | | |
| West Tiger Swallowtail (*P. rutulus*) | | |
| Sara Orangetip (*Anthocharis sara*) | | |
| Felder's Orangetip (*A. cethura*) | | |
| Cabbage White (*Artogeia rapae*) | | |
| Sleepy Orange (*Eurema nicippe*) | | |
| Common White (*Pontia protodice*) | | |
| California Dogface (*Zerene eurydice*) | | |
| Alfalfa Butterfly (*Colias eurytheme*) | | |
| Harford's Sulfur (*C. harfordi*) | | |
| California Ringlet (*Coenonympha californica*) | | |
| Monarch (*Danaus plexippus*) | | |
| Queen (*D. gilippus*) | | |
| Henne's Checkerspot (*Euphydryas chalcedona hennei*) | | |
| Caloodon Checkerspot (*E. chalcedona chalcedona*) | | |
| Quino Checkerspot (*E. editha quino*) | | |
| Gabb's Checkerspot (*Charidryas gabbii*) | | |
| Leanira Checkerspot (*Thessalia leanira wrighti*) | | |
| Mylitta Crescent (*Phyciodes mylitta*) | | |
| Painted Lady (*Vanessa cardui*) | | |
| West Coast Lady (*V. annabella*) | | |
| Virginia Lady (*V. virginiensis*) | | |
| Red Admiral (*V. atalanta*) | | |
| Buckeye (*Junonia coenia*) | | |
| Mourning Cloak (*Nymphalis antiopa*) | | |
| California Sister (*Adelpha bredowii californica*) | | |
| Satyr Anglewing (*Polygonia satyrus*) | | |
| Lorquin's Admiral (*Basilarchia lorquini*) | | |
| Western Tailed Blue (*Everes amyntula*) | | |
| Southern Blue (*Glaucopsyche lygdamus australis*) | | |
| Echo Blue (*Celastrina ladon echo*) | | |
| Sonoran Blue (*Philotes sonorensis*) | | |
| Marine Blue (*Leptotes marina*) | | |
| Acmon Blue (*Icaricia acmon*) | | |
| Pygmy Blue (*Brephidium exilis*) | | |
| Gray Hairstreak (*Strymon melinus*) | | |
| Brown Elfin (*Incisalia augustinus*) | | |
| Perplexing Hairstreak (*Callophrys perplexa*) | | |
| Gri Purple Hairstreak (*Atlides halesus*) | | |
| Behr's Metalmark (*Apodemia mormo virgulti*) | | |
| Wright's Metalmark (*Calephelis wrightii*) | | |
| | | |

Checkerspot General Form — Survey type: Habitat Assessment/Adult Survey

rveyor: Sprague Date: 3/17/99 (mm/dd/yyyy) Site Visit No: 1 (2) 3 4 5 6 7 8 9 10

tal site acres: _____ Site Name: Sage/LiveOak Site Location: Agoura Hills

| ime (24 hr) | Sky | Wind (Beaufort) | Temp F or C |
|---|---|---|---|
| gin 930 | clear/ partcloudy/(overcast)/fog/drizzle/shower | <1 (1-3) 4-7 8-12 >12 | 55° |
| 1030 | clear/ partcloudy/(overcast)/fog/drizzle/shower | <1 (1-3) 4-7 8-12 >12 | 55° |
| 1600 | clear/ partcloudy/(overcast)/fog/drizzle/shower | <1 (1-3) 4-7 8-12 >12 | 63° |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| d 1200 | clear/ partcloudy/(overcast)/fog/drizzle/shower | <1 (1-3) 4-7 8-12 >12 | 65° |

tal hours surveyed: 2.5

cused Survey Acres: _____ Elev Min: _____ft Max: _____ft

scribe, map, and estimate areas surveyed below.

| lost Plants[a] | Patch Size ($ft^2$) | No Plants/$ft^2$ | Sparse/Dense[b] | Map ID[c] | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

rval or nectar resources. Identify species. b. Sparse= plants not touching; dense = plants touching c. Corresponds to polygon on a map.

rrounding land uses (including adjoining properties):

North _____ Distance _____ ft./mile
South _____ Distance _____ ft./mile
East _____ Distance _____ ft./mile
West _____ Distance _____ ft./mile

bitat onsite (circle): (open soils) (hilltop) (ridge) (Plantago) Castilleja (soil crusts) (old roads) ctar (clay soils) (rock outcrops)

nditions: (e.g.,(grazing) agriculture (sowbugs/earwigs) recent fire (grading)
her: _____

| Butterflies Observed (larvae or adults) | Number | Comments |
|---|---|---|
| Pale Swallowtail (*Papilio eurymedon*) | | |
| Anise Swallowtail (*P. zelicaon*) | | |
| West Tiger Swallowtail (*P. rutulus*) | | |
| Sara Orangetip (*Anthocharis sara*) | | |
| Felder's Orangetip (*A. cethura*) | | |
| Cabbage White (*Artogeia rapae*) | | |
| Sleepy Orange (*Eurema nicippe*) | | |
| Common White (*Pontia protodice*) | | |
| California Dogface (*Zerene eurydice*) | | |
| Alfalfa Butterfly (*Colias eurytheme*) | | |
| Harford's Sulfur (*C. harfordi*) | | |
| California Ringlet (*Coenonympha californica*) | 1 | |
| Monarch (*Danaus plexippus*) | | |
| Queen (*D. gilippus*) | | |
| Henne's Checkerspot (*Euphydryas chalcedona hennei*) | | |
| Calcedon Checkerspot (*E. chalcedona chalcedona*) | | |
| Quino Checkerspot (*E. editha quino*) | | |
| Gabb's Checkerspot (*Charidryas gabbii*) | | |
| Leanira Checkerspot (*Thessalia leanira wrighti*) | | |
| Mylitta Crescent (*Phyciodes mylitta*) | | |
| Painted Lady (*Vanessa cardui*) | | |
| West Coast Lady (*V. annabella*) | | |
| Virginia Lady (*V. virginiensis*) | | |
| Red Admiral (*V. atalanta*) | | |
| Buckeye (*Junonia coenia*) | | |
| Mourning Cloak (*Nymphalis antiopa*) | | |
| California Sister (*Adelpha bredowii californica*) | | |
| Satyr Anglewing (*Polygonia satyrus*) | | |
| Lorquin's Admiral (*Basilarchia lorquini*) | | |
| Western Tailed Blue (*Everes amyntula*) | | |
| Southern Blue (*Glaucopsyche lygdamus australis*) | | |
| Echo Blue (*Celastrina ladon echo*) | | |
| Sonoran Blue (*Philotes sonorensis*) | | |
| Marine Blue (*Leptotes marina*) | | |
| Acmon Blue (*Icaricia acmon*) | | |
| Pygmy Blue (*Brephidium exilis*) | | |
| Gray Hairstreak (*Strymon melinus*) | | |
| Brown Elfin (*Incisalia augustinus*) | | |
| Perplexing Hairstreak (*Callophrys perplexa*) | | |
| Gri Purple Hairstreak (*Atlides halesus*) | | |
| Behr's Metalmark (*Apodemia mormo virgulti*) | | |
| Wright's Metalmark (*Calephelis wrightii*) | | |
| | | |

.ino Checkerspot General Form  Survey type: Habitat Assessment/Adult Survey

veyor: Sprague  Date: 3/28/99 (mm/dd/yyyy)  Site Visit No: 1 2 3 4 5 6 7 8 9 10

al site acres: _____  Site Name: Sage/Live Oak  Site Location: Agoura Hills

| ne (24 hr) | Sky | Wind (Beaufort) | Temp F or C |
|---|---|---|---|
| in 1000 | (clear) partcloudy/overcast/fog/drizzle/shower | <1 (1-3) 4-7 8-12 >12 | 68° |
| 1100 | (clear) partcloudy/overcast/fog/drizzle/shower | <1 (1-3) 4-7 8-12 >12 | 71° |
| 1218 | (clear) partcloudy/overcast/fog/drizzle/shower | <1 (3) 4-7 8-12 >12 | 72° |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| 100 | (clear) partcloudy/overcast/fog/drizzle/shower | <1 (1-3) 4-7 8-12 >12 | 72° |

al hours surveyed: 3

used Survey Acres: _____  Elev Min: _____ft Max: _____ft

scribe, map, and estimate areas surveyed below.

| ost Plants[a] | Patch Size ($ft^2$) | No Plants/$ft^2$ | Sparse/Dense[b] | Map ID[c] | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

rval or nectar resources. Identify species. b. Sparse= plants not touching; dense = plants touching c. Corresponds to polygon on a map.

rounding land uses (including adjoining properties):

North _____  Distance _____ ft./mile
South _____  Distance _____ ft./mile
East _____  Distance _____ ft./mile
West _____  Distance _____ ft./mile

bitat onsite (circle): open soils hilltop ridge Plantago Castilleja soil crusts old roads
tar clay soils rock outcrops

nditions: (e.g., grazing agriculture sowbugs/earwigs recent fire grading)
ıer: _____

| Butterflies Observed (larvae or adults) | Number | Comments |
|---|---|---|
| Pale Swallowtail (*Papilio eurymedon*) | | |
| Anise Swallowtail (*P. zelicaon*) | | |
| West Tiger Swallowtail (*P. rutulus*) | 1 | |
| Sara Orangetip (*Anthocharis sara*) | 1 | |
| Felder's Orangetip (*A. cethura*) | | |
| Cabbage White (*Artogeia rapae*) | | |
| Sleepy Orange (*Eurema nicippe*) | | |
| Common White (*Pontia protodice*) | | |
| California Dogface (*Zerene eurydice*) | | |
| Alfalfa Butterfly (*Colias eurytheme*) | | |
| Harford's Sulfur (*C. harfordi*) | | |
| California Ringlet (*Coenonympha californica*) | | |
| Monarch (*Danaus plexippus*) | | |
| Queen (*D. gilippus*) | | |
| Hanne's Checkerspot (*Euphydryas chalcedona hanni*) | | |
| Calcedon Checkerspot (*E. chalcedona chalcedona*) | | |
| Quino Checkerspot (*E. editha quino*) | | |
| Gabb's Checkerspot (*Chlosyne gabbii*) | | |
| Leanira Checkerspot (*Thessalia leanira wrighti*) | | |
| Mylitta Crescent (*Phyciodes mylitta*) | | |
| Painted Lady (*Vanessa cardui*) | | |
| West Coast Lady (*V. annabella*) | | |
| Virginia Lady (*V. virginiensis*) | | |
| Red Admiral (*V. atalanta*) | | |
| Buckeye (*Junonia coenia*) | | |
| Mourning Cloak (*Nymphalis antiopa*) | | |
| California Sister (*Adelpha bredowii californica*) | | |
| Satyr Anglewing (*Polygonia satyrus*) | | |
| Lorquin's Admiral (*Basilarchia lorquini*) | | |
| Western Tailed Blue (*Everes amyntula*) | | |
| Southern Blue (*Glaucopsyche lygdamus australis*) | | |
| Echo Blue (*Celastrina ladon echo*) | | |
| Sonoran Blue (*Philotes sonorensis*) | | |
| Marine Blue (*Leptotes marina*) | | |
| Acmon Blue (*Icaricia acmon*) | 3 | |
| Pygmy Blue (*Brephidium exilis*) | | |
| Gray Hairstreak (*Strymon melinus*) | | |
| Brown Elfin (*Incisalia augustinus*) | | |
| Purplescing Hairstreak (*Callophrys perplexa*) | 4 | |
| Gt Purple Hairstreak (*Atlides halesus*) | | |
| Behr's Metalmark (*Apodemia mormo virgulti*) | 2 | |
| Wright's Metalmark (*Calephelis wrightii*) | | |
| funeral dusky wing | 1 | |

Checklist/Spot General Form — Survey Type: Habitat Assessment/Audit Survey

rveyor: Sprague Date: 3/31/99 (mm/dd/yyyy) Site Visit No: 1 2 3 (4) 5 6 7 8 9 10

tal site acres: _____ Site Name: Sage/Live Oak Site Location: Agoura Hills

| me (24 hr) | Sky | Wind (Beaufort) | Temp F or C |
|---|---|---|---|
| gin 906 | clear/ partcloudy/(overcast)/fog/drizzle/shower | <1 (1-3) 4-7 8-12 >12 | 65° |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| d 1200 | clear/ partcloudy/(overcast)/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | 64° |

tal hours surveyed: 3

cused Survey Acres: _____ Elev Min: _____ft Max: _____ft

scribe, map, and estimate areas surveyed below.

| lost Plants[a] | Patch Size (ft²) | No Plants/ft² | Sparse/Dense[b] | Map ID[c] | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

arval or nectar resources. Identify species. b. Sparse= plants not touching; dense = plants touching c. Corresponds to polygon on a map.

rrounding land uses (including adjoining properties):

North _____ Distance _____ ft./mile

South _____ Distance _____ ft./mile

East _____ Distance _____ ft./mile

West _____ Distance _____ ft./mile

abitat onsite (circle): open soils hilltop ridge Plantago Castilleja soil crusts old roads
ctar clay soils rock outcrops

nditions: (e.g., grazing agriculture sowbugs/earwigs recent fire grading)

her: _____

| Butterflies Observed (larvae or adults) | Number | Comments |
|---|---|---|
| Pale Swallowtail (*Paplio eurymedon*) | | |
| Anise Swallowtail (*P. zelicaon*) | | |
| West Tiger Swallowtail (*P. rutulus*) | | |
| Sara Orangetip (*Anthocharis sara*) | | |
| Felder's Orangetip (*A. cethura*) | | |
| Cabbage White (*Artogeia rapae*) | | |
| Sleepy Orange (*Eurema nicippe*) | | |
| Common White (*Pontia protodice*) | | |
| California Dogface (*Zerene eurydice*) | | |
| Alfalfa Butterfly (*Colias eurytheme*) | | |
| Harford's Sulfur (*C. harfordi*) | | |
| California Ringlet (*Coenonympha californica*) | | |
| Monarch (*Danaus plexippus*) | | |
| Queen (*D. gilippus*) | | |
| Henne's Checkerspot (*Euphydryas chalcedona hennei*) | | |
| Chalcedon Checkerspot (*E. chalcedona chalcedona*) | | |
| Quino Checkerspot (*E. editha quino*) | | |
| Gabb's Checkerspot (*Charidryas gabbii*) | | |
| Loomis Checkerspot (*Thessalia loomis wrighti*) | | |
| Mylitta Crescent (*Phyciodes mylitta*) | | |
| Painted Lady (*Vanessa cardui*) | | |
| West Coast Lady (*V. annabella*) | | |
| Virginia Lady (*V. virginiensis*) | | |
| Red Admiral (*V. atalanta*) | | |
| Buckeye (*Junonia coenia*) | | |
| Mourning Cloak (*Nymphalis antiopa*) | | |
| California Sister (*Adelpha bredowii californica*) | | |
| Satyr Anglewing (*Polygonia satyrus*) | | |
| Lorquin's Admiral (*Basilarchia lorquini*) | | |
| Western Tailed Blue (*Everes amyntula*) | | |
| Southern Blue (*Glaucopsyche lygdamus australis*) | | |
| Echo Blue (*Celastrina ladon echo*) | | |
| Sonoran Blue (*Philotes sonorensis*) | | |
| Marine Blue (*Leptotes marina*) | | |
| Acmon Blue (*Icaricia acmon*) | | |
| Pygmy Blue (*Brephidium exilis*) | | |
| Gray Hairstreak (*Strymon melinus*) | | |
| Brown Elfin (*Incisalia augustinus*) | | |
| Perplexing Hairstreak (*Callophrys perplexa*) | | |
| Gt Purple Hairstreak (*Atlides halesus*) | | |
| Behr's Metalmark (*Apodemia mormo virgulti*) | | |
| Wright's Metalmark (*Calephelis wrightii*) | | |
| | | |

...kerspot General Form — Survey type: Habitat Assessment/Rare Plant Survey

rveyor: Sprague Date: 4/7/99 (mm/dd/yyyy) Site Visit No: 1 2 3 4 (5) 6 7 8 9 10

tal site acres: _____ Site Name: Sage/LiveOak Site Location: Agoura Hills

| me (24 hr) | Sky | Wind (Beaufort) | Temp F or C |
|---|---|---|---|
| pm | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| d | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |

tal hours surveyed: _____

cused Survey Acres: _____ Elev Min: _____ft Max: _____ft

scribe, map, and estimate areas surveyed below.

| ost Plants[a] | Patch Size ($ft^2$) | No Plants/$ft^2$ | Sparse/Dense[b] | Map ID[c] | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

rval or nectar resources. Identify species. b. Sparse= plants not touching; dense = plants touching c. Corresponds to polygon on a map.

rrounding land uses (including adjoining properties):

North _____ Distance _____ ft./mile
South _____ Distance _____ ft./mile
East _____ Distance _____ ft./mile
West _____ Distance _____ ft./mile

bitat onsite (circle): open soils hilltop ridge Plantago Castilleja soil crusts old roads
ctar clay soils rock outcrops

nditions: (e.g.,grazing agriculture sowbugs/earwigs recent fire grading)
her: _____

| Butterflies Observed (larvae or adults) | Number | Comments |
|---|---|---|
| Pale Swallowtail (*Papilio eurymedon*) | | |
| Anise Swallowtail (*P. zelicaon*) | | |
| West Tiger Swallowtail (*P. rutulus*) | | |
| Sara Orangetip (*Anthocharis sara*) | | |
| Felder's Orangetip (*A. cethura*) | | |
| Cabbage White (*Artogeia rapae*) | | |
| Sleepy Orange (*Eurema nicippe*) | | |
| Common White (*Pontia protodice*) | | |
| California Dogface (*Zerene eurydice*) | | |
| Alfalfa Butterfly (*Colias eurytheme*) | | |
| Harford's Sulfur (*C. harfordi*) | | |
| California Ringlet (*Coenonympha californica*) | | |
| Monarch (*Danaus plexippus*) | | |
| Queen (*D. gilippus*) | | |
| Henne's Checkerspot (*Euphydryas chalcedona hennei*) | | |
| Chalcedon Checkerspot (*E. chalcedona chalcedona*) | | |
| Quino Checkerspot (*E. editha quino*) | | |
| Gabb's Checkerspot (*Charidryas gabbii*) | | |
| Lemmin Checkerspot (*Thessalia leanira wrighti*) | | |
| Mylitta Crescent (*Phyciodes mylitta*) | | |
| Painted Lady (*Vanessa cardui*) | | |
| West Coast Lady (*V. annabella*) | | |
| Virginia Lady (*V. virginiensis*) | | |
| Red Admiral (*V. atalanta*) | | |
| Buckeye (*Junonia coenia*) | | |
| Mourning Cloak (*Nymphalis antiopa*) | | |
| California Sister (*Adelpha bredowii californica*) | | |
| Satyr Anglewing (*Polygonia satyrus*) | | |
| Lorquin's Admiral (*Basilarchia lorquini*) | | |
| Western Tailed Blue (*Everes amyntula*) | | |
| Southern Blue (*Glaucopsyche lygdamus australis*) | | |
| Echo Blue (*Celastrina ladon echo*) | | |
| Sonoran Blue (*Philotes sonorensis*) | | |
| Marine Blue (*Leptotes marina*) | | |
| Acmon Blue (*Icaricia acmon*) | | |
| Pygmy Blue (*Brephidium exilis*) | | |
| Gray Hairstreak (*Strymon melinus*) | | |
| Brown Elfin (*Incisalia augustinus*) | | |
| Perplexing Hairstreak (*Callophrys perplexa*) | | |
| Get Purple Hairstreak (*Atlides halesus*) | | |
| Behr's Metalmark (*Apodemia mormo virgulti*) | | |
| Wright's Metalmark (*Calephelis wrightii*) | | |
| | | |

ıllo Checkerspot General Form  Survey type: Habitat Assessment/Adult Survey

ırveyor: Sprague  Date: 4/14/99 (mm/dd/yyyy)  Site Visit No: 1 2 3 4 5 (6) 7 8 9 10

ıtal site acres: _____  Site Name: Sage/Live Oak  Site Location: Agoura Hills

| ime (24 hr) | Sky | Wind (Beaufort) | Temp F or C |
|---|---|---|---|
| 918 | (clear)/ partcloudy/overcast/fog/drizzle/shower | <1 (1-3) 4-7 8-12 >12 | 70° |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| 122 | (clear)/partcloudy/overcast/fog/drizzle/shower | <1 (1-3) 4-7 8-12 >12 | 85° |

ıtal hours surveyed: 4

ıcused Survey Acres: _____  Elev Min: _____ft Max: _____ft

ıscribe, map, and estimate areas surveyed below.

| lost Plants[a] | Patch Size ($ft^2$) | No Plants/$ft^2$ | Sparse/Dense[b] | Map ID[c] | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

arval or nectar resources. Identify species. b. Sparse= plants not touching; dense = plants touching c. Corresponds to polygon on a map.

ırrounding land uses (including adjoining properties):

North _____  Distance _____ ft./mile
South _____  Distance _____ ft./mile
East _____  Distance _____ ft./mile
West _____  Distance _____ ft./mile

ıbitat onsite (circle): open soils hilltop ridge Plantago Castilleja soil crusts old roads
ctar clay soils rock outcrops

ınditions: (e.g., grazing agriculture sowbugs/earwigs recent fire grading)
ıher: _____

| Butterflies Observed (larvae or adults) | Number | Comments |
|---|---|---|
| Pale Swallowtail (*Papilio eurymedon*) | | |
| Anise Swallowtail (*P. zelicaon*) | | |
| West Tiger Swallowtail (*P. rutulus*) | | |
| Sara Orangetip (*Anthocharis sara*) | 2 | |
| Felder's Orangetip (*A. cethura*) | | |
| Cabbage White (*Artogeia rapae*) | | |
| Sleepy Orange (*Eurema nicippe*) | | |
| Common White (*Pontia protodice*) | | |
| California Dogface (*Zerene eurydice*) | | |
| Alfalfa Butterfly (*Colias eurytheme*) | | |
| Harford's Sulfur (*C. harfordi*) | | |
| California Ringlet (*Coenonympha californica*) | 3 | |
| Monarch (*Danaus plexippus*) | | |
| Queen (*D. gilippus*) | | |
| Henne's Checkerspot (*Euphydryas chalcedona hennei*) | | |
| Chalcedon Checkerspot (*E. chalcedona chalcedona*) | | |
| Quino Checkerspot (*E. editha quino*) | | |
| Gabb's Checkerspot (*Charidryas gabbii*) | | |
| Lemmin Checkerspot (*Thessalia leanira wrighti*) | | |
| Mylitta Crescent (*Phyciodes mylitta*) | | |
| Painted Lady (*Vanessa cardui*) | | |
| West Coast Lady (*V. annabella*) | | |
| Virginia Lady (*V. virginiensis*) | | |
| Red Admiral (*V. atalanta*) | | |
| Buckeye (*Junonia coenia*) | | |
| Mourning Cloak (*Nymphalis antiopa*) | | |
| California Sister (*Adelpha bredowii californica*) | | |
| Satyr Anglewing (*Polygonia satyrus*) | | |
| Lorquin's Admiral (*Basilarchia lorquini*) | | |
| Western Tailed Blue (*Everes amyntula*) | | |
| Southern Blue (*Glaucopsyche lygdamus australis*) | | |
| Echo Blue (*Celastrina ladon echo*) | | |
| Sonoran Blue (*Philotes sonorensis*) | | |
| Marine Blue (*Leptotes marina*) | | |
| Acmon Blue (*Icaricia acmon*) | | |
| Pygmy Blue (*Brephidium exilis*) | | |
| Gray Hairstreak (*Strymon melinus*) | | |
| Brown Elfin (*Incisalia augustinus*) | | |
| Perplexing Hairstreak (*Callophrys perplexa*) | 11 | |
| Gr Purple Hairstreak (*Atlides halesus*) | | |
| Behr's Metalmark (*Apodemia mormo virgulti*) | 2 | |
| Wright's Metalmark (*Calephelis wrighti*) | | |
| Vanessa sp. | 1 | |

...kerspot General Form — Survey type: Habitat Assessment/Rapid Survey

rveyor: Sprague Date: 4/21/99 (mm/dd/yyyy) Site Visit No: 1 2 3 4 5 6 7 8 9 10

tal site acres: _____ Site Name: Sage/Livoak Site Location: Agoura Hills

| me (24 hr) | Sky | Wind (Beaufort) | Temp F or C |
|---|---|---|---|
| 900 | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | 78° |
| 1000 | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | 80° |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| 130 | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | 85° |

tal hours surveyed: 4.5

cused Survey Acres: _____ Elev Min: _____ft Max: _____ft

scribe, map, and estimate areas surveyed below.

| ost Plants[a] | Patch Size ($ft^2$) | No Plants/$ft^2$ | Sparse/Dense[b] | Map ID[c] | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

rval or nectar resources. Identify species. b. Sparse= plants not touching; dense = plants touching c. Corresponds to polygon on a map.

rrounding land uses (including adjoining properties):

North _____ Distance _____ ft./mile
South _____ Distance _____ ft./mile
East _____ Distance _____ ft./mile
West _____ Distance _____ ft./mile

bitat onsite (circle) open soils hilltop ridge Plantago Castilleja soil crusts old roads
:tar clay soils rock outcrops

nditions: (e.g. grazing agriculture sowbugs/earwigs recent fire grading)
her: _____

| Butterflies Observed (larvae or adults) | Number | Comments |
|---|---|---|
| Pale Swallowtail (*Paplio eurymedon*) | | |
| Anise Swallowtail (*P. zelicaon*) | | |
| West Tiger Swallowtail (*P. rutulus*) | 1 | |
| Sara Orangetip (*Anthocharis sara*) | 23 | |
| Felder's Orangetip (*A. cethura*) | | |
| Cabbage White (*Artogeia rapae*) | | |
| Sleepy Orange (*Eurema nicippe*) | | |
| Common White (*Pontia protodice*) | | |
| California Dogface (*Zerene eurydice*) | | |
| Alfalfa Butterfly (*Colias eurytheme*) | | |
| Harford's Sulfur (*C. harfordi*) | | |
| California Ringlet (*Coenonympha californica*) | | |
| Monarch (*Danaus plexippus*) | | |
| Queen (*D. gilippus*) | | |
| Hanne's Checkerspot (*Euphydryas chalcedona hennei*) | | |
| Calcedon Checkerspot (*E. chalcedona chalcedona*) | | |
| Quino Checkerspot (*E. editha quino*) | | |
| Gabb's Checkerspot (*Charidryas gabbii*) | | |
| Leanira Checkerspot (*Thessalia leanira wrighti*) | | |
| Mylitta Crescent (*Phyciodes mylitta*) | | |
| Painted Lady (*Vanessa cardui*) | | |
| West Coast Lady (*V. annabella*) | | |
| Virginia Lady (*V. virginiensis*) | | |
| Red Admiral (*V. atalanta*) | | |
| Buckeye (*Junonia coenia*) | | |
| Mourning Cloak (*Nymphalis antiopa*) | | |
| California Sister (*Adelpha bredowii californica*) | | |
| Satyr Anglewing (*Polygonia satyrus*) | | |
| Lorquin's Admiral (*Basilarchia lorquini*) | | |
| Western Tailed Blue (*Everes amyntula*) | | |
| Southern Blue (*Glaucopsyche lygdamus australis*) | 2 | |
| Echo Blue (*Celastrina ladon echo*) | | |
| Sonoran Blue (*Philotes sonorensis*) | | |
| Marine Blue (*Leptotes marina*) | | |
| Acmon Blue (*Icaricia acmon*) | 4 | |
| Pygmy Blue (*Brephidium exilis*) | | |
| Gray Hairstreak (*Strymon melinus*) | | |
| Brown Elfin (*Incisalia augustinus*) | | |
| Purplering Hairstreak (*Callophrys perplexa*) | | |
| Gt Purple Hairstreak (*Atlides halesus*) | | |
| Behr's Metalmark (*Apodemia mormo virgulti*) | 3 | |
| Wright's Metalmark (*Calephelis wrightii*) | | |
| fiery skipper | 1 | |

ulfio Checkerspot General Form  Survey type: Habitat Assessment/Adult Survey

urveyor: Sprague  Date: 4/28/99 (mm/dd/yyyy)  Site Visit No: 1 2 3 4 5 6 7 (8) 9 10

otal site acres: _____  Site Name: Sage/Liveoak Site Location: Agoura Hills

| ime (24 hr) | Sky | Wind (Beaufort) | Temp F or C |
|---|---|---|---|
| egin 1000 | clear/(partcloudy)/overcast/fog/drizzle/shower | <1 (1-3) 4-7 8-12 >12 | 68° |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| nd 200 | clear/(partcloudy)/overcast/fog/drizzle/shower | <1 (1-3) 4-7 8-12 >12 | 70° |

otal hours surveyed: 4

ocused Survey Acres: _____  Elev Min: _____ft Max: _____ft

escribe, map, and estimate areas surveyed below.

| Host Plants[a] | Patch Size ($ft^2$) | No Plants/$ft^2$ | Sparse/Dense[b] | Map ID[c] | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

arval or nectar resources. Identify species. b. Sparse= plants not touching; dense = plants touching c. Corresponds to polygon on a map.

urrounding land uses (including adjoining properties):

North _____ Distance _____ ft./mile
South _____ Distance _____ ft./mile
East _____ Distance _____ ft./mile
West _____ Distance _____ ft./mile

abitat onsite (circle): (open soils) hilltop ridge Plantago Castilleja (soil crusts) (old roads)
ctar clay soils rock outcrops

onditions: (e.g.,grazing) agriculture (sowbugs/earwigs) recent fire (grading)
her: _____

| Butterflies Observed (larvae or adults) | Number | Comments |
|---|---|---|
| Pale Swallowtail (*Papilio eurymedon*) | | |
| Anise Swallowtail (*P. zelicaon*) | | |
| West Tiger Swallowtail (*P. rutulus*) | | |
| Sara Orangetip (*Anthocharis sara*) | 2 | |
| Felder's Orangetip (*A. cethura*) | | |
| Cabbage White (*Artogeia rapae*) | | |
| Sleepy Orange (*Eurema nicippe*) | | |
| Common White (*Pontia protodice*) | | |
| California Dogface (*Zerene eurydice*) | | |
| Alfalfa Butterfly (*Colias eurytheme*) | | |
| Harford's Sulfur (*C. harfordi*) | | |
| California Ringlet (*Coenonympha californica*) | | |
| Monarch (*Danaus plexippus*) | | |
| Queen (*D. gilippus*) | | |
| Henne's Checkerspot (*Euphydryas chalcedona hennei*) | | |
| Calcedon Checkerspot (*E. chalcedona chalcedona*) | | |
| Quino Checkerspot (*E. editha quino*) | | |
| Gabb's Checkerspot (*Charidryas gabbii*) | | |
| Leanira Checkerspot (*Thessalia leanira wrighti*) | | |
| Mylitta Crescent (*Phyciodes mylitta*) | | |
| Painted Lady (*Vanessa cardui*) | | |
| West Coast Lady (*V. annabella*) | | |
| Virginia Lady (*V. virginiensis*) | | |
| Red Admiral (*V. atalanta*) | | |
| Buckeye (*Junonia coenia*) | | |
| Mourning Cloak (*Nymphalis antiopa*) | | |
| California Sister (*Adelpha bredowii californica*) | | |
| Satyr Anglewing (*Polygonia satyrus*) | | |
| Lorquin's Admiral (*Basilarchia lorquini*) | | |
| Western Tailed Blue (*Everes amyntula*) | | |
| Southern Blue (*Glaucopsyche lygdamus australis*) | | |
| Echo Blue (*Celastrina ladon echo*) | | |
| Sonoran Blue (*Philotes sonorensis*) | | |
| Marine Blue (*Leptotes marina*) | | |
| Acmon Blue (*Icaricia acmon*) | 1 | |
| Pygmy Blue (*Brephidium exilis*) | | |
| Gray Hairstreak (*Strymon melinus*) | | |
| Brown Elfin (*Incisalia augustinus*) | | |
| Perplexing Hairstreak (*Callophrys perplexa*) | | |
| Gri Purple Hairstreak (*Atlides halesus*) | | |
| Behr's Metalmark (*Apodemia mormo virgulti*) | 4 | |
| Wright's Metalmark (*Calephelis wrightii*) | | |
| | | |

fflo Checkerspot General Form — Survey type: Habitat Assessment/Adult Survey

rveyor: Sprague Date: 5/5/99 (mm/dd/yyyy) Site Visit No: 1 2 3 4 5 6 7 8 (9) 10

tal site acres: _____ Site Name: Sage/LiveOak Site Location: Agoura Hills

| me (24 hr) | Sky | Wind (Beaufort) | Temp F or C |
|---|---|---|---|
| gin 910 | (clear)/partcloudy/overcast/fog/drizzle/shower | <1 (1-3) 4-7 8-12 >12 | 72° |
| 1130 | (clear)/partcloudy/overcast/fog/drizzle/shower | <1 (1-3) 4-7 8-12 >12 | 88° |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| | clear/ partcloudy/overcast/fog/drizzle/shower | <1 1-3 4-7 8-12 >12 | |
| d 100 | (clear)/partcloudy/overcast/fog/drizzle/shower | <1 (1-3) 4-7 8-12 >12 | 89° |

tal hours surveyed: 4

cused Survey Acres: _____ Elev Min: _____ft Max: _____ft

scribe, map, and estimate areas surveyed below.

| ost Plants[a] | Patch Size ($ft^2$) | No Plants/$ft^2$ | Sparse/Dense[b] | Map ID[c] | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

urval or nectar resources. Identify species. b. Sparse= plants not touching; dense = plants touching c. Corresponds to polygon on a map.

rrounding land uses (including adjoining properties):

North _____ Distance _____ ft./mile

South _____ Distance _____ ft./mile

East _____ Distance _____ ft./mile

West _____ Distance _____ ft./mile

bitat onsite (circle): open soils hilltop ridge Plantago Castilleja soil crusts old roads
ctar clay soils rock outcrops

nditions: (e.g., grazing agriculture sowbugs/earwigs recent fire grading)

her: _____

| Butterflies Observed (larvae or adults) | Number | Comments |
|---|---|---|
| Pale Swallowtail (*Papilio eurymedon*) | | |
| Anise Swallowtail (*P. zelicaon*) | | |
| West Tiger Swallowtail (*P. rutulus*) | | |
| Sara Orangetip (*Anthocharis sara*) | 4 | |
| Felder's Orangetip (*A. cethura*) | | |
| Cabbage White (*Artogeia rapae*) | | |
| Sleepy Orange (*Eurema nicippe*) | | |
| Common White (*Pontia protodice*) | | |
| California Dogface (*Zerene eurydice*) | | |
| Alfalfa Butterfly (*Colias eurytheme*) | | |
| Harford's Sulfur (*C. harfordi*) | | |
| California Ringlet (*Coenonympha californica*) | 2 | |
| Monarch (*Danaus plexippus*) | | |
| Queen (*D. gilippus*) | | |
| Hanne's Checkerspot (*Euphydryas chalcedona hanni*) | | |
| Chalcedon Checkerspot (*E. chalcedona chalcedona*) | | |
| Quino Checkerspot (*E. editha quino*) | | |
| Gabb's Checkerspot (*Charidryas gabbii*) | 1 | |
| Lemmin Checkerspot (*Thessalia leanira wrighti*) | | |
| Mylitta Crescent (*Phyciodes mylitta*) | | |
| Painted Lady (*Vanessa cardui*) | | |
| West Coast Lady (*V. annabella*) | | |
| Virginia Lady (*V. virginiensis*) | | |
| Red Admiral (*V. atalanta*) | | |
| Buckeye (*Junonia coenia*) | | |
| Mourning Cloak (*Nymphalis antiopa*) | | |
| California Sister (*Adelpha bredowii californica*) | | |
| Satyr Anglewing (*Polygonia satyrus*) | | |
| Lorquin's Admiral (*Basilarchia lorquini*) | | |
| Western Tailed Blue (*Everes amyntula*) | | |
| Southern Blue (*Glaucopsyche lygdamus australis*) | | |
| Echo Blue (*Celastrina ladon echo*) | | |
| Sonoran Blue (*Philotes sonorensis*) | | |
| Marine Blue (*Leptotes marina*) | | |
| Acmon Blue (*Icaricia acmon*) | | |
| Pygmy Blue (*Brephidium exilis*) | | |
| Gray Hairstreak (*Strymon melinus*) | | |
| Brown Elfin (*Incisalia augustinus*) | | |
| Purplescing Hairstreak (*Callophrys perplexa*) | | |
| Gt Purple Hairstreak (*Atlides halesus*) | | |
| Behr's Metalmark (*Apodemia mormo virgulti*) | 2 | |
| Wright's Metalmark (*Calephelis wrightii*) | | |
| | | |

# APPENDIX C-9

**Least Bell's Vireo Survey Report, Live Oak Ranch, prepared by PCR Services Corporation; August 24, 1999**

PCR

# Live Oak Ranch

**City of Agoura Hills**
**Los Angeles County, California**

# LEAST BELL'S VIREO SURVEY REPORT

*Prepared for:*
**Diane Fradkin**
**Sage Community Group**
**3 Corporate Plaza, Suite 102**
**Newport Beach, CA 90053-2325**

*Prepared by:*
**PCR Services Corporation**
**One Venture, Suite 150**
**Irvine, CA 92618**

Contact: Jason L. Berkley
Wildlife Biologist

**August 24, 1999**

August 11, 1999

Mr. Doug Krofta
U.S. FISH AND WILDLIFE SERVICE
Carlsbad Field Office
2730 Loker Avenue West
Carlsbad, California 92008

**Re: Results of Least Bell's Vireo Focused Surveys for the Live Oak Ranch Property, Los Angeles County, California**

Dear Mr. Krofta:

This letter report summarizes the methodology and findings of surveys for the least Bell's vireo (*Vireo bellii pusillus*) conducted by **PCR Services Corporation** on the Live Oak Ranch property in Los Angeles County, California. The surveys were conducted to determine the presence and location or absence of least Bell's vireo within the project site and adjacent areas. Individuals of this species were not observed or otherwise detected on the site or within adjacent habitat areas during any of the survey efforts.

## SITE LOCATION

The Live Oak Ranch site encompasses 320.3 acres located ¼ mile west of California Highway 101 in Los Angeles County adjacent to the City of Agoura Hills, California (Figure 1, Regional Location Map). Access to the site is from Kanan Road south from the Ventura Freeway (U.S. Highway 101). The site is also bordered on the North by Malibu Junction, on the west by Ladyface Mountain, on the south by Silver Creek Road (currently inaccessible) along with residential development, and the east by undeveloped private lands. The center of the site is located on the United States Geological Survey (USGS) 7.5' Calabasas and Thousand Oaks Quadrangles, T1N, R18W.[1] (Figure 2, Vicinity Map). Medea Creek bisects the property as it runs southward between Cornell and Kanan roads, through the Santa Monica Mountains ultimately emptying into Malibu Lake.

---

[1] *U.S. Geological Survey. Calabasas and Thousand Oaks 7.5' topographic Quadrangle. 1952, photo revised 1967.*

## VEGETATION

Natural community designations were determined according to terminology contained in Sawyer and Keeler-Wolfe's *A Manual of California Vegetation* (1995) and Holland's *Preliminary Descriptions of the Terrestrial Natural Communities of California* (1986 and 1992 update). Natural community names and hierarchical structure follows the California Department of Fish and Game *List of California Terrestrial Natural Communities Recognized by the Natural Diversity Data Base, January 1999 Edition.*[2] Vegetation on the Live Oak property is predominantly composed of a willow riparian forest, oak woodland, coastal sage scrub-grassland ecotone, chaparral, and disturbed. (Figure 3, Generalized Vegetation Map). A brief description of the plant communities onsite follows.

### Willow Riparian Forest

The Medea Creek drainage channel supports approximately 5.9 acres of well-developed Southern Arroyo Willow Riparian Forest (NDDB Element Code 61.201.00) dominated by arroyo willow (*Salix lasiolepis*) and red willow (*S. laevigata*). Areas of the channel apparently subject to high velocity scouring flow's support mulefat (*Baccharis salicifolia*), mugwort (*Artemisia douglasiana*), western ragweed (*Ambrosia psilostachya* var. *californica*), poison hemlock (*Conium maculatum*) and fennel (*Foeniculum vulgare*).

### Oak Woodland

Approximately 3.3 acres of mixed Coast Live Oak Woodland (NDDB Element Code 71.060.19) and Valley Oak Woodland (NDDB Element Code 71.040.08), approaching the southern limit of its range, are scattered across the project site. They do not form extensive woodlands with substantial canopy cover. Previously prepared biota reports mention a mature western sycamore (*Platanus racemosa*), several valley oaks (*Quercus lobata*) and several coast live oaks (*Q. agrifolia*) adjacent to the Medea Creek, but isolated by roadways. Their presence may indicate a historically more extensive distribution of alluvial bottomland forest (i.e., Sycamore Alluvial Woodland) what remains today, but this small, disjunct assemblage no longer merits

---

[2] *State of California Resources Agency. 1999. Department of Fish and Game. Natural Communities (1999 update of Holland, 1986). Sacramento.*

consideration as a distinct plant community onsite. Three mature coast live oaks are also noted to have formerly occupied a drainage on the slopes of Ladyface Mountain, to the west of Kanan Road, in a now-filled area of the project site.

### Coastal Sage Scrub - Grassland

Considered as a single community, scrub-grasslands occupy approximately 86.9 acres on the project site. Mixed grasslands and coastal sage scrub elements have developed along gentler south-facing slopes where sufficient soil accumulation and correspondingly more mesic conditions support their growth. Envicom biologists attempted to quantitatively distinguish stands of coastal sage scrub from chaparral and grasslands at the request of SEATAC. However, they concluded that scrub and grassland communities on the project site intergrade in a mosaic containing varying densities of both communities, as is typical in Southern California, and it was determined insufficient differentiation or uniformity of plant species existed to permit refinement of community boundaries. Coastal sage scrub species are scattered throughout the site and do not form distinct stands. Dominant scrub species include California buckwheat (*Eriogonum fasciculatum*), coast encelia (*Encelia californica*), coast goldenbush (*Isocoma menziesii* ssp. *vernonioides*), California-aster (*Lessingia filaginifolia* ssp. *latifolia*), and California sagebrush (*Artemisia californica*), and most closely approximate Riversidean Sage Scrub (Element Code 32.005.00). Native perennial bunch grasses and non-native grasses represent elements of Valley Needlegrass Grassland (NDDB Element Code 41.170.00) and Non-Native Grassland (Element Code 42.000.00), but form an ecotone with scrub species, together with native and introduced forbs.

### Chaparral

Areas of Chamise Chaparral or Chamisal (NDDB Element Code 37.100.00) intergrade with sage scrub and grasslands throughout the project site and occupy approximately 204 acres. Chaparral forms intermittent patches of relatively dense cover along south-facing slopes in the eastern portion of the project site, where dominant species include chamise (*Adenostoma fasciculatum*), laurel sumac (*Malosma laurina*), bush mallow (*Malacothamnus fasciculatus* var. *laxifolius*), buck brush (*Ceanothus cuneatus*), black sage (*Salvia mellifera*) and birch-leaf mountain mahogany (*Cercocarpus betuloides*).

The densest chaparral cover is found along the more mesic north-facing slopes in the eastern half of the site, particularly along drainages and sheltered slopes, and exhibit greater species diversity. Species include scrub oak (*Quercus berberidifolia*), California ash (*Fraxinus dipetala*), chaparral currant (*Ribes malvaceum* ssp. *viridifolium*), fuchsia-flowered gooseberry (*Ribes speciosum*), holly-leaf redberry (*Rhamnus ilicifolia*), poison oak (*Toxicodendron diversilobum*), orange bush monkeyflower (*Mimulus aurantiacus*), heart-leaf penstemon (*Keckiella cordifolia*), honeysuckle (*Lonicera subspicata* var. *denudata*), and wild cucumber (*Marah macrocarpus*). Chaparral along north-facing slopes most closely conforms to Holland's Scrub Oak Chaparral (CNDDB Element Code 37.407.00); approximately 116 acres of the total area mapped as chaparral support this assemblage.

Chaparral stands in the western half of the project site also exhibit consistent differences between north- and south-facing slopes, albeit with some variations. A single small stand of red shank (*Adenostoma sparsifolium*) occurs only along a ridge line and its north face east of Ladyface Mountain; it is not considered a separate red shank chaparral plant community due to its small size. A single stand of bigberry manzanita (*Arctostaphylos glauca*) was also observed to be confined to a small area on north-facing slopes southwest of Ladyface Mountain. This is an indicator species for chamisal and is therefore not considered a separate community.

### Disturbed

Approximately 15 acres on the project site are characterized as disturbed, encompassing turnouts along Kanan and Cornell Roads, a heavy machinery operation along Kanan Road in the western portion of the property, and two small areas between Kanan and Cornell Roads. Developed areas along the southern boundary also slightly encroach on the project site.

## METHODOLOGY

Surveys for the least Bell's vireo were conducted by PCR biologists Jason Berkley, and Steve Sprague. Methods employed were in conformance with U.S. Fish and Wildlife Service (USFWS) protocol (April, 1999).[3] Accordingly, eight (8) surveys were performed between April

---

[3] *U.S. Department of the Interior, Fish and Wildlife Service. April 8, 1999. Survey Protocol for the Endangered Least Bell's Vireo (Vireo bellii pusillus) Unpublished paper.*

10 and July 31, 1999. Surveys were conducted no less than ten (10) days apart, between dawn and 1100 a.m., within all portions of the study area containing suitable riparian habitat and adjacent habitat potentially used for foraging. Weather conditions were suitable for surveys, with skies ranging from clear to 100 percent overcast, with winds below Beaufort scale 2. Surveys were suspended whenever conditions became less than favorable. This included periods of rain, excessive wind, or exceedingly hot or cold temperatures. Temperatures during surveys ranged between 46 and 82 degrees Fahrenheit.

Approximately 5.9 acres of riparian habitat is present on-site and was covered in its entirety during each survey. The field investigators slowly walked along or within the riparian habitat, stopping at approximately 150- to 200-foot intervals, looking and listening for least Bell's vireos. Surveys were conducted on April 21st, May 5th, 19th, June 2nd, 16th, 30th, July 14th, and 28th, 1999.

## RESULTS

No least Bell's vireos were observed or heard on the property. Other bird activity was relatively high during the surveys, and a list of those species observed is attached in Attachment A, Bird Compendium. Approximately 10 brown-headed cowbirds (*Molothrus ater)* were observed on the property during the course of the surveys.

Should you have any questions regarding the methodology or findings in this report, please do not hesitate to call.

Sincerely,
PCR SERVICES CORPORATION

Jason L Berkley

Jason Berkley
Wildlife Biologist

Attachments

# ATTACHMENT

**Table A-1**

**BIRD COMPENDIUM**

| BIRDS<br>Scientific Name | Common Name | Status |
|---|---|---|
| **Ardeidae** | **Herons** | |
| *Nycticorax nycticorax* | black-crowned night-heron | |
| **Anatidae** | **Waterfowl** | |
| *Aix sponsa* | wood duck | |
| *Anas platyrhynchos* | mallard | |
| **Cathartidae** | **New World Vultures** | |
| *Cathartes aura* | turkey vulture | |
| **Accipitridae** | **Hawks** | |
| *Elanus leucurus* | white-tailed kite | |
| *Buteo lineatus* | red-shouldered hawk | |
| *Buteo jamaicensis* | red-tailed hawk | |
| *Aquila chrysaetos* | golden eagle | CSC |
| **Falconidae** | **Falcons** | |
| *Falco sparverius* | American kestrel | |
| **Phasianidae** | **Pheasants and Quails** | |
| *Callipepla californica* | California quail | |
| **Charadriidae** | **Plovers** | |
| *Charadrius vociferus* | killdeer | |
| **Laridae** | **Gulls and Terns** | |
| *Larus delawarensis* | ring-billed gull | |
| **Columbidae** | **Pigeons and Doves** | |
| * *Columba livia* | rock dove | |
| *Zenaida macroura* | mourning dove | |
| **Apodidae** | **Swifts** | |
| *Chaetura vauxi* | Vaux's swift | CSC |

| | | | |
|---|---|---|---|
| FT | Federal Threatened | SFP | State Fully Protected |
| FSC | Federal Species of Concern (former C2 and C3) | CSC | CDFG Species of Special Concern ("Special" Animals) |

*Non-native

Table A-1 (Continued)

BIRD COMPENDIUM

| BIRDS<br>Scientific Name | Common Name | Status |
|---|---|---|
| **Trochilidae** | **Hummingbirds** | |
| *Archilochus alexandri* | black-chinned hummingbird | |
| *Calypte anna* | Anna's hummingbird | |
| *Calypte costae* | Costa's hummingbird | |
| **Alcedinidae** | **Kingfishers** | |
| *Ceryle alcyon* | belted kingfisher | |
| **Picidae** | **Woodpeckers** | |
| *Melanerpes formicivorus* | acorn woodpecker | |
| *Picoides nuttallii* | Nuttall's woodpecker | |
| *Picoides pubescens* | downy woodpecker | |
| *Picoides villosus* | hairy woodpecker | |
| *Colaptes auratus* | northern flicker | |
| **Tyrannidae** | **Tyrant Flycatchers** | |
| *Sayornis nigricans* | black phoebe | |
| *Myiarchus cinerascens* | ash-throated flycatcher | |
| *Tyrannus verticalis* | western kingbird | |
| **Hirundinidae** | **Swallows** | |
| *Tachycineta thalassina* | violet-green swallow | |
| *Stelgidopteryx serripennis* | northern rough-winged swallow | |
| *Petrochelidon pyrrhonota* | cliff swallow | |
| **Corvidae** | **Jays and Crows** | |
| *Aphelocoma californica* | Western scrub jay | |
| *Corvus brachyrhynchos* | American crow | |
| *Corvus corax* | common raven | |
| **Paridae** | **Titmice** | |
| *Baeolophus inornatus* | oak titmouse | |
| **Aegithalidae** | **Bushtits** | |
| *Psaltriparus minimus* | bushtit | |

| | | | |
|---|---|---|---|
| **FT** | Federal Threatened | **SFP** | State Fully Protected |
| **FSC** | Federal Species of Concern (former C2 and C3) | **CSC** | CDFG Species of Special Concern ("Special" Animals) |

*Non-native

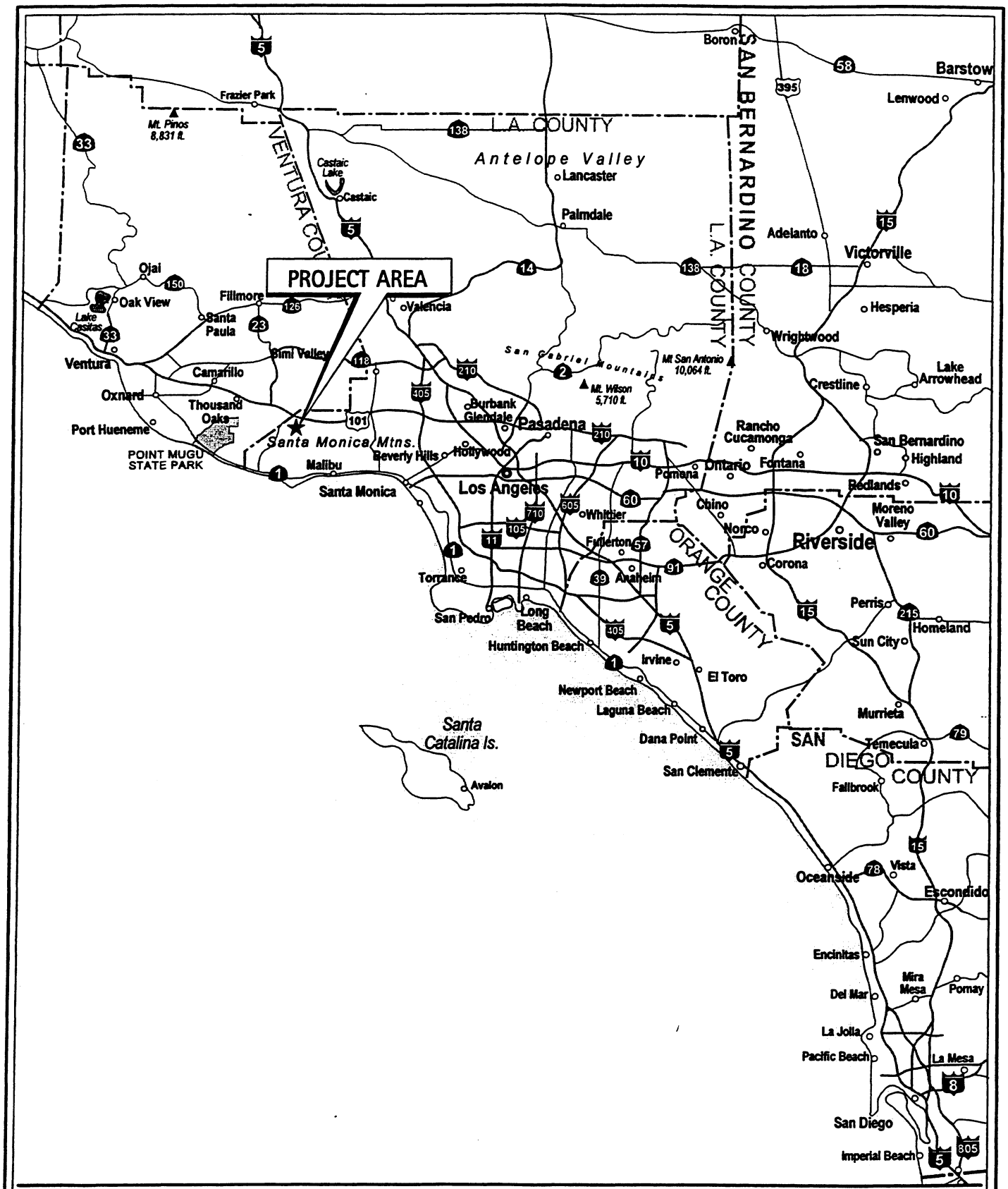
Table A-1 (Continued)

BIRD COMPENDIUM

| BIRDS<br>Scientific Name | Common Name | Status |
|---|---|---|
| **Sittidae** | **Nuthatches** | |
| *Sitta carolinensis* | white-breasted nuthatch | |
| **Troglodytidae** | **Wrens** | |
| *Thryomanes bewickii* | Bewick's wren | |
| *Troglodytes aedon* | house wren | |
| **Muscicapidae** | **Kinglets, Gnatcatchers, Thrushes, and Babblers** | |
| *Chamaea fasciata* | wrentit | |
| **Mimidae** | **Thrashers** | |
| *Mimus polyglottos* | northern mockingbird | |
| *Toxostoma redivivum* | California thrasher | |
| **Ptilogonatidae** | **Silky Flycatchers** | |
| *Phainopepla nitens* | phainopepla | |
| **Sturnidae** | **Starlings** | |
| * *Sturnus vulgaris* | European starling | |
| **Emberizidae** | **Wood Warblers, Tanagers, Buntings, and Blackbirds** | |
| *Dendroica coronata* | yellow-rumped warbler | CSC |
| *Geothlypis trichas* | common yellowthroat | |
| *Pheucticus melanocephalus* | black-headed grosbeak | |
| *Piranga ludoviciana* | western tanager | |
| *Pipilo crissalis* | California towhee | |
| *Pipilo maculatus* | spotted towhee | |
| *Melospiza melodia* | song sparrow | |
| *Agelaius phoeniceus* | red-winged blackbird | |
| *Molothrus ater* | brown-headed cowbird | |
| *Icterus bullockii* | Bullock's oriole | |
| *Icterus cucullatus* | hooded oriole | |
| **Fringillidae** | **Finches** | |
| *Carpodacus mexicanus* | house finch | |
| *Carduelis psaltria* | lesser goldfinch | |

| | | | |
|---|---|---|---|
| FT | Federal Threatened | SFP | State Fully Protected |
| FSC | Federal Species of Concern (former C2 and C3) | CSC | CDFG Species of Special Concern ("Special" Animals) |

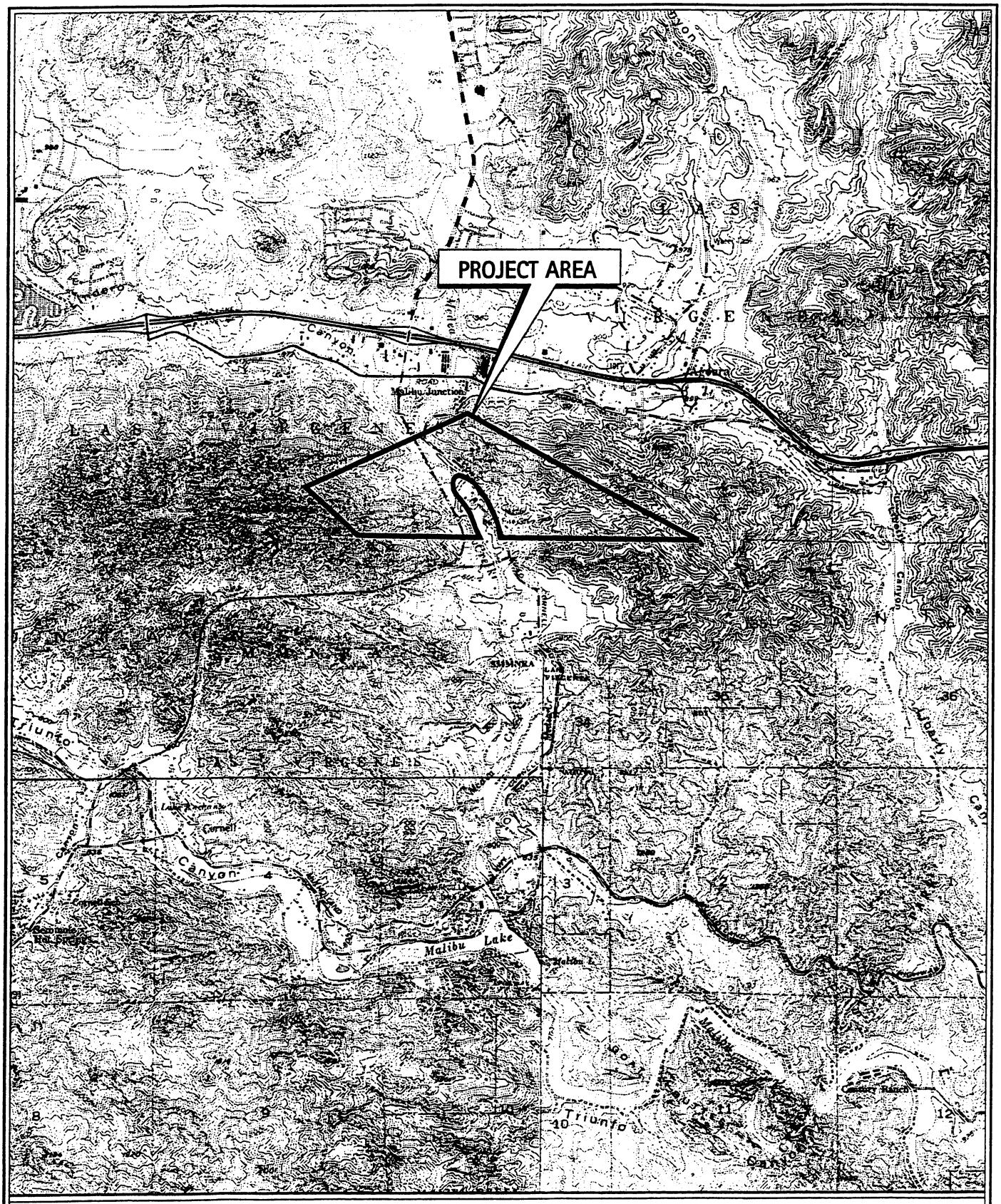
*Non-native




PCR

NOT TO SCALE

Figure 1
Live Oak Ranch
Regional Map

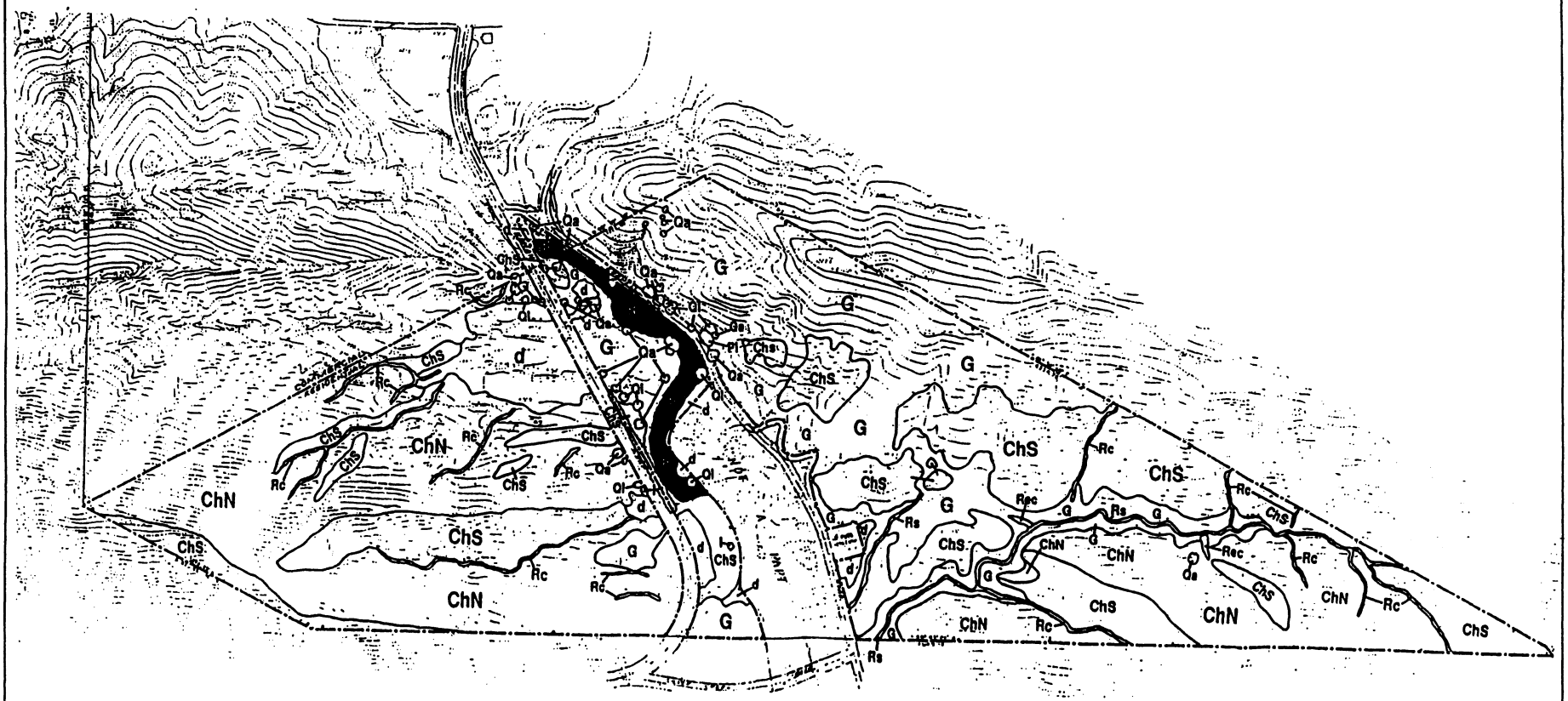



PCR

NOT TO SCALE

SOURCE: USGS Quadrangles Calabasas and Thousand Oaks, Photorevised 1981

Figure 2
**Live Oak Ranch**
**Vicinity Map**




**LEGEND**

| UPLANDS | | RIPARIAN | | TREES | | OTHER | |
|---|---|---|---|---|---|---|---|
| G | Grassland, with sparse scrub | Rf | Forest (Willow) | Ql | Valley Oak | d | Disturbed |
| ChS | Chaparral; South Slopes | Rs | Scrub (Mulefat, willow) | Qa | Coast Live Oak | | LBV Survey Location |
| ChN | Chaparral; North Slopes | Rc | Chaparral | Pl | Sycamore | | |
| | Seep | Rec | Giant Wildrye | I | Introduced | | |

PCR

N

0 1,200 Feet

Source: Envicom Corporation and PCR Services Corporation

Figure 3
**Live Oak Ranch**
**Vegetation Communities**

# APPENDIX C-10

**Southwestern Willow Flycatcher Survey Report, Live Oak Ranch, prepared by TW Biological Services; September 19, 1999**

September 19, 1999

**TW Biological Services**
2415 29th St.
San Diego, CA. 92104

**PLANNING CONSULTANTS RESEARCH**
One Venture, Suite 150
Irvine, CA 92618

**Subject:** Results of focused Southwestern Willow Flycatcher surveys on the Live Oak Ranch Project Site, Los Angeles County, California.

Methods
In accordance with established U.S. Fish and Wildlife Service survey protocol, a minimum of three focused willow flycatcher surveys were performed during 1999; the first occurring between May 15 - 31, the second between June 1-21, and a final survey between June 21- July 10. Surveys were conducted by slowly walking within or immediately adjacent to all suitable riparian habitat areas observing for as well as listening for the species distinctive vocalizations. A taped playback of the Southwestern Willow Flycatcher was also utilized to aid in the detection of any birds present. Surveys were conducted in the morning hours and only during clement or fair weather conditions. All surveys were conducted by Jennifer Turnbull of TW Biological Services. Survey dates, conditions, and results are summarized in Table 1.

Project Area
Located within Los Angeles County, west of highway 101 in Agoura Hills, the Live Oak Ranch survey area consists of approximately 2400 feet of narrow linear streamside riparian habitat. Dominant riparian overstory species consists of willow (*Salix* spp.), Coast live oak (*Quercus agrifolia* ), Sycamore (*Platanus racemosa*), and California Black Oak ( *Quercus kelloggii* ). Understory riparian species include Mulefat (*Baccharis* spp.), California rose (*Rosa californica*) , Poison hemlock (*Conium maculatum*), and Western ragweed (*Ambrosia psilostachya.*).

Results
There were no willow flycatchers detected during survey efforts of the project area.

Table 1. Survey Dates and Results.

| Survey Date | SURVEY TIME BEGIN | END | WEATHER | | TEMP. | | WIND | | Results |
|---|---|---|---|---|---|---|---|---|---|
| May 29 | 07:00 | 08:30 | OVC | OVC | 60 | 63 | 0 | 0 | No flycatchers detected |
| June 17 | 06:30 | 7:30 | OVC | OVC | 53 | 57 | 0 | 1 | No flycatchers detected |
| July 06 | 07:00 | 08:00 | PC | PC | 55 | 58 | 1 | 1 | No flycatchers detected |

Table 2. Bird Species List

| Species | Comments | Species | Comments |
|---|---|---|---|
| Turkey Vulture | | Common Raven | |
| Cooper's Hawk | | Oak Titmouse | |
| Red-shouldered hawk | | Bushtit | |
| Red-tailed hawk | | Bewick's Wren | |
| Mourning Dove | | House Wren | |
| Anna's Hummingbird | | American Robin | |
| Red-shafted Flicker | | European Starling | |
| Acorn Woodpecker | | Wilsons Warbler | |
| Downy Woodpecker | | Yellow Warbler | |
| Nuttall"s Woodpecker | | Common yellowthroat | |
| Ash-throated Flycatcher | | Spotted Towhee | |
| Western Wood-Pewee | | California Towhee | |
| Black Phoebe | | Song Sparrow | |
| Pacific Slope Flycatcher | | Brown-headed Cowbird | 1 obs. on 5/29. |
| Northern Rough-wing Swallow | | Hooded Oriole | |
| Cliff Swallow | | American Goldfinch | |
| Scrub Jay | | Lesser Goldfinch | |
| American Crow | | House Finch | |

Comments

Due to limited size and the lack of dense understory of the riparian habitat, Southwestern willow flycatcher occupation within the Live Oak Ranch project area is unlikely.

If there are any questions regarding this report. please contact Jennifer Turnbull.

TW Biological Services
(619) 281-9731
(619) 281-7982 fax
E-mail twbio@adnc.com

# APPENDIX C-11

**Focused Surveys for the federally endangered Lyon's pentachaeta (*Pentachaeta lyonii* A. Gray) and the Threatened Santa Monica Mountains Dudleya (*Dudleya cymosa ovatifolia* (Britton) Moran) on the Triangle Ranch, Los Angeles County, California, prepared by Impact Sciences Inc.; June 2003**

# FOCUSED SURVEYS FOR THE FEDERALLY ENDANGERED LYON'S PENTACHAETA (PENTACHAETA LYONII A. GRAY) AND THE THREATENED SANTA MONICA MOUNTAINS DUDLEYA (DUDLEYA CYMOSA OVATIFOLIA (BRITTON) MORAN) ON THE TRIANGLE RANCH, LOS ANGELES COUNTY, CALIFORNIA

**Prepared for:**

Sage Community Group
3 Corporate Plaza, Suite 102
Newport Beach, CA 92660


**Jointly Prepared by:**

Impact Sciences, Inc.
30343 Canwood Street, Suite 210
Agoura Hills, CA 91301

**and**

The Planning Associates
3151 Airway Avenue, Suite R-1
Costa mesa, CA 92626


JUNE 2003

# Focused Surveys for the Federally Endangered Lyon's Pentachaeta *(Pentachaeta lyonii* A. Gray*)* and the Threatened Santa Monica Mountains dudleya (*Dudleya cymosa ssp. ovatifolia* (Britton) Moran*)* on Triangle Ranch, Los Angeles County, California

Prepared for:

Sage Community Group
3 Corporate Plaza, Suite 102
Newport Beach, CA 92660

Prepared Jointly by:

Impact Sciences, Inc.
30343 Canwood Street, Suite 210
Agoura Hills, CA 91301

The Planning Associates
3151 Airway Avenue, Suite R-1
Costa Mesa, CA 92626

**June 2003**

***Cooperative Study*** —This report represents the combined efforts of Impact Sciences, Inc., Agoura, CA, and The Planning Associates, Costa Mesa, CA. Impact Sciences, Inc. had primary responsibility for the study plot delineation, defining and implementing field survey methodology for the target species, and detailing the field data summary report for Lyon's pentachaeta and the Santa Monica Mountains dudleya. The assessment and analysis of these data was completed and final report prepared by The Planning Associates. The final report was reviewed and revised by Impact Sciences, Inc. and The Planning Associates.

# 0.0 CONTENTS

**0.0 CONTENTS**

**1.0 EXECUTIVE SUMMARY**

**2.0 BACKGROUND**

**3.0 LYONS PENTACHAETA, *Pentachaeta lyonii* A. Gray**
- **3.1 Ecology**
- **3.2 Survey Methods**
- **3.3 Study Plots**
- **3.4 Survey Results and Discussion**
- **3.5 Survey Conclusions**

**4.0 SANTA MONICA MOUNTAINS DUDLEYA, *Dudleya cymosa* ssp. *ovatifolia* (Britton) Moran**
- **4.1 Ecology**
- **4.2 Survey Methods**
- **4.3 Survey Results and Discussion**
- **4.4 Survey Conclusion**

**5.0 TABLES**

Table 1. Study plot size ($m^2$), density (individual plants per $m^2$, and estimated abundance of Lyons pentachaeta, *Pentachaeta lyonii*, on the Triangle Ranch Project site, Los Angeles County, California, May 2003.

Table 2. Survey results for Santa Monica Mountain dudleya, *Dudleya cymosa* ssp. *ovatifolia* on the Triangle Ranch Project site, Los Angeles County, California, May 2003.

Table 3. Annual precipitation records from the Oxnard, Ventura County recording station (#046569). The 2003 precipitation record is incomplete. The water year recording period is October through September. Precipitation at the end of June 2003 (nine months) exceeds 125% of the 54-year (01 July 1948 to 31 December 2002) mean precipitation.

**6.0 FIGURES**

Figure 1. Regional location of subject project, Triangle Ranch, Los Angeles County, California

Figure 2A. Triangle Ranch, Los Angeles County, California topographic vicinity map. Project site boundary delimited by solid green line; red polygons distinguish Pentachaeta study plots. The Ventura Freeway (State Highway 101) and local road arterials are shown in red and yellow respectively.

Figure 2B. Triangle Ranch, Los Angeles County, California aerial vicinity map. Project site boundary delimited by solid green line; green polygons distinguish Pentachaeta study plots. The Ventura Freeway (State Highway 101) and local road arterials are shown in red and yellow respectively.

## 6.0 FIGURES, continued

Figure 3. Lyons pentachaeta, *Pentachaeta lyonii*, on the Triangle Ranch Project site (Study Plot P1), Los Angeles County, California, May 2003

Figure 4. Orientation and relative location of Lyons pentachaeta study plots A, AA, B, C, and G on and near the Triangle Ranch, Los Angeles County, California project site. Study plots AA and B are north east of the proposed project site boundary (dark line).

Figure 5. Orientation and relative location of Lyons pentachaeta study plots D, E1, E2, K1-4K, and L1-L4 on the Triangle Ranch, Los Angeles County, California project site.

Figure 6. Orientation and relative location of Lyons pentachaeta study plots F, H1, H2, I, and M on the Triangle Ranch, Los Angeles County, California project site.

Figure 7. Orientation and relative location of Lyons pentachaeta study plots N, O, P1, P2, and Q on the Triangle Ranch, Los Angeles County, California project site.

Figure 8. Orientation and relative location of Lyons pentachaeta study plots S1-S3 and U1-U4 on the Triangle Ranch, Los Angeles County, California project site.

Figure 9. Orientation and relative location of Lyons pentachaeta study plots T2-T4 on the Triangle Ranch, Los Angeles County, California project site.

Figure 10. Southern portion of study area P1 in the foreground recently disked (May 2003) for fuel management (wildfire abatement), background was disked in May 2002. Insert shows Lyon's pentachaeta, *Pentachaeta lyonii*, growing in the area disked in 2002 at the interface of the two areas. Pentachaeta densities were among the highest in this area of P1 despite last years disking activity.

## 7.0 LITERATURE CITED

## 8.0 APPENDICES

**8.1** Field data summary reports: transected quadrat surveys for Lyons pentachaeta

**8.2** Santa Monica Mountain dudleya photographs

# 1.0 EXECUTIVE SUMMARY

Historic vegetation surveys of Triangle Ranch property, Los Angeles County, California found Lyon's pentachaeta *(Pentachaeta lyonii* A. Gray*)* and Santa Monica Mountains dudleya *(Dudleya cymosa ssp. ovatifolia* (Britton) Moran*)*, two special status plant species. Focused plant species surveys were performed in May 2003 to delineate current distribution demographics and extent to which these plants occupy the Triangle Ranch site. Direct counts and transected quadrat surveys were used to estimate the total on site numbers of each of these two plant species. Lyon's pentachaeta was found in 37 distinct locations occupying 8.8 acres of the ranch property. These locations ranged in size from 23,508 $m^2$ (5.8 acres) to 3 $m^2$, and showed densities of 0.6 to 110 plants per $m^2$. Total Lyon's pentachaeta present on the Triangle Ranch site are estimated to be 0.5 million individual plants. Nearly 500 individual Santa Monica Mountains dudleya were observed on the project site.

## 2.0 BACKGROUND

The 320-acre Triangle Ranch project site (hereafter referenced as the project site) is located in the western Santa Monica Mountains, west of Agoura Hills, Los Angeles County, California (Fig. 1 and Fig. 2). The project site lies within Township 1 North, Range 18 West embraced by the Calabasas and Thousand Oaks 7.5 Quadrangles (United States Geological Survey) approximately 0.5 mile from the junction of Kanan Road and State Highway 101 (Ventura Freeway). It is delimited by sparse rural development on the northern and southern perimeter and open space to the east and west. A residential development, not part of the project site or proposed development, intrudes from the southern boundary into the property's contiguous landmass. Kanan Road and Cornell Road bisect the property in a general north-south direction.

The steep mountainous terrain on the east and west of the project site supports a dense Chamise Chaparral or Chamisal (NDDB Element Code 37.100.00) with intermittent precipitous rocky exposures sustaining little vegetation. Chaparral is the predominant vegetation community. Ruderal non-native grasslands are second most abundant and pervade the moderate slopes punctuated by thinly distributed patches of coastal sage scrub and scattered clusters of coast live oak (*Quercus agrifolia*) and valley oak (*Quercus lobata*). Medea Creek in the north central portion of the project site is dominated by Southern Arroyo Willow Riparian Forest (NDDB Element Code 61.201.00). Comprehensive vegetation descriptions and summaries are variously detailed elsewhere (see Envicom Corporation 1998; Impact Sciences, Inc. 2000; PCR Services Corporation 2000).

Historically, the study site receives impacts from various types of recreational use, as well as grazing of recreational domestic stock. Direct and indirect impacts from developed areas, unimproved roads, trails, Kanan and Cornell Roads, turnouts, and fuel modification zone (firebreak) have encroached onto the project site. This encroachment extends primarily to the less rugged portions of the project site within access of established roadways. The last fire to impact the project site was in the 1982-1983 fire season. Disking for fuel modification is done annually during May, June, and July (Pers. Comm. Firemen, Station 65, Agoura, CA 06/04/03).

Three previous biological surveys of the project site have established the on site presence and general locations of Lyon's pentachaeta, *Pentachaeta lyonii* A. Gray, and Santa Monica Mountains dudleya, *Dudleya cymosa* ssp. *ovatifolia* (Britton) Moran (Michael Brandman Associates 1992; Envicom Corporation 1998; Impact Sciences, Inc. 2000; PCR Services Corporation 2000). These two plant species are specific in their habitat requirements and were listed under the federal Endangered Species Act (ESA) because of potential threats of extinction from competition from invasive weeds, alteration of fire cycles and fire suppression activities, recreational activities, over collecting, habitat fragmentation and degradation, recreational activities, urban development, and by virtue of their perceived small numbers and population sizes despite the absence of empirical data (USFWS 1997).

Impact Sciences, Inc. performed focused plant surveys in May 2003 to delineate current distribution demographics and designate the extent to which these plants occupy the Triangle Ranch site. Direct counts and transected quadrat surveys were used to estimate the total number of individuals for each of these two plant species.

# 3.0 LYON'S PENTACHAETA

## 3.1 Lyon's pentachaeta Ecology

Lyon's pentachaeta was first described from a plant collected by Mr. William Lyon circa 1886, near Palos Verdes Mountain in Los Angeles County, California.. This slender stemmed, simply branched, herb averages less than 36 cm in height. The small yellow flower heads of this annual aster (Asteraceae) appears in late spring (April to June) (Fig. 3). There are no other members of this genus locally. The alternate leaves of Lyon's pentachaeta are easily distinguished from the similarly appearing goldenfields, *Lasthenia californica*, which has opposite leaves (Hickman 1993). The rays of pentachaeta's inflorescence curl under in the evening forming a narrow ruffle around the floral disk and do not unfurl until warmed by the sun.

The general habitat for Lyon's pentachaeta embraces the ecotone transition between the shrublands of chaparral and costal sage to the pocket grasslands (USFWS 1999). Undisturbed native habitat can be generally characterized by low densities of competing plant native species, the absence of competing exotic species, minimal vegetative cover, and exposed soils with a microbiotic crust (Belnap 1990). These conditions are replicated by some disturbed habitat situations that replicate essential factor(s) necessary for pentachaeta. Scenarios of reduced vegetative competition, either from native or invasive exotic plant species, favor pentachaeta growth (Fotheringham and Keeley 1998; Keeley and Keeley 1992). Reduced vegetative competition can originate from anthropogenic disturbance such as road, firebreak, and trail edges, wildfire and controlled burns or disking, as well as from grazing by horses, or rodent and insect activity that reduce competing plant density (Thomas and Wishner 1988). The majority of California Native Diversity Data Base (CNDDB) reports that included ecological notes indicated a trend for occurrence in rocky volcanic and clay soils in disturbed areas (see also Fotheringham and Keeley 1998). Abundance of this species is known to fluctuate annually in population size depending on the amount and timing of rainfall and other environmental factors (Fotheringham and Keeley 1998). However, the extent of those fluctuations is unknown.

Thirty-two new occurrences of Lyon's pentachaeta have been added to the CNDDB since May 1984, twenty-six since 1990. Previous to May, 1984, only a single occurrence, in 1964, was noted. The current range of extant populations is concentrated from Conejo Valley, near Newbury Park, north to Simi Valley and east to the Santa Monica Mountains north of Malibu. The southernmost occurrence is based on an isolated report from Point Fermin, south of San Pedro (CNDDB Occurrence No. 1). All recorded occurrences have been within 20 miles of the coast, coincident with its coastal habitat designation at elevations up to 2000 feet (Hickman 1993). Although the CNDDB is an available source of data, it is not necessarily a reliable source of data. Many occurrences (known or otherwise)

are never listed. Further, there is no requirement to list new occurrences. Consequently, the CNDDB underestimates the occurrences of Lyon's pentachaeta within the region.

## 3.2 Survey Methods

Focused protocol survey methodology for Lyon's pentachaeta have yet to be defined by either the U.S. Fish and Wildlife Service (USFWS) or the California Department of Fish and Game (CDFG). For purposes of this survey, an absence—presence method to report estimates of numbers of individual plants on site was adopted by convention. Small assemblages of the target species were counted directly. These patches were defined with stakes placed at their periphery. The stakes were identified as to individual study area defined and consecutively number. Larger pentachaeta assemblages were similarly staked and identified, however total populations were estimated from transected quadrats. Transects were established through the long axis the study plot, passing through the center. The ends of each transect were identified with an identifying stake specific for each study plot. Quadrat sampling was done at 5-foot intervals by placing a 0.25 $m^2$ rectangle next to the transect line and counting the individual pentachaeta plants within the quadrat. Placement of the quadrat rectangle commenced with the right side and was alternated from right to left of the transect line at each 5 ft interval. Each study plot and transect was commercially surveyed by a registered civil engineer to ensure accuracy. The area of each study plot polygon was determined and the total number of plants within each polygon was established directly, by counting, or my estimating the total plants present in the study plot from mean plant density determined from transected quadrat survey results.

## 3.3 Lyon's pentachaeta Study Plots

The following describes each of the study plots identified on the project site (Fig. 2). Study plot A, AA, and B are located on a mesa and ridgeline at the northwest area of the site (Fig. 4); A and AA were previously identified as a single plot (Impact Sciences, Inc. 2000). Approximately 40 feet now separates these two study plots. A and AA are located on the mesa that trends east-west. The vegetation surrounding A and AA is invasive non-native grasses. Shrubs at the outer perimeter of these plots include buckwheat (*Eriogonum fasciculatum*), purple sage (*Salvia leucophylla*) and chamise (*Adenostoma fasciculatum*). Study plot B is located uphill of A and AA between rocky outcrops where chamise and purple sage is the main vegetation; non-native grasses are found in between the shrubs. Surface core drilling for soil compaction occurred on the west end of study plot AA. The drilling process impacted a small area, approximately 1.5 meters in diameter.

Study plot C is located south of AA and B, across a tributary in an open space area. Plot C extends westerly from the open space into an area of rocky outcroppings surrounded by chamise pervaded by non-native grasses and tocalote (*Centaurea melitensis*) interspersed with Lyon's pentachaeta. Plot G is in rocky soil with limited peripheral vegetation north-northeast of plot A towards Kanan Road and immediately north of the graded plateau currently used as a landscape maintenance yard. Dudleya and pentachaeta are both found in the general locations of study

plots D, E, J, K and L (Fig 5). These plots are on a rocky outcrop south of a small ravine and detention basin on the west side of Kanan Road immediately south of the turnout for the landscape maintenance yard. The rocky outcrop and corresponding ridgeline are dominated by mountain mahogany (*Cercocarpus betuloides*) on the north-facing slopes and by chamise and buckwheat on the ridgeline. Non-native grasses, tocalote, and native annual forbs, such as delphinium (*Delphinium parryi*) and golden stars (*Bloomeria crocea*), are interspersed with the Lyon's pentachaeta. Plots D, J and L are on the north-facing slopes within openings in the mountain mahogany. Plots E and K occupy small clearings in the chamise and buckwheat along the ridgeline. Plot D is the furthest west of this group, located on the south bank of a small ravine. Openings in the mountain mahogany were densely blanketed with pentachaeta. Southeast (uphill) from plot D, the two separate segments of plot E (E1 and E2) are separated by stands of chamise. North of plot E2, a small opening in the mountain mahogany delineated study area J. East of the E plots, along the ridge line, are the four segments of study area K (K1, K2, K3, and K4). North of K1 and separated by thick stands of mountain mahogany are the four segments of the L study area (L1, L2, L3, and L4). L1 consists of the observation of single plant.

Study areas F, M, and I are the southern most plots on the west of Kanan Road (Fig 6). Two tributaries to Medea Creek delineate an east-west ridgeline terminating at a detention basin draining under Kanan Road. Study plot F is at the top of the ridgeline extending from Kanan Road west to an unimproved road that crosses the ridgeline. Study area I is on the dirt road, northwest of F, and plot M is on the ridgeline, west of area I. These three plots were sparsely vegetated by yucca, chamise, buckwheat, and purple sage. This ridgeline is more exposed than the others and, therefore, drier than the ridges on the other study areas. It also has less non-native grasses and tocalote. East of Kanan Road, two distinct aggregations of pentachaeta between Kanan Road and Medea Creek along the southern boundary of the project site are identified as plots H1 and H2. H1 occurs within twenty feet of an existing residence. The Los Angeles County Department of Agriculture disked the H1 study plot as part of the ongoing fuel modification program (fire abatement activity) after our survey was conducted. The H2 plot is north of H1 on a northwest slope dominated by chamise, purple sage, with some poison oak (*Toxicodendron diversilobum*). Non-native grasses, tocalote and native forbs are interspersed with the Lyon's pentachaeta at this site.

East of Cornell Road at the southern edge of the project site in an east-west ravine formerly terminating at Medea Creek are study areas N and O (Fig. 7). Plot N occupies a west facing rocky slope. This sparsely vegetated slope is dominated by chamise and purple sage intermingled with non-native grasses and forbs. Area N is on the north facing slopes east of plot O. It is overgrown with chamise, non-native grasses and tocalote throughout the lower regions. Lyon's pentachaeta is sparsely represented.

Study plot P1, the largest study area of continuous distribution of Lyon's pentachaeta on the project site, is located on the east of Cornell Road and south of Agoura Fire Station #65 (Fig 7). The southeast portion of plot P1 is adjacent to Cornell Road. Approximately 700 $m^2$ were disked by the Los Angeles County Department of Agriculture for fire abatement. P1 contains several well-utilized recreational jogging trails. The Agoura Fire

Station #65, located on Cornell Road, has built a short distance golf driving range with the prevailing trajectory into the middle of the study area. Unique to study area P is a dense abundance of slender tarweed *(Hemizonia fasciculata)* occupying a significant portion of area P1. The large size of P1 and the abundance of tarweed necessitated four transects, two each in areas of high and low pentachaeta abundance. Area P2 is an impacted area with trash dumping and a dirt road terminating at the top of a small hill. Previous studies (Impact Sciences, Inc. 2000) demonstrated pentachaeta in this area. Domestic bee supers were located into the middle of this plot. Consequently, this area was not surveyed.

Southeast of study area P1, at the crest of a rise are plots Q1 and Q2. Study area Q1 resides in an open area at the hill's crest; Q2 is the area defined by hill's sparsely vegetated western slope. Q1 is nearly circumscribed by chamise and yucca. There are limited non-native grasses, tocalote and native forbs on the top of the hill, which consists of mostly open ground. Study area R was defined from a previous study (Impact Sciences, Inc. 2000); none was found during this survey. .

Study area S is found on the south side of a large drainage east of area Q (Fig 8). Four areas (S1, S2, S3, and S4) are separated from each other by stands of chamise and mountain mahogany. Pentachaeta were interspersed among non-native grasses and native forbs. S4 is a single point where 7 plants were observed. Study areas U1 and U4 are on knolls across a large ravine, west and east of S3, respectively. Two additional areas (single points) were designated plots U2 and U3, each with 5 individual plants.

East of plot S are the T study areas (T1, T2, T3, and T4). Facing north, T2 is surrounded by chamise and mountain mahogany (Fig 9). T1 is a single point plot west of T2; T3 and T4 are northeast and south east of T2, respectively. Here, native delphiniums, non-native grasses, and tocalote are interspersed with the pentachaeta.

## 3.4 Lyon's pentachaeta Survey Results & Discussion

Forty-one study areas were delineated from past plant survey data ranging from in size from a point source (example, plot L2) to 23,508 $m^2$ (plot P2). Thirty-nine plots were surveyed by Laura Malessa and Morag Logan, field biologists with Impact Sciences, Inc. for the presence of Lyon's pentachaeta. One study plot (H1) was disked for fuel management (fire safety) before it was surveyed; a second plot (P2) was not counted because of the presence of domestic bee, *Apis melifera,* hives. Direct count of 2,830 plants was made on 16 study plots; transects and 0.25 $m^2$ sampling quadrats on 17 plots resulted in the direct count of 4,114 plants. Pentachaeta density ranged from 110 individuals per $m^2$ on plot D to 0.1 individuals per $m^2$ on plot O. An estimated 529,561 plants are thought to occur on 8.8 acres of the Triangle Ranch property (Table 1). The mean density was 19.8 plants per $m^2$ on the 8.8 acres of the cumulative study plot area. The density of Lyons pentachaeta on directly counted study plots (n = 16) was 4.2 ± 4.1 plants per $m^2$; the density on plots which were surveyed with transected quadrats (n = 17) was 34.6 ± 29.6 plants per $m^2$. The estimated density on plots was 8.2 times greater than for plots counted directly. Within the 16 directly

counted study areas, 4433 $m^2$ were surveyed. The total area surveyed with 0.25 $m^2$ quadrats associated with transects on the study plots was 155 $m^2$ which was used to estimate the pentachaeta population on more than 31,000 $m^2$. Less than 1 percent of the study plot area was sampled.

Pentachaeta exhibits an aggregated distribution within its environment (Appendix A) which in part, explains the occurrence of high and low densities on small study plots. For example, plot D has the greatest mean density or distribution frequency (110 plants per $m^2$). However, frequencies >250 plants per $m^2$ are bounded by areas with 12 plants per $m^2$ in this same plot. Plot I was counted in its entirety and displays 9.7 plants per $m^2$ within a comparably sized area. For expediency, only small study plots (21 plots totaling 4,433 $m^2$) with low densities of pentachaeta were counted in their entirety. The population of pentachaeta on the remaining 17 study plots was estimated from counts made on a total of 155 $m^2$ from transected quadrats (0.003%) on the remaining 31,241 $m^2$.

The aggregated distribution of Lyons pentachaeta relates to the presence of essential environmental parameters, which are similarly distributed in an aggregated or nonrandom manner. Survey methodology derived for sampling random distributions implemented on aggregated or clustered distributions are statistically biased (Thompson 1992; Krebs 1998). Adaptive cluster sampling would provide for less bias.

Competition with pervasive non-native vegetation, which predominates a major portion of the project site along with aggressive native plants like slender tarweed, appear to be a significant limiting factor for Lyons pentachaeta, rather than more anthropogenic issues. Study plot P1 is the largest, and as a result contains the largest number of pentachaeta individuals. However, the numbers are decreased from previous years. The principle difference relates to the increase in abundance of the slender tarweed (Pers. Comm. M. Logan 06/04/03). Indeed, some of the densest pentachaeta growth occurs at the southern end of the P1 study plot. In this area tarweed is nearly absent and this portion of the P1 was disked last year as part of the fuel modification (fire prevention) program (Fig 10). Pentachaeta was also observed growing on foot-trails or in the wheel worn areas of the on site dirt roads yet was not growing in edaphically enhanced native and exotic vegetation adjacent to the road. Study area P2 was not surveyed due to the presence of bee supers. This site, historically, was cleared and graded for a large water storage tank or related development and receives unimproved road access. The overall impact has resulted in the loss of most competing exotic and native invasive vegetation, allowing pentachaeta to advance and flourish. The loss of competitive vegetation, directly through disking or indirectly by compaction appears to favor pentachaeta growth. Although, not considered to be an invasive species of disturbed habitat, pentachaeta appears to benefit from selected forms of disturbance that serve to reduce competition. Indeed, the problem is not totally one related to exotic species. Years of fire suppression have caused disproportionately high densities of chamisal species. Management efforts directed toward the reduction or elimination of competing invasive exotic and native species, pentachaeta expansion would be favored. Despite the potential of this management approach, its application seems more serendipitous than a consequence of directed conservation efforts.

The 2000 survey (Impact Sciences, Inc. 2000) reports significantly fewer individuals present on the project area, although no definitive population size or extent of pentachaeta occupation was provided. For example, approximately 1,075 individuals were observed in study area A in 2000 (Impact Sciences, Inc. 2000). The current study reports 9,309 individuals for the same plot. PCR Services Corporation determined 7.2 acres of the project site contained 3,764,681 individuals (2.69 to 1076 individuals per $m^2$, with a mean value of 129 individuals per $m^2$) in 1999 (PCR Services Corporation 2000). This is more than 7 times greater pentachaeta density than measured by the current study. Some of the variation in the observed plant density between these studies is, in part, a consequence of not having a focused protocol survey capable of estimating an aggregated nonrandom plant distribution.

Precipitation may variously affect the reproductive potential of plants and has a decided positive impact to the development of pentachaeta (Fotheringham and Keeley 1998). The annual rainfall (October through June 2003) was 125% of normal in part due to nearly twice the mean Fall (September through November) rainfall (Table 3). Winter precipitation (8.54 inches) was below average (8.80 inches) in 2003 (www.wrcc.dri.edu). The Spring rainfall (5.98 inches), however was characterized by rainfall 1.6 times greater than the mean of 3.69 inches. The 2003 water year was positive relative to the long term mean. The last seven years are characterized by precipitation ranging from 12% to 249% of the 54 year mean precipitation of 14.82 inches per year (Table 3). The pentachaeta density in 1999 was considerably higher than measured in this survey, however the 1998 precipitation was nearly 250% of the mean rainfall followed by a comparative drought year in 1999 where only 60% of the expected rainfall occurred.

## 3.5 Lyon's pentachaeta Survey Conclusions

Historic surveys defined 20 areas of Lyon's pentachaeta concentration on the Triangle Ranch project site. These areas of growth have been defined into 41 study plots, two of which were not counted in the study. The total Triangle Ranch pentachaeta population of approximately 530,000 individual plants was distributed over an estimated 8.8 acres in May 2003. Pentachaeta density ranged from 0.1 to 110.5 individuals per $m^2$; the mean density was estimated at 19.8 plants per $m^2$. Competition for sunlight appears significant to pentachaeta survival. Canopy shade, resulting from invasive exotic (and native) vegetation, reduces irradiance, which appears to have significant effect on pentachaeta distribution and abundance. Water availability is important in the development of pentachaeta, however, its importance above a yet to be described threshold level is equivocal. Rather, soil type and soil depth seem to have a greater role in pentachaeta abundance than water above threshold levels necessary for germination. (Fotheringham and Keeley 1998). The aggregated distribution of Lyon's pentachaeta in concert with the linear bias for random distribution in the survey methodology may also relate to the observed disparity within this survey data set and the population density differences observed in previous surveys.

# 4.0 SANTA MONICA MOUNTAINS DUDLEYA

## 4.1 Santa Monica Mountains Dudleya Floristics and Ecology

The Santa Monica Mountains dudleya, *Dudleya cymosa* ssp. *ovatifolia*, was first described from a specimen collected in 1902. The name common name, live-forever, is taken from its perennial habit and that its basal rosette leaves remain succulent and green rather than withering during the summer. Included within the succulent or stonecrop family (Crassulaceae) the genus *Dudleya* has definite affinities for sedimentary conglomerate or volcanic breccia substrates and the costal chamisal vegetation community. The yellow flowered peduncles are usually observed from March through May in shaded recesses of rocky outcroppings on north-facing slopes of the Santa Monica Mountains. Limited quantities of highly specific habitat restrict the range and distribution of this plant and few new occurrences of only several hundred individuals have been recorded. The Santa Monica Mountains dudleya was federally listed under ESA in 1997 (USFWS 1997).

## 4.2 Santa Monica Mountains Dudleya Background Information

Previous focused surveys for Santa Monica Mountains dudleya established the presence and general distribution of this threatened plant species on the Triangle Ranch project site. A focused survey (MBA 1992) identified a total of 307 plants from three adjacent areas (CNDDB Occurrence No. 7, 1990, formerly listed *D. cymosa* ssp *ovatifolia* occurrence No. 5) occupying approximately 0.1 acre (PCR Services Corporation 2000). Here, dudleya generally occupy north-facing volcanic rock outcrop cliffs and a northeast-facing volcanic rock road embankment on the west side of Kanan Road. The rock outcrops are exposed to sun for a large part of the day. The absence of a contiguous canopy cover provides minimal shade, maximizing exposure on the dry rocky outcroppings.

## 4.3 Santa Monica Mountains Dudleya Survey Methodology

Neither the U.S. Fish and Wildlife Service (USFWS) nor California Department of Fish and Game (CDFG) have defined Focused Protocol Survey methodology for the Santa Monica Mountains dudleya. For purposes of this survey, an absence—presence method to report estimates of individual plants was adopted. Individual caudices are difficult to discern without destroying the plant, its habitat or both. By agreement with the CDFG, individual plants were identified by counting each rosette when it was separate from others, and to count each rosette per plant when a discreet plant could be identified (Pers. Comm. M. Meyer, with M. Logan, 2003). Individual plants were identified by observing if the rosettes appeared from the same location in the rock. If rosettes were located adjacent to and touching a grouping of rosettes, each of the rosettes was counted as a single plant. If the rosettes were adjacent, but not

touching, each rosette was counted as 1 plant. Surveyed plants were marked with flagging to avoid duplicate surveys. Dudleya on the west facing road embankment were counted first. The survey continued on to the north-facing slope at the downhill side of the rock outcrops, moving from the east to west and uphill. Each rock outcrop and crevice was inspected. Shrubs peripheral to the outcrops were searched for plants hidden by foliage. For each plant, the number of rosettes and flower stalks was recorded. A photographic record of representative dudleya plants occurring on the rocky outcroppings was made (**Appendix B**).

## 4.4 Santa Monica Mountains Survey Results and Discussion

On 28 May 2003 Laura Malessa and Morag Logan, Field Biologists with Impact Sciences, Inc. surveyed for the presence of the Santa Monica Mountains dudleya on rocky outcroppings previously delineated (MBA 1992; PCR Services Corporation 2000) on the Triangle Ranch project site. Dudleya occupies an area north of the Lyon's pentachaeta study plots K1 and K2 on the same ridgeline (Fig. 2A,B, Fig. 5). Nearly 600 plants were identified in an estimated 0.1 acre (Table 2). The largest group, 53% were comprised of individual plants with a single rosette. Presumably, plants with a single rosette are the youngest individuals. Seventy percent or the surveyed plants had at least one flower stalk; 42 % had 2 or more flower stalks. Thirty percent of the surveyed individuals exhibited no evidence of flowering and comprised the largest single group of plants surveyed, regardless of the number of rosettes. The dudleya population surveyed (597 individuals) was nearly twice that measured in 1992 (307 individuals). Precipitation variously affects the reproductive potential of plants. The annual rainfall (October through June 2003), was 125% of normal in part due to nearly twice the mean Fall (September through November) rainfall (Table 3). Winter precipitation (8.54 inches) was below average (8.80 inches) in 2003 (www.wrcc.dri.edu). The Spring rainfall (5.98 inches), however was characterized by rainfall 1.6 times greater than the mean of 3.69 inches. The 2003 water year was positive relative to the long term mean. The last seven years are characterized by precipitation ranging from 12% to 249% of the 54 year mean precipitation of 14.82 inches per year (Table 3).

## 4.5 Santa Monica Mountains Dudleya Conclusions

Historic surveys defined a single disjointed distribution approximating 0.1 acre. A current survey of this area found 597 individual Santa Monica dudleya, nearly twice that observed in 1992 survey of the same area (Michael Brandman Associates 1992). Increased annual precipitation during 2003 favoring spring rainfall may have resulted

in an increased number of juvenile plants in this population, although a doubling of the existing 1992 population in more than 10 years may be normative.

# 5.0 TABLES

# FOCUSED ENDANGERED SPECIES SURVEY

| STUDY PLOT DESIGNATION | STUDY PLOT AREA ($M^2$) | DENSITY (PLANTS PER $M^2$) | ESTIMATED TOTAL PENTACHAETA #S |
|---|---|---|---|
| A | 142.27 | 65.4 | 9,309 |
| AA | 283.67 | 10.1 | 19,875 |
| B | 164.71 | 36.9 | 6,083 |
| C | 403.63 | 56.2 | 22,684 |
| D | 48.82 | 110.5 | 5,395 |
| E1 | 179.49 | 0.9 | 162 |
| E2 | 22.23 | 28.3 | 630 |
| F | 802.54 | 13.2 | 10,582 |
| _G | 47.04 | 13 | 612 |
| H1 | 85.05 | NOT COUNTED | DISKED |
| H2 | 3,691.82 | 17.8 | 65,714 |
| I | 42.59 | 9.7 | 413 |
| J | 9.51 | 8.6 | 82 |
| K1 | 37.07 | 1.5 | 56 |
| K2 | 60.56 | 33.6 | 2,035 |
| K3 | 31.16 | 3.2 | 100 |
| K4 | 31.37 | 5.9 | 185 |
| L1 | 3.04 | 2 | 6 |
| L2 | 0.00 | N/A | 1 |
| L3 | 5.33 | 13.9 | 74 |
| L4 | 7.89 | 7.4 | 58 |
| M | 69.89 | 1.3 | 94 |
| N | 306.54 | 16.6 | 5,089 |
| O | 3,003.31 | 0.1 | 300 |
| P1 | 23,508.22 | 14.3 | 336,029 |
| P2 | 1,007.33 | NOT COUNTED | BEE HIVES |
| Q1 | 443.49 | 69.2 | 30,690 |
| Q2 | 13.20 | 6.8 | 90 |
| R | 0.00 | NONE FOUND | 0 |
| S1 | 36.31 | 8 | 290 |
| S2 | 16.96 | 7.3 | 124 |
| S3 | 36.35 | 18.8 | 683 |
| S4 | 0.00 | N/A | 7 |
| T1 | 0.00 | N/A | 60 |
| T2 | 1,225.81 | 8.8 | 10,910 |
| T3 | 355.42 | 1.4 | 498 |
| T4 | 290.87 | 0.6 | 175 |
| U1 | 202.42 | 1.4 | 283 |
| U2 | 0.00 | N/A | 5 |
| U3 | 0.00 | N/A | 5 |
| U4 | 150.19 | 1.8 | 270 |
| | | **TOTAL** | **529,651** |

Table 1. Estimated Lyon's pentachaeta population distributed in each of the defined study plots on the Triangle Ranch, Los Angeles County, California project site.

| Number of Rosettes | Number of Flower Stalks | | | | | | | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | ≥17 | |
| 1 | 101 | 100 | 70 | 32 | 6 | 1 | 3 | 2 | 1 | 1 | | | | | | | | | 317 |
| 2 | 39 | 41 | 15 | 9 | 7 | 4 | 3 | 1 | | | 2 | | | | | | | | 121 |
| 3 | 23 | 8 | 10 | 1 | 5 | 3 | | 2 | | 3 | 1 | 1 | | | | | | | 57 |
| 4 | 5 | 6 | 7 | 5 | 3 | 3 | 1 | 3 | 1 | 2 | | 2 | 1 | | | | | | 39 |
| 5 | 4 | 8 | 5 | 1 | 1 | 2 | 3 | 1 | 1 | | | | 1 | | 1 | 2 | | | 30 |
| 6 | 2 | 2 | 4 | | 4 | 1 | 1 | | | | | 1 | | | 1 | | | | 16 |
| 7 | 3 | 2 | | 1 | 1 | | | 1 | | | | | | | | | 1 | 1 | 10 |
| 8 | | | 2 | | | 1 | | | | | | | | | | 1 | 1 | | 5 |
| 9 | | | | | | | | | | | | | 1 | | | | | | 1 |
| 10 | | | | | | | | | | | | | | | | | | 1 | 1 |
| | | | | | | | | | | | | | | | | | | | 597 |

Table 2. Survey results for Santa Monica Mountain dudleya, *Dudleya cymosa* ssp *ovatifolia* on the Triangle Ranch Project site, Los Angeles County, California, May 2003.

## 2003 PRECIPITATION[A] (INCHES)

| Oct | Nov | Dec | Jan | Feb | Mar | April | May | June | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 4.02 | 2.86 | 0.00 | 5.68 | 3.28 | 1.15 | 1.55 | 0.02 | 18.56[B] |

## SEVEN-YEAR PRECIPITATION RECORD (INCHES)

| YEAR | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003[B] |
|---|---|---|---|---|---|---|---|
| PRECIPITATION[A] | 13.29 | 36.86 | 9.39 | 13.87 | 16.63 | 1.74 | 18.54 |
| MEAN PPT[C] | 14.82 | 14.82 | 14.82 | 14.82 | 14.82 | 14.82 | 14.82 |
| % MEAN | 89.68 | 248.72 | 63.36 | 93.59 | 112.21 | 11.74 | 125.24 |

[A] DATA SOURCE: HTTP://CDEC.WATER.CA.GOV/SNOW_RAIN.HTML

[B] INCOMPLETE DATA SET. ANNUAL PPT IS BASED ON OCTOBER THROUGH SEPTEMBER

[C] DATA SOURCE: HTTP://WWW.WRCC.DRI.EDU

Table 3. Annual precipitation records from the Oxnard, Ventura County recording station (#046569). The 2003 precipitation record is incomplete (The water year recording period is October through September.), but precipitation at the end of June 2003 exceeds 125% of the 54 year (01 July 1948 to 31 December 2002) mean precipitation.

# 6.0 FIGURES

# FOCUSED ENDANGERED SPECIES SURVEY

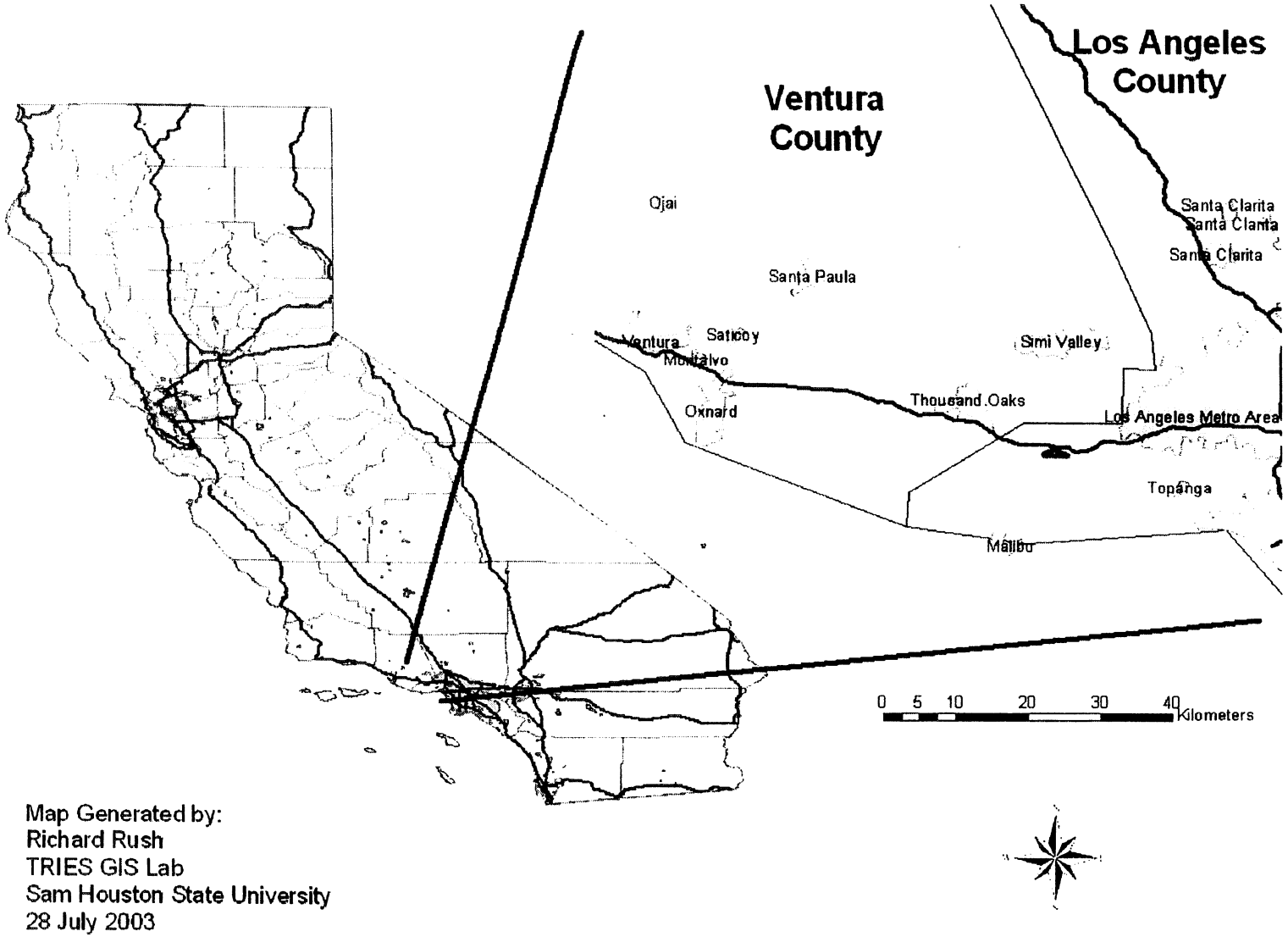



Figure 1. Regional location of subject project, Triangle Ranch, Los Angeles County, California.

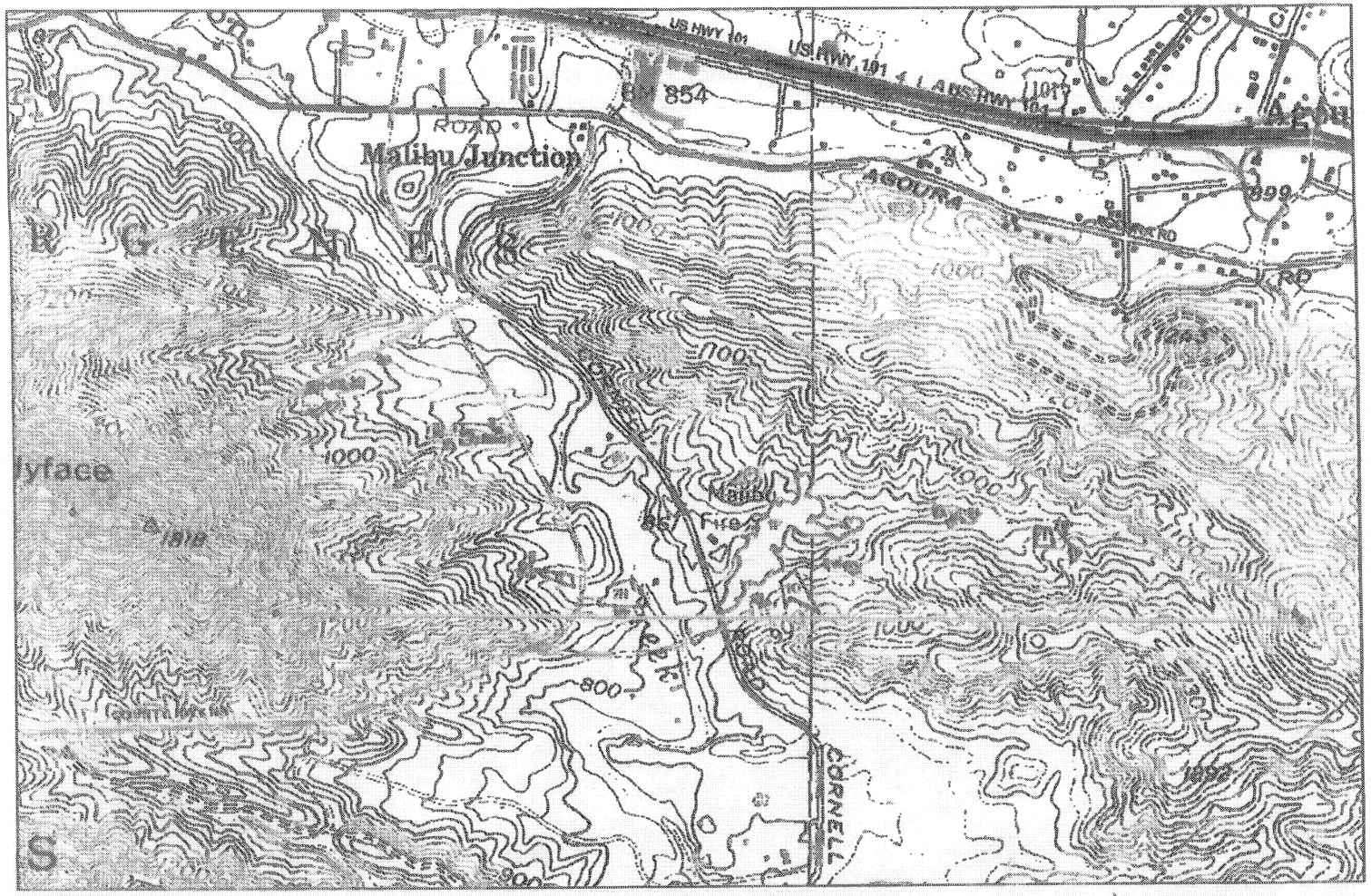



Figure 2A. Triangle Ranch, Los Angeles County, California topographic vicinity map. Project site boundary delimited by solid green line; red polygons distinguish pentachaeta study plots. The Ventura Freeway (State Highway 101) and local road arterials are shown in red and yellow respectively.

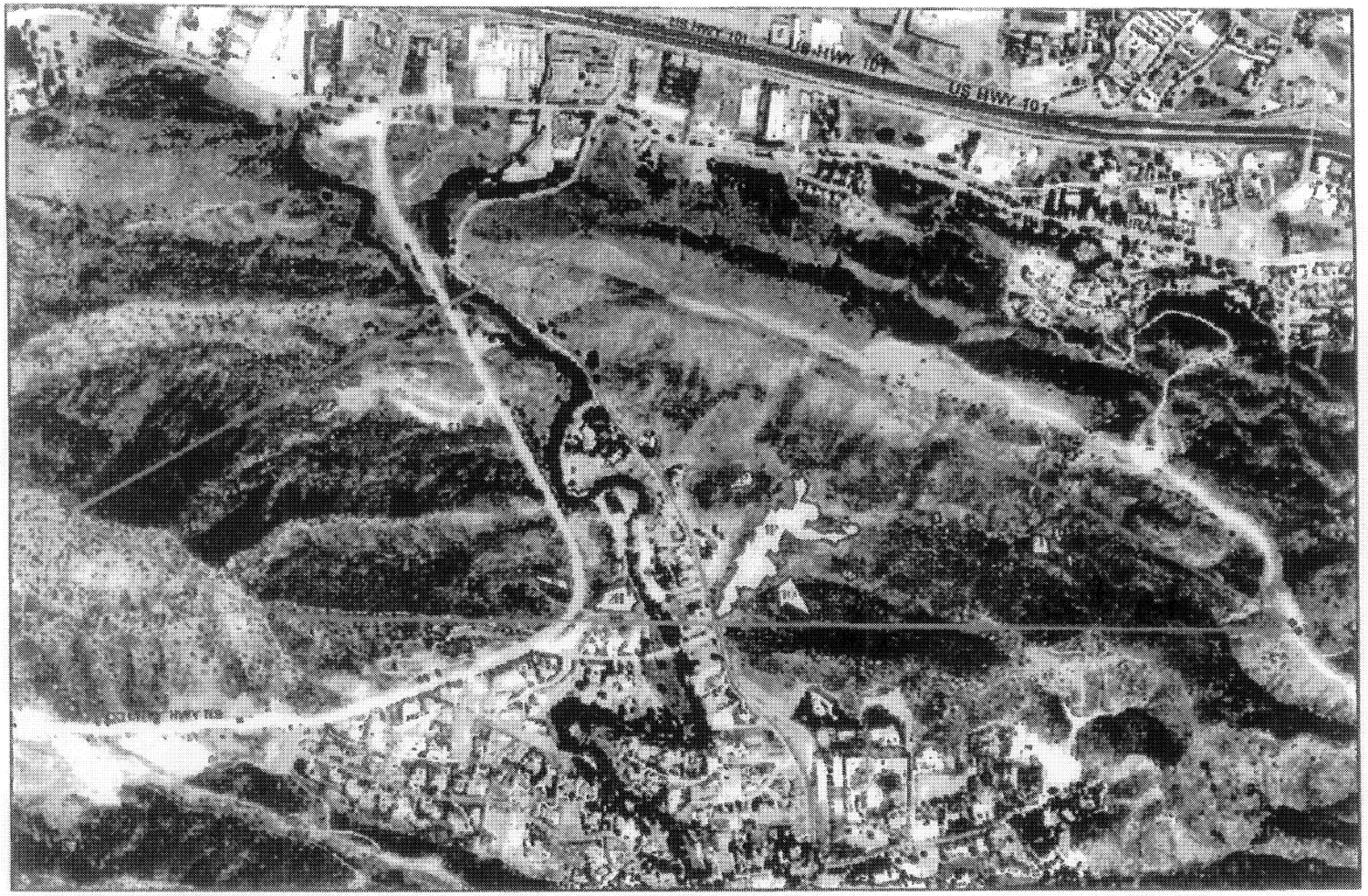



Figure 2B. Triangle Ranch, Los Angeles County, California aerial vicinity map. Project site boundary delimited by solid green line; green polygons distinguish pentachaeta study plots. The Ventura Freeway (State Highway 101) and local road arterials are shown in red and yellow respectively.

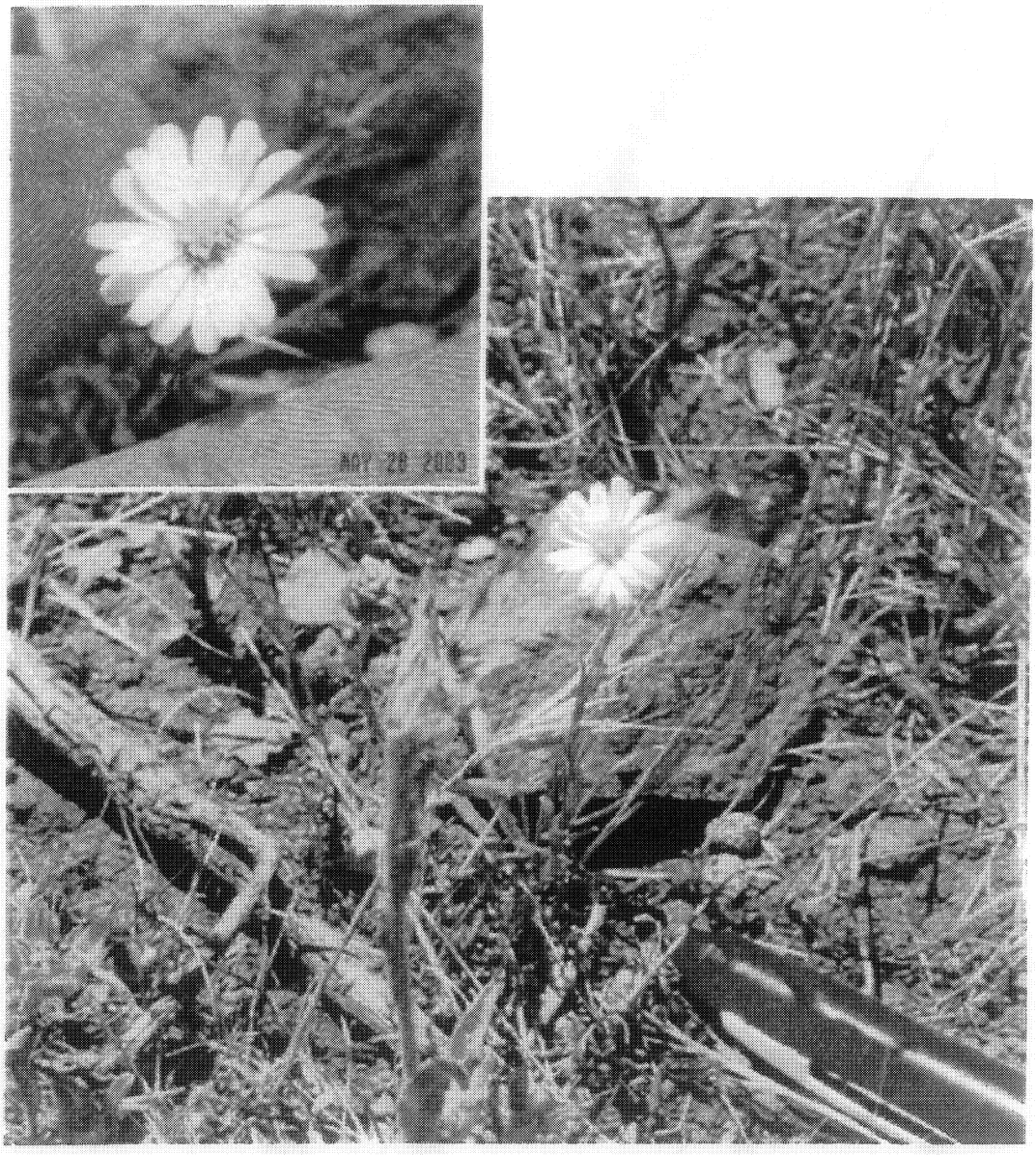


Figure 3. Lyons pentachaeta, *Pentachaeta lyonii*, on the Triangle Ranch Project site (Study Plot P1), Los Angeles County, California, May 2003.

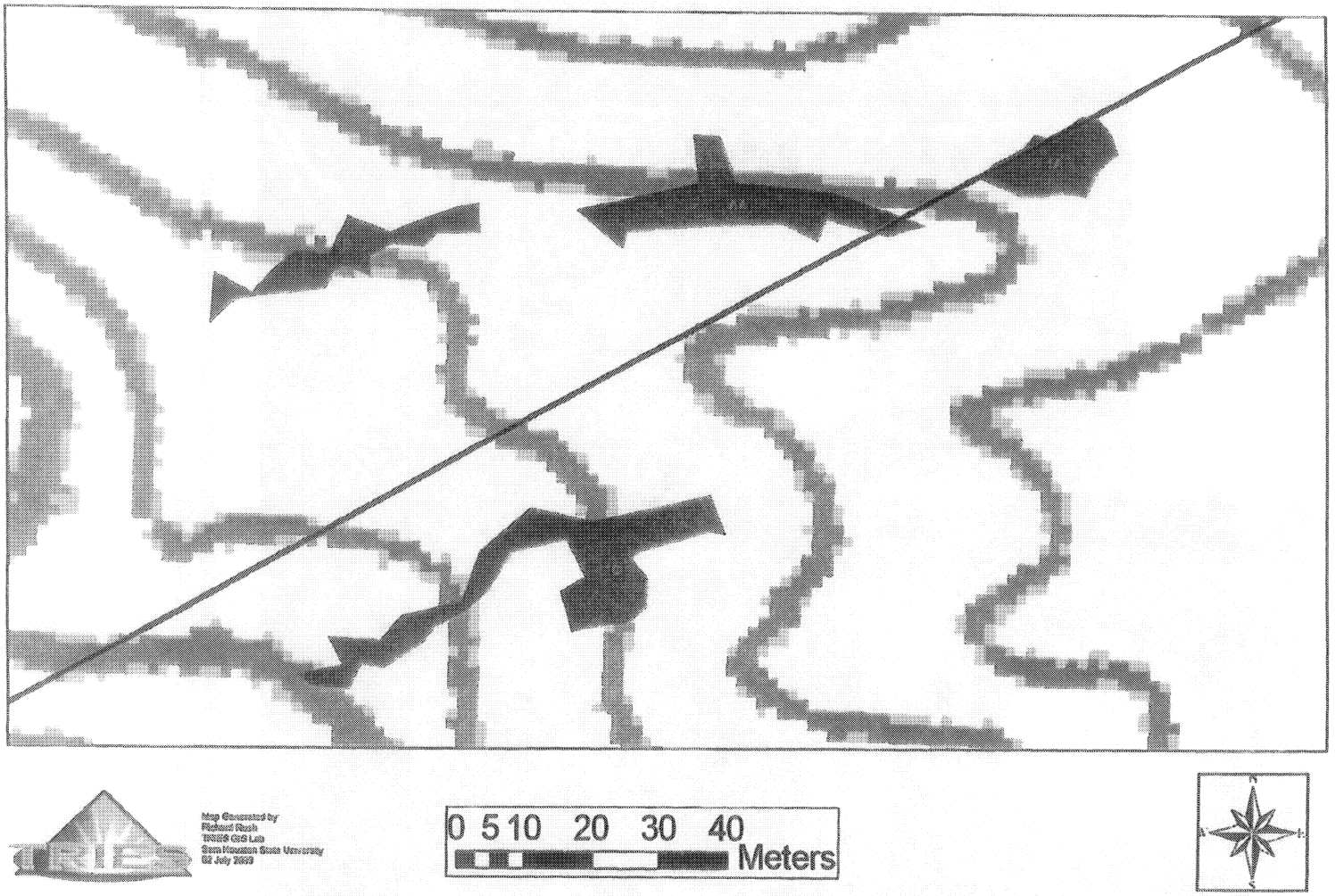



Figure 4. Orientation and relative location of Lyons pentachaeta study plots A, AA, B, C, and G on and near the Triangle Ranch, Los Angeles County, California project site. Study plots AA and B are north east of the proposed project site boundary (dark line).

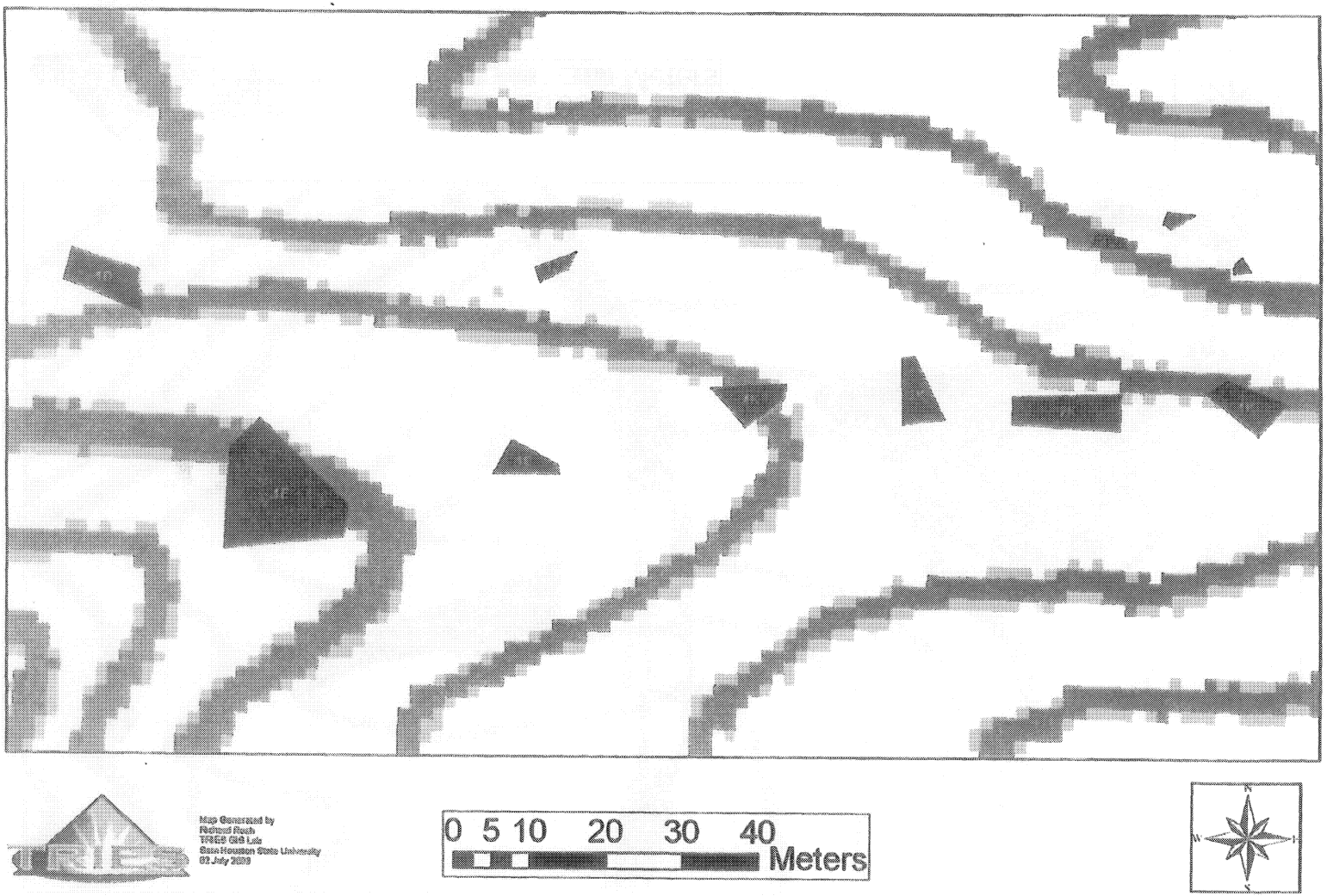



Figure 5. Orientation and relative location of Lyons pentachaeta study plots D, E1, E2, K1-4K, and L1-L4 on the Triangle Ranch, Los Angeles County, California project site.

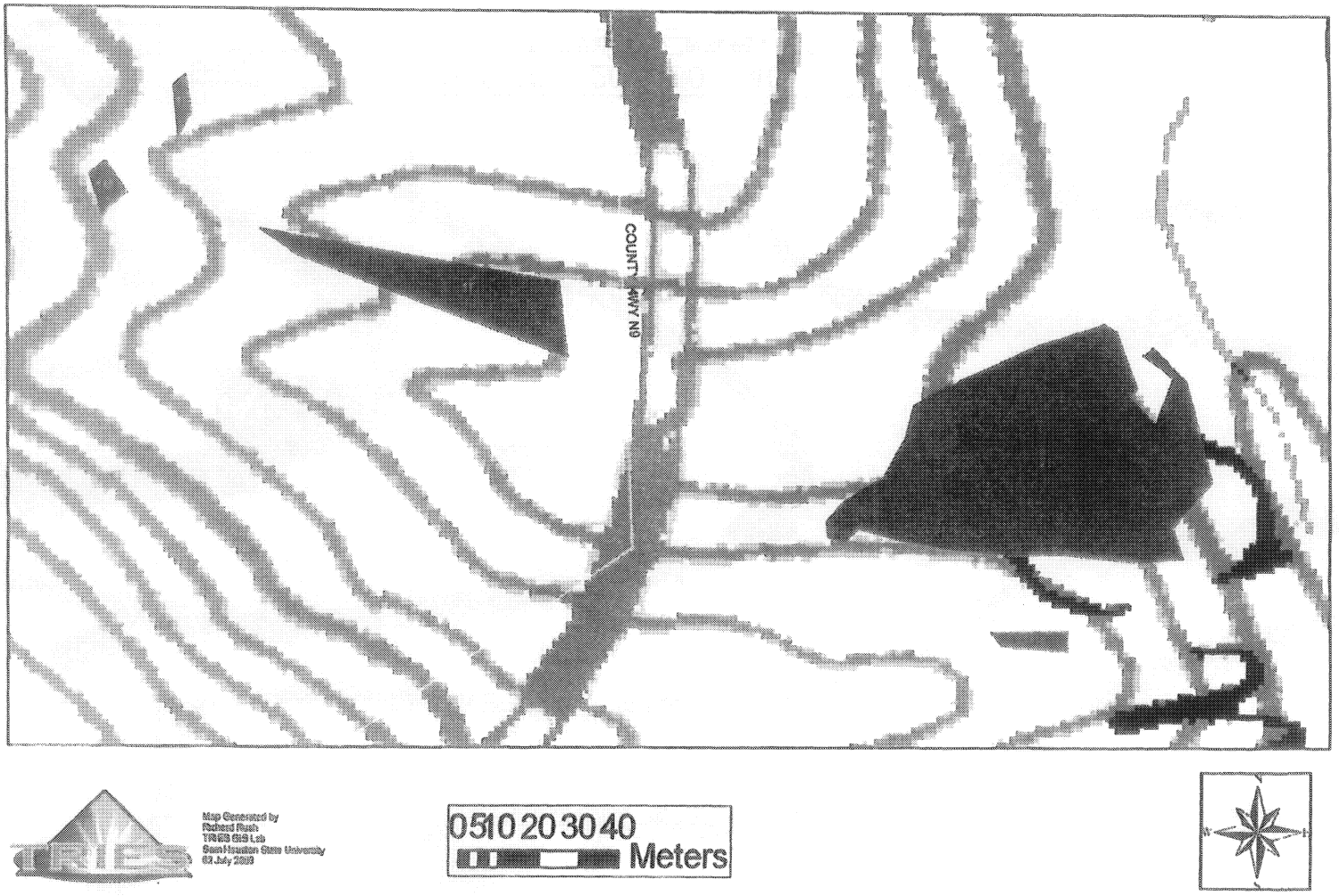



Figure 6. Orientation and relative location of Lyons pentachaeta study plots F, H1, H2, I, and M on the Triangle Ranch, Los Angeles County, California project site.

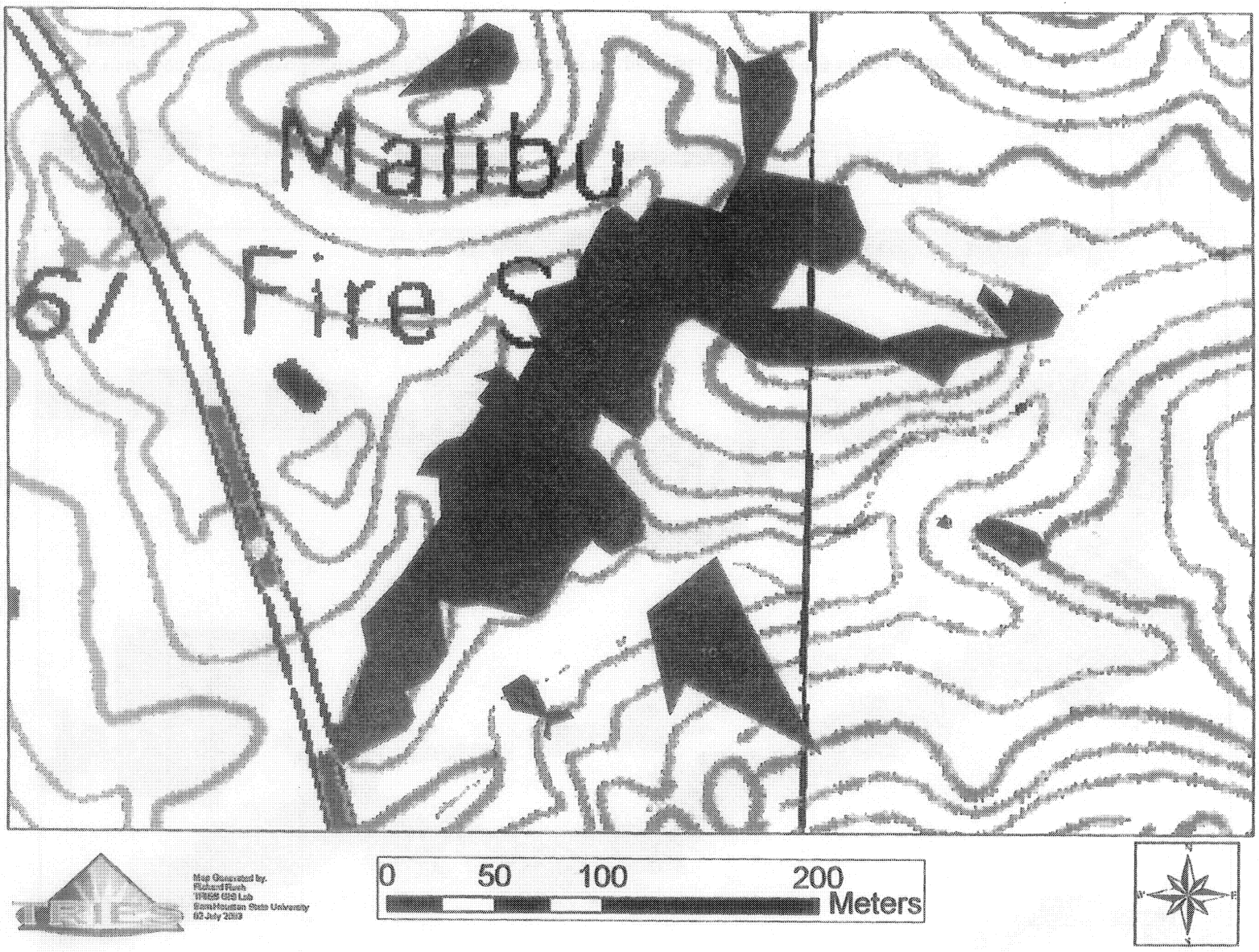



Figure 7. Orientation and relative location of Lyons pentachaeta study plots N, O, P1, P2, and Q on the Triangle Ranch, Los Angeles County, California project site.

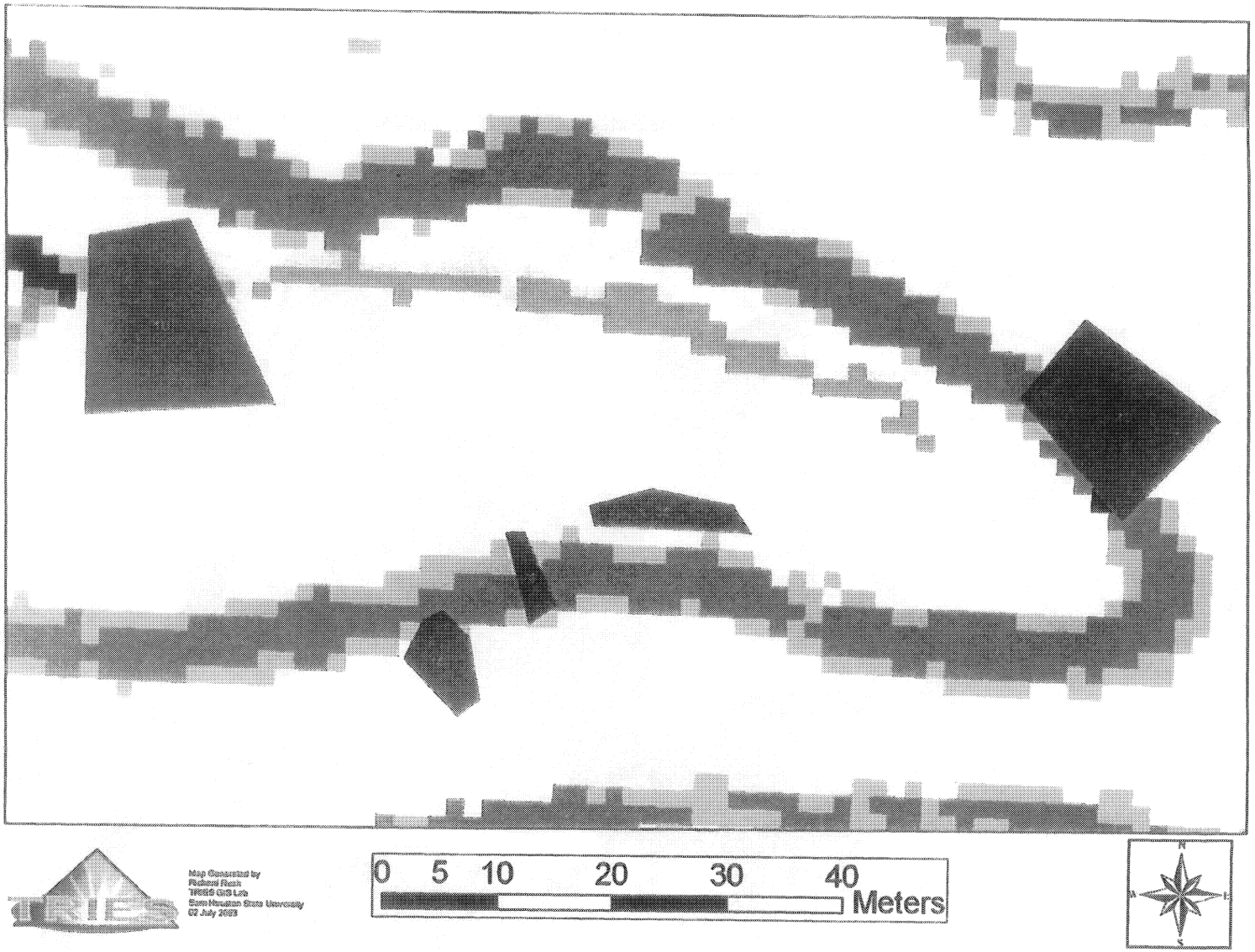



Figure 8. Orientation and relative location of Lyons pentachaeta study plots S1-S3 and U1-U4 on the Triangle Ranch, Los Angeles County, California project site.

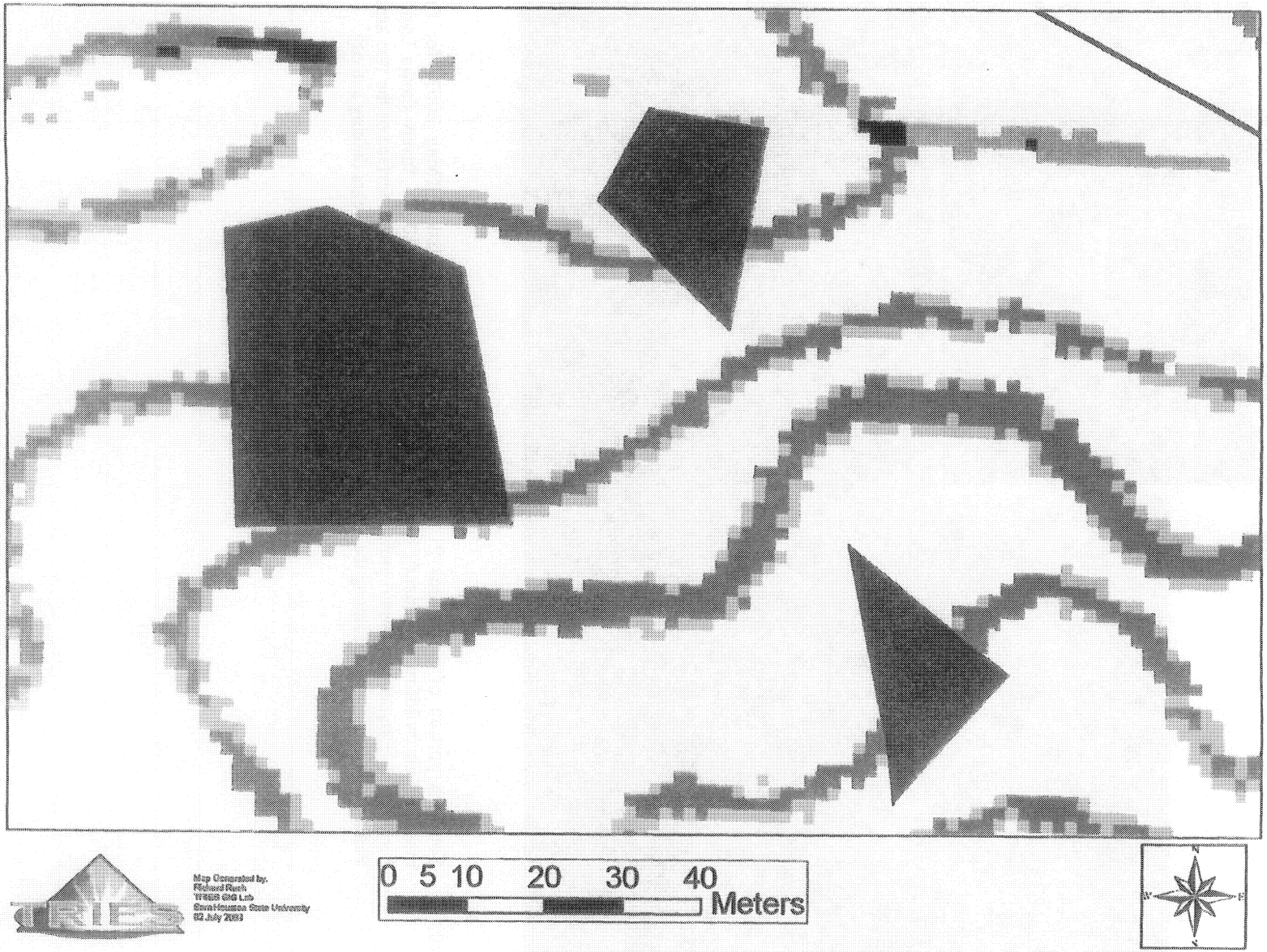



Figure 9. Orientation and relative location of Lyons pentachaeta study plots T2-T4 on the Triangle Ranch, Los Angeles County, California project site.

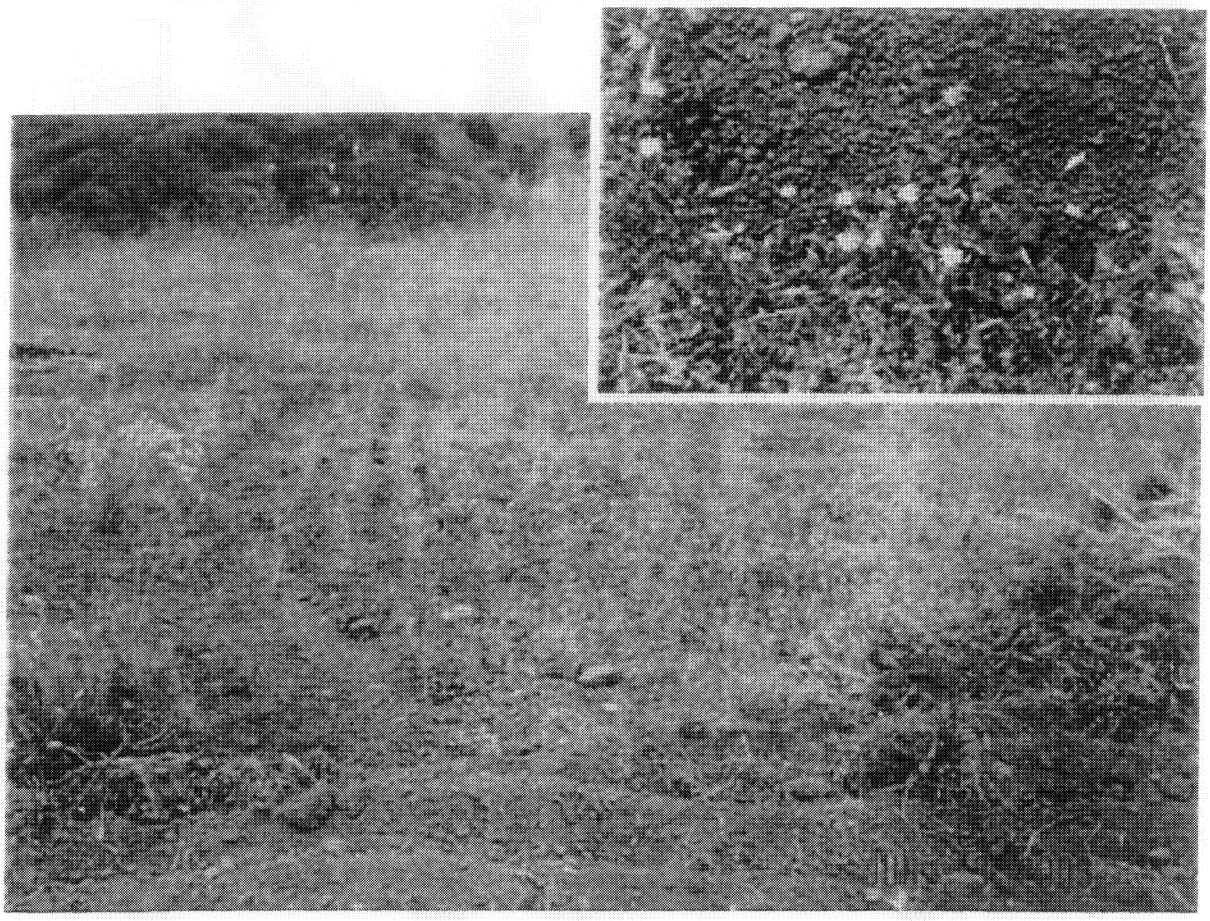


Figure 10. Southern portion of study area P1 in the foreground recently disked (May 2003) for fuel management (wildfire abatement), background was disked in May 2002. Insert shows Lyon's pentachaeta, *Pentachaeta lyonii*, growing in the area disked in 2002 at the interface of the two areas. Pentachaeta densities were among the highest in this area of P1 despite last years disking activity.

# 7.0 LITERATURE CITED

# FOCUSED ENDANGERED SPECIES SURVEY

# 7.0 LITERATURE CITED

Belnap, J. 1990. Microbiotic crusts: their role in past and present ecosystems. Park Science: a resource management bulletin. U.S. Department of the Interior, National Park Service. Vol. 10. No. 3.

Envicom Corporation. 1998. Biota report for the Beautiful Homes site, Los Angeles County. Prepared for Beautiful City Holding Corporation. 67 pp + appendices.

Fotheringham, C.J., and J.E. Keeley. 1998. Ecology and distribution of Braunton's milkvetch *(Astragalus brauntonii)* and Lyon's pentachaeta *(Pentachaeta lyonii)*.

Hickman, J.C. 1993. The Jepson manual: Higher plants of California. University of California Press, Los Angeles 1400 pp.

Impact Sciences, Inc. 2000. Endangered plant focused surveys at Live Oak Ranch. Prepared by Impact Sciences, Inc., Agoura Hills, CA for Sage Community Group. October 2000.

Keeley, J.E., and M.B. Keeley. 1992. Mitigation plan for Pentachaeta lyonii on the Lake Eleanor Hills project site. Report submitted to Glen Lukos Associates for M.J. Brock & Sons, Inc.

Krebs, C.J. 1998. Ecological Methodology, 2nd ed. Addison Westly Longman, Inc. CA. 620 pp.

Michael Brandman Associates (MBA). 1992. Sensitive Species Survey for the Creekside Terrace Project Site. Prepared for Beautiful City, Agoura Hills, CA.

PCR Services Corporation (PCR). 2000. Biotic assessment and report of sensitive resource surveys, Live Oak Ranch, Los Angeles County, California. Prepared for the U.S. Army Corps of Engineers. April 2000.

Thomas, T.W., and C. Wishner. 1988. *Pentachaeta lyonii*: rarity, threats and recovery plans. *In*: Third biennial conference of research in California's national Parks, program abstracts, 13-15 Sept. 1988. University of California, Davis.

Thompson, S.K. 1992. Sampling. John Wiley and Sons, New York.

U.S. Fish and Wildlife Service. 1997. Endangered and threatened wildlife and plants; determination of endangered status for two plants and threatened status for four plants from southern California. Federal Register 62(19): 4172-4183.

U.S. Fish and Wildlife Service. 1999. Recovery plan for six plants from the mountains surrounding the Los Angeles Basin. Portland, Oregon. 62 pp.

# 8.0 APPENDICES

# FOCUSED ENDANGERED PLANT SURVEYS

# 8.1 APPENDIX A
# Lyons Pentachaeta Survey Data Sheets

# Triangle Ranch Lyons Pentachaeta Surveys
## Dates of Surveys: May 8, 9, 12, 13, and 14
## Observers: Laura Malessa and Morag Logan

| Populations/Number of Lath/Length of transect/ | Date | 0' | 5' | 10' | 15' | 20' | 25' | 30' | 35' | 40' | 45' | 50' | 55' | 60' | 65' | 70' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A/14/65' | May 8 | 0 | 0 | 0 | 0 | 5 | 29 | 77 | 9 | 98 | 4 | 6 | 0 | 1 | 0 | |
| AA/16/150' | May 8 | 0 | 11 | 5 | 3 | 19 | 11 | 5 | 0 | 60 | 48 | 7 | 27 | 16 | 34 | 2 |
| B/23/145' | May 9 | 15 | 6 | 20 | 0 | 0 | 0 | 2 | 3 | 3 | 0 | 2 | 2 | 28 | 67 | 9 |
| C/31/250' | May 9 | 7 | 8 | 125 | 18 | 2 | 70 | 27 | 5 | 17 | 6 | 5 | 4 | 1 | 154 | 0 |
| D/4/35' | May 12 | 3 | 65 | 47 | 55 | 15 | 2 | 17 | 17 | | | | | | | |
| E1/4/157 plants | May 12 | | | | | | | | | | | | | | | |
| E2/5/55' | May 12 | 4 | 0 | 0 | 0 | 14 | 22 | 5 | 11 | 10 | 13 | 6 | 0 | | | |
| F/4/265' | May 13 | 0 | 1 | 1 | 16 | 0 | 0 | 8 | 19 | 14 | 2 | 1 | 0 | 0 | 7 | 3 |
| G/7/35' | May 9 | 5 | 2 | 1 | 2 | 7 | 2 | 7 | 0 | | | | | | | |
| H1/4/-DISKED | May 14 | | | | | | | | | | | | | | | |
| H2/29/145'/ T1 | May 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 1 | 28 | 10 |
| H2/29/205'/ T2 | May 14 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 12 | 19 | 10 | 5 |
| H2/29/190'/ T3 | May 14 | 0 | 9 | 2 | 2 | 0 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| I/4/ 411 plants | May 13 | | | | | | | | | | | | | | | |
| J/4/ 82 plants | May 12 | | | | | | | | | | | | | | | |
| K1/4/ 57 plants | May 12 | | | | | | | | | | | | | | | |
| K2/4/45' | May 12 | 0 | 6 | 10 | 33 | 12 | 0 | 9 | 10 | 1 | 3 | | | | | |
| K3/4/ 101 plants | May 12 | | | | | | | | | | | | | | | |
| K4/4/ 185 plants | May 12 | | | | | | | | | | | | | | | |
| L1/4/ 6 plants | May 12 | | | | | | | | | | | | | | | |
| L2/1/ 1 plant in path | May 12 | | | | | | | | | | | | | | | |
| L3/4/ 74 plants | May 12 | | | | | | | | | | | | | | | |
| L4/4/ 58 plants | May 12 | | | | | | | | | | | | | | | |

## Triangle Ranch Lyons Pentachaeta Surveys
## Dates of Surveys: May 8, 9, 12, 13, and 14
## Observers: Laura Malessa and Morag Logan

| Populations/Number of Lath/Length of transect/ | Date | 75' | 80' | 85' | 90' | 95' | 100' | 105' | 110' | 115' | 120' | 125' | 130' | 135' | 140' | 145' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AA/16/150' | May 8 | 28 | 52 | 19 | 0 | 4 | 37 | 46 | 22 | 39 | 36 | 3 | 1 | 6 | 2 | 0 |
| B/23/145' | May 9 | 21 | 12 | 39 | 13 | 14 | 2 | 1 | 1 | 0 | 0 | 0 | 16 | 1 | 0 | 0 |
| C/31/250' | May 9 | 0 | 5 | 1 | 0 | 4 | 0 | 11 | 12 | 0 | 0 | 0 | 11 | 1 | 0 | 4 |
| F/4/265' | May 13 | 0 | 10 | 12 | 13 | 1 | 3 | 5 | 9 | 6 | 3 | 0 | 6 | 13 | 2 | 16 |
| H2/29/145'/ T1 | May 14 | 0 | 0 | 6 | 0 | 15 | 4 | 27 | 0 | 0 | 3 | 27 | 23 | 3 | 0 | 0 |
| H2/29/205'/ T2 | May 14 | 2 | 38 | 25 | 4 | 19 | 18 | 17 | 0 | 32 | 0 | 5 | 0 | 1 | 0 | 0 |
| H2/29/190'/ T3 | May 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 16 | 0 | 1 | 0 | 0 | 0 |

| Populations/Number of Lath/Length of transect/ | Date | 150' | 155' | 160' | 165' | 170' | 175' | 180' | 185' | 190' | 195' | 200' | 205' | 210' | 215' | 220' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AA/16/150' | May 8 | 0 | | | | | | | | | | | | | | |
| C/31/250' | May 9 | 0 | 2 | 3 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 87 | 16 | 15 | 12 | 59 |
| F/4/265' | May 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 1 | 0 |
| H2/29/205'/T2 | May 14 | 0 | 0 | 0 | 22 | 0 | 10 | 4 | 0 | 0 | 0 | 3 | 14 | | | |
| H2/29/190'/T3 | May 14 | 0 | 0 | 0 | 0 | 0 | 1 | 22 | 3 | 0 | | | | | | |

| Populations/Number of Lath/Length of transect/ | Date | 225' | 230' | 235' | 240' | 245' | 250' | 255' | 260' | 265' | 270' | 200' | 205' | 210' | 215' | 220' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C/31/250' | May 9 | 1 | 0 | 10 | 5 | 0 | 5 | | | | | | | | | |
| F/4/265' | May 13 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | | | | | |

# Triangle Ranch Lyons Pentachaeta Surveys
## Dates of Surveys: May 15, 16, and 21
## Observers: Laura Malessa and Morag Logan

| Populations/Number of Lath/Length of transect/ | Date | 0' | 5' | 10' | 15' | 20' | 25' | 30' | 35' | 40' | 45' | 50' | 55' | 60' | 65' | 70' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M/4/ 94 plants | May 13 | | | | | | | | | | | | | | | |
| N/11/130' | May 15 | 0 | 38 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| O/6/ 220 plants | May 15 | | | | | | | | | | | | | | | |
| P1/99/165'/ T1 | May 21 | 12 | 7 | 34 | 8 | 5 | 0 | 12 | 19 | 28 | 5 | 3 | disked | 0 | 2 | 0 |
| P1/99/165'/ T2 | May 21 | 7 | 7 | 1 | 0 | 0 | 0 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| P1/99/165'/ T3 | May 21 | 1 | 3 | 1 | 4 | 9 | 16 | 43 | 20 | 9 | 11 | 34 | 27 | 17 | 0 | 0 |
| P1/99/165'/ T4 | May 21 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Q1/10/115' | May15 | 0 | 29 | 0 | 0 | 0 | 1 | 0 | 0 | 8 | 107 | 56 | 3 | 29 | 70 | 0 |
| Q2/3/ 90 plants | May 15 | | | | | | | | | | | | | | | |
| R/1/ no plants | May 15 | | | | | | | | | | | | | | | |
| S1/6/30' | May 16 | 9 | 1 | 0 | 2 | 2 | 0 | 0 | | | | | | | | |
| S2/4/25' | May 16 | 7 | 0 | 0 | 1 | 1 | 2 | | | | | | | | | |
| S3/5/45' | May 16 | 2 | 15 | 2 | 3 | 7 | 4 | 1 | 6 | 6 | 1 | | | | | |
| S4/1/ 7 plants | May 16 | | | | | | | | | | | | | | | |
| T1/1/ 60 plants | May 16 | | | | | | | | | | | | | | | |
| T2/5/135'/ T1 | May 16 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 |
| T2/5/110'/ T2 | May 16 | 1 | 0 | 0 | 6 | 0 | 0 | 3 | 9 | 1 | 0 | 4 | 6 | 5 | 12 | 9 |
| T2/5/140'/ T3 | May 16 | 0 | 0 | 0 | 2 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 6 | 19 | 2 |
| T3/4/ 483 plants | May 16 | | | | | | | | | | | | | | | |
| T4/4/ 166 plants | May 16 | | | | | | | | | | | | | | | |
| U1/4/ 292 plants | May 16 | | | | | | | | | | | | | | | |
| U2/1/ 5 plants | May 16 | | | | | | | | | | | | | | | |
| U3/1/ 5 plants | May 16 | | | | | | | | | | | | | | | |
| U4/4/ 276 plants | May 16 | | | | | | | | | | | | | | | |

## Triangle Ranch Lyons Pentachaeta Surveys
## Dates of Surveys: May 15, 16, and 21
## Observers: Laura Malessa and Morag Logan

| Populations/Number of Lath/Length of transect/ | Date | 75' | 80' | 85' | 90' | 95' | 100' | 105' | 110' | 115' | 120' | 125' | 130' | 135' | 140' | 145' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N/11/130' | May 15 | 0 | 1 | 13 | 16 | 11 | 17 | 0 | 2 | 0 | 1 | 0 | 0 | | | |
| P/99/165'/T1 | May 21 | 2 | 0 | 3 | 0 | 0 | 6 | 1 | 5 | 7 | 0 | 1 | 1 | 0 | 1 | 0 |
| P/99/165'/T2 | May 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| P/99/165'/T3 | May 21 | 2 | 14 | 8 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 21 | 13 | 4 | 8 | 2 |
| P/99/165'/T4 | May 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Q1/10/115' | May 15 | 10 | 19 | 19 | 25 | 7 | 31 | 1 | 0 | 0 | | | | | | |
| T2/5/135'/ T1 | May 16 | 33 | 0 | 0 | 1 | 1 | 3 | 1 | 5 | 4 | 5 | 1 | 11 | 0 | | |
| T2/5/110'/ T2 | May 16 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 0 | | | | | | | |
| T2/5/140'/ T3 | May 16 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | |

| Populations/Number of Lath/Length of transect/ | Date | 150' | 155' | 160' | 165' | 170' | 175' | 180' | 185' | 190' | 195' | 200' | 205' | 210' | 215' | 220' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P/99/165'/T1 | May 21 | 0 | 0 | 7 | 14 | | | | | | | | | | | |
| P/99/165'/T2 | May 21 | 0 | 0 | 0 | 0 | | | | | | | | | | | |
| P/99/165'/T3 | May 21 | 4 | 4 | 2 | 3 | | | | | | | | | | | |
| P/99/165'/T4 | May 21 | 0 | 0 | 0 | 0 | | | | | | | | | | | |

# 8.2 APPENDIX B

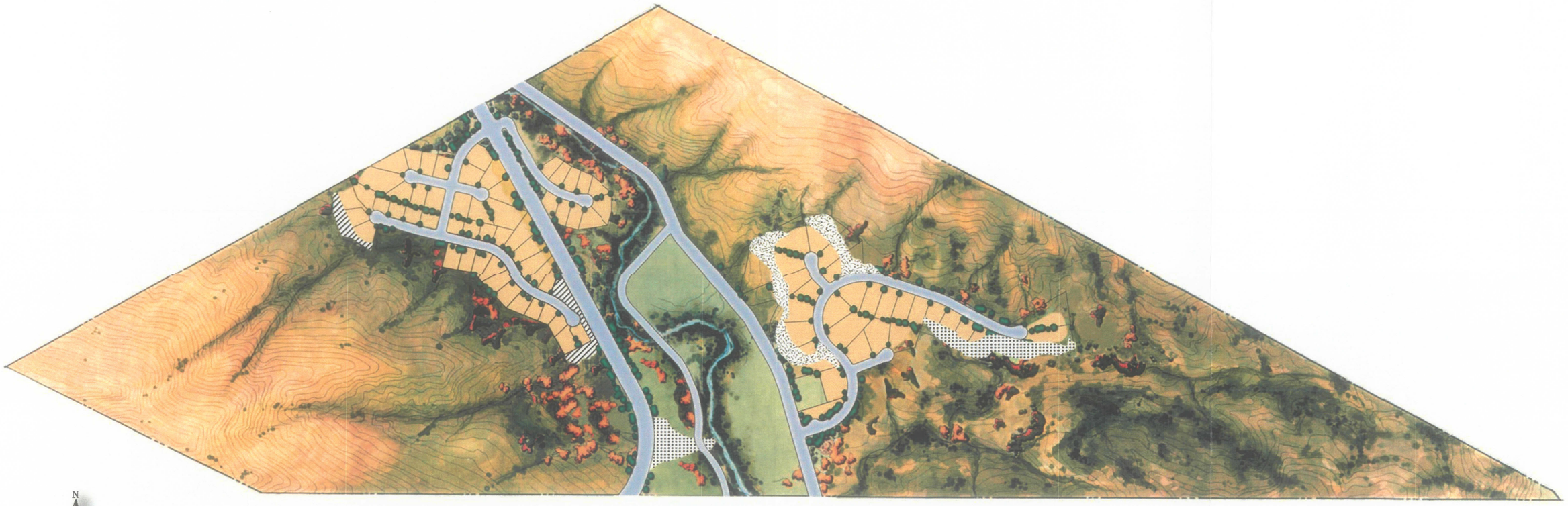
# Santa Monica Mountains Dudleya, Photographs

Santa Monica Mountain dudleya, (*Dudleya cymosa ssp. ovatifolia* (Britton) Moran) growing from a rocky outcropping near Kanan Road on Triangle Ranch, Los Angeles County, California (03 June 2003)

Multiple Santa Monica Mountain dudleya (*Dudleya cymosa ssp. ovatifolia* (Britton) Moran) growing in a shaded niche within a rocky outcropping north of the pentachaeta study area K2, west of Kanan Road on Triangle Ranch, Los Angeles County, California (03 June 2003).

# Appendix C-12

**Comprehensive Mixed Oak Woodland Revegetation Plan, prepared by dizin Landscape Architects, May 2004**



N
W E
S

0' 300' 600' 1200'

**Chaparral Scrub (107,000 S.F.)**

**Mixed Oak Woodland (35,000 S.F.)**

**Willow Riparian Forest (90,000 S.F.)**

Source: dizin Landscape Architects, May 2004.

# Appendix C-13

**Thomas Leslie Corporation, Tentative Tract No. 52419 (Triangle Ranch), undated memo**

Thomas Leslie Corporation

Biological & Cultural Investigations & Monitoring

**TO:** The Planning Associates

**FROM:** Thomas Leslie, BS-MS Biology
Thomas Leslie Corporation (TLC)

**SUBJECT: Tentative Tract No. 52419 (Triangle Ranch)**

During the afternoon of May 25, 2004, I performed a focused botanical field survey on the subject property to collect data for use in preparation of a biological assessment report. The biological assessment process included a resurvey of the area on TTM 52419 where the threatened Santa Monica Mountains dudleya (*Dudleya cymosa ovatifolia*) had been identified onsite in May 2003 by biologists of The Planning Associates and Impact Sciences, Inc. (TPA 2003). In addition, on August 23, 2003, TLC biologists (Tom and Nadya Leslie) observed numerous specimens of mature and juvenile dudleya at the TPA dudleya site on TTM 52419.

During the May 25, 2004, dudleya resurvey I discovered that all of "adult" dudleya identified onsite by TPA, IS and TLC biologists in 2003 had been carefully excavated and removed from the site except for a few small juvenile specimens. The attached photographs document the conditions of the Dudleya removal site on May 25, 2004.

- Photo Plate 1a shows one of the few remaining small juvenile dudleya.
- Photo Plate 1b shows a close-up view of the "holes" where the larger, more mature dudleya specimens once grew. It appeared that someone, presumably a trespassing "plant collector," "professionally" removed all but a few small juvenile dudleya specimens from TTM 52419

On May 25, 2004, I also observed that at least one of TPA's 2003 study plot for Lyon's pentachaeta (*Pentachaeta lyonii*), situated adjacent to the area where the dudleya had been removed, had also been impacted. No Lyon's pentachaeta flowers or plants were present at the dudleya removal site due to the drought conditions of 2004. Therefore, it is likely that the impact to the Lyon's pentachaeta study plot was not an intentional act comparable to the removal (theft) of dudleya, but rather an ancillary action related to the "plant collector(s)" and equipment used during the course of the dudleya removal.

It appears that someone with knowledge of the location of the dudleya plants, and with the intention of carefully removing the threatened plant for some reason (e.g., preservation, sale, etc.) was the trespasser/dudleya thief. There were no indicators of who might be responsible for this action. However, the location of the dudleya plants is widely known within the governmental and environmental community from numerous published reports.

It is likely that the Santa Monica Mountains dudleya will continue to exist at the dudleya removal area due to the presence of a number of small plants left intact within the rock outcrops.

Please call me if you have any questions regarding this memo.

**REFERENCE**

The Planning Associates (TPA) and Impact Sciences, Inc. (IS) 2003. Focused surveys for the federally endangered Lyon's pentachaeta (*Pentachaeta lyonii* A. Gray) and the threatened Santa Monica Mountains dudleya (*Dudleya cymosa ovatifolia* (Britton) Moran) on Triangle Ranch, Los Angeles County, CA. Prepared for Sage community Group, June 2003. pp 55.

# PHOTO PLATE NO. 1

1a. Close-up view of the federally listed threatened Santa Monica Mountains Dudleya (*Dudleya cymosa ssp. ovatifolia*), surrounded by Spike-moss (*Selaginella bigelovii*). Although TLC biologists observed numerous specimens of Dudleya on TTM 52419 on August 23, 2003, most were removed by someone by May 25, 2004 [see 1b below] (*05/25/04*).

1b. Close-up view of the "holes" where larger, more mature specimens of Santa Monica Mountains Dudleya once grew. Someone, presumably a "plant collector," "professionally" removed all but a few small specimens form TTM 52419 (*05/25/04*).

# APPENDIX D

**Traffic Impact Study for Triangle Ranch, prepared by Kimley-Horn and Associates, Inc.; March 1999 (Revised September 2003)**

*Traffic Impact Study*

for:

# Triangle Ranch

## In the County of Los Angeles

*Prepared for:*

Sage Community Group

Kimley-Horn
and Associates, Inc.

September 2003
© Kimley-Horn and Associates, Inc.

# TRAFFIC STUDY
# FOR
# TRIANGLE RANCH

# IN THE COUNTY OF LOS ANGELES

***Prepared for:***

**Sage Community Group**

***Prepared by:***
**Kimley-Horn and Associates, Inc.**
2100 W. Orangewood Avenue, Suite 140
Orange, California 92868

***September, 2003***

# TRIANGLE RANCH
# TRAFFIC IMPACT STUDY

## TABLE OF CONTENTS


INTRODUCTION ..... 1
PROJECT DESCRIPTION ..... 1
STUDY METHODOLOGY ..... 1
- Significant Impact Thresholds ..... 4
- Two-lane Roadway Analysis Methodology ..... 4
- Signalized Intersection Analysis Methodology ..... 4
- Unsignalized Intersection Analysis Methodology ..... 5

EXISTING CONDITIONS ..... 5
- Existing Roadway System ..... 5
- Two-Lane Roadways ..... 7
- Intersections ..... 7
- Summary of Two-lane Roadway Analysis ..... 8
- Summary of Intersection Analysis ..... 8

AMBIENT GROWTH ..... 8
- Summary of Two-lane Roadway Analysis ..... 8
- Summary of Intersection Analysis ..... 8

TRIANGLE RANCH PROJECT TRAFFIC ..... 13
- Trip Generation ..... 13
- Trip Distribution and Assignment ..... 13
- Summary of Two-Lane Roadway Analysis ..... 14
- Summary of Intersection Analysis ..... 14

CUMULATIVE CONDITIONS ..... 14
- Summary of Two-lane Roadway Analysis ..... 21
- Summary of Intersection Analysis ..... 21

OPERATIONAL ISSUES ..... 23
- Accident Analysis ..... 23
- Speed Study ..... 26

CONGESTION MANAGEMENT PROGRAM COMPLIANCE ..... 29
SUMMARY OF FINDINGS AND CONCLUSIONS ..... 29


## APPENDICES


APPENDIX A – LEVEL OF SERVCE DESCRIPTIONS
APPENDIX B – TRAFFIC COUNT DATA SHEETS
APPENDIX C – INTERSECTION ANALYSIS WORKSHEETS
APPENDIX D – RELATED PROJECTS PEAK HOUR TRAFFIC

## LIST OF FIGURES

Figure 1 – Vicinity Map ..... 2
Figure 2 – Triangle Ranch Site Plan ..... 3
Figure 3 – Existing Roadway Configurations ..... 6
Figure 4 – Existing Peak Hour Traffic Volumes ..... 11
Figure 5 – Existing plus Growth Peak Hour Traffic Volumes ..... 12
Figure 6 – Triangle Ranch Trip Distribution ..... 15
Figure 7 – Triangle Ranch Peak Hour Traffic Volumes ..... 16
Figure 8 – Existing plus Growth plus Triangle Ranch Peak Hour Traffic Volumes ..... 17
Figure 9 – Related Projects Locations ..... 19
Figure 10 – Kanan Road Interchange Project ..... 20
Figure 11 – Related Projects Peak Hour Traffic Volumes ..... 24
Figure 12 – Cumulative Conditions Projects Traffic Volumes ..... 25

## LIST OF TABLES

Table 1 – Summary of Two-Lane Roadway Operations – Existing Conditions ..... 9
Table 2 – Summary of Intersection Operations – Existing Conditions ..... 10
Table 3 – Summary of Triangle Ranch Trip Generation ..... 13
Table 4 – Summary of Related Projects ..... 18
Table 5 – Summary of Intersection Operation with Mitigation ..... 22
Table 6 Summary of Cumulative Conditions ..... 23
Table 7 – Summary of Highway Accident History ..... 27
Table 8 – Summary of Speed Data ..... 28

# TRIANGLE RANCH
# TRAFFIC IMPACT STUDY

## INTRODUCTION

Sage Community Group proposes to develop 81 single-family homes on approximately 320 acres on Kanan Road and Cornell Road south of the intersection of Kanan Road and Cornell Way in the County of Los Angeles. The project is to be known as Triangle Ranch (Tract Number 52419). The project is shown in its regional setting on the vicinity map in **Figure 1**.

Kimley-Horn and Associates, Inc. has been retained to prepare a traffic impact study for the proposed development. The study will address existing traffic conditions in the area, including regional growth, project-related and cumulative project traffic impacts on the surrounding street system, and project access. If applicable, the report will identify necessary mitigation measures to mitigate project traffic impacts.

## PROJECT DESCRIPTION

Triangle Ranch is comprised of 81 single-family homes on about 320 acres. The project site is currently vacant. Approximately 255 of the 320 acres will remain open space area. A site plan for Triangle Ranch is shown in **Figure 2**. Fifty-four lots will take access from Kanan Road, and 27 lots will take access from Cornell Road. On Kanan Road, access to lots on both sides of the street will be provided by a four-way, full-access intersection, about 550 feet south of Cornell Way. A secondary right-in/right-out only entrance will be located about 1,900 feet south of the main entrance. Left-turn pockets and right-turn deceleration and deceleration lanes will be provided on Kanan Road at both entrances. On Cornell Road, a full-movement, gated entrance will provide access to 27 lots on the east side of the road, 3,300 feet south of Cornell Way.

## STUDY METHODOLOGY

Triangle Ranch is located in the County of Los Angeles, south of the City of Agoura Hills. Three roadway segments and seven intersections will be analyzed in this study. One of the roadway segments and all of the intersections analyzed in this traffic study are in the City of Agoura Hills. Two roadways segments are in the County of Los Angeles. The intersection analyses performed will follow City of Agoura Hills standards for the seven intersections in the City, and County standards for the roadway segments in the County. The format of the traffic study will follow County of Los Angeles and Congestion Management Program (CMP) guidelines.

The study area for this project was identified in concert with the County of Los Angeles staff, and is consistent with the Los Angeles County Congestion Management Program (CMP) policy. At a minimum, the Los Angeles CMP requires that intersections within a one-mile radius of the project be analyzed. The list of study intersections was expanded, however, to include intersections along Kanan Road (in the City of Agoura Hills) up to Canwood Street, north of the US-101 Freeway.

Per the County of Los Angeles traffic study guidelines, the following traffic conditions will be analyzed:

1. Existing traffic -- Traffic volumes used in the study were counted in May 2003.

2. Existing Plus Ambient Growth to the year the project will be completed – Per the County of Los Angeles Traffic and Lighting Division, ambient growth in the area is 1.1 % per year. The project is projected to be built out in three years, therefore, growth will be 1.1 % per year for three years.

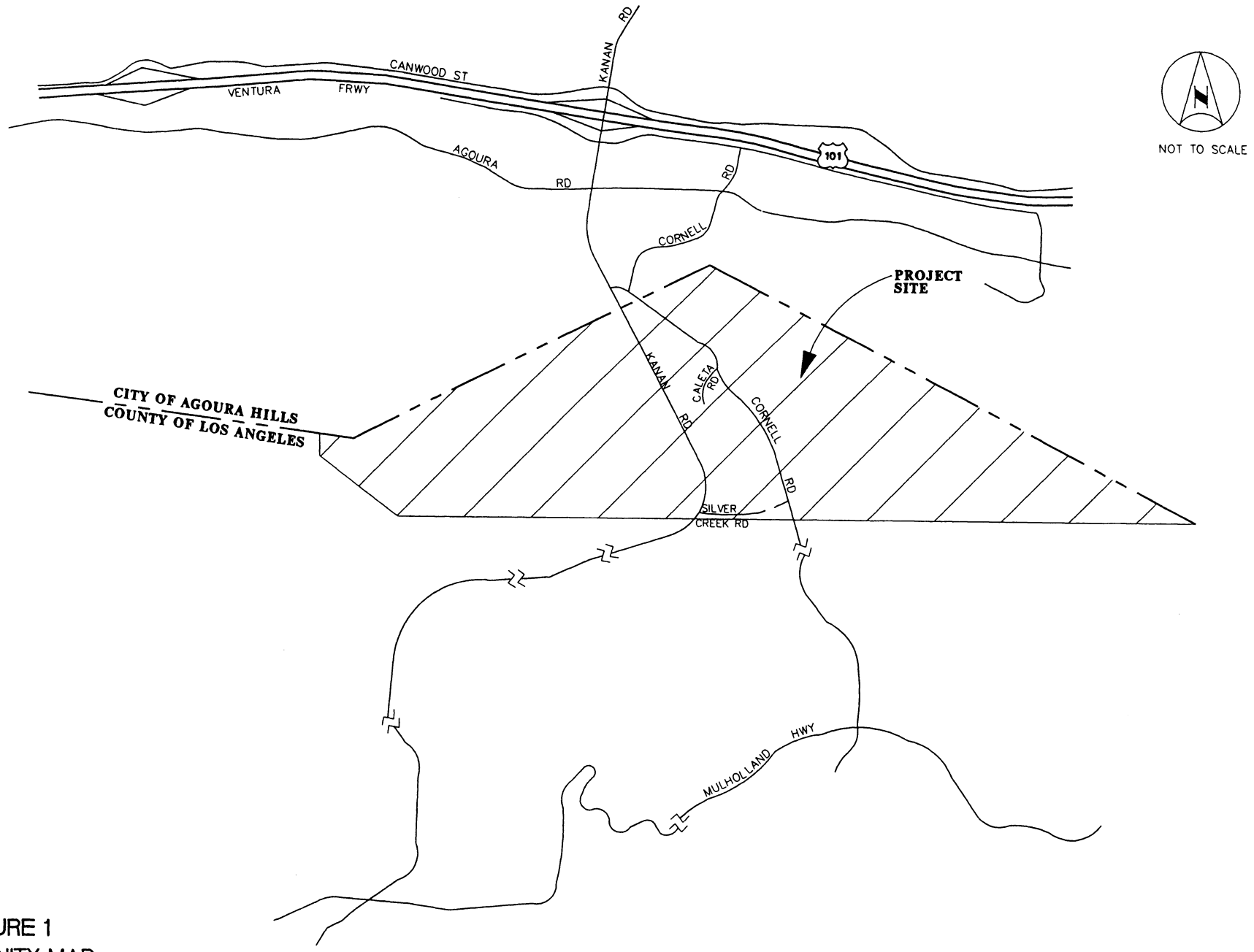



FIGURE 1
VICINITY MAP

Kimley–Horn and Associates, Inc.

NOT TO SCALE

FIGURE 2
SITE PLAN

Kimley-Horn and Associates, Inc.

3. Existing Plus Ambient Growth Plus Project -- This analysis will determine the direct impacts of Triangle Ranch by adding project traffic to the Existing Plus Ambient Growth traffic volumes.

4. Cumulative Conditions (Existing Plus Ambient Growth Plus Project Plus Related Projects) in the vicinity – This analysis will determine cumulative impacts.

The methodology in this traffic study will employ standard technologies of trip generation, trip distribution, trip assignment, and roadway and intersection capacity analysis.

Technical analysis of the intersection operating conditions will provide a qualitative assessment of the operating conditions of that intersection. Operating conditions are expressed in terms of "Level of Service" which is also known by its acronym, LOS. Level of Service designations range from LOS "A" to "F," with LOS "A" representing comfortable, free-flowing traffic conditions with minimal delays, and LOS "F" representing congested conditions, with long delays. A qualitative description of each Level of Service is provided in **Appendix A** to this report.

**Significant Impact Thresholds**

County guidelines stipulate that the project traffic impact would be considered significant on two-lane roadways if the project causes an increase in traffic volumes in the peak hour of four percent for roadways operating at LOS C, two percent for roadways operating at LOS D, or one percent for roadways operating at LOS E or F. These standards will be applied to the three roadways to be analyzed (Kanan Road north of Cornell Way, Kanan Road south of Cornell Way, and Cornell Road south of Kanan Road).

As previously mentioned, all seven of the study area intersections are located in the City of Agoura Hills. The City's intersection Level of Service (LOS) standard is LOS C, or 80% or less of the intersection capacity. City standards stipulate that the project traffic impact at study intersections would be considered to be significant if the project causes any intersection to worsen from acceptable (LOS C) to unacceptable (LOS D, E, F) conditions, or if the project causes an unacceptable ICU to increase by 0.02 or more.

**Two-lane Roadway Analysis Methodology**

Analysis of two-lane roadways will be conducted according to the Two-Way Roadway Analysis requirements of the County of Los Angeles Traffic Impact Analysis Report Guidelines. The hourly capacity of the two-lane roadway is determined primarily by the peak hour volume of traffic, and the degree of directional split. A roadway with a 50/50 split in directional traffic has a higher hourly capacity than a roadway with an 80/20 directional split. The hourly traffic volume is compared to the hourly capacity for the roadway, a volume-to-capacity ratio (v/c ratio) is calculated, and the level of service is identified for each peak hour.

**Signalized Intersection Analysis Methodology**

Analysis of signalized intersections will be conducted utilizing the Intersection Capacity Utilization (ICU) analysis method. The ICU technique is used for signalized intersections and compares the volumes of traffic on each movement to the capacity for each movement, and calculates the sum of individual volume-to-capacity (V/C) ratios for key conflicting movements. The ICU numerical value represents the percent of signal green time, or capacity, required by existing or future traffic. The County of LA ICU methodology is used for signalized intersections, including an hourly capacity of 1,600 vehicles per lane, and a 10% clearance.

Because of the close spacing, the existing US-101 eastbound and westbound ramps at Kanan Road will be analyzed using the "Tight Diamond" interchange analysis methodology. The "Tight Diamond" interchange analysis methodology was developed by Caltrans, and is designed to analyze two adjacent signalized interchange intersections as one intersection. This methodology applies when the two interchange intersections are in the diamond formation, and are in such close proximity to each other, that there is little or no room for vehicles to stack between the intersections, and the traffic movements through one closely affect the movements through the other, such as is the case with the existing Kanan/US-101 northbound and southbound interchanges configurations. Future analysis of the intersection will be conducted assuming proposed interchange improvements that will be discussed in detail in a later section of this report.

**Unsignalized Intersection Analysis Methodology**

The unsignalized intersections will be analyzed using the 2000 Highway Capacity Manual methodology for unsignalized intersections. The procedure for stop-control analysis determines the average total delay, expressed in seconds of delay per vehicle, for all turning movements from the major street and from the stop-controlled minor street traffic stream. Delay values are calculated based on the relationship between traffic on the major street and the availability of acceptable "gaps" in this stream through which conflicting traffic movements can be made. Level of Service conditions for each intersection are defined based on the weighted average of the delay estimates for each individual movement.

## EXISTING CONDITIONS

Existing traffic conditions on the area road and street system are described and analyzed in this section. The physical characteristics of the roadway system serving the project site are shown on **Figure 3**.

**Existing Roadway System**

Regional access to the project site is provided by the Ventura Freeway (US-101), which travels in an east-west direction through the project area and connects to the project site via the Kanan Road interchange.

Local access to the project is provided by several roads:

Kanan Road - The Circulation Element of the City of Agoura Hills classifies Kanan Road as a Secondary Arterial (4 lanes undivided) south of Agoura Road, a Major Arterial (6 lanes divided) between Agoura Road and Thousand Oaks Boulevard and an Augmented Primary Arterial (6 lanes divided) north of Thousand Oaks Boulevard. The County of Los Angeles Highway Plan Policy designates Kanan Road as a Major Highway (100-foot right-of-way) between Agoura Road and Mulholland Highway.

North of Agoura Road, two travel lanes are provided in each direction with left-turn storage at intersections. At the approaches to the US-101 interchange, three lanes are provided in each direction. South of Agoura Road, there is one southbound lane and two northbound through lanes with a left-turn lane. The roadway transitions to one lane in each direction south of Cornell Way, with a southbound left-turn lane at the Cornell Way intersection. The speed limit is 35 miles per hour north of Agoura Road and 45 miles per hour south of Agoura Road.

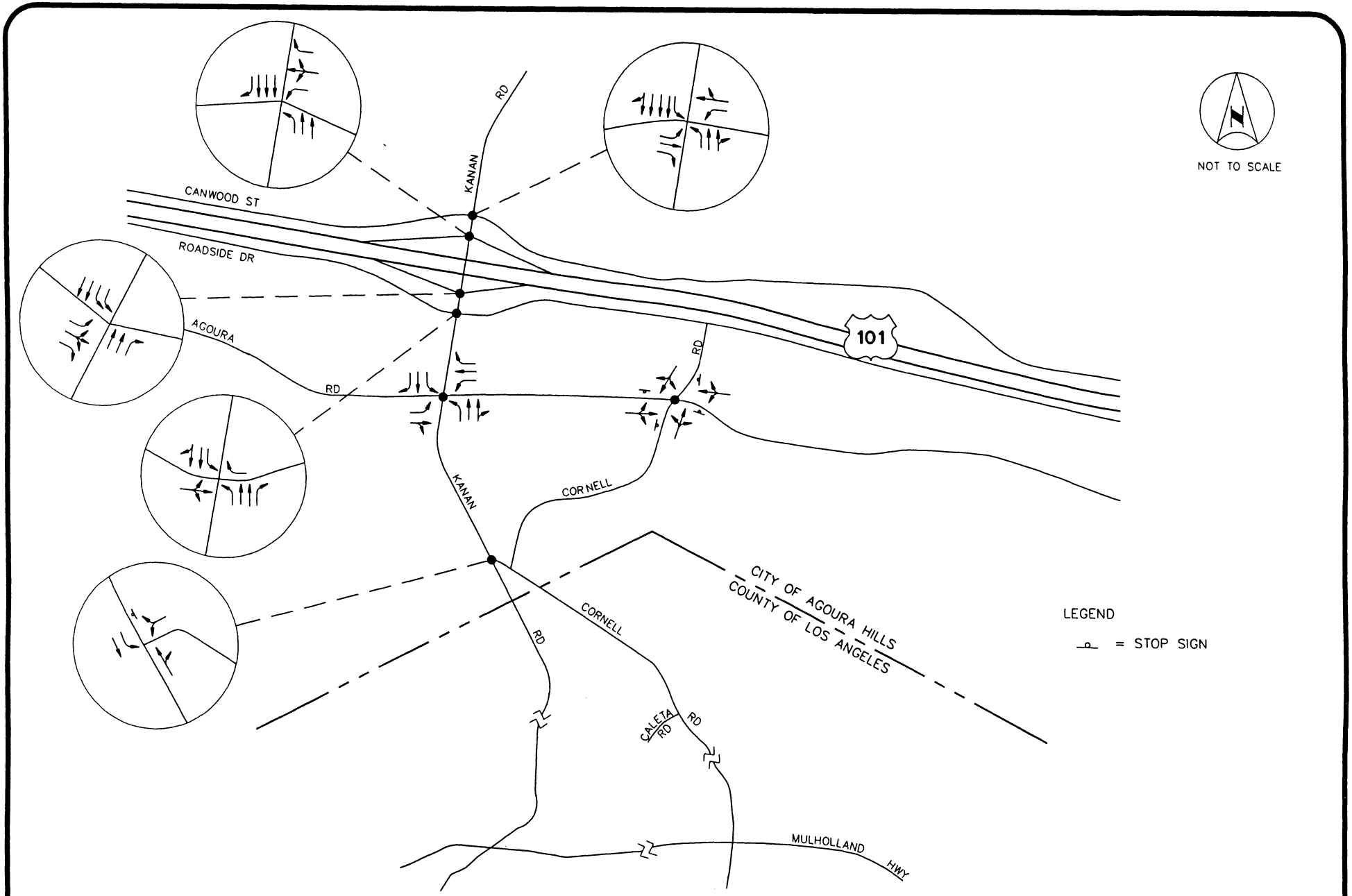



FIGURE 3
EXISTING LANE CONFIGURATIONS

Kimley–Horn and Associates, Inc.

Cornell Road - Cornell Road is a north/south roadway, designated on the County of Los Angeles Highway Plan Policy as a Secondary Highway (80-foot right-of-way). There are two through travel lanes in each direction. The roadway connects to Roadside Drive on the north and through the southern residential portions of Agoura Hills to the Santa Monica Mountains National Recreation area on the south. Cornell Road connects to Kanan Road south of Agoura Road via a short east/west roadway segment called Cornell Way, which is a two-lane undivided road. Parking is prohibited on both sides of Cornell Road. Cornell Road is currently 30 feet wide with 60 feet of right-of-way.

Agoura Road is an east-west Secondary Arterial that runs parallel to US-101. The road is designated as a future Primary Arterial in the study area, to be upgraded to 84 feet of roadway width. Existing right-of-way varies from 80 to 100 feet in the vicinity of the project. Agoura Road presently provides one travel lane in each direction in the project vicinity. The road is 30 feet wide west of the Kanan Road intersection to Reyes Adobe Road. The roadway widens to 56 feet on the east side of the Kanan Road intersection to provide an exclusive westbound right-turn lane. Parking is generally prohibited along Agoura Road, except for the section between Lewis Road and Palo Comado Canyon. The speed limit is 40 miles per hour west of Kanan Road and 45 miles per hour east of Reyes Adobe Road.

Roadside Drive is an east-west local street that serves as a frontage road on the south side of US-101. One travel lane is provided in each direction. It provides access to businesses located along its length. West of Kanan Road, the street width varies from 30 feet to 44 feet; east of Kanan Road the street varies from 30 feet to 45 feet in width. At the intersection of roadside Drive at Kanan Road, the westbound leg of Roadside Drive is restricted to right turns only.

Canwood Street is an east-west local street which serves as a frontage road on the north side of US-101 Freeway. Canwood Street is designated on the circulation element as a Local Arterial (2 lanes undivided) between Reyes Adobe Road and Kanan Road, a Secondary Arterial between Kanan Road and the future ramp terminal, and a Local Arterial east of the ramp terminal. It serves local businesses east of Kanan Road and residential neighborhoods west of Kanan Road. One travel lane is provided in each direction. The street varies in width from 30 feet to 40 feet. Curb and sidewalk are provided along the north side of the street for approximately 300 feet from the Kanan Road intersection. Canwood Street originates at Lake Crest Drive, at the west City limits, and extends to Chesebro/ Driver/ Palo Comado Canyon Road on the east.

**Two-Lane Roadways**

The following three roadway segments will be evaluated throughout the course of the traffic study, following the County of Los Angeles guidelines discussed previously:

- Kanan Road north of Cornell Way
- Kanan Road south of Cornell Way
- Cornell Road south of Kanan Road

**Intersections**

Seven intersections will be evaluated throughout the course of the study, as indicated below.

- Kanan Road at Canwood Street (Signalized)
- Kanan Road at US-101 Westbound Ramps (Signalized)
- Kanan Road at US-101 Eastbound Ramps (Signalized)
- Kanan Road at Roadside Drive (Unsignalized)

- Kanan Road at Agoura Road (Signalized)
- Kanan Road at Cornell Way (Unsignalized)
- Agoura Road at Cornell Road (Four-way stop controlled)

The intersections will be analyzed following the City of Agoura Hills guidelines discussed previously.

### Summary of Two-lane Roadway Analysis

Existing 24-hour counts were conducted in May 2003 on Kanan Road north of Cornell Way, on Kanan Road south of Cornell Way and on Cornell Road south of Kanan Road. The daily and peak hour volumes on these roadway segments are presented on **Figure 4**. Copies of traffic data collection worksheets are provided in ***Appendix B.***

The existing conditions analysis for the two-lane roadways was conducted using the County Traffic Impact Report Analysis Guidelines, and the results are summarized on **Table 1**. The analysis indicates that the three roadway segments are currently operating at LOS A in both peak hours.

### Summary of Intersection Analysis

Existing morning and evening peak hour traffic counts were conducted at the seven study intersections, and are presented on Figure 4, previously referenced. Copies of traffic data collection worksheets are provided in ***Appendix B.*** The results of the existing conditions analysis for the study intersections are summarized on **Table 2.** The signalized intersection of Kanan Road and Canwood Street is currently operating at an unacceptable level of service (LOS E) during the evening peak hour, and the signalized intersections of the US-101 Ramps at Kanan Road (analyzed as a "Tight Diamond" interchange) are currently operating at an unacceptable level of service (LOS D) during the morning peak hour. At the intersection of Kanan Road and Roadside Drive, the eastbound approach experiences LOS "F" delays in both the morning and evening peak hours. The remaining study intersections are operating at acceptable levels of service (LOS A, B or C) in both peak hours. Intersection analysis worksheets for all intersections are provided in ***Appendix C***.

## AMBIENT GROWTH

The County of Los Angeles traffic study guidelines requires an analysis of Existing Conditions with the addition of ambient growth to the year the project is completed. In accordance with the County of Los Angeles CMP, the growth rate in the area is 1.1 percent per year. Triangle Ranch is projected to be completed in approximately three years. Therefore, existing traffic volumes were increased by 1.1 percent for three years, and the resulting existing plus growth peak hour traffic volumes are shown on **Figure 5**.

### Summary of Two-lane Roadway Analysis

The results of the Existing plus Growth roadway analysis are summarized in Table 1, previously referenced. The analysis indicates that the three roadway segments will continue to operate at LOS A in both peak hours with the addition of ambient traffic growth.

### Summary of Intersection Analysis

The results of the Existing plus Growth intersection analysis is shown on Table 2, previously referenced. The following signalized intersections will continue to operate at an unacceptable level of service (LOS D or worse) in one or both peak hours with the addition of ambient traffic growth:

**Table 1**
**Summary of Two-Lane Roadway Operation**

| Segment | Hour | Split [a] | Cap. | Vol. | V/C | LOS | Proj. Vol. | %-age | Signif.? |
|---|---|---|---|---|---|---|---|---|---|
| **Kanan Road north of Cornell Way** | | | | | | | | | |
| Existing Conditions | AM | 50/50 | 2,800 | 1,266 | 0.46 | A | | | |
| | PM | 60/40 | 2,650 | 1,210 | 0.46 | A | | | |
| Existing Plus Growth | AM | 50/50 | 2,800 | 1,308 | 0.47 | A | | | |
| | PM | 60/40 | 2,650 | 1,250 | 0.48 | A | | | |
| Existing plus Growth plus Project | AM | 50/50 | 2,800 | 1,351 | 0.49 | A | 48 | 3% | No |
| | PM | 60/40 | 2,650 | 1,301 | 0.49 | A | 63 | 4% | No |
| Cumulative Conditions | AM | 50/50 | 2,800 | 1,473 | 0.53 | A | | | |
| | PM | 60/40 | 2,650 | 1,419 | 0.54 | A | | | |
| **Kanan Road south of Cornell Way** | | | | | | | | | |
| Existing Conditions | AM | 60/40 | 2,650 | 995 | 0.38 | A | | | |
| | PM | 50/50 | 2,800 | 1,094 | 0.39 | A | | | |
| Existing Plus Growth | AM | 60/40 | 2,650 | 1,028 | 0.39 | A | | | |
| | PM | 50/50 | 2,800 | 1,131 | 0.41 | A | | | |
| Existing plus Growth plus Project | AM | 60/40 | 2,650 | 1,061 | 0.40 | A | 37 | 3% | No |
| | PM | 50/50 | 2,800 | 1,174 | 0.42 | A | 49 | 4% | No |
| Cumulative Conditions | AM | 60/40 | 2,650 | 1,184 | 0.45 | A | | | |
| | PM | 50/50 | 2,800 | 1,310 | 0.47 | A | | | |
| **Cornell Road south of Kanan Road** | | | | | | | | | |
| Existing Conditions | AM | 60/40 | 2,650 | 279 | 0.11 | A | | | |
| | PM | 60/40 | 2,650 | 247 | 0.10 | A | | | |
| Existing Plus Growth | AM | 60/40 | 2,650 | 289 | 0.11 | A | | | |
| | PM | 60/40 | 2,650 | 256 | 0.10 | A | | | |
| Existing plus Growth plus Project | AM | 60/40 | 2,650 | 300 | 0.12 | A | 11 | 4% | No |
| | PM | 60/40 | 2,650 | 267 | 0.10 | A | 14 | 4% | No |
| Cumulative Conditions | AM | 60/40 | 2,650 | 312 | 0.12 | A | | | |
| | PM | 60/40 | 2,650 | 278 | 0.11 | A | | | |

Source: Los Angeles County Traffic Impact Analysis Report Guidelines - Significant Impact Threshold

**Table 2**
**Summary of Intersection Operations**

| Signalized Intersection | Existing Conditions | | | | Existing plus Growth Conditions | | | | Existing plus Growth plus Project Conditions | | | | Cumulative Conditions | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AM | | PM | | AM | | PM | | AM | | PM | | AM | | PM | |
| | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS |
| **Kanan Road at:** | | | | | | | | | | | | | | | | |
| Canwood Street [a] | 0.778 | C | 0.971 | E | 0.801 | C | 1.000 | E | 0.803 | C | 1.001 | E | 0.87 | D | 1.003 | E |
| US-101 Interchange [a] | 0.871 | D | 0.786 | C | 0.896 | D | 0.809 | D | 0.901 | D | 0.813 | D | | | | |
| Kanan/US-101 WB [a] | | | | | | | | | | | | | 0.837 | D | 0.953 | E |
| Kanan/US-101 EB [a] | | | | | | | | | | | | | 0.647 | B | 0.941 | E |
| Agoura Road | 0.632 | B | 0.707 | C | 0.649 | B | 0.727 | C | 0.663 | B | 0.746 | C | 0.800 | C | 1.103 | F |

| Unsignalized Intersection | Existing Conditions | | | | Existing plus Growth Conditions | | | | Existing plus Growth plus Project Conditions | | | | Cumulative Conditions | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AM | | PM | | AM | | PM | | AM | | PM | | AM | | PM | |
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| **Kanan Road at:** | | | | | | | | | | | | | | | | |
| Roadside Drive - WB [a] | 10.7 | B | 14.8 | B | 10.8 | B | 15.4 | C | 10.9 | B | 15.6 | C | | | | |
| Roadside Drive - EB [a] | 290.2 | F | 441.6 | F | 334 | F | 610.3 | F | 393.7 | F | 653.0 | F | | | | |
| Cornell Way - WB | 17.4 | C | 14.4 | B | 18.5 | C | 14.8 | B | 19.5 | C | 15.4 | C | 24.1 | C | 20.0 | C |
| **Agoura Road at:** | | | | | | | | | | | | | | | | |
| Cornell Road - All-way | 8.45 | A | 11.41 | B | 8.52 | A | 11.79 | B | 8.59 | A | 12.1 | B | 10.96 | B | 52.35 | F |

[a] Existing intersection configurations used for Existing, Existing Plus Growth, and Existing Plus Growth Plus Project Conditions

For future Cumulative Conditions evaluation, the proposed interchange improvement program is assumed. Roadside Drive will no longer be a stand-alone intersection.

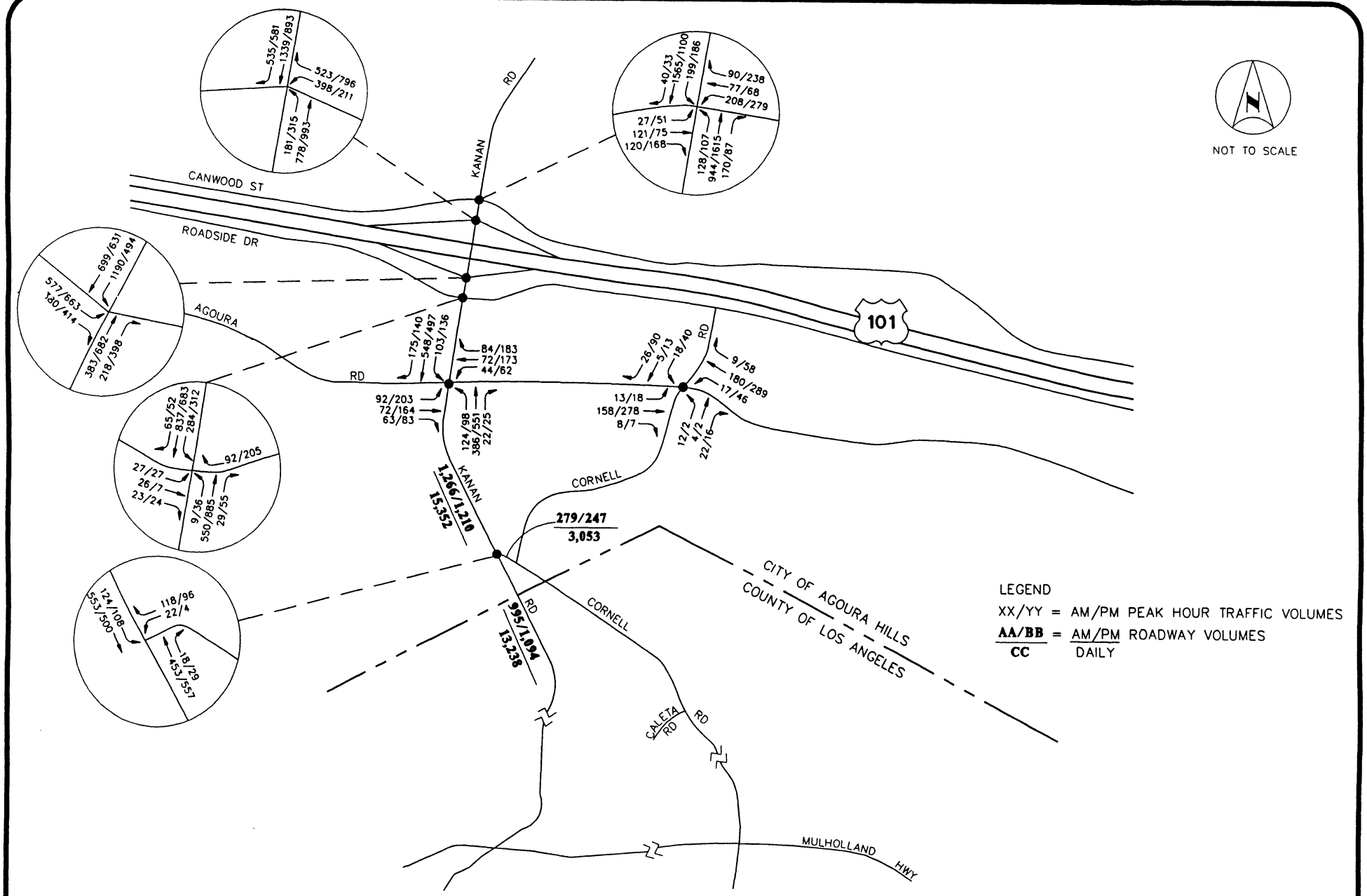



FIGURE 4
EXISTING DAILY AND PEAK HOUR TRAFFIC VOLUMES

Kimley-Horn and Associates, Inc.

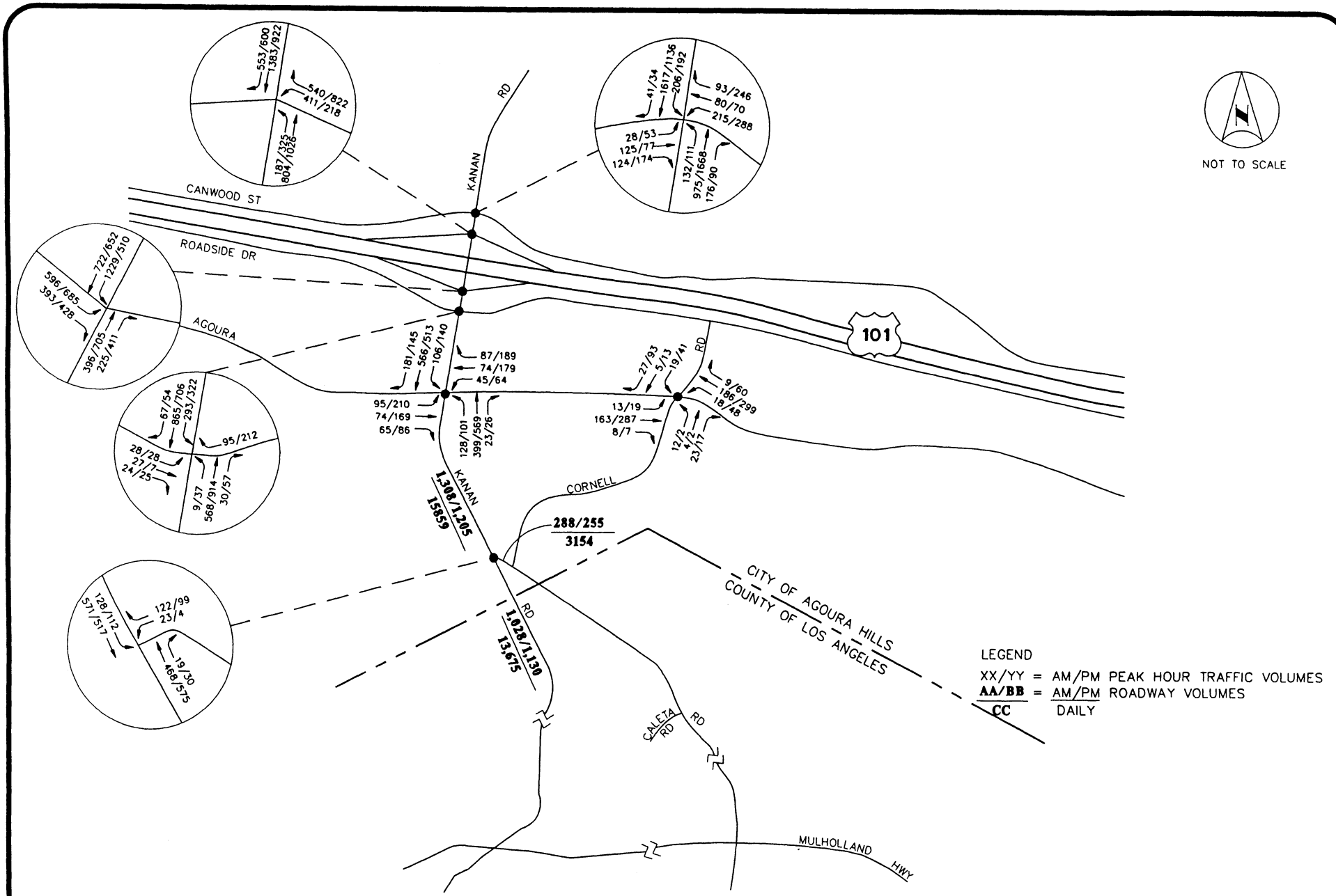



FIGURE 5
EXISTING PLUS GROWTH TRAFFIC VOLUMES

Kimley–Horn and Associates, Inc.

- Kanan Road at Canwood Street (PM continues at LOS E),
- Kanan Road at US 101 Interchange (AM continues at LOS D),
- Kanan Road at Roadside Drive (EB approach continues at LOS F in AM and PM)

The remaining signalized and unsignalized intersections will continue to operate at an acceptable level of service (LOS A, B or C) with ambient growth.

## TRIANGLE RANCH PROJECT TRAFFIC

### Trip Generation

The traffic to be generated by Triangle Ranch was calculated using trip generation rates from the Institute of Transportation Engineers (ITE) publication Trip Generation, Sixth Edition. Daily, morning and evening peak hour trip generation rates and project-related trips are presented on **Table 3**.

Triangle Ranch will consist of 81 single-family homes and will generate 854 trips on a daily basis with 67 trips in the morning peak hour and 89 trips in the evening peak hour.

**Table 3**
**Summary of Triangle Ranch Trip Generation**

| | | Trip Generation Rates | | | | | Project Trip Generation | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AM Peak | | PM Peak | | | AM Peak | | PM Peak | |
| Land Use | Units | Daily | In | Out | In | Out | Daily | In | Out | In | Out |
| Single Family Homes | 81 DU | 10.54 | 0.20 | 0.61 | 0.70 | 0.40 | 854 | 17 | 50 | 57 | 32 |

**Source:** Institute of Transportation Engineers Trip Generation Report, 6th Edition.
**Land Use Category:** 210 – Single-Family Detached Housing
**Trip Generation Formulas:** Trip Generation rates are based on the following formulas, where T = # of trips, and X = # of dwelling units.

| | |
|---|---|
| Daily | Ln (T) = 0.920 Ln(X) + 2.707 |
| AM Peak Hour: | T = 0.700(X) + 9.477, 25% entering, 75% exiting |
| PM Peak Hour: | Ln(T) = 0.901 Ln(X) + 0.527, 64% entering, 36% exiting |

### Trip Distribution and Assignment

The project-generated trips were distributed to likely origin-destination locations, using the County of Los Angeles Congestion Management Program (CMP) Trip Distribution Percentages (Appendix D of the CMP). The trip distribution assumptions reflect the nature of the project land use, land uses likely to interact with the project, and the roadway system available for tripmaking. With the basic trip distributions established, the project trips were assigned to the available road system.

The trip assignment takes into consideration the distance and roadway geometrics of each path which would most likely serve the project. **Figure 6** presents the trip distribution assumptions for Triangle Ranch. The trip distribution percentage factors were applied to the project trip generation, and the results are shown on **Figure 7**. These volumes represent the Triangle Ranch project contribution of traffic at the study intersections and study roadways. Existing plus Growth plus Project peak hour volumes are shown on **Figure 8.**

### Summary of Two-Lane Roadway Analysis

The results of the Existing plus Growth plus Project roadway analysis are summarized in Table 1, previously referenced. The analysis indicates that the three roadway segments will continue to operate at Level of Service A in both peak hours with the addition of project traffic. The project traffic added to these roadway segments would not represent a significant impact, based on the County of Los Angeles Traffic Analysis Guidelines.

### Summary of Intersection Analysis

The study intersections were evaluated for Existing plus Growth plus Project traffic conditions, to determine if there are any direct project impacts. The results of the analysis are presented on Table 2, previously referenced.

With the addition of project traffic, none of the study intersections would worsen to LOS D or worse in either peak hour. The two signalized intersections found previously to be deficient (Kanan Road/Canwood Street and Kanan Road/US 101 Interchange) would continue to operate unacceptably, with Triangle Ranch contributing to unacceptable conditions by an increase in V/C of less than 0.02. As previously mentioned, project impact at study intersections in the City of Agoura Hills would be considered to be significant if the project causes an unacceptable ICU to increase by 0.02 or more, or if the project causes any intersection to worsen from acceptable to unacceptable conditions. Based on these criteria, the project would not have a significant impact at any of the signalized study area intersections. The unsignalized intersection of Kanan Road and Roadside Drive will continue to experience LOS F delays on the eastbound approach. This intersection will be eliminated as a stand-alone intersection and integrated into the Kanan Road / US-101 interchange as part of the planned improvements currently under design by the City, as discussed in the next section.

## CUMULATIVE CONDITIONS

In order to conduct an analysis of Cumulative Conditions, related projects in the project vicinity were considered. The County of Los Angeles Department of Regional Planning and the Planning Department at the City of Agoura Hills were contacted to obtain information about related projects. All projects within a mile-and-a-half of the study area, which have been approved or are pending approval by the County of Los Angeles must be considered in this analysis. Approved and pending project data was obtained from the County of Los Angeles Department of Regional Planning. In addition, all approved and pending projects in the City of Agoura Hills Commercial and Residential Development Summary database are included in this analysis. A summary of Related Projects is provided on **Table 4**. The location of Related Projects is shown on **Figure 9**.

For the Cumulative Conditions analysis of the Kanan Road / US-101 interchange, future lane configurations of the interchange and Year 2020 forecasts will be assumed. A conceptual drawing of the proposed improvements is provided on **Figure 10.**

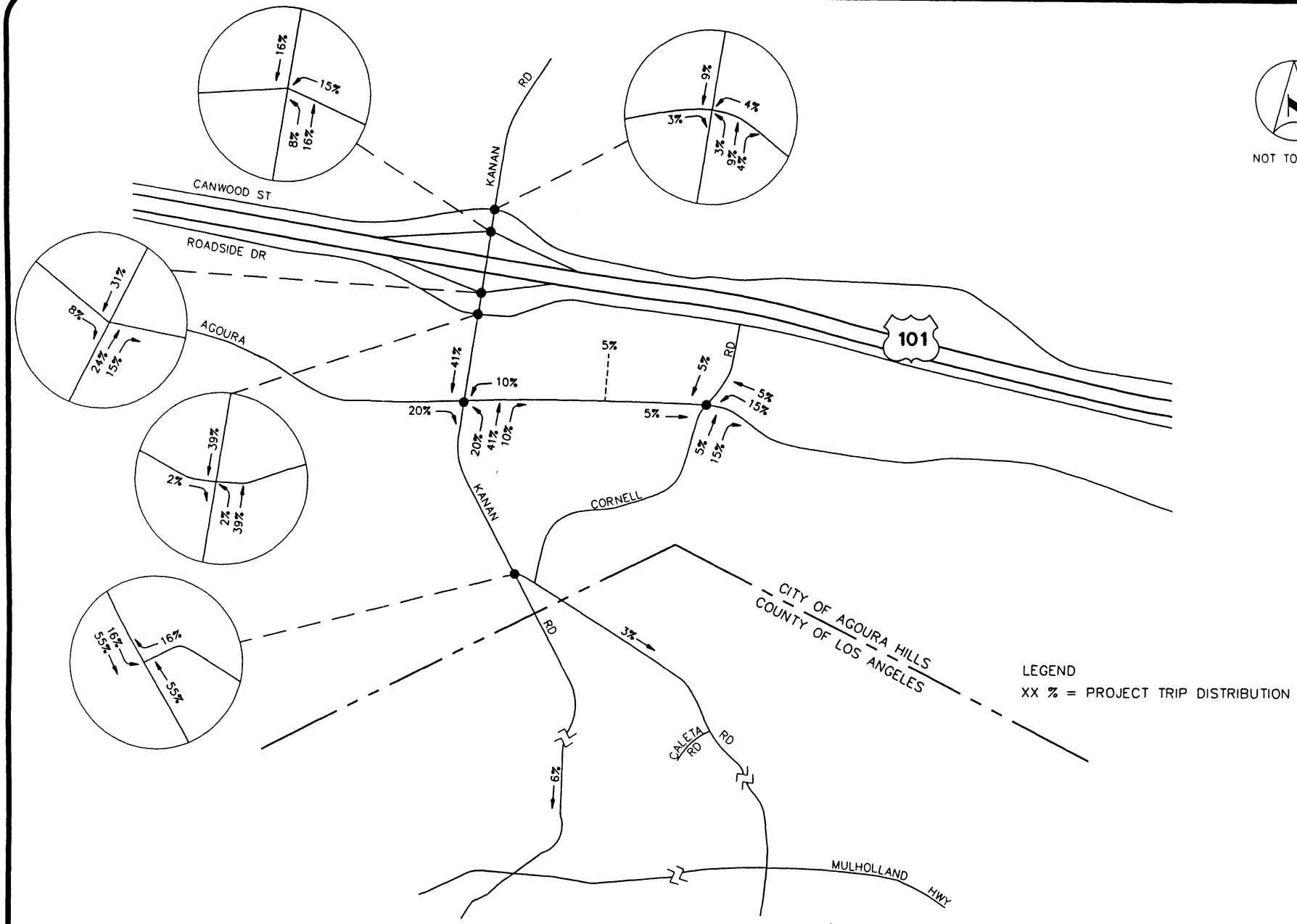



FIGURE 6
TRIANGLE RANCH TRIP DISTRIBUTION

Kimley–Horn and Associates, Inc.

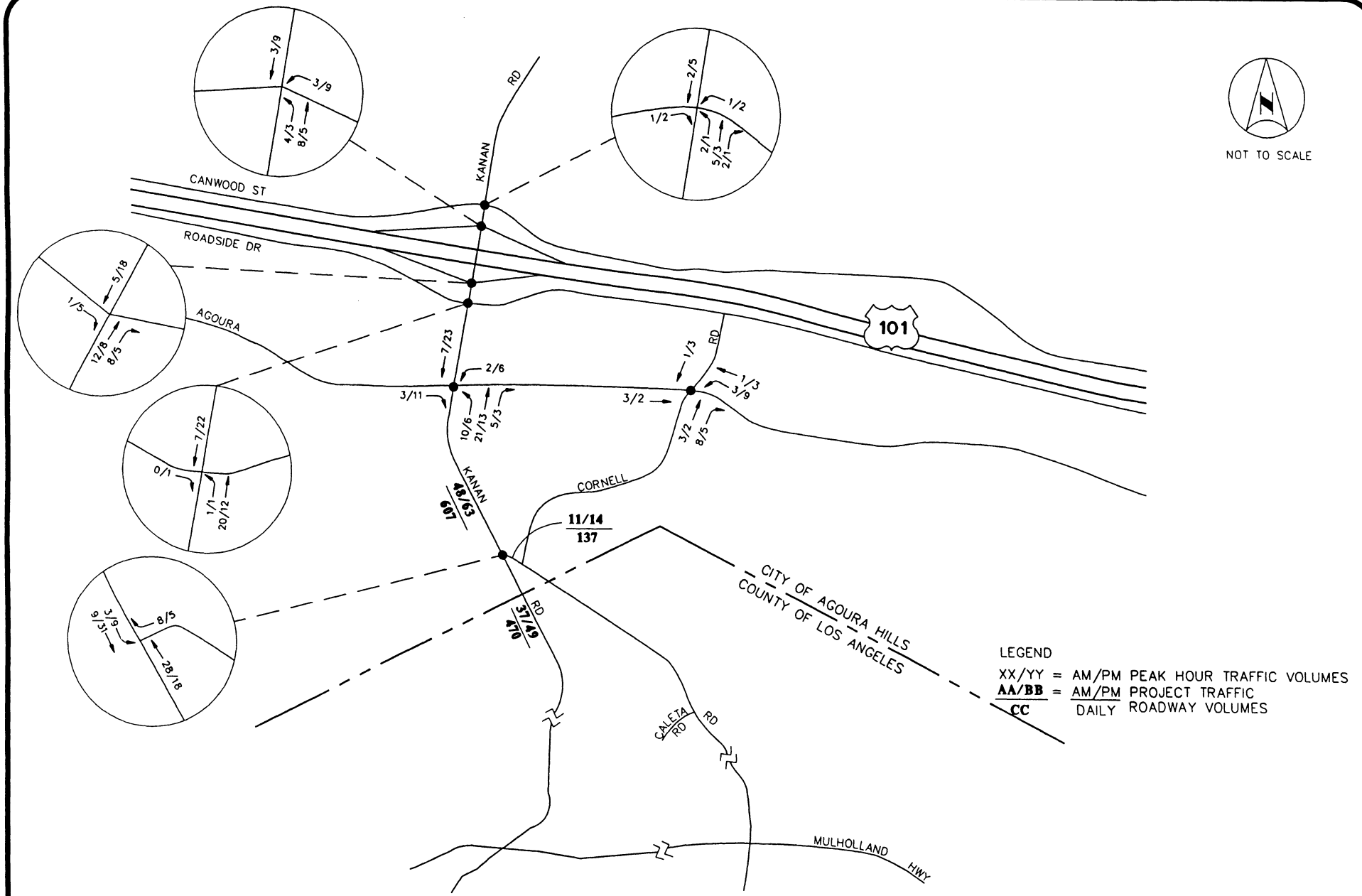



FIGURE 7
TRIANGLE RANCH PROJECT TRAFFIC VOLUMES

Kimley-Horn and Associates, Inc.

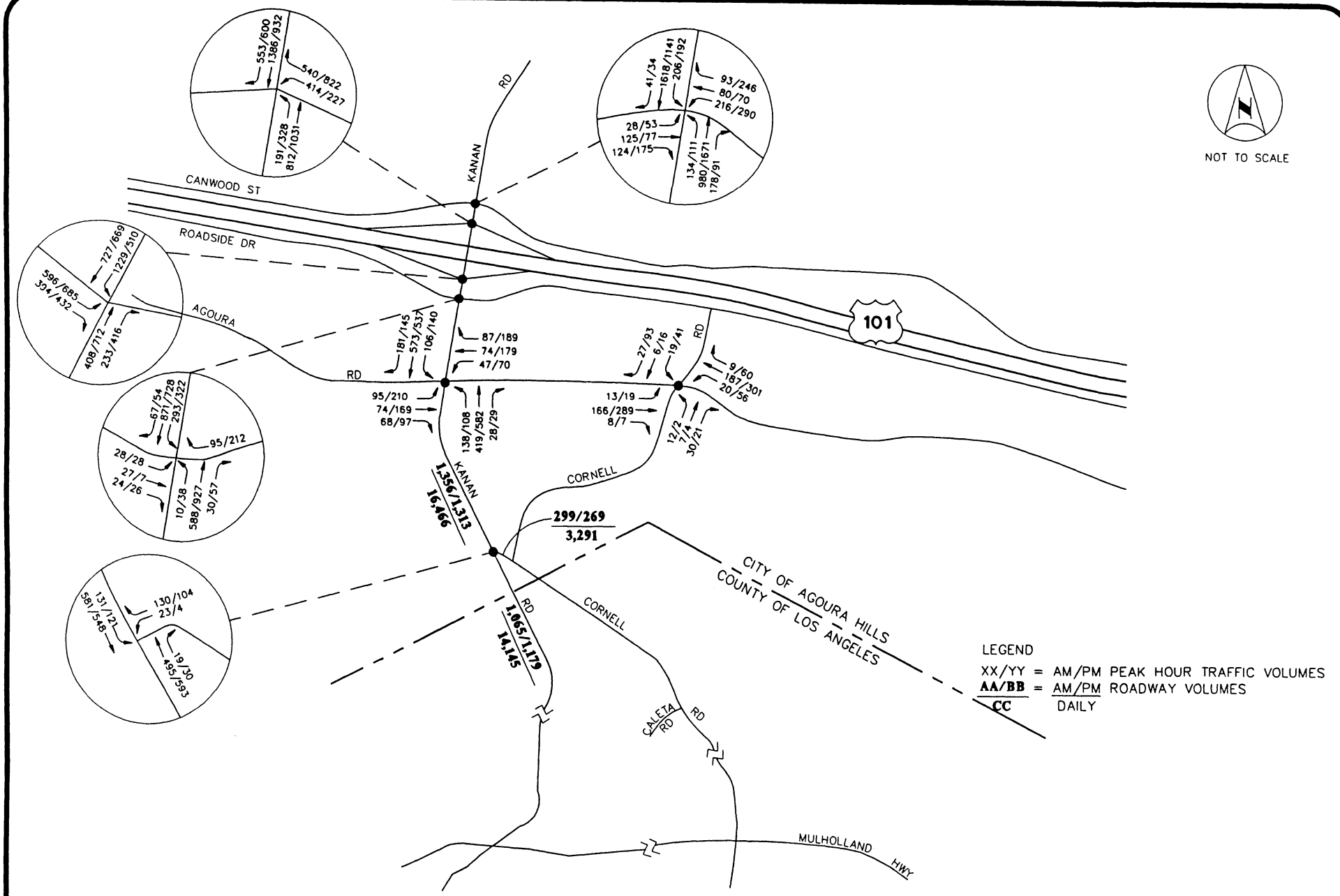



FIGURE 8
EXISTING PLUS GROWTH PLUS TRIANGLE RANCH TRAFFIC VOLUMES

Kimley–Horn and Associates, Inc.

TABLE 4
LIST OF RELATED PROJECTS

| No. | Project Description and Location | Project Size | Location |
|---|---|---|---|
| *City of Agoura Hills - Residential* | | | |
| 1 | Riopharm 1 - single family residences | 14 DU | 27754 Agoura Rd SE of Agoura and Montecillo |
| 2 | Riopharm 2 - single family residences | 14 DU | 26750 Agoura Rd SE of Agoura and Ropharm |
| 3 | Stockton - 4-unit apartment building | 4 DU | 5310 Colodny Dr |
| 4 | Schneider - 4-unit condominium project | 4 DU | 5276 Colodny Dr |
| 5 | Minder - 19-unit condominium project | 19 DU | 5241 Colodny Dr. |
| *City of Agoura Hills - Commercial* | | | |
| 6 | Creekside - Retail Center | 93 KSF | SWC Kanan Road and Agoura Rd. |
| 7 | Burgandy Creek Bistro - New restaurant and reception hall | 11 KSF | Vacant lot west of 28818 Agoura Rd |
| 8 | St. Paul's Lutheran Church | 91.04 KSF | 30125 Agoura Rd. |
| 9 | Alesco Development - Office Buildings | 67 KSF | NEC Chesebro and Agoura Rds |
| 10 | Ted Moore - Agoura Village mixed use land development | Mixed: 10 Acres<br>Open: 8 Acres | SEC of Agoura and Kanan |
| 11 | Ball Properties (Centerpointe) - 2 office buildings | 8 KSF | Ladyface Cir |
| 12 | Riverwalk - Residential, office buildings, & resturaunts | Res: 336 Apts<br>Office: 93 KSF<br>Rest: 19 KSF | NEC Canwood and Kanan |
| 13 | Silagi "Canwood Plaza" - Office building | 22.896 KSF | NW corner of Canwood and Kanan |
| 14 | Semler (Alan Hartley) - 2 office buildings | 125 KSF | NEC Canwood and Derry St |
| 15 | Levy, Moshe - office building w/underground parking | 20.830 KSF | Roadside Dr, west of Lewis Rd |
| 16 | Wickman "Agoura Furniture Center" | 38.760 KSF | N/S Canwood St and Chesebro Rd |
| 17 | Reyes Adobe Partners - Matress and Bedroom showroom | 14.5 KSF | Reyes Adobe Rd, directly south of US 101 |
| 18 | Leaders Carpets | 14.080 KSF | 28350 Roadside Dr |
| 19 | So. Cal Food Services for Wendy's | 3.2 KSF | Lots 29 & 30 on Dorothy Dr |
| 20 | Silagi "Center Court" - Office Building | 49 KSF | 29475 Canwood St |
| 21 | Scheu (Corp. Point) - 2 new buildings | 81 KSF | S/S Agoura Rd @ Reyes Adobe Rd |
| 22 | Development Partners - 2 story office building | 31.160 KSF | 30101 Agoura Ct |
| 23 | Realty Bancorp Equities - 2 story commercial building | 76.750 KSF | 29901 Agoura Rd |
| *County of Los Angeles* | | | |
| 24 | Private School, K-8 | 750 Students | E of Palo Comado Cyn Rd and Chesebro |
| 25 | Six story office building w/parking structure | 140 Employees | 26585 Agoura Rd, Calabasas |
| 26 | 5 SF Lots | 5 DU | 3155 Kanan Rd |

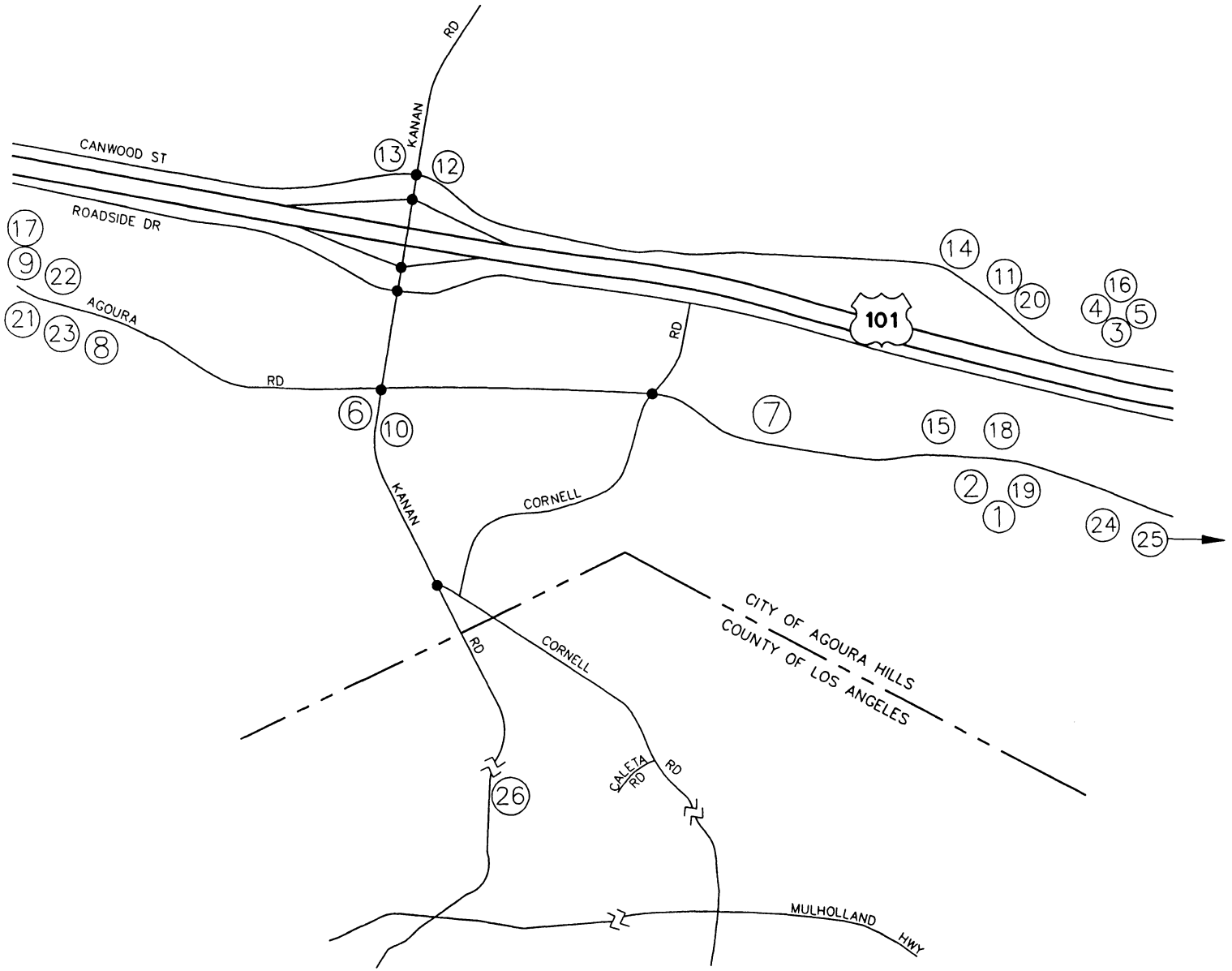



FIGURE 9
LOCATION OF RELATED PROJECTS

Kimley-Horn and Associates, Inc.

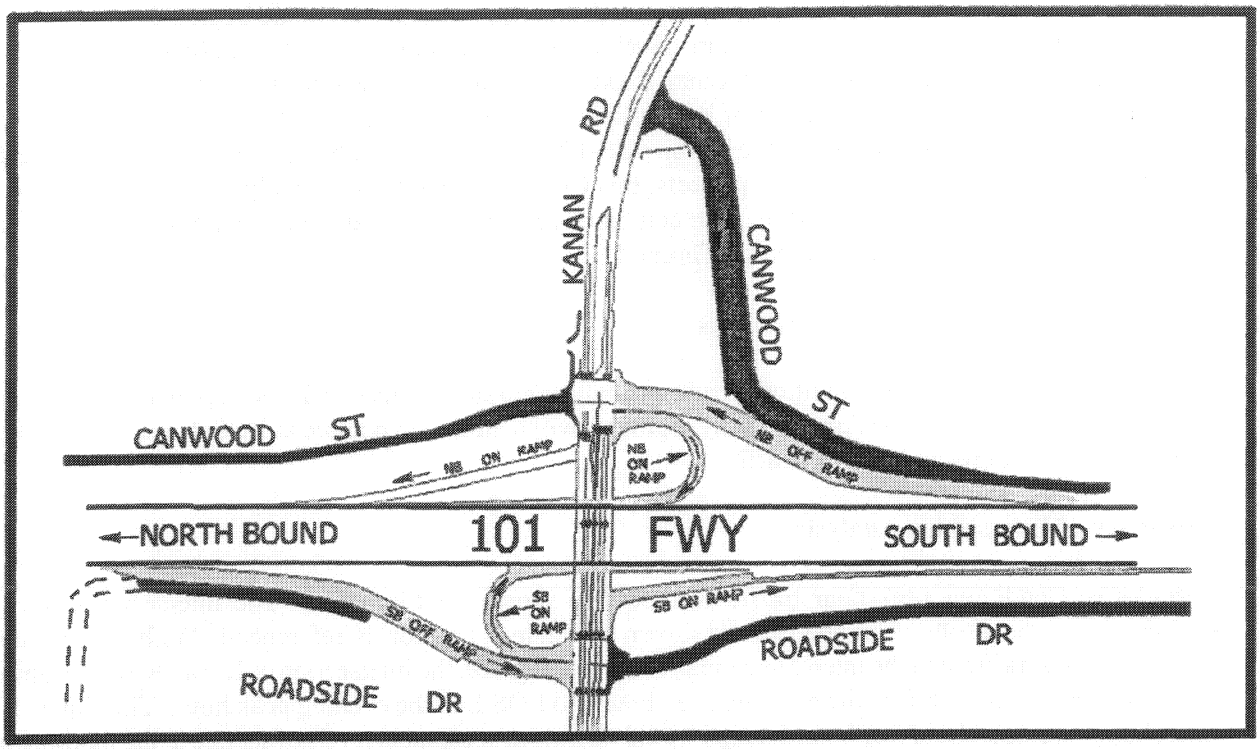



**Figure 10 – Kanan Road Interchange Project**

The interchange is an approved project that has made it through the Project Study Report phase, and is in final review at Caltrans. Funding has been identified, with $10.5 million coming from MTA, and $13.5 million from City funds. The interchange improvements will create greater separation between the ramps, and will provide loop ramps to eliminate left-turns to access the freeway. The eastbound off-ramp will be moved south to the existing Roadside Drive alignment, and the westbound off-ramp will be moved north to the existing Canwood Street alignment. East of Kanan Road, Canwood Street will be moved several hundred feet to the north, to achieve greater distance from the ramps. Construction is anticipated to begin early in Winter 2004, with completion in Winter, 2005/2006.

Peak hour traffic projections assuming the improved interchange configuration were obtained from the US-101 / Kanan Road Interchange Upgrade Traffic Study (Austin-Foust Associates, 2001). The forecasts include traffic from all Related Projects and ambient growth for 20 years to the Year 2020. Forecasts obtained from the US-101/Kanan Road Interchange Upgrade Traffic Study will be used for the intersections of Kanan Road at Canwood Street, and the two ramp intersections. The intersection of Kanan Road at Roadside Drive will be integrated into the US-101 eastbound ramps, and will no longer be a stand-alone intersection. Cumulative Conditions forecasts at the remaining study intersections have been developed using the standard process of identifying related projects and adding project traffic from each project to Existing Plus Growth Plus Project Traffic Volumes.

A general description of each related project is provided in ***Appendix D***. It should be noted that the Related Projects include a number of significant future developments, including the Ted Moore Mixed-Use project on the southeast corner of the intersection of Kanan Road and Agoura Road, and the Creekside Retail project on the southwest corner of the intersection of Kanan Road and Agoura Road, and the mixed-use development proposed for the northeast quadrant of the Kanan / US-101 interchange. Although it is likely that intersection improvements will be required of these projects, this Cumulative Conditions analysis does not assume any mitigation improvements to be in place. The combined related project daily and peak hour traffic volumes from all Related Projects are illustrated on **Figure 11**.

**Summary of Two-lane Roadway Analysis**

The results of the Cumulative Conditions roadway analysis are summarized in Table 1, previously referenced. The analysis indicates that the three roadway segments will continue to operate at LOS A in both peak hours with the addition of related projects traffic.

**Summary of Intersection Analysis**

Cumulative Conditions peak hour traffic volumes are shown on **Figure 12**. The intersections were re-evaluated, and the results of the analysis are shown on Table 2, previously referenced. With the addition of related projects traffic, and the interchange improvements in place, the intersection of Kanan Road at Canwood Street will operate at LOS D in the morning peak hour and LOS E in the evening peak hour. The Kanan Road interchange eastbound and westbound ramps would operate at acceptable levels of service in the morning peak hour, and will operate at LOS D in the evening peak hour. The intersections of Kanan Road at Agoura Road and Agoura Road at Cornell Road are projected to operate at LOS E or F in the evening peak hour. It should be noted once again, that no mitigation improvements for the Related Projects are assumed in the Cumulative Conditions analysis, although it is expected that the major development projects will have substantial mitigation requirements.

Based on County of Los Angeles criteria, the project would have a Cumulative Impact at the intersections of Kanan Road at Canwood Street, and Kanan Road at Agoura Road, and the project will be required to contribute on a fair-share basis to the improvements necessary to mitigate these conditions.

At the intersection of Kanan Road at Canwood Street, the addition of northbound and southbound through lanes would improve the morning peak hour ICU to 0.722 (LOS "C") and the evening peak hour ICU to 0.805 (LOS "C"). The Triangle Ranch project traffic represents approximately 2% of the additional peak hour traffic in the cumulative condition at this intersection.

At the intersection of Kanan Road at Agoura Road, improvements needed to mitigate Cumulative Impacts would be the addition of a southbound left-turn lane, eastbound right and through lanes, and a westbound through lane. These improvements would improve the morning peak hour ICU to 0.508, LOS "A", and the evening peak hour ICU to 0.713, LOS "C". The Triangle Ranch project traffic represents approximately 6% of the additional peak hour traffic in the cumulative condition at this intersection.

A summary of intersection operation with mitigation is provided on **Table 5**.

Since the future Cumulative Conditions analysis assumes a significant network improvement at the Kanan / US-101 interchange, an analysis was also conducted to show the project's impact on the operation of the future interchange. A summary of Cumulative Conditions at the interchange, with and without the Triangle Ranch project, is provided in Table 6.

**Table 5**
**Summary of Intersection Operations**
**Cumulative Conditions With and Without Mitigation**

| Signalized Intersection | Existing Plus Growth Conditions | | | | Cumulative Conditions Without Mitigation | | | | Cumulative Conditions With Mitigation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AM | | PM | | AM | | PM | | AM | | PM | |
| | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS |
| **Kanan Road at:** | | | | | | | | | | | | |
| Canwood Street | 0.801 | C | 1.000 | E | 0.870 | D | 1.003 | E | 0.722 | C | 0.805 | D |
| Agoura Road | 0.649 | B | 0.727 | C | 0.800 | C | 1.103 | F | 0.508 | A | 0.713 | C |

**Table 6**
**Summary of Cumulative Conditions**
**At the Kanan – US-101 Interchange**
**Without and With Triangle Ranch**

| Intersection | Cumulative Conditions Without Project | | | | Cumulative Conditions With Project | | | |
|---|---|---|---|---|---|---|---|---|
| | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | |
| | ICU | LOS | ICU | LOS | ICU | LOS | ICU | LOS |
| Kanan / US-101 WB | 0.786 | C | 0.901 | D | 0.787 | C | 0.903 | D |
| Kanan / US-101 EB | 0.595 | A | 0.889 | D | 0.597 | A | 0.891 | D |
| | | | | | | | | |

Review of Table 6 shows that the Triangle Ranch project will not significantly impact the peak hour operation of the interchange under Cumulative Conditions. The ICU increase in both peak hours at both interchange intersections would be 0.002, and does not meet the 0.02 threshold of significance. The Triangle Ranch project will participate in a Traffic Impact Fee program on a per-PM-trip basis through the City of Agoura Hills Benefit Assessment Fee.

## OPERATIONAL ISSUES

### Accident Analysis

Accident data was obtained from the County of Los Angeles Department of Public Works for Kanan Road and Cornell Road between Canwood Street (north of the US-101 Freeway) and Mulholland Highway for the five-year period from February 1, 1998 to January 31, 2003.

The data for the five-year time period revealed that an average of 9.4 accidents per year occurred on Kanan Road between Canwood Street and Mulholland Highway, and an average of 5.2 accidents per year occurred on Cornell Road between Kanan Road and Mulholland Highway. This equates to an accident rate of .229 accidents per million-vehicle-miles on Kanan Road, and 1.31 accidents per million-vehicle-miles on Cornell Road. The County average for accidents on rural mountain roads ranges from 1.82 to 3.79 accidents per million-vehicle-miles, depending on the design speed of the roadway.

A summary of the accidents on Kanan Road and Cornell Road within one mile of the project is provided on **Table 7**. On Kanan Road, within a mile of the project site, there were six accidents over the course of the five-year period. One accident was a fatality accident – all others were property damage only. On Cornell Road, within one mile of the site, there were 10 accidents over the five-year period. All were property-damage-only accidents.

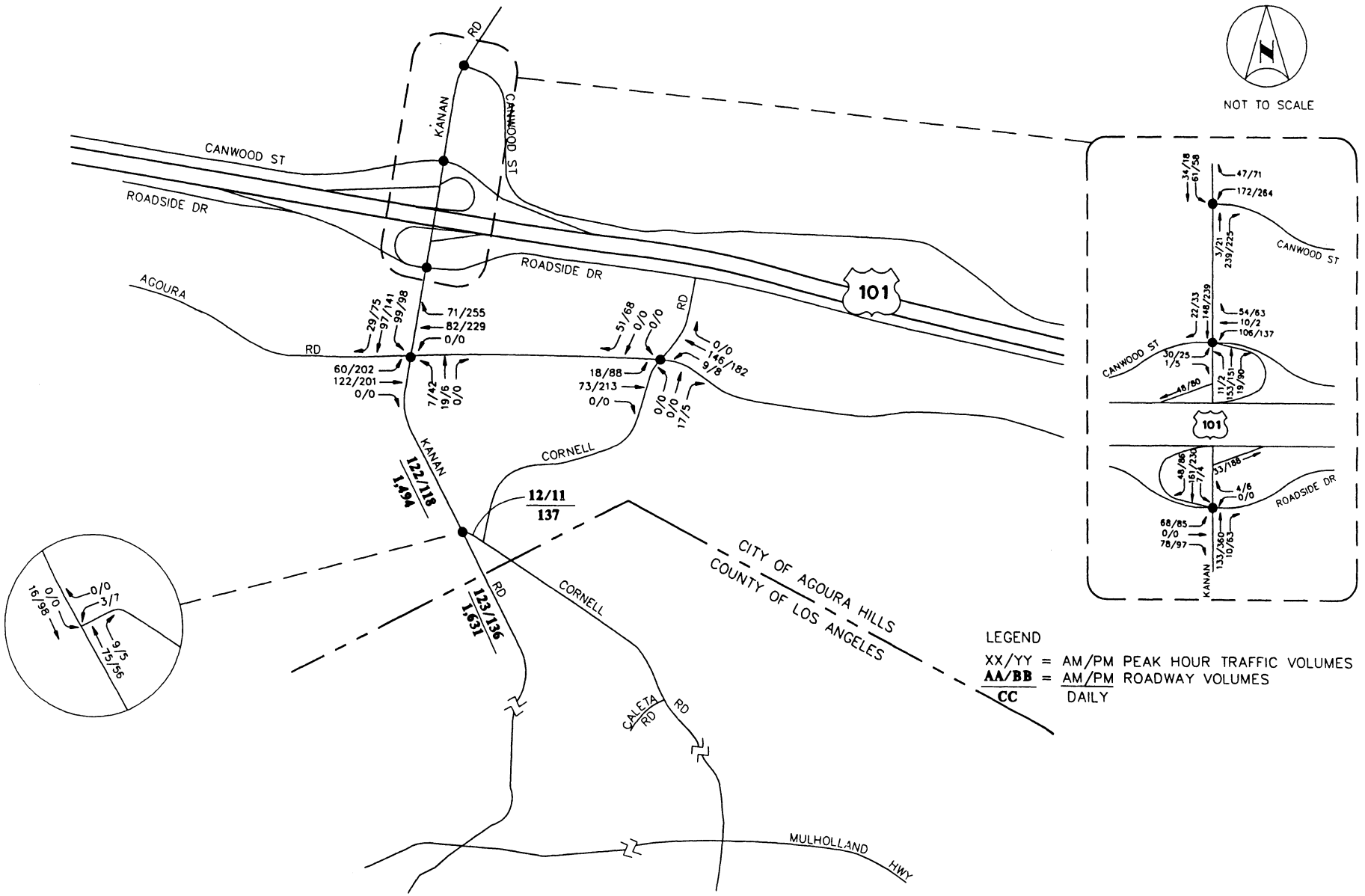



FIGURE 11

RELATED PROJECTS TRAFFIC VOLUMES

Kimley-Horn and Associates, Inc.

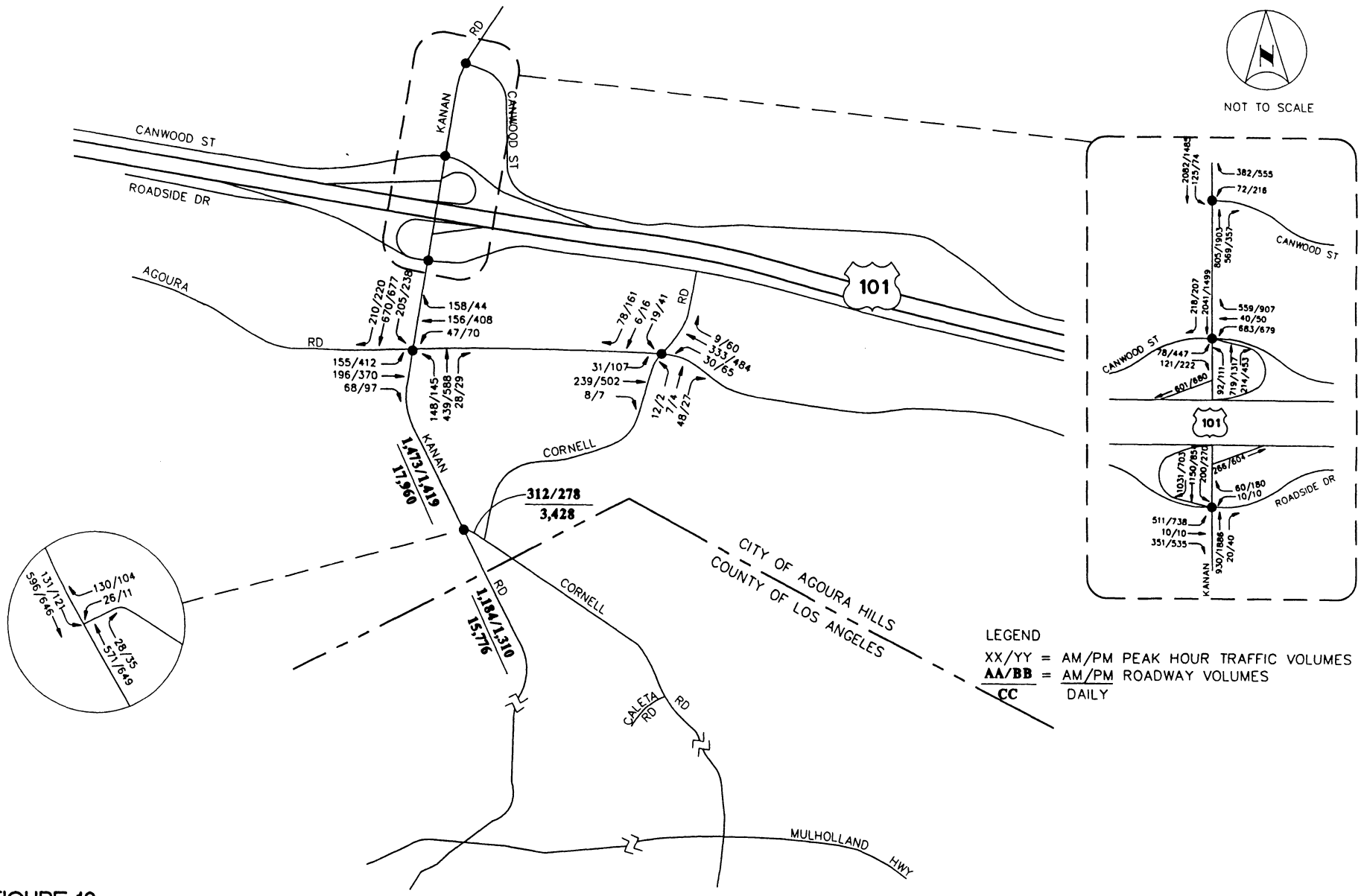



FIGURE 12
CUMULATIVE CONDITIONS

Kimley-Horn and Associates, Inc.

On the segment of Cornell Way that connects Kanan Road to Cornell Road, there were two accidents in 1999, and two in 2000. All were property-damage-only accidents.

Based on the accident database provided by the County, most of the accidents on both Cornell Road or Kanan Road resulted in property damage only. The primary causes of accidents were speeding, improper turns or other moving violations, and driving under the influence.

To minimize the risk of additional accidents in the vicinity of the project, and to facilitate the safe movement of vehicles into and out of the project, the project access points have been designed with left-turn lanes, deceleration lanes, and acceleration lanes, and will comply with County of Los Angeles sight distance criteria.

In addition to observations made from the County of Los Angeles Accident Data, travel speed on Kanan Road and Cornell Road have been observed to be in excess of the posted speed limits, which are 50 mph on Kanan Road and 35 mph on Cornell Road.

**Speed Study**

Speed data was collected on Kanan Road and Cornell Road in the vicinity of the project. The results of speed data are typically reported in terms of average speed, and the 85$^{th}$ percentile speed, which identifies the speed under which 85% of the drivers are driving, and over which the remaining 15% of the drivers are driving. For example, if the 85$^{th}$ percentile speed is 40 miles per hour, that means that 85 of the drivers are driving at 40 mph or slower, and the remaining 15% of the drivers are driving faster than 40 mph.

The speed data indicates that the 85$^{th}$ percentile speed of area residents and through travelers driving on Kanan Road is 54-54 mph just south of Agoura road, and increases to 57-59 mph south of Silvercreek. On Cornell Road, the 85$^{th}$ percentile speed is 49 to 52 mph. A summary of the speed data is provided on **Table 8**.

From this data, it is apparent that many drivers currently travel at speeds that exceed the posted speed limit on the roadways from which the Triangle Ranch project will take access. To minimize the risk of additional accidents in the vicinity of the project, and to facilitate the safe movement of vehicles into and out of the project, the project access points have been designed with left-turn lanes, deceleration lanes, and acceleration lanes, and will comply with County of Los Angeles sight distance criteria.

**Table 7**

**Summary of Highway Accident History**
**Within One Mile of Project Site**

| Year | Date / Time | Location | No. of Vehicles | Vehicle Direction | Cause / Violation | Driver Condition | Weather | Injuries | Fatalities |
|---|---|---|---|---|---|---|---|---|---|
| **Kanan Road** | | | | | | | | | |
| 1998 | Oct. 11 / 2:00 PM | Kanan at Canwood | 2 | NB | Speeding | Normal | Clear | 0 | 0 |
| 1999 | Jan. 14 / 8:00 AM | 1,056' s/o Castle View | 2 | NB/SB | Following too close | Normal | Clear | 0 | 0 |
| | Nov. 20 / 8:00 PM | 200' n/o Silver Creek Rd. | 1 | SB | Speeding | Normal | Clear | 0 | 0 |
| 2000 | Nov. 15 / 10 PM | 227' n/o Silver Creek Rd. | 2 | NB | DUI | Under Influence | Clear | 0 | 2 |
| 2001 | Jun. 16 / 2:00 AM | 0.7 mi. s/o Castle View | 1 | SB | DUI | Under Influence | Clear | 0 | 0 |
| | Aug. 13 / 5:00 PM | 0.8 mi. s/o Castle View | 1 | SB | DUI | Under Influence | Clear | 0 | 0 |
| **Cornell Road** | | | | | | | | | |
| 1998 | May 24 / 3:00 PM | 0.2 mi. s/o Wagon Road | 1 | SB | Speeding | Normal | Clear | 0 | 0 |
| | Dec. 11 / 5:00 AM | 145' n/o Caleta Road | 2 | NB/SB | DUI | Drunk/Normal | Clear | 0 | 0 |
| 2000 | May 21 / 12 Noon | Cornell at Silver Creek | 2 | WB/EB | Stop sign violation | Normal | Clear | 0 | 0 |
| | June 2 / 6:00 PM | 0.7 mi. s/o Wagon Rd | 1 | NB | Speeding | Normal | Clear | 0 | 0 |
| | Aug. 9 / 7:00 PM | 0.7 mi. s/o Wagon Rd | 1 | SB | Speeding | Normal | Clear | 0 | 0 |
| 2001 | Jun. 10 / 8:00 PM | 0.7 mi. s/o Wagon Rd | 1 | NB | No violation | Normal | Clear | 0 | 0 |
| | Nov. 10 / 7:00 PM | 0.5 mi. s/o Wagon Rd | 2 | SB | Unsafe turn | Normal | Clear | 0 | 0 |
| 2002 | Mar. 27 / 6:00 PM | 15' s/o Wagon Rd | 1 | SB | Unsafe turn | Normal | Clear | 0 | 0 |
| | Mar. 31 / 6:00 AM | 104' n/o Countryside Dr | 1 | SB | DUI | Drunk | Cloudy | 0 | 0 |
| | Aug. 5 / 1:00 PM | 0.2 mi. s/o Wagon Rd. | 1 | NB | Speeding | Normal | Clear | 0 | 0 |
| **Cornell Way** | | | | | | | | | |
| 1999 | Feb. 7 / 11:00 PM | 0.1 mi. e/o Kanan Rd | 1 | WB | Speeding | Normal | Cloudy | 0 | 0 |
| | Dec. 21 / 1:00 AM | 0.2 mi. e/o Kanan Rd | 1 | WB | Speeding | Normal | Clear | 0 | 0 |
| 2000 | Jan. 25 / 5:00 PM | 0.2 mi. e/o Kanan Rd | 1 | EB | No violation | Normal | Raining | 0 | 0 |
| | Dec. 22 / 5:00 PM | 0.25 mi. e/o Kanan Rd | 1 | WB | Unsafe turn | Normal | Clear | 0 | 0 |

Source: L.A. County Department of Public Works – Maintenance Management System
Traffic Accident File Listing – File Period 02/01/98 thru 01/31/03

**Table 8**
**Summary of Speed Data**

| Roadway Segment | Average Speed | 85th Percentile | Range of Speed | Posted Speed Limit |
|---|---|---|---|---|
| **Kanan Road** btwn Agoura and Cornell Way | | | | |
| - Northbound | 46 | 53 | 36 to 56 | 50 |
| - Southbound | 50 | 54 | 38 to 60 | |
| **Kanan Road** south of Silvercreek | | | | |
| - Northbound | 54 | 57 | 42 to 62 | 50 |
| - Southbound | 55 | 59 | 44 to 60 | |
| **Cornell Road** south of Silvercreek | | | | |
| - Northbound | 47 | 52 | 35 to 54 | 35 |
| - Southbound | 44 | 49 | 34 to 52 | |

## CONGESTION MANAGEMENT PROGRAM COMPLIANCE

The Los Angeles County Congestion Management Program (CMP) was developed in response to California Proposition 111, approved June 1990, and is intended to address regional congestion by linking land use, transportation, and air quality decisions.

Among the elements of the CMP is a land use analysis program which "requires local jurisdictions to analyze the impacts of land use decisions on the regional transportation system, for projects preparing and Environmental Impact Report (EIR)."

The CMP document identifies the County's CMP Highway System, and requires that Level of Service E or better be maintained on this network. The US-101 Freeway is the only CMP facility in the Agoura Hills area..

Analysis of project impact on a freeway segment would be required of any project that would add 150 trips or more in either direction during the AM or PM weekday peak hours. Triangle Ranch is projected to add 8 peak hour trips to US 101 east of Kanan Road in the eastbound direction during the morning peak hour and 5 peak hour trips during the evening peak hour. In the westbound direction, Triangle Ranch would add 4 morning peak hour trips and 9 evening peak hour trips to US 101 east of Kanan Road. Triangle Ranch is projected to add 4 peak hour trips to US 101 west of Kanan Road in the westbound direction during the morning peak hour and 3 peak hour trips during the evening peak hour. In the eastbound direction, Triangle Ranch would add 1 morning peak hour trips and 5 evening peak hour trips to US 101 west of Kanan Road. Therefore, further analysis of US 101 is not required for CMP purposes.

An analysis of CMP monitored intersections is required if a project contributes 50 or more peak hour trips to the CMP monitored intersections. No intersections in the study area have been identified in the CMP document as CMP monitored intersections.

## SUMMARY OF FINDINGS AND CONCLUSIONS

- Sage Community Group proposes to develop 81 single-family homes on approximately 320 acres at Kanan Road and Cornell Road in the County of Los Angeles. The development is known as Triangle Ranch.

- Seven intersections were analyzed for existing traffic operations. The signalized intersection of Kanan Road and Canwood Street is currently operating at LOS E in the evening peak hour, and the unsignalized intersection of Kanan Road at Roadside Drive is currently operating at LOS F in the evening peak hour. All other study intersections are currently operating at an acceptable level of service.

- The seven study intersections were reevaluated with Existing plus Growth traffic volumes. With the addition of ambient traffic growth, the intersection of Kanan Road and Canwood Street would remain at LOS E in the evening peak hours, and the intersection of Kanan Road and the US-101 interchange would remain at LOS D in the morning peak hour. The unsignalized intersection of Kanan Road at Roadside Drive would continue to operate at LOS F in the evening peak hour, and would worsen to LOS E in the morning peak hour.

- Triangle Ranch is estimated to generate 854 daily trips with 67 trips in the morning peak hour and 89 trips in the evening peak hour.

- Triangle Ranch would contribute to unacceptable conditions at the signalized intersections by less than 0.01, and would not cause any signalized intersection to worsen to unacceptable conditions in the morning or evening peak hours. Triangle Ranch will contribute to long delays at the intersection of Kanan Road / Roadside Drive in the evening peak hour. This intersection will be integrated into the Kanan Road Interchange improvement project, and will no longer function as a stand-alone intersection. The Triangle Ranch project will participate in a Traffic Impact Fee program on a per-PM-trip basis through the City of Agoura Hills Benefit Assessment Fee.

- Traffic from related projects in the area was added to Existing plus Growth plus Project conditions in order to conduct a Cumulative Conditions analysis. For the Cumulative Conditions analysis, the Kanan Road interchange improvements are assumed, and Year 2020 forecasts from the Kanan Road Interchange Upgrade Project Traffic Study were assumed for the intersections of Kanan Road and Canwood Street, and the Kanan Road and US-101 EB and WB ramps.

- With the addition of related projects traffic, and the interchange improvements in place, the intersection of Kanan Road at Canwood Street will operate at LOS D in the morning peak hour and LOS E in the evening peak hour. The Kanan Road interchange eastbound and westbound ramps would operate at acceptable levels of service in the morning peak hour, and will operate at LOS D in the evening peak hour. The intersections of Kanan Road at Agoura Road and Agoura Road at Cornell Road are projected to operate at LOS E or F in the evening peak hour. The project impact at each of the intersections is less than 0.01, far below the City's significance threshold of 0.02.

- The project would have a Cumulative Impact at two intersections, and will be required to contribute to the improvement of those intersections on a fair-share basis. Mitigation for the intersections of Kanan Road and Canwood Street and Kanan Road at Agoura Road was identified.

- Review of County of Los Angeles accident data indicates that an average of 9.4 accidents per year occurred on Kanan Road between Canwood Street and Mulholland Drive over the course of a five-year period, from February 1, 1998 to January 31, 2003. On Cornell Road, an average of 5.2 accidents per year occurred between Kanan Road and Mulholland Drive. This equates to an accident rate of .229 accidents per million-vehicle-miles on Kanan Road, and 1.31 accidents per million-vehicle-miles on Cornell Road. The County average for accidents on rural mountain roads ranges from 1.82 to 3.79 accidents per million-vehicle-miles, depending on the design speed of the roadway.

- Traffic speeds on Cornell Road and Kanan Road in the vicinity of the project are currently in excess of the posted speed limits. To minimize the risk of accidents due to excessive speeds on Kanan Road and Cornell Road, and to facilitate the safe movement of vehicles into and out of the project, the project access points have been designed with left-turn lanes, deceleration lanes, and acceleration lanes; and will comply with County of Los Angeles sight distance criteria.

# APPENDIX A

# LEVEL OF SERVICE DESCRIPTIONS

TABLE 1

LEVEL OF SERVICE DEFINITIONS
(SIGNALIZED INTERSECTIONS)

| Level of Service | Traffic Flow Characteristics |
|---|---|
| A | Very low average stopped delay, less than five seconds per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay. |
| B | Average stop delay is in the range of 5.1 to 15.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay. |
| C | Average stopped delay is in the range of 15.1 to 25.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping. |
| D | Average stopped delays are in the range of 25.1 to 40.0 seconds per vehicle. The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle length, or high volume/capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable. |
| E | Average stopped delays are in the range of 40.1 to 60.0 seconds per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high volume/capacity ratios. Individual cycle failures are frequent occurrences. |
| F | Average stop delay is in excess of 60 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with oversaturation. It may also occur at high volume/capacity ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such high delay levels. |

Note: A signal cycle failure is considered to occur when one or more vehicles are forced to wait through more than one green signal indication for a particular approach.

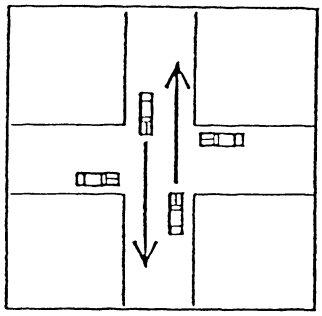
TABLE 3

GENERAL LEVEL OF SERVICE DESCRIPTIONS FOR UNSIGNALIZED INTERSECTIONS

| LOS | General Description |
|---|---|
| A | - Nearly all drivers find freedom of operation<br>- Very seldom is there more than one vehicle in the queue |
| B | - Some drivers begin to consider the delay an inconvenience<br>- Occasionally there is more than one vehicle in the queue |
| C | - Many times there is more than one vehicle in the queue<br>- Most drivers feel restricted, but not objectionably so |
| D | - Often there is more than one vehicle in the queue<br>- Drivers feel quite restricted |
| E | - Represents a condition in which the demand is near or equal to the probable maximum number of vehicles that can be accommodated by the movement<br>- There is almost always more than one vehicle in the queue<br>- Drivers find the delays to be approaching intolerable levels |
| F | - Forced flow<br>- Represents an intersection failure condition that is caused by geometric and/or operational constraints external to the intersection |

Table B-3

The OPERATIONS LEVEL METHODOLOGY, which is described in the Transportation Research Board's Highway Capacity Manual, defines Level of Service (LOS) for signalized intersections in terms of delay. Technically, delay is the amount of time an average vehicle must wait at an intersection before being able to pass through the intersection. For signalized intersections, the relationship between LOS and delay is based on the average stopped delay per vehicle for a fifteen minute period.

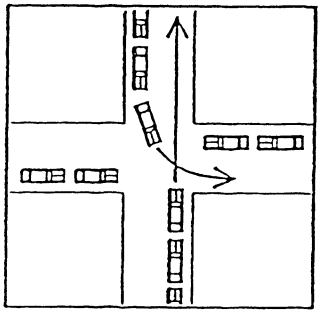


LOS 'A'

LEVEL OF SERVICE 'A' - Delay 0.0 to 5.0 seconds

Describes operations with very low delay, i.e., less than 5 seconds per vehicle. This occurs when signal progression is extremely favorable. Most vehicles arrive during the green phase and are not required to stop at all.

***Corresponding V/C ratios usually range from 0.00 to 0.60.***

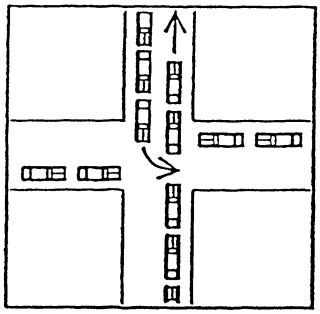


LOS 'C'

LEVEL OF SERVICE 'B' - Delay 5.1 to 15.0 seconds

Describes operations with delay in the range of 5 to 15 seconds per vehicle generally characterized by good signal progression and/or short cycle lengths. More vehicles are required to stop than for LOS 'A' causing higher levels of average delay.

***Corresponding V/C ratios usually range from 0.61 to 0.70.***

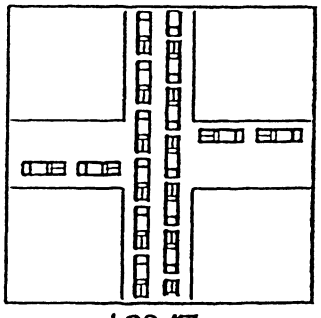


LOS 'D'

LEVEL OF SERVICE 'C' - Delay 15.1 to 25.0 seconds

Describes operations with delay in the range of 15 to 25 seconds per vehicle. Occasionally, vehicles may be required to wait more than one red signal phase. The number of vehicles stopping at this level is significant although many still pass through the intersection without stopping.

***Corresponding V/C ratios usually range from 0.71 to 0.80.***



LOS 'F'

LEVEL OF SERVICE 'D' - Delay 25.1 to 40.0 seconds

Describes operations with delay in the range of 25 of 40 seconds per vehicle. At LOS 'D', the influence of congestion becomes more noticeable. Many vehicles stop, and the proportion of vehicles not stopping declines. The number of vehicles failing to clear the signal during the first green phase is noticeable.

***Corresponding V/C ratios usually range from 0.81 to 0.90.***

LEVEL OF SERVICE 'E' - Delay 40.1 to 60.0 seconds

Describes operations with delay in the range of 40 to 60 seconds per vehicle. These high delay values generally indicate poor signal progression, long cycle lengths and high V/C ratios. Vehicles frequently fail to clear the intersection during the first green phase.

***Corresponding V/C ratios usually range from 0.91 to 1.00.***

LEVEL OF SERVICE 'F' - Delay 60.1 seconds plus

Describes operations with delay in excess of 60 seconds per vehicle. This condition often occurs with oversaturation, i.e., when arrival flow rates exceed the capacity of the intersection.

***Corresponding V/C ratios of over 1.00 are usually associated.***

SOURCE: Transportation Research Board, "Operations Level Methodology-Signalized Intersections", Highway Capacity Manual, Special Report 209, 1965.

LOS-HCS-1/21/92CRL

LEVEL OF SERVICE DIAGRAM

# APPENDIX B

# TRAFFIC COUNT DATA SHEETS

# Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Kanan Rd. DATE: 5/6/2003 LOCATION: City of Agoura Hills

E-W STREET: Canwood St. DAY: TUESDAY PROJECT# 03-0747-001

| | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTAL |
| LANES: | 1 | 2 | 0 | 1 | 3.5 | .5 | 1 | 1 | 1 | 1 | 1 | 0 | |
| 6:00 AM | | | | | | | | | | | | | |
| 6:15 AM | | | | | | | | | | | | | |
| 6:30 AM | | | | | | | | | | | | | |
| 6:45 AM | | | | | | | | | | | | | |
| 7:00 AM | 5 | 154 | 43 | 20 | 359 | 5 | 0 | 17 | 32 | 49 | 10 | 17 | 711 |
| 7:15 AM | 11 | 181 | 55 | 24 | 397 | 2 | 2 | 15 | 27 | 53 | 16 | 16 | 799 |
| 7:30 AM | 20 | 169 | 51 | 30 | 422 | 3 | 6 | 29 | 60 | 109 | 23 | 31 | 953 |
| 7:45 AM | 13 | 196 | 59 | 29 | 330 | 7 | 8 | 21 | 22 | 35 | 15 | 11 | 746 |
| 8:00 AM | 23 | 246 | 50 | 40 | 445 | 10 | 6 | 15 | 32 | 35 | 21 | 22 | 945 |
| 8:15 AM | 35 | 258 | 43 | 50 | 372 | 10 | 11 | 25 | 24 | 57 | 21 | 25 | 931 |
| 8:30 AM | 33 | 245 | 46 | 55 | 359 | 9 | 6 | 39 | 38 | 52 | 12 | 19 | 913 |
| 8:45 AM | 37 | 195 | 31 | 54 | 389 | 11 | 4 | 42 | 26 | 64 | 23 | 24 | 900 |
| 9:00 AM | | | | | | | | | | | | | |
| 9:15 AM | | | | | | | | | | | | | |
| 9:30 AM | | | | | | | | | | | | | |
| 9:45 AM | | | | | | | | | | | | | |
| 10:00 AM | | | | | | | | | | | | | |
| 10:15 AM | | | | | | | | | | | | | |
| 10:30 AM | | | | | | | | | | | | | |
| 10:45 AM | | | | | | | | | | | | | |
| 11:00 AM | | | | | | | | | | | | | |
| 11:15 AM | | | | | | | | | | | | | |
| 11:30 AM | | | | | | | | | | | | | |
| 11:45 AM | | | | | | | | | | | | | |
| TOTAL VOLUMES = | NL 177 | NT 1644 | NR 378 | SL 302 | ST 3073 | SR 57 | EL 43 | ET 203 | ER 261 | WL 454 | WT 141 | WR 165 | TOTAL 6898 |

AM Peak Hr Begins at: 800 AM

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PEAK VOLUMES = | 128 | 944 | 170 | 199 | 1565 | 40 | 27 | 121 | 120 | 208 | 77 | 90 | 3689 |
| PEAK HR. FACTOR: | | 0.924 | | | 0.911 | | | 0.807 | | | 0.845 | | 0.976 |

CONTROL: Signalized;

# Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Kanan Rd. DATE: 5/6/2003 LOCATION: City of Agoura Hills

E-W STREET: Canwood St. DAY: TUESDAY PROJECT# 03-0747-001

| | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTAL |
| LANES: | | | | 1 | 3.5 | .5 | 1 | 1 | 1 | 1 | 1 | 0 | |
| 1:00 PM | | | | | | | | | | | | | |
| 1:15 PM | | | | | | | | | | | | | |
| 1:30 PM | | | | | | | | | | | | | |
| 1:45 PM | | | | | | | | | | | | | |
| 2:00 PM | | | | | | | | | | | | | |
| 2:15 PM | | | | | | | | | | | | | |
| 2:30 PM | | | | | | | | | | | | | |
| 2:45 PM | | | | | | | | | | | | | |
| 3:00 PM | | | | | | | | | | | | | |
| 3:15 PM | | | | | | | | | | | | | |
| 3:30 PM | | | | | | | | | | | | | |
| 3:45 PM | | | | | | | | | | | | | |
| 4:00 PM | 31 | 276 | 60 | 45 | 274 | 21 | 10 | 11 | 31 | 67 | 22 | 48 | 896 |
| 4:15 PM | 28 | 335 | 28 | 51 | 254 | 10 | 10 | 16 | 31 | 66 | 6 | 49 | 884 |
| 4:30 PM | 25 | 447 | 20 | 39 | 322 | 11 | 14 | 20 | 37 | 76 | 28 | 63 | 1102 |
| 4:45 PM | 29 | 341 | 14 | 55 | 229 | 7 | 16 | 13 | 33 | 62 | 11 | 48 | 858 |
| 5:00 PM | 25 | 492 | 25 | 41 | 295 | 5 | 11 | 26 | 67 | 75 | 23 | 78 | 1163 |
| 5:15 PM | 25 | 367 | 22 | 38 | 228 | 7 | 10 | 28 | 37 | 57 | 18 | 40 | 877 |
| 5:30 PM | 30 | 425 | 34 | 35 | 248 | 29 | 19 | 26 | 39 | 73 | 17 | 68 | 1043 |
| 5:45 PM | 26 | 400 | 23 | 23 | 262 | 7 | 8 | 20 | 33 | 52 | 22 | 39 | 915 |
| 6:00 PM | | | | | | | | | | | | | |
| 6:15 PM | | | | | | | | | | | | | |
| 6:30 PM | | | | | | | | | | | | | |
| 6:45 PM | | | | | | | | | | | | | |
| TOTAL VOLUMES = | NL 219 | NT 3083 | NR 226 | SL 327 | ST 2112 | SR 97 | EL 98 | ET 160 | ER 308 | WL 528 | WT 147 | WR 433 | TOTAL 7738 |

PM Peak Hr Begins at: 415 PM

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PEAK VOLUMES = | 107 | 1615 | 87 | 186 | 1100 | 33 | 51 | 75 | 168 | 279 | 68 | 238 | 4007 |
| PEAK HR. FACTOR: | | 0.834 | | | 0.886 | | | 0.707 | | | 0.831 | | 0.861 |

CONTROL: Signalized;

# Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Kanan Rd. DATE: 5/6/2003 LOCATION: City of Agoura Hills

E-W STREET: SR-101 WB Ramps DAY: TUESDAY PROJECT# 03-0747-002

| | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTAL |
| LANES: | 1 | 2 | | | 3 | 1 | | | | 1.3 | .3 | 1.3 | |
| 6:00 AM | | | | | | | | | | | | | |
| 6:15 AM | | | | | | | | | | | | | |
| 6:30 AM | | | | | | | | | | | | | |
| 6:45 AM | | | | | | | | | | | | | |
| 7:00 AM | 42 | 109 | | | 322 | 82 | | | | 132 | | 169 | 856 |
| 7:15 AM | 47 | 94 | | | 308 | 116 | | | | 110 | | 95 | 770 |
| 7:30 AM | 47 | 113 | | | 440 | 121 | | | | 103 | | 99 | 923 |
| 7:45 AM | 57 | 125 | | | 302 | 138 | | | | 113 | | 134 | 869 |
| 8:00 AM | 32 | 190 | | | 374 | 129 | | | | 93 | | 136 | 954 |
| 8:15 AM | 53 | 188 | | | 294 | 138 | | | | 103 | | 140 | 916 |
| 8:30 AM | 41 | 225 | | | 321 | 103 | | | | 101 | | 115 | 906 |
| 8:45 AM | 55 | 175 | | | 350 | 165 | | | | 101 | | 132 | 978 |
| 9:00 AM | | | | | | | | | | | | | |
| 9:15 AM | | | | | | | | | | | | | |
| 9:30 AM | | | | | | | | | | | | | |
| 9:45 AM | | | | | | | | | | | | | |
| 10:00 AM | | | | | | | | | | | | | |
| 10:15 AM | | | | | | | | | | | | | |
| 10:30 AM | | | | | | | | | | | | | |
| 10:45 AM | | | | | | | | | | | | | |
| 11:00 AM | | | | | | | | | | | | | |
| 11:15 AM | | | | | | | | | | | | | |
| 11:30 AM | | | | | | | | | | | | | |
| 11:45 AM | | | | | | | | | | | | | |
| TOTAL | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTAL |
| VOLUMES = | 374 | 1219 | 0 | 0 | 2711 | 992 | 0 | 0 | 0 | 856 | 0 | 1020 | 7172 |
| AM Peak Hr Begins at: | 800 AM | | | | | | | | | | | | |
| PEAK VOLUMES = | 181 | 778 | 0 | 0 | 1339 | 535 | 0 | 0 | 0 | 398 | 0 | 523 | 3754 |
| PEAK HR. FACTOR: | | 0.901 | | | 0.910 | | | 0.000 | | | 0.948 | | 0.960 |

CONTROL: Signalized;

# Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Kanan Rd. DATE: 5/6/2003 LOCATION: City of Agoura Hills

E-W STREET: SR-101 WB Ramps DAY: TUESDAY PROJECT# 03-0747-002

| | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTAL |
| LANES: | | | | | 3 | 1 | | | | 1.3 | .3 | 1.3 | |
| 1:00 PM | | | | | | | | | | | | | |
| 1:15 PM | | | | | | | | | | | | | |
| 1:30 PM | | | | | | | | | | | | | |
| 1:45 PM | | | | | | | | | | | | | |
| 2:00 PM | | | | | | | | | | | | | |
| 2:15 PM | | | | | | | | | | | | | |
| 2:30 PM | | | | | | | | | | | | | |
| 2:45 PM | | | | | | | | | | | | | |
| 3:00 PM | | | | | | | | | | | | | |
| 3:15 PM | | | | | | | | | | | | | |
| 3:30 PM | | | | | | | | | | | | | |
| 3:45 PM | | | | | | | | | | | | | |
| 4:00 PM | 83 | 217 | | | 211 | 137 | | | | 52 | 0 | 200 | 900 |
| 4:15 PM | 78 | 250 | | | 226 | 170 | | | | 67 | 1 | 186 | 978 |
| 4:30 PM | 83 | 245 | | | 209 | 137 | | | | 54 | 0 | 195 | 923 |
| 4:45 PM | 78 | 252 | | | 233 | 133 | | | | 47 | 0 | 176 | 919 |
| 5:00 PM | 77 | 246 | | | 239 | 150 | | | | 54 | 0 | 199 | 965 |
| 5:15 PM | 77 | 250 | | | 212 | 161 | | | | 56 | 0 | 226 | 982 |
| 5:30 PM | 85 | 252 | | | 201 | 107 | | | | 56 | 0 | 211 | 912 |
| 5:45 PM | 85 | 255 | | | 223 | 121 | | | | 73 | 0 | 166 | 923 |
| 6:00 PM | | | | | | | | | | | | | |
| 6:15 PM | | | | | | | | | | | | | |
| 6:30 PM | | | | | | | | | | | | | |
| 6:45 PM | | | | | | | | | | | | | |
| TOTAL VOLUMES = | 646 | 1967 | 0 | 0 | 1754 | 1116 | 0 | 0 | 0 | 459 | 1 | 1559 | 7502 |

PM Peak Hr Begins at: 430 PM

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PEAK VOLUMES = | 315 | 993 | 0 | 0 | 893 | 581 | 0 | 0 | 0 | 211 | 0 | 796 | 3789 |
| PEAK HR. FACTOR: | | 0.991 | | | 0.947 | | | 0.000 | | | 0.893 | | 0.965 |

CONTROL: Signalized;

# Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Kanan Rd. DATE: 5/6/2003 LOCATION: City of Agoura Hills

E-W STREET: SR-101 EB Ramps DAY: TUESDAY PROJECT# 03-0747-003

| | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTAL |
| LANES: | | 2 | 1 | 2 | 2 | | 1.3 | 0.3 | 1.3 | | | | |
| 6:00 AM | | | | | | | | | | | | | |
| 6:15 AM | | | | | | | | | | | | | |
| 6:30 AM | | | | | | | | | | | | | |
| 6:45 AM | | | | | | | | | | | | | |
| 7:00 AM | | 71 | 59 | 279 | 138 | | 105 | | 73 | | | | 725 |
| 7:15 AM | | 94 | 81 | 316 | 185 | | 146 | | 90 | | | | 912 |
| 7:30 AM | | 88 | 51 | 319 | 194 | | 136 | | 107 | | | | 895 |
| 7:45 AM | | 66 | 40 | 259 | 146 | | 156 | | 94 | | | | 761 |
| 8:00 AM | | 135 | 46 | 296 | 174 | | 139 | | 89 | | | | 879 |
| 8:15 AM | | 96 | 62 | 277 | 207 | | 134 | | 97 | | | | 873 |
| 8:30 AM | | 96 | 63 | 271 | 160 | | 154 | | 131 | | | | 875 |
| 8:45 AM | | 98 | 47 | 193 | 180 | | 114 | | 99 | | | | 731 |
| 9:00 AM | | | | | | | | | | | | | |
| 9:15 AM | | | | | | | | | | | | | |
| 9:30 AM | | | | | | | | | | | | | |
| 9:45 AM | | | | | | | | | | | | | |
| 10:00 AM | | | | | | | | | | | | | |
| 10:15 AM | | | | | | | | | | | | | |
| 10:30 AM | | | | | | | | | | | | | |
| 10:45 AM | | | | | | | | | | | | | |
| 11:00 AM | | | | | | | | | | | | | |
| 11:15 AM | | | | | | | | | | | | | |
| 11:30 AM | | | | | | | | | | | | | |
| 11:45 AM | | | | | | | | | | | | | |
| TOTAL VOLUMES = | NL 0 | NT 744 | NR 449 | SL 2210 | ST 1384 | SR 0 | EL 1084 | ET 0 | ER 780 | WL 0 | WT 0 | WR 0 | TOTAL 6651 |

AM Peak Hr Begins at: 715 AM

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PEAK VOLUMES = | 0 | 383 | 218 | 1190 | 699 | 0 | 577 | 0 | 380 | 0 | 0 | 0 | 3447 |
| PEAK HR. FACTOR: | | 0.830 | | | 0.921 | | | 0.957 | | | 0.000 | | 0.945 |

CONTROL: Signalized;

# Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Kanan Rd. DATE: 5/6/2003 LOCATION: City of Agoura Hills

E-W STREET: SR-101 EB Ramps DAY: TUESDAY PROJECT# 03-0747-003

| | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTAL |
| LANES: | | | | 2 | 2 | | 1.3 | 0.3 | 1.3 | | | | |
| 1:00 PM | | | | | | | | | | | | | |
| 1:15 PM | | | | | | | | | | | | | |
| 1:30 PM | | | | | | | | | | | | | |
| 1:45 PM | | | | | | | | | | | | | |
| 2:00 PM | | | | | | | | | | | | | |
| 2:15 PM | | | | | | | | | | | | | |
| 2:30 PM | | | | | | | | | | | | | |
| 2:45 PM | | | | | | | | | | | | | |
| 3:00 PM | | | | | | | | | | | | | |
| 3:15 PM | | | | | | | | | | | | | |
| 3:30 PM | | | | | | | | | | | | | |
| 3:45 PM | | | | | | | | | | | | | |
| 4:00 PM | | 184 | 79 | 147 | 155 | | 137 | | 84 | | | | 786 |
| 4:15 PM | | 182 | 94 | 124 | 150 | | 166 | | 94 | | | | 810 |
| 4:30 PM | | 184 | 99 | 101 | 156 | | 160 | | 104 | | | | 804 |
| 4:45 PM | | 173 | 98 | 106 | 185 | | 168 | | 104 | | | | 834 |
| 5:00 PM | | 143 | 107 | 163 | 140 | | 169 | | 112 | | | | 834 |
| 5:15 PM | | 168 | 96 | 106 | 168 | | 128 | | 115 | | | | 781 |
| 5:30 PM | | 207 | 88 | 131 | 147 | | 137 | | 106 | | | | 816 |
| 5:45 PM | | 181 | 65 | 118 | 186 | | 142 | | 100 | | | | 792 |
| 6:00 PM | | | | | | | | | | | | | |
| 6:15 PM | | | | | | | | | | | | | |
| 6:30 PM | | | | | | | | | | | | | |
| 6:45 PM | | | | | | | | | | | | | |

| TOTAL | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOLUMES = | 0 | 1422 | 726 | 996 | 1287 | 0 | 1207 | 0 | 819 | 0 | 0 | 0 | 6457 |

PM Peak Hr Begins at: 415 PM

| PEAK | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOLUMES = | 0 | 682 | 398 | 494 | 631 | 0 | 663 | 0 | 414 | 0 | 0 | 0 | 3282 |
| PEAK HR. FACTOR: | | 0.954 | | | 0.928 | | | 0.958 | | | 0.000 | | 0.984 |

CONTROL: Signalized;

# Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Kanan Rd. DATE: 5/6/2003 LOCATION: City of Agoura Hills

E-W STREET: Roadside Dr. DAY: TUESDAY PROJECT# 03-0747-004

| | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTAL |
| LANES: | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | | | 1 | |
| | | | | | 2 | | | | | | | | |
| 6:00 AM | | | | | | | | | | | | | |
| 6:15 AM | | | | | | | | | | | | | |
| 6:30 AM | | | | | | | | | | | | | |
| 6:45 AM | | | | | | | | | | | | | |
| 7:00 AM | 6 | 97 | 4 | 19 | 147 | 14 | 6 | 2 | 6 | | | 8 | 309 |
| 7:15 AM | 12 | 131 | 11 | 36 | 180 | 11 | 6 | 3 | 12 | | | 6 | 408 |
| 7:30 AM | 1 | 129 | 1 | 45 | 255 | 21 | 5 | 0 | 6 | | | 25 | 488 |
| 7:45 AM | 1 | 76 | 5 | 41 | 171 | 17 | 8 | 1 | 9 | | | 14 | 343 |
| 8:00 AM | 1 | 168 | 11 | 48 | 201 | 12 | 4 | 6 | 5 | | | 19 | 475 |
| 8:15 AM | 3 | 112 | 4 | 69 | 227 | 16 | 6 | 6 | 12 | | | 21 | 476 |
| 8:30 AM | 5 | 142 | 9 | 89 | 207 | 13 | 14 | 7 | 4 | | | 30 | 520 |
| 8:45 AM | 0 | 128 | 5 | 78 | 202 | 24 | 3 | 7 | 2 | | | 22 | 471 |
| 9:00 AM | | | | | | | | | | | | | |
| 9:15 AM | | | | | | | | | | | | | |
| 9:30 AM | | | | | | | | | | | | | |
| 9:45 AM | | | | | | | | | | | | | |
| 10:00 AM | | | | | | | | | | | | | |
| 10:15 AM | | | | | | | | | | | | | |
| 10:30 AM | | | | | | | | | | | | | |
| 10:45 AM | | | | | | | | | | | | | |
| 11:00 AM | | | | | | | | | | | | | |
| 11:15 AM | | | | | | | | | | | | | |
| 11:30 AM | | | | | | | | | | | | | |
| 11:45 AM | | | | | | | | | | | | | |
| TOTAL VOLUMES = | 29 | 983 | 50 | 425 | 1590 | 128 | 52 | 32 | 56 | 0 | 0 | 145 | 3490 |

AM Peak Hr Begins at: 800 AM

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PEAK VOLUMES = | 9 | 550 | 29 | 284 | 837 | 65 | 27 | 26 | 23 | 0 | 0 | 92 | 1942 |
| PEAK HR. FACTOR: | | 0.817 | | | 0.950 | | | 0.760 | | | 0.767 | | 0.934 |

CONTROL: Unsignalized;

# Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Kanan Rd. DATE: 5/6/2003 LOCATION: City of Agoura Hills

E-W STREET: Roadside Dr. DAY: TUESDAY PROJECT# 03-0747-004

| | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTAL |
| LANES: | 1 | 2 | 1 | 1 | 2 | 0 | 0 | 1 | 0 | | | 1 | |
| 1:00 PM | | | | | | | | | | | | | |
| 1:15 PM | | | | | | | | | | | | | |
| 1:30 PM | | | | | | | | | | | | | |
| 1:45 PM | | | | | | | | | | | | | |
| 2:00 PM | | | | | | | | | | | | | |
| 2:15 PM | | | | | | | | | | | | | |
| 2:30 PM | | | | | | | | | | | | | |
| 2:45 PM | | | | | | | | | | | | | |
| 3:00 PM | | | | | | | | | | | | | |
| 3:15 PM | | | | | | | | | | | | | |
| 3:30 PM | | | | | | | | | | | | | |
| 3:45 PM | | | | | | | | | | | | | |
| 4:00 PM | 3 | 201 | 17 | 79 | 153 | 9 | 4 | 2 | 11 | | | 55 | 534 |
| 4:15 PM | 2 | 220 | 13 | 77 | 153 | 13 | 7 | 5 | 2 | | | 50 | 542 |
| 4:30 PM | 32 | 227 | 22 | 75 | 153 | 21 | 5 | 0 | 8 | | | 43 | 586 |
| 4:45 PM | 1 | 211 | 9 | 76 | 190 | 17 | 10 | 1 | 7 | | | 53 | 575 |
| 5:00 PM | 1 | 227 | 11 | 84 | 187 | 1 | 5 | 1 | 7 | | | 59 | 583 |
| 5:15 PM | 2 | 185 | 9 | 83 | 187 | 4 | 6 | 2 | 6 | | | 51 | 535 |
| 5:30 PM | 2 | 228 | 12 | 74 | 160 | 9 | 4 | 2 | 5 | | | 58 | 554 |
| 5:45 PM | 2 | 190 | 7 | 77 | 205 | 11 | 2 | 8 | 2 | | | 51 | 555 |
| 6:00 PM | | | | | | | | | | | | | |
| 6:15 PM | | | | | | | | | | | | | |
| 6:30 PM | | | | | | | | | | | | | |
| 6:45 PM | | | | | | | | | | | | | |
| TOTAL VOLUMES = | NL 45 | NT 1689 | NR 100 | SL 625 | ST 1388 | SR 85 | EL 43 | ET 21 | ER 48 | WL 0 | WT 0 | WR 420 | TOTAL 4464 |

PM Peak Hr Begins at: 415 PM

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PEAK VOLUMES = | 36 | 885 | 55 | 312 | 683 | 52 | 27 | 7 | 24 | 0 | 0 | 205 | 2286 |
| PEAK HR. FACTOR: | | 0.868 | | | 0.925 | | | 0.806 | | | 0.869 | | 0.975 |

CONTROL: Unsignalized;

# Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Kanan Rd. DATE: 5/7/2003 LOCATION: City of Agoura Hills

E-W STREET: Agoura Rd. DAY: WEDNESDAY PROJECT# 03-0747-005

| | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTAL |
| LANES: | 1 | 2 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | |
| 6:00 AM | | | | | | | | | | | | | |
| 6:15 AM | | | | | | | | | | | | | |
| 6:30 AM | | | | | | | | | | | | | |
| 6:45 AM | | | | | | | | | | | | | |
| 7:00 AM | 8 | 106 | 1 | 8 | 125 | 43 | 16 | 8 | 8 | 11 | 5 | 12 | 351 |
| 7:15 AM | 14 | 76 | 3 | 19 | 139 | 29 | 12 | 17 | 13 | 13 | 10 | 12 | 357 |
| 7:30 AM | 18 | 77 | 3 | 15 | 159 | 52 | 17 | 18 | 13 | 19 | 11 | 17 | 419 |
| 7:45 AM | 41 | 110 | 2 | 23 | 131 | 58 | 17 | 16 | 16 | 15 | 11 | 18 | 458 |
| 8:00 AM | 43 | 129 | 7 | 24 | 139 | 42 | 27 | 12 | 11 | 4 | 19 | 14 | 471 |
| 8:15 AM | 17 | 73 | 4 | 33 | 140 | 49 | 21 | 23 | 17 | 15 | 18 | 26 | 436 |
| 8:30 AM | 23 | 74 | 9 | 23 | 138 | 26 | 27 | 21 | 19 | 10 | 24 | 26 | 420 |
| 8:45 AM | 44 | 89 | 5 | 28 | 110 | 63 | 27 | 25 | 14 | 11 | 16 | 21 | 453 |
| 9:00 AM | | | | | | | | | | | | | |
| 9:15 AM | | | | | | | | | | | | | |
| 9:30 AM | | | | | | | | | | | | | |
| 9:45 AM | | | | | | | | | | | | | |
| 10:00 AM | | | | | | | | | | | | | |
| 10:15 AM | | | | | | | | | | | | | |
| 10:30 AM | | | | | | | | | | | | | |
| 10:45 AM | | | | | | | | | | | | | |
| 11:00 AM | | | | | | | | | | | | | |
| 11:15 AM | | | | | | | | | | | | | |
| 11:30 AM | | | | | | | | | | | | | |
| 11:45 AM | | | | | | | | | | | | | |
| TOTAL VOLUMES = | NL 208 | NT 734 | NR 34 | SL 173 | ST 1081 | SR 362 | EL 164 | ET 140 | ER 111 | WL 98 | WT 114 | WR 146 | TOTAL 3365 |

AM Peak Hr Begins at: 745 AM

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PEAK VOLUMES = | 124 | 386 | 22 | 103 | 548 | 175 | 92 | 72 | 63 | 44 | 72 | 84 | 1785 |
| PEAK HR. FACTOR: | | 0.743 | | | 0.930 | | | 0.847 | | | 0.833 | | 0.947 |

CONTROL: Signalized;

# Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Kanan Rd. DATE: 5/7/2003 LOCATION: City of Agoura Hills

E-W STREET: Agoura Rd. DAY: WEDNESDAY PROJECT# 03-0747-005

| | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTAL |
| LANES: | | | | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | |
| 1:00 PM | | | | | | | | | | | | | |
| 1:15 PM | | | | | | | | | | | | | |
| 1:30 PM | | | | | | | | | | | | | |
| 1:45 PM | | | | | | | | | | | | | |
| 2:00 PM | | | | | | | | | | | | | |
| 2:15 PM | | | | | | | | | | | | | |
| 2:30 PM | | | | | | | | | | | | | |
| 2:45 PM | | | | | | | | | | | | | |
| 3:00 PM | | | | | | | | | | | | | |
| 3:15 PM | | | | | | | | | | | | | |
| 3:30 PM | | | | | | | | | | | | | |
| 3:45 PM | | | | | | | | | | | | | |
| 4:00 PM | 26 | 133 | 12 | 30 | 85 | 28 | 39 | 19 | 10 | 14 | 31 | 35 | 462 |
| 4:15 PM | 35 | 150 | 11 | 40 | 80 | 24 | 53 | 34 | 21 | 13 | 39 | 31 | 531 |
| 4:30 PM | 32 | 128 | 10 | 26 | 94 | 30 | 52 | 33 | 20 | 10 | 48 | 35 | 518 |
| 4:45 PM | 22 | 130 | 10 | 25 | 115 | 33 | 48 | 30 | 27 | 17 | 42 | 43 | 542 |
| 5:00 PM | 23 | 130 | 4 | 36 | 123 | 28 | 55 | 42 | 18 | 16 | 44 | 49 | 568 |
| 5:15 PM | 26 | 160 | 7 | 38 | 121 | 38 | 53 | 43 | 20 | 17 | 49 | 42 | 614 |
| 5:30 PM | 27 | 131 | 4 | 37 | 138 | 41 | 47 | 49 | 18 | 12 | 38 | 49 | 591 |
| 5:45 PM | 25 | 107 | 7 | 38 | 116 | 36 | 54 | 35 | 12 | 12 | 36 | 42 | 520 |
| 6:00 PM | | | | | | | | | | | | | |
| 6:15 PM | | | | | | | | | | | | | |
| 6:30 PM | | | | | | | | | | | | | |
| 6:45 PM | | | | | | | | | | | | | |
| TOTAL VOLUMES = | NL 216 | NT 1069 | NR 65 | SL 270 | ST 872 | SR 258 | EL 401 | ET 285 | ER 146 | WL 111 | WT 327 | WR 326 | TOTAL 4346 |

PM Peak Hr Begins at: 445 PM

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PEAK VOLUMES = | 98 | 551 | 25 | 136 | 497 | 140 | 203 | 164 | 83 | 62 | 173 | 183 | 2315 |
| PEAK HR. FACTOR: | | 0.873 | | | 0.895 | | | 0.970 | | | 0.959 | | 0.943 |

CONTROL: Signalized;

# Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Kanan Rd. DATE: 5/7/2003 LOCATION: City of Agoura Hills

E-W STREET: Cornell Rd DAY: WEDNESDAY PROJECT# 03-0747-007

| | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTAL |
| LANES: | | 1 | 0 | 1 | 1 | | | | | 0 | 1 | 0 | |
| 6:00 AM | | | | | | | | | | | | | |
| 6:15 AM | | | | | | | | | | | | | |
| 6:30 AM | | | | | | | | | | | | | |
| 6:45 AM | | | | | | | | | | | | | |
| 7:00 AM | | 86 | 3 | 25 | 85 | | | | | 3 | | 26 | 228 |
| 7:15 AM | | 76 | 2 | 35 | 139 | | | | | 2 | | 21 | 275 |
| 7:30 AM | | 75 | 4 | 33 | 140 | | | | | 5 | | 35 | 292 |
| 7:45 AM | | 113 | 5 | 36 | 132 | | | | | 4 | | 36 | 326 |
| 8:00 AM | | 143 | 6 | 30 | 134 | | | | | 8 | | 45 | 366 |
| 8:15 AM | | 82 | 4 | 26 | 155 | | | | | 6 | | 14 | 287 |
| 8:30 AM | | 115 | 3 | 32 | 132 | | | | | 4 | | 23 | 309 |
| 8:45 AM | | 99 | 6 | 20 | 115 | | | | | 2 | | 26 | 268 |
| 9:00 AM | | | | | | | | | | | | | |
| 9:15 AM | | | | | | | | | | | | | |
| 9:30 AM | | | | | | | | | | | | | |
| 9:45 AM | | | | | | | | | | | | | |
| 10:00 AM | | | | | | | | | | | | | |
| 10:15 AM | | | | | | | | | | | | | |
| 10:30 AM | | | | | | | | | | | | | |
| 10:45 AM | | | | | | | | | | | | | |
| 11:00 AM | | | | | | | | | | | | | |
| 11:15 AM | | | | | | | | | | | | | |
| 11:30 AM | | | | | | | | | | | | | |
| 11:45 AM | | | | | | | | | | | | | |
| TOTAL VOLUMES = | NL 0 | NT 789 | NR 33 | SL 237 | ST 1032 | SR 0 | EL 0 | ET 0 | ER 0 | WL 34 | WT 0 | WR 226 | TOTAL 2351 |

AM Peak Hr Begins at: 745 AM

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PEAK VOLUMES = | 0 | 453 | 18 | 124 | 553 | 0 | 0 | 0 | 0 | 22 | 0 | 118 | 1288 |
| PEAK HR. FACTOR: | | 0.790 | | | 0.935 | | | 0.000 | | | 0.660 | | 0.880 |

CONTROL: 1-Way Stop, West

# Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Kanan Rd. DATE: 5/7/2003 LOCATION: City of Agoura Hills

E-W STREET: Cornell Rd DAY: WEDNESDAY PROJECT# 03-0747-007

| | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTAL |
| LANES: | | | | 1 | 1 | | | | | 0 | 1 | 0 | |
| 1:00 PM | | | | | | | | | | | | | |
| 1:15 PM | | | | | | | | | | | | | |
| 1:30 PM | | | | | | | | | | | | | |
| 1:45 PM | | | | | | | | | | | | | |
| 2:00 PM | | | | | | | | | | | | | |
| 2:15 PM | | | | | | | | | | | | | |
| 2:30 PM | | | | | | | | | | | | | |
| 2:45 PM | | | | | | | | | | | | | |
| 3:00 PM | | | | | | | | | | | | | |
| 3:15 PM | | | | | | | | | | | | | |
| 3:30 PM | | | | | | | | | | | | | |
| 3:45 PM | | | | | | | | | | | | | |
| 4:00 PM | | 163 | 10 | 20 | 104 | | | | | 0 | | 20 | 317 |
| 4:15 PM | | 161 | 13 | 22 | 110 | | | | | 0 | | 16 | 322 |
| 4:30 PM | | 165 | 8 | 21 | 97 | | | | | 1 | | 20 | 312 |
| 4:45 PM | | 137 | 9 | 23 | 131 | | | | | 1 | | 21 | 322 |
| 5:00 PM | | 139 | 8 | 22 | 126 | | | | | 1 | | 26 | 322 |
| 5:15 PM | | 148 | 6 | 31 | 112 | | | | | 2 | | 28 | 327 |
| 5:30 PM | | 133 | 6 | 32 | 131 | | | | | 0 | | 21 | 323 |
| 5:45 PM | | 98 | 3 | 16 | 121 | | | | | 3 | | 23 | 264 |
| 6:00 PM | | | | | | | | | | | | | |
| 6:15 PM | | | | | | | | | | | | | |
| 6:30 PM | | | | | | | | | | | | | |
| 6:45 PM | | | | | | | | | | | | | |

| TOTAL | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOLUMES = | 0 | 1144 | 63 | 187 | 932 | 0 | 0 | 0 | 0 | 8 | 0 | 175 | 2509 |

PM Peak Hr Begins at: 445 PM

| PEAK | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VOLUMES = | 0 | 557 | 29 | 108 | 500 | 0 | 0 | 0 | 0 | 4 | 0 | 96 | 1294 |
| PEAK HR. FACTOR: | | 0.951 | | | 0.933 | | | 0.000 | | | 0.833 | | 0.989 |

CONTROL: 1-Way Stop, West

# Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Cornell Rd. DATE: 5/7/2003 LOCATION: City of Agoura Hills

E-W STREET: Agoura Rd. DAY: WEDNESDAY PROJECT# 03-0747-006

| | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTAL |
| LANES: | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | |
| 6:00 AM | | | | | | | | | | | | | |
| 6:15 AM | | | | | | | | | | | | | |
| 6:30 AM | | | | | | | | | | | | | |
| 6:45 AM | | | | | | | | | | | | | |
| 7:00 AM | 3 | 0 | 9 | 2 | 2 | 5 | 5 | 20 | 0 | 4 | 12 | 3 | 65 |
| 7:15 AM | 2 | 1 | 2 | 1 | 0 | 4 | 4 | 30 | 2 | 5 | 26 | 3 | 80 |
| 7:30 AM | 0 | 1 | 3 | 1 | 0 | 8 | 4 | 25 | 3 | 7 | 28 | 0 | 80 |
| 7:45 AM | 2 | 0 | 5 | 2 | 1 | 4 | 4 | 29 | 2 | 6 | 35 | 3 | 93 |
| 8:00 AM | 0 | 1 | 8 | 2 | 2 | 4 | 4 | 38 | 0 | 4 | 45 | 4 | 112 |
| 8:15 AM | 5 | 1 | 5 | 4 | 2 | 8 | 3 | 43 | 4 | 4 | 55 | 3 | 137 |
| 8:30 AM | 3 | 1 | 3 | 9 | 0 | 9 | 3 | 36 | 2 | 6 | 35 | 2 | 109 |
| 8:45 AM | 4 | 1 | 6 | 3 | 1 | 5 | 3 | 41 | 2 | 3 | 45 | 0 | 114 |
| 9:00 AM | | | | | | | | | | | | | |
| 9:15 AM | | | | | | | | | | | | | |
| 9:30 AM | | | | | | | | | | | | | |
| 9:45 AM | | | | | | | | | | | | | |
| 10:00 AM | | | | | | | | | | | | | |
| 10:15 AM | | | | | | | | | | | | | |
| 10:30 AM | | | | | | | | | | | | | |
| 10:45 AM | | | | | | | | | | | | | |
| 11:00 AM | | | | | | | | | | | | | |
| 11:15 AM | | | | | | | | | | | | | |
| 11:30 AM | | | | | | | | | | | | | |
| 11:45 AM | | | | | | | | | | | | | |
| TOTAL VOLUMES = | NL 19 | NT 6 | NR 41 | SL 24 | ST 8 | SR 47 | EL 30 | ET 262 | ER 15 | WL 39 | WT 281 | WR 18 | TOTAL 790 |

AM Peak Hr Begins at: 800 AM

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PEAK VOLUMES = | 12 | 4 | 22 | 18 | 5 | 26 | 13 | 158 | 8 | 17 | 180 | 9 | 472 |
| PEAK HR. FACTOR: | | 0.864 | | | 0.681 | | | 0.895 | | | 0.831 | | 0.861 |

CONTROL: 4-Way Stop

# Intersection Turning Movement

Prepared by: Southland Car Counters

N-S STREET: Cornell Rd. DATE: 5/7/2003 LOCATION: City of Agoura Hills

E-W STREET: Agoura Rd. DAY: WEDNESDAY PROJECT# 03-0747-006

| | NORTHBOUND | | | SOUTHBOUND | | | EASTBOUND | | | WESTBOUND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NL | NT | NR | SL | ST | SR | EL | ET | ER | WL | WT | WR | TOTAL |
| LANES: | | | | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | |
| 1:00 PM | | | | | | | | | | | | | |
| 1:15 PM | | | | | | | | | | | | | |
| 1:30 PM | | | | | | | | | | | | | |
| 1:45 PM | | | | | | | | | | | | | |
| 2:00 PM | | | | | | | | | | | | | |
| 2:15 PM | | | | | | | | | | | | | |
| 2:30 PM | | | | | | | | | | | | | |
| 2:45 PM | | | | | | | | | | | | | |
| 3:00 PM | | | | | | | | | | | | | |
| 3:15 PM | | | | | | | | | | | | | |
| 3:30 PM | | | | | | | | | | | | | |
| 3:45 PM | | | | | | | | | | | | | |
| 4:00 PM | 1 | 1 | 11 | 3 | 2 | 21 | 6 | 58 | 1 | 6 | 47 | 1 | 158 |
| 4:15 PM | 0 | 1 | 6 | 13 | 1 | 20 | 4 | 62 | 1 | 7 | 73 | 20 | 208 |
| 4:30 PM | 1 | 1 | 3 | 13 | 5 | 15 | 5 | 68 | 0 | 13 | 69 | 18 | 211 |
| 4:45 PM | 1 | 0 | 3 | 12 | 6 | 26 | 4 | 70 | 3 | 12 | 78 | 15 | 230 |
| 5:00 PM | 0 | 0 | 4 | 2 | 1 | 29 | 5 | 78 | 3 | 14 | 69 | 5 | 210 |
| 5:15 PM | 0 | 1 | 3 | 3 | 2 | 28 | 4 | 76 | 5 | 12 | 68 | 5 | 207 |
| 5:30 PM | 2 | 0 | 6 | 4 | 1 | 35 | 5 | 57 | 8 | 15 | 69 | 9 | 211 |
| 5:45 PM | 1 | 0 | 2 | 5 | 1 | 29 | 5 | 64 | 3 | 14 | 56 | 4 | 184 |
| 6:00 PM | | | | | | | | | | | | | |
| 6:15 PM | | | | | | | | | | | | | |
| 6:30 PM | | | | | | | | | | | | | |
| 6:45 PM | | | | | | | | | | | | | |
| TOTAL VOLUMES = | 6 | 4 | 38 | 55 | 19 | 203 | 38 | 533 | 24 | 93 | 529 | 77 | 1619 |

PM Peak Hr Begins at: 415 PM

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PEAK VOLUMES = | 2 | 2 | 16 | 40 | 13 | 90 | 18 | 278 | 7 | 46 | 289 | 58 | 859 |
| PEAK HR. FACTOR: | | 0.714 | | | 0.813 | | | 0.881 | | | 0.936 | | 0.934 |

CONTROL: 4-Way Stop

# Average Daily Traffic Volumes

Prepared by: Southland Car Counters

Volumes for: Wednesday, May 07, 2003 City: Agoura Hills Project #: 03-0761-001

Location: Kanan Rd. & n/o Cornell Way Client Ref #:

| AM Period | NB | | SB | | EB | WB | | PM Period | NB | | SB | | EB | WB | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12:00-12:15 | 8 | | 16 | | | | | 12:00-12:15 | 116 | | 89 | | | | |
| 12:15-12:30 | 12 | | 12 | | | | | 12:15-12:30 | 131 | | 117 | | | | |
| 12:30-12:45 | 5 | | 13 | | | | | 12:30-12:45 | 162 | | 119 | | | | |
| 12:45-1:00 | 9 | 34 | 12 | 53 | | | 87 | 12:45-1:00 | 125 | 534 | 123 | 448 | | | 982 |
| 1:00-1:15 | 5 | | 4 | | | | | 1:00-1:15 | 138 | | 108 | | | | |
| 1:15-1:30 | 15 | | 4 | | | | | 1:15-1:30 | 111 | | 134 | | | | |
| 1:30-1:45 | 23 | | 5 | | | | | 1:30-1:45 | 107 | | 112 | | | | |
| 1:45-2:00 | 2 | 45 | 7 | 20 | | | 65 | 1:45-2:00 | 133 | 489 | 118 | 472 | | | 961 |
| 2:00-2:15 | 5 | | 7 | | | | | 2:00-2:15 | 117 | | 109 | | | | |
| 2:15-2:30 | 3 | | 4 | | | | | 2:15-2:30 | 131 | | 104 | | | | |
| 2:30-2:45 | 2 | | 0 | | | | | 2:30-2:45 | 138 | | 122 | | | | |
| 2:45-3:00 | 3 | 13 | 2 | 13 | | | 26 | 2:45-3:00 | 117 | 503 | 134 | 469 | | | 972 |
| 3:00-3:15 | 0 | | 4 | | | | | 3:00-3:15 | 147 | | 138 | | | | |
| 3:15-3:30 | 5 | | 1 | | | | | 3:15-3:30 | 140 | | 121 | | | | |
| 3:30-3:45 | 4 | | 2 | | | | | 3:30-3:45 | 175 | | 111 | | | | |
| 3:45-4:00 | 2 | 11 | 3 | 10 | | | 21 | 3:45-4:00 | 181 | 643 | 142 | 512 | | | 1155 |
| 4:00-4:15 | 7 | | 2 | | | | | 4:00-4:15 | 177 | | 160 | | | | |
| 4:15-4:30 | 4 | | 1 | | | | | 4:15-4:30 | 181 | | 129 | | | | |
| 4:30-4:45 | 2 | | 3 | | | | | 4:30-4:45 | 177 | | 103 | | | | |
| 4:45-5:00 | 2 | 15 | 1 | 7 | | | 22 | 4:45-5:00 | 170 | 705 | 113 | 505 | | | 1210 |
| 5:00-5:15 | 5 | | 11 | | | | | 5:00-5:15 | 136 | | 129 | | | | |
| 5:15-5:30 | 5 | | 7 | | | | | 5:15-5:30 | 137 | | 163 | | | | |
| 5:30-5:45 | 10 | | 9 | | | | | 5:30-5:45 | 161 | | 134 | | | | |
| 5:45-6:00 | 7 | 27 | 27 | 54 | | | 81 | 5:45-6:00 | 149 | 583 | 175 | 601 | | | 1184 |
| 6:00-6:15 | 22 | | 27 | | | | | 6:00-6:15 | 125 | | 139 | | | | |
| 6:15-6:30 | 32 | | 35 | | | | | 6:15-6:30 | 107 | | 104 | | | | |
| 6:30-6:45 | 55 | | 55 | | | | | 6:30-6:45 | 131 | | 127 | | | | |
| 6:45-7:00 | 50 | 159 | 97 | 214 | | | 373 | 6:45-7:00 | 152 | 515 | 121 | 491 | | | 1006 |
| 7:00-7:15 | 71 | | 112 | | | | | 7:00-7:15 | 103 | | 103 | | | | |
| 7:15-7:30 | 120 | | 133 | | | | | 7:15-7:30 | 87 | | 112 | | | | |
| 7:30-7:45 | 119 | | 147 | | | | | 7:30-7:45 | 95 | | 95 | | | | |
| 7:45-8:00 | 100 | 410 | 188 | 580 | | | 990 | 7:45-8:00 | 79 | 364 | 95 | 405 | | | 769 |
| 8:00-8:15 | 151 | | 167 | | | | | 8:00-8:15 | 74 | | 82 | | | | |
| 8:15-8:30 | 194 | | 161 | | | | | 8:15-8:30 | 67 | | 86 | | | | |
| 8:30-8:45 | 130 | | 167 | | | | | 8:30-8:45 | 64 | | 79 | | | | |
| 8:45-9:00 | 114 | 589 | 182 | 677 | | | 1266 | 8:45-9:00 | 56 | 261 | 75 | 322 | | | 583 |
| 9:00-9:15 | 127 | | 130 | | | | | 9:00-9:15 | 38 | | 81 | | | | |
| 9:15-9:30 | 108 | | 148 | | | | | 9:15-9:30 | 39 | | 77 | | | | |
| 9:30-9:45 | 109 | | 128 | | | | | 9:30-9:45 | 42 | | 59 | | | | |
| 9:45-10:00 | 113 | 457 | 107 | 513 | | | 970 | 9:45-10:00 | 35 | 154 | 50 | 267 | | | 421 |
| 10:00-10:15 | 115 | | 129 | | | | | 10:00-10:15 | 44 | | 54 | | | | |
| 10:15-10:30 | 105 | | 113 | | | | | 10:15-10:30 | 47 | | 45 | | | | |
| 10:30-10:45 | 147 | | 95 | | | | | 10:30-10:45 | 23 | | 35 | | | | |
| 10:45-11:00 | 111 | 478 | 98 | 435 | | | 913 | 10:45-11:00 | 15 | 129 | 38 | 172 | | | 301 |
| 11:00-11:15 | 110 | | 99 | | | | | 11:00-11:15 | 16 | | 28 | | | | |
| 11:15-11:30 | 102 | | 87 | | | | | 11:15-11:30 | 23 | | 28 | | | | |
| 11:30-11:45 | 117 | | 95 | | | | | 11:30-11:45 | 25 | | 24 | | | | |
| 11:45-12:00 | 113 | 442 | 97 | 378 | | | 820 | 11:45-12:00 | 7 | 71 | 23 | 103 | | | 174 |
| **Total Vol.** | | 2680 | | 2954 | 0 | 0 | 5634 | | | 4951 | | 4767 | 0 | 0 | 9718 |
| **Daily Totals** | | | | | | | | | | 7631 | | 7721 | 0 | 0 | 15352 |

# Average Daily Traffic Volumes

Prepared by: Southland Car Counters

Volumes for: Wednesday, May 07, 2003 City: Agoura Hills Project #: 03-0761-002

Location: Kanan Rd. & s/o Cornell Way Client Ref #:

| AM Period | NB | | SB | | EB | WB | | PM Period | NB | | SB | | EB | WB | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12:00-12:15 | 10 | | 6 | | | | | 12:00-12:15 | 110 | | 98 | | | | |
| 12:15-12:30 | 4 | | 13 | | | | | 12:15-12:30 | 121 | | 102 | | | | |
| 12:30-12:45 | 9 | | 10 | | | | | 12:30-12:45 | 116 | | 99 | | | | |
| 12:45-1:00 | 6 | 29 | 3 | 32 | | | 61 | 12:45-1:00 | 124 | 471 | 102 | 401 | | | 872 |
| 1:00-1:15 | 7 | | 3 | | | | | 1:00-1:15 | 94 | | 111 | | | | |
| 1:15-1:30 | 19 | | 6 | | | | | 1:15-1:30 | 96 | | 104 | | | | |
| 1:30-1:45 | 3 | | 5 | | | | | 1:30-1:45 | 102 | | 93 | | | | |
| 1:45-2:00 | 4 | 33 | 9 | 23 | | | 56 | 1:45-2:00 | 109 | 401 | 110 | 418 | | | 819 |
| 2:00-2:15 | 2 | | 3 | | | | | 2:00-2:15 | 114 | | 92 | | | | |
| 2:15-2:30 | 1 | | 0 | | | | | 2:15-2:30 | 112 | | 111 | | | | |
| 2:30-2:45 | 2 | | 1 | | | | | 2:30-2:45 | 95 | | 119 | | | | |
| 2:45-3:00 | 1 | 6 | 2 | 6 | | | 12 | 2:45-3:00 | 119 | 440 | 127 | 449 | | | 889 |
| 3:00-3:15 | 4 | | 4 | | | | | 3:00-3:15 | 132 | | 118 | | | | |
| 3:15-3:30 | 2 | | 1 | | | | | 3:15-3:30 | 158 | | 103 | | | | |
| 3:30-3:45 | 3 | | 2 | | | | | 3:30-3:45 | 165 | | 117 | | | | |
| 3:45-4:00 | 6 | 15 | 2 | 9 | | | 24 | 3:45-4:00 | 138 | 593 | 127 | 465 | | | 1058 |
| 4:00-4:15 | 5 | | 2 | | | | | 4:00-4:15 | 172 | | 130 | | | | |
| 4:15-4:30 | 2 | | 3 | | | | | 4:15-4:30 | 183 | | 102 | | | | |
| 4:30-4:45 | 3 | | 1 | | | | | 4:30-4:45 | 169 | | 90 | | | | |
| 4:45-5:00 | 2 | 12 | 8 | 14 | | | 26 | 4:45-5:00 | 124 | 648 | 97 | 419 | | | 1067 |
| 5:00-5:15 | 3 | | 8 | | | | | 5:00-5:15 | 134 | | 163 | | | | |
| 5:15-5:30 | 7 | | 7 | | | | | 5:15-5:30 | 146 | | 122 | | | | |
| 5:30-5:45 | 8 | | 19 | | | | | 5:30-5:45 | 154 | | 126 | | | | |
| 5:45-6:00 | 16 | 34 | 30 | 64 | | | 98 | 5:45-6:00 | 118 | 552 | 131 | 542 | | | 1094 |
| 6:00-6:15 | 19 | | 37 | | | | | 6:00-6:15 | 83 | | 99 | | | | |
| 6:15-6:30 | 41 | | 48 | | | | | 6:15-6:30 | 113 | | 105 | | | | |
| 6:30-6:45 | 32 | | 73 | | | | | 6:30-6:45 | 126 | | 117 | | | | |
| 6:45-7:00 | 51 | 143 | 100 | 258 | | | 401 | 6:45-7:00 | 84 | 406 | 90 | 411 | | | 817 |
| 7:00-7:15 | 84 | | 110 | | | | | 7:00-7:15 | 79 | | 96 | | | | |
| 7:15-7:30 | 96 | | 114 | | | | | 7:15-7:30 | 73 | | 73 | | | | |
| 7:30-7:45 | 80 | | 158 | | | | | 7:30-7:45 | 67 | | 78 | | | | |
| 7:45-8:00 | 107 | 367 | 128 | 510 | | | 877 | 7:45-8:00 | 57 | 276 | 75 | 322 | | | 598 |
| 8:00-8:15 | 126 | | 136 | | | | | 8:00-8:15 | 48 | | 77 | | | | |
| 8:15-8:30 | 114 | | 148 | | | | | 8:15-8:30 | 62 | | 63 | | | | |
| 8:30-8:45 | 85 | | 154 | | | | | 8:30-8:45 | 48 | | 59 | | | | |
| 8:45-9:00 | 112 | 437 | 120 | 558 | | | 995 | 8:45-9:00 | 37 | 195 | 66 | 265 | | | 460 |
| 9:00-9:15 | 97 | | 142 | | | | | 9:00-9:15 | 29 | | 67 | | | | |
| 9:15-9:30 | 86 | | 120 | | | | | 9:15-9:30 | 29 | | 49 | | | | |
| 9:30-9:45 | 89 | | 97 | | | | | 9:30-9:45 | 35 | | 33 | | | | |
| 9:45-10:00 | 109 | 381 | 119 | 478 | | | 859 | 9:45-10:00 | 42 | 135 | 37 | 186 | | | 321 |
| 10:00-10:15 | 87 | | 102 | | | | | 10:00-10:15 | 35 | | 47 | | | | |
| 10:15-10:30 | 123 | | 82 | | | | | 10:15-10:30 | 22 | | 37 | | | | |
| 10:30-10:45 | 98 | | 93 | | | | | 10:30-10:45 | 13 | | 28 | | | | |
| 10:45-11:00 | 93 | 401 | 98 | 375 | | | 776 | 10:45-11:00 | 17 | 87 | 23 | 135 | | | 222 |
| 11:00-11:15 | 82 | | 79 | | | | | 11:00-11:15 | 18 | | 26 | | | | |
| 11:15-11:30 | 104 | | 89 | | | | | 11:15-11:30 | 23 | | 14 | | | | |
| 11:30-11:45 | 78 | | 88 | | | | | 11:30-11:45 | 8 | | 21 | | | | |
| 11:45-12:00 | 93 | 357 | 89 | 345 | | | 702 | 11:45-12:00 | 9 | 58 | 15 | 76 | | | 134 |
| **Total Vol.** | | 2215 | | 2672 | 0 | 0 | 4887 | | | 4262 | | 4089 | 0 | 0 | 8351 |
| **Daily Totals** | | | | | | | | | | 6477 | | 6761 | 0 | 0 | 13238 |

# Average Daily Traffic Volumes

Prepared by: Southland Car Counters

Volumes for: Wednesday, May 07, 2003 City: Agoura Hills Project #: 03-0761-003

Location: Cornell Rd. & s/o Kanan Rd. Client Ref #:

| AM Period | NB | | SB | | EB | WB | | PM Period | NB | | SB | | EB | WB | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12:00-12:15 | 0 | | 3 | | | | | 12:00-12:15 | 23 | | 24 | | | | |
| 12:15-12:30 | 1 | | 6 | | | | | 12:15-12:30 | 26 | | 26 | | | | |
| 12:30-12:45 | 0 | | 1 | | | | | 12:30-12:45 | 40 | | 21 | | | | |
| 12:45-1:00 | 0 | 1 | 2 | 12 | | | 13 | 12:45-1:00 | 26 | 115 | 32 | 103 | | | 218 |
| 1:00-1:15 | 2 | | 1 | | | | | 1:00-1:15 | 25 | | 27 | | | | |
| 1:15-1:30 | 6 | | 1 | | | | | 1:15-1:30 | 13 | | 27 | | | | |
| 1:30-1:45 | 0 | | 1 | | | | | 1:30-1:45 | 19 | | 17 | | | | |
| 1:45-2:00 | 0 | 8 | 0 | 3 | | | 11 | 1:45-2:00 | 29 | 86 | 32 | 103 | | | 189 |
| 2:00-2:15 | 2 | | 0 | | | | | 2:00-2:15 | 24 | | 25 | | | | |
| 2:15-2:30 | 1 | | 2 | | | | | 2:15-2:30 | 29 | | 16 | | | | |
| 2:30-2:45 | 1 | | 0 | | | | | 2:30-2:45 | 25 | | 15 | | | | |
| 2:45-3:00 | 0 | 4 | 0 | 2 | | | 6 | 2:45-3:00 | 25 | 103 | 24 | 80 | | | 183 |
| 3:00-3:15 | 0 | | 0 | | | | | 3:00-3:15 | 24 | | 20 | | | | |
| 3:15-3:30 | 0 | | 0 | | | | | 3:15-3:30 | 25 | | 28 | | | | |
| 3:30-3:45 | 2 | | 2 | | | | | 3:30-3:45 | 30 | | 24 | | | | |
| 3:45-4:00 | 0 | 2 | 0 | 2 | | | 4 | 3:45-4:00 | 22 | 101 | 42 | 114 | | | 215 |
| 4:00-4:15 | 0 | | 1 | | | | | 4:00-4:15 | 28 | | 26 | | | | |
| 4:15-4:30 | 0 | | 0 | | | | | 4:15-4:30 | 31 | | 16 | | | | |
| 4:30-4:45 | 1 | | 0 | | | | | 4:30-4:45 | 18 | | 25 | | | | |
| 4:45-5:00 | 0 | 1 | 1 | 2 | | | 3 | 4:45-5:00 | 23 | 100 | 30 | 97 | | | 197 |
| 5:00-5:15 | 3 | | 2 | | | | | 5:00-5:15 | 30 | | 33 | | | | |
| 5:15-5:30 | 1 | | 0 | | | | | 5:15-5:30 | 16 | | 25 | | | | |
| 5:30-5:45 | 2 | | 1 | | | | | 5:30-5:45 | 28 | | 37 | | | | |
| 5:45-6:00 | 1 | 7 | 1 | 4 | | | 11 | 5:45-6:00 | 28 | 102 | 50 | 145 | | | 247 |
| 6:00-6:15 | 5 | | 3 | | | | | 6:00-6:15 | 27 | | 33 | | | | |
| 6:15-6:30 | 11 | | 3 | | | | | 6:15-6:30 | 27 | | 24 | | | | |
| 6:30-6:45 | 17 | | 6 | | | | | 6:30-6:45 | 20 | | 26 | | | | |
| 6:45-7:00 | 16 | 49 | 11 | 23 | | | 72 | 6:45-7:00 | 23 | 97 | 24 | 107 | | | 204 |
| 7:00-7:15 | 20 | | 17 | | | | | 7:00-7:15 | 27 | | 20 | | | | |
| 7:15-7:30 | 22 | | 25 | | | | | 7:15-7:30 | 24 | | 21 | | | | |
| 7:30-7:45 | 30 | | 31 | | | | | 7:30-7:45 | 28 | | 29 | | | | |
| 7:45-8:00 | 21 | 93 | 52 | 125 | | | 218 | 7:45-8:00 | 19 | 98 | 20 | 90 | | | 188 |
| 8:00-8:15 | 40 | | 38 | | | | | 8:00-8:15 | 16 | | 14 | | | | |
| 8:15-8:30 | 59 | | 24 | | | | | 8:15-8:30 | 24 | | 19 | | | | |
| 8:30-8:45 | 26 | | 33 | | | | | 8:30-8:45 | 7 | | 16 | | | | |
| 8:45-9:00 | 30 | 155 | 29 | 124 | | | 279 | 8:45-9:00 | 5 | 52 | 19 | 68 | | | 120 |
| 9:00-9:15 | 27 | | 26 | | | | | 9:00-9:15 | 6 | | 21 | | | | |
| 9:15-9:30 | 28 | | 25 | | | | | 9:15-9:30 | 11 | | 17 | | | | |
| 9:30-9:45 | 23 | | 22 | | | | | 9:30-9:45 | 6 | | 11 | | | | |
| 9:45-10:00 | 27 | 105 | 14 | 87 | | | 192 | 9:45-10:00 | 5 | 28 | 20 | 69 | | | 97 |
| 10:00-10:15 | 18 | | 15 | | | | | 10:00-10:15 | 6 | | 12 | | | | |
| 10:15-10:30 | 25 | | 22 | | | | | 10:15-10:30 | 9 | | 2 | | | | |
| 10:30-10:45 | 27 | | 17 | | | | | 10:30-10:45 | 4 | | 9 | | | | |
| 10:45-11:00 | 27 | 97 | 17 | 71 | | | 168 | 10:45-11:00 | 2 | 21 | 8 | 31 | | | 52 |
| 11:00-11:15 | 21 | | 16 | | | | | 11:00-11:15 | 1 | | 8 | | | | |
| 11:15-11:30 | 23 | | 14 | | | | | 11:15-11:30 | 1 | | 2 | | | | |
| 11:30-11:45 | 16 | | 18 | | | | | 11:30-11:45 | 1 | | 5 | | | | |
| 11:45-12:00 | 22 | 82 | 12 | 60 | | | 142 | 11:45-12:00 | 1 | 4 | 5 | 20 | | | 24 |
| **Total Vol.** | | 604 | | 515 | 0 | 0 | 1119 | | | 907 | | 1027 | 0 | 0 | 1934 |
| **Daily Totals** | | | | | | | | | | 1511 | | 1542 | 0 | 0 | 3053 |

# APPENDIX C

# INTERSECTION ANALYSIS WORKSHEETS

## INTERSECTION CAPACITY UTILIZATION WORKSHEET

**INTERSECTION:** N/S: Kanan Rd E/W: Canwood Street
**DATE OF COUNTS:** 05/06/03 **Notes:** Triangle Ranch
**ANALYSIS PERIOD:** AM Peak Hour

| | | Existing Conditions | | | | Existing Plus Growth | | | | Existing Plus Growth Plus Project | | | | | Cumulative Conditions - See Next Sheet | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movemnt | No. Lanes | Cap. | Vol. | AM Peak V/C | Crit. Mvmt. | Growth 3.3% | Exist + Growth | AM Peak V/C | Crit. Mvmt. | Growth 3.3% | Project Traffic | xist+Growth + Proj | AM Peak V/C | Crit. Mvmt. | App Projects | xist+Growth + Proj | Exist+App +Gro+Proj | AM Peak V/C | Crit. Mvmt. |
| NL | 1 | 1,600 | 128 | 0.080 | 0 | 4 | 132 | 0.083 | 0 | 4 | 2 | 134 | 0.084 | 0 | | 134 | 134 | 0.084 | 0 |
| NR | #N/A | #N/A | 170 | #N/A | 0 | 6 | 176 | #N/A | 0 | 6 | 2 | 178 | #N/A | 0 | | 178 | 178 | #N/A | 0 |
| NT | 2 | 3,200 | 944 | 0.348 | 1 | 31 | 975 | 0.360 | 1 | 31 | 5 | 980 | 0.362 | 1 | | 980 | 980 | 0.362 | 1 |
| SL | 1.0 | 1,600 | 199 | 0.124 | 1 | 7 | 206 | 0.128 | 1 | 7 | 0 | 206 | 0.128 | 1 | | 206 | 206 | 0.128 | 1 |
| SR | 0.5 | 800 | 40 | 0.050 | 0 | 1 | 41 | 0.052 | 0 | 1 | 0 | 41 | 0.052 | 0 | | 41 | 41 | 0.052 | 0 |
| ST | 3.5 | 5,600 | 1565 | 0.279 | 0 | 52 | 1617 | 0.289 | 0 | 52 | 2 | 1618 | 0.289 | 0 | | 1618 | 1618 | 0.289 | 0 |
| EL | 1 | 1,600 | 27 | 0.017 | 0 | 1 | 28 | 0.017 | 0 | 1 | 0 | 28 | 0.017 | 0 | | 28 | 28 | 0.017 | 0 |
| ER | 1 | 1600 | 120 | 0.075 | 0 | 4 | 124 | 0.077 | 0 | 4 | 1 | 124 | 0.078 | 0 | | 124 | 124 | 0.078 | 0 |
| ET | 1 | 1,600 | 121 | 0.076 | 1 | 4 | 125 | 0.078 | 1 | 4 | 0 | 125 | 0.078 | 1 | | 125 | 125 | 0.078 | 1 |
| WL | 1 | 1,600 | 208 | 0.130 | 1 | 7 | 215 | 0.134 | 1 | 7 | 1 | 216 | 0.135 | 1 | | 216 | 216 | 0.135 | 1 |
| WR | #N/A | #N/A | 90 | #N/A | 0 | 3 | 93 | #N/A | 0 | 3 | 0 | 93 | #N/A | 0 | | 93 | 93 | #N/A | 0 |
| WT | 1 | 1,600 | 77 | 0.104 | 0 | 3 | 80 | 0.108 | 0 | 3 | 0 | 80 | 0.108 | 0 | | 80 | 80 | 0.108 | 0 |
| | | | N/S component | | 0.473 | | N/S component | | 0.488 | | | N/S component | | 0.490 | | | | N/S component | 0.490 |
| | | | E/W component | | 0.206 | | E/W component | | 0.212 | | | E/W component | | 0.213 | | | | E/W component | 0.213 |
| | | | Rt.Tn. comp. | | 0.000 | | Rt.Tn. comp. | | 0.000 | | | Rt.Tn. comp. | | 0.000 | | | | Rt.Tn. comp. | 0.000 |
| | | | Clearance Interval | | 0.100 | | Clearance Interval | | 0.100 | | | Clearance Interval | | 0.100 | | | | Clearance Interval | 0.100 |
| | | | | ICU | 0.778 | | | ICU | 0.801 | | | | ICU | 0.803 | | | | ICU | 0.803 |
| | | | | LOS | C | | | LOS | C | | | | LOS | C | | | | LOS | C |
| | | | | | | | | | | | | | | | | | | Project Impact: | 0.000 |

Critical movement identified by a 1.
Ten lanes for a right turn indicates free movement.
NA - Not Applicable

## INTERSECTION CAPACITY UTILIZATION WORKSHEET

**INTERSECTION:** N/S: Kanan Rd E/W: Canwood Street
**DATE OF COUNTS:** 05/06/03 **Notes:** Triangle Ranch
**ANALYSIS PERIOD:** PM Peak Hour

| | | Existing Conditions | | | | Existing Plus Growth | | | | Existing Plus Growth Plus Approved | | | | | Cumulative Conditions - See Next Sheet | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movemnt | No. Lanes | Cap. | Vol. | AM Peak V/C | Crit. Mvmt. | Growth 3.3% | Exist + Growth | AM Peak V/C | Crit. Mvmt. | Growth 3.3% | Project Traffic | xist+Growth + Proj | AM Peak V/C | Crit. Mvmt. | App Projects | xist+Growth + Proj | Exist+App +Gro+Proj | AM Peak V/C | Crit. Mvmt. |
| NL | 1 | 1,600 | 107 | 0.067 | 0 | 4 | 111 | 0.069 | 0 | 4 | 1 | 111 | 0.070 | 0 | | 111 | 111 | 0.070 | 0 |
| NR | #N/A | #N/A | 87 | #N/A | 0 | 3 | 90 | #N/A | 0 | 3 | 1 | 91 | #N/A | 0 | | 91 | 91 | #N/A | 0 |
| NT | 2 | 3,200 | 1615 | 0.532 | 1 | 53 | 1668 | 0.549 | 1 | 53 | 3 | 1671 | 0.551 | 1 | | 1671 | 1671 | 0.551 | 1 |
| SL | 1.0 | 1,600 | 186 | 0.116 | 1 | 6 | 192 | 0.120 | 1 | 6 | 0 | 192 | 0.120 | 1 | | 192 | 192 | 0.120 | 1 |
| SR | 0.5 | 800 | 33 | 0.041 | 0 | 1 | 34 | 0.043 | 0 | 1 | 0 | 34 | 0.043 | 0 | | 34 | 34 | 0.043 | 0 |
| ST | 3.5 | 5,600 | 1109 | 0.196 | 0 | 36 | 1136 | 0.203 | 0 | 36 | 5 | 1141 | 0.204 | 0 | | 1141 | 1141 | 0.204 | 0 |
| EL | 1 | 1,600 | 51 | 0.032 | 1 | 2 | 53 | 0.033 | 1 | 2 | 0 | 53 | 0.033 | 1 | | 53 | 53 | 0.033 | 1 |
| ER | 1 | 1600 | 168 | 0.105 | 0 | 6 | 174 | 0.108 | 0 | 6 | 2 | 175 | 0.110 | 0 | | 175 | 175 | 0.110 | 0 |
| ET | 1 | 1,600 | 75 | 0.047 | 0 | 2 | 77 | 0.048 | 0 | 2 | 0 | 77 | 0.048 | 0 | | 77 | 77 | 0.048 | 0 |
| WL | 1 | 1,600 | 279 | 0.174 | 0 | 9 | 288 | 0.180 | 0 | 9 | 2 | 290 | 0.182 | 0 | | 290 | 290 | 0.182 | 0 |
| WR | #N/A | #N/A | 238 | #N/A | 0 | 8 | 246 | #N/A | 0 | 8 | 0 | 246 | #N/A | 0 | | 246 | 246 | #N/A | 0 |
| WT | 1 | 1,600 | 68 | 0.191 | 1 | 2 | 70 | 0.198 | 1 | 2 | 0 | 70 | 0.198 | 1 | | 70 | 70 | 0.198 | 1 |
| | | | N/S component | | 0.648 | | N/S component | | 0.670 | | | N/S component | | 0.671 | | | | N/S component | 0.671 |
| | | | E/W component | | 0.223 | | E/W component | | 0.230 | | | E/W component | | 0.230 | | | | E/W component | 0.230 |
| | | | Rt.Tn. comp. | | 0.000 | | Rt.Tn. comp. | | 0.000 | | | Rt.Tn. comp. | | 0.000 | | | | Rt.Tn. comp. | 0.000 |
| | | | Clearance Interval | | 0.100 | | Clearance Interval | | 0.100 | | | Clearance Interval | | 0.100 | | | | Clearance Interval | 0.100 |
| | | | | ICU | 0.971 | | | ICU | 1.000 | | | | ICU | 1.001 | | | | ICU | 1.001 |
| | | | | LOS | E | | | LOS | E | | | | LOS | E | | | | LOS | E |
| | | | | | | | | | | | | | | | | | | Project Impact: | 0.000 |

Critical movement identified by a 1.
Ten lanes for a right turn indicates free movement.
NA - Not Applicable

## INTERSECTION CAPACITY UTILIZATION WORKSHEET

**INTERSECTION:** # 1 **N/S:** Kanan Road **E/W:** Canwood Street
**DATE OF COUNTS:** **Notes:** 2020 Volumes with Interchange Improvements
**ANALYSIS PERIOD:** AM Peak Hour

| | | Future 2020 With Interchange | | | | Future 2020 with Project | | | |
|---|---|---|---|---|---|---|---|---|---|
| Movemnt | No. Lanes | Cap. | Vol. | AM Peak V/C | Crit. Mvmt. | PROJ. VOL. | Vol. | AM Peak V/C | Crit. Mvmt. |
| NL | 0 | 0 | 0 | 0.000 | 1 | | - | 0.000 | 1 |
| NR | 1 | 1,600 | 567 | 0.354 | 0 | 2 | 569 | 0.356 | 0 |
| NT | 2 | 3,200 | 800 | 0.250 | 0 | 5 | 805 | 0.252 | 0 |
| SL | 1 | 1,600 | 125 | 0.078 | 0 | | 125 | 0.078 | 0 |
| SR | #N/A | #N/A | 0 | #N/A | 0 | | - | #N/A | 0 |
| ST | 2 | 3,200 | 2080 | 0.650 | 1 | 2 | 2,082 | 0.651 | 1 |
| EL | #N/A | #N/A | 0 | #N/A | 0 | | - | #N/A | 0 |
| ER | #N/A | #N/A | 0 | #N/A | 0 | | - | #N/A | 0 |
| ET | 0 | 0 | 0 | 0.000 | 1 | | - | 0.000 | 1 |
| WL | 2 | 3,200 | 381 | 0.119 | 1 | 1 | 382 | 0.119 | 1 |
| WR | 1 | 1,600 | 72 | 0.045 | 0 | | 72 | 0.045 | 0 |
| WT | 0 | 0 | 0 | 0.000 | 0 | | - | 0.000 | 0 |

| | | | |
|---|---|---|---|
| N/S component | 0.650 | N/S component | 0.651 |
| E/W component | 0.119 | E/W component | 0.119 |
| Rt.Tn. Component | 0.000 | Rt.Tn. Component | 0.000 |
| Clearance Interval | 0.100 | Clearance Interval | 0.100 |
| ICU | 0.869 | ICU | 0.870 |
| LOS | D | LOS | D |

Critical movement identified by a 1. Project Impact: 0.001
Ten lanes for a right turn indicates free movement.
#N/A - Not Applicable

## INTERSECTION CAPACITY UTILIZATION WORKSHEET

**INTERSECTION:** # 1 **N/S:** Kanan Road **E/W:** Canwood Street
**DATE OF COUNTS:** ####### **Notes:** 2020 Volumes with Interchange Improvements
**ANALYSIS PERIOD:** PM Peak Hour

| | | Existing Conditions | | | | Future 2020 with Project | | | |
|---|---|---|---|---|---|---|---|---|---|
| Movemnt | No. Lanes | Cap. | Vol. | PM Peak V/C | Crit. Mvmt. | PROJ. VOL. | Vol. | PM Peak V/C | Crit. Mvmt. |
| NL | 0 | 0 | 0 | 0 | 0 | | - | 0.00 | 0 |
| NR | 1 | 1,600 | 356 | 0.22 | 0 | 1 | 357 | 0.22 | 0 |
| NT | 2 | 3,200 | 1900 | 0.59 | 1 | 3 | 1,903 | 0.59 | 1 |
| SL | 1 | 1,600 | 74 | 0.05 | 1 | | 74 | 0.05 | 1 |
| SR | #N/A | #N/A | 0 | #N/A | 0 | | - | #N/A | 0 |
| ST | 2 | 3,200 | 1480 | 0.46 | 0 | 5 | 1,485 | 0.46 | 0 |
| EL | #N/A | #N/A | 0 | #N/A | 0 | | - | #N/A | 0 |
| ER | #N/A | #N/A | 0 | #N/A | 0 | | - | #N/A | 0 |
| ET | 0 | 0 | 0 | 0.00 | 1 | | - | 0.00 | 1 |
| WL | 2 | 3,200 | 553 | 0.17 | 1 | 2 | 555 | 0.17 | 1 |
| WR | 1 | 1,600 | 216 | 0.14 | 1 | | 216 | 0.14 | 1 |
| WT | 0 | 0 | 0 | 0.00 | 0 | | - | 0.00 | 0 |

| | | | |
|---|---|---|---|
| N/S component | 0.640 | N/S component | 0.641 |
| E/W component | 0.173 | E/W component | 0.173 |
| Rt.Tn. Component | 0.089 | Rt.Tn. Component | 0.089 |
| Clearance Interval | 0.100 | Clearance Interval | 0.100 |
| ICU | 1.002 | ICU | 1.003 |
| LOS | E | LOS | E |

Critical movement identified by a 1. Project Impact: 0.002
Ten lanes for a right turn indicates free movement.
#N/A - Not Applicable

## INTERSECTION CAPACITY UTILIZATION WORKSHEET

**INTERSECTION:** # 1 **N/S:** Kanan Road **E/W:** Canwood Street
**DATE OF COUNTS:** **Notes:** 2020 Volumes with Interchange Improvements
**ANALYSIS PERIOD:** AM Peak Hour

| | | Future 2020 With Interchange | | | | Future 2020 with Project | | | |
|---|---|---|---|---|---|---|---|---|---|
| Movemnt | No. Lanes | Cap. | Vol. | AM Peak V/C | Crit. Mvmt. | PROJ. VOL. | Vol. | AM Peak V/C | Crit. Mvmt. |
| NL | 0 | 0 | 0 | 0.000 | 1 | | - | 0.000 | 1 |
| NR | 1 | 1,600 | 567 | 0.354 | 1 | 2 | 569 | 0.356 | 1 |
| NT | 3 | 4,800 | 800 | 0.167 | 0 | 5 | 805 | 0.168 | 0 |
| SL | 1 | 1,600 | 125 | 0.078 | 0 | | 125 | 0.078 | 0 |
| SR | #N/A | #N/A | 0 | #N/A | 0 | | - | #N/A | 0 |
| ST | 3 | 4,800 | 2080 | 0.433 | 1 | 2 | 2,082 | 0.434 | 1 |
| EL | #N/A | #N/A | 0 | #N/A | 0 | | - | #N/A | 0 |
| ER | #N/A | #N/A | 0 | #N/A | 0 | | - | #N/A | 0 |
| ET | 0 | 0 | 0 | 0.000 | 1 | | - | 0.000 | 1 |
| WL | 2 | 3,200 | 381 | 0.119 | 1 | 1 | 382 | 0.119 | 1 |
| WR | 1 | 1,600 | 72 | 0.045 | 0 | | 72 | 0.045 | 0 |
| WT | 0 | 0 | 0 | 0.000 | 0 | | - | 0.000 | 0 |
| | | | N/S component | | 0.433 | | N/S component | | 0.434 |
| | | | E/W component | | 0.119 | | E/W component | | 0.119 |
| | | | Rt.Tn. Component | | 0.069 | | Rt.Tn. Component | | 0.069 |
| | | | Clearance Interval | | 0.100 | | Clearance Interval | | 0.100 |
| | | | ICU | | 0.721 | | ICU | | 0.722 |
| | | | LOS | | C | | LOS | | C |

Critical movement identified by a 1. Project Impact: 0.001
Ten lanes for a right turn indicates free movement.
#N/A - Not Applicable

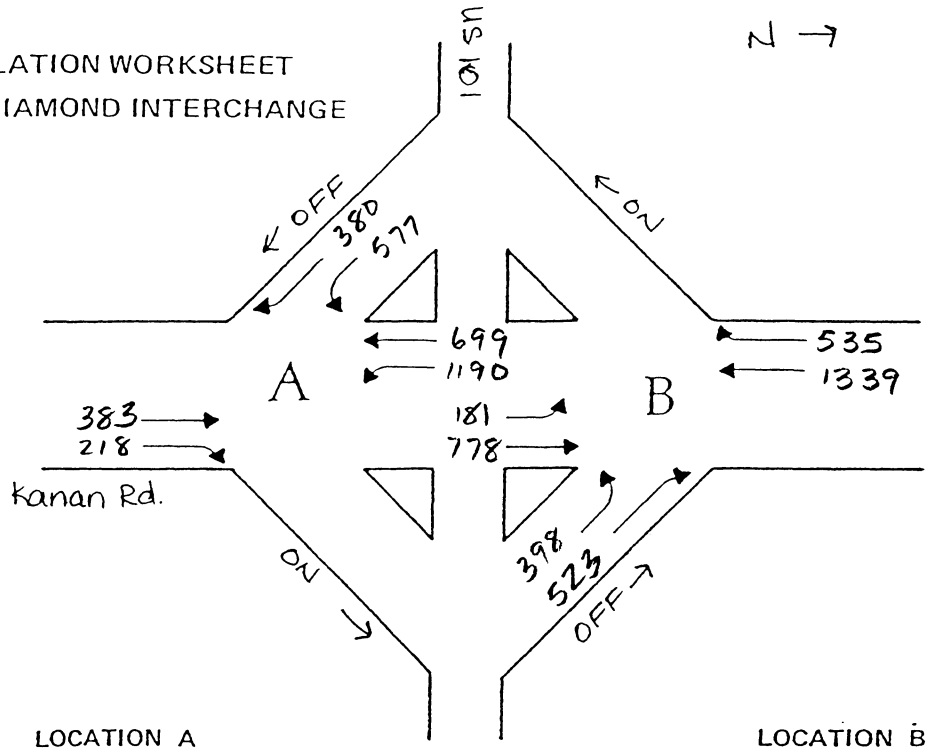
## INTERSECTION CAPACITY UTILIZATION WORKSHEET

**INTERSECTION:** # 1 **N/S:** Kanan Road **E/W:** Canwood Street
**DATE OF COUNTS:** ####### **Notes:** 2020 Volumes with Interchange Improvements
**ANALYSIS PERIOD:** PM Peak Hour

| | | Existing Conditions | | | | Future 2020 with Project | | | |
|---|---|---|---|---|---|---|---|---|---|
| Movemnt | No. Lanes | Cap. | Vol. | PM Peak V/C | Crit. Mvmt. | PROJ. VOL. | Vol. | PM Peak V/C | Crit. Mvmt. |
| NL | 0 | 0 | 0 | 0 | 0 | | - | 0.00 | 0 |
| NR | 1 | 1,600 | 356 | 0.22 | 0 | 1 | 357 | 0.22 | 0 |
| NT | 3 | 4,800 | 1900 | 0.40 | 1 | 3 | 1,903 | 0.40 | 1 |
| SL | 1 | 1,600 | 74 | 0.05 | 1 | | 74 | 0.05 | 1 |
| SR | #N/A | #N/A | 0 | #N/A | 0 | | - | #N/A | 0 |
| ST | 3 | 4,800 | 1480 | 0.31 | 0 | 5 | 1,485 | 0.31 | 0 |
| EL | #N/A | #N/A | 0 | #N/A | 0 | | - | #N/A | 0 |
| ER | #N/A | #N/A | 0 | #N/A | 0 | | - | #N/A | 0 |
| ET | 0 | 0 | 0 | 0.00 | 1 | | - | 0.00 | 1 |
| WL | 2 | 3,200 | 553 | 0.17 | 1 | 2 | 555 | 0.17 | 1 |
| WR | 1 | 1,600 | 216 | 0.14 | 1 | | 216 | 0.14 | 1 |
| WT | 0 | 0 | 0 | 0.00 | 0 | | - | 0.00 | 0 |
| | | | N/S component | | 0.442 | | N/S component | | 0.443 |
| | | | E/W component | | 0.173 | | E/W component | | 0.173 |
| | | | Rt.Tn. Component | | 0.089 | | Rt.Tn. Component | | 0.089 |
| | | | Clearance Interval | | 0.100 | | Clearance Interval | | 0.100 |
| | | | ICU | | 0.804 | | ICU | | 0.805 |
| | | | LOS | | C | | LOS | | C |

Critical movement identified by a 1. Project Impact: 0.001
Ten lanes for a right turn indicates free movement.
#N/A - Not Applicable

# ICU CALCULATION WORKSHEET
# FOR A TIGHT-DIAMOND INTERCHANGE




| | LOCATION A | | | LOCATION B | | |
|---|---|---|---|---|---|---|
| | CAP. | VOL. | V/C | CAP. | VOL. | V/C |
| PHASE 1 | 3200 | 383 | 0.120 | 1600 | 181 | 0.113 |
| | 3200 | 383 | 0.120 | 3200 | 181 | 0.057 |
| PHASE 2 | 4800 | 957 | 0.200 | 3200 | 597 | 0.187 |
| | | | | 4800 | 1339 | 0.279 |
| PHASE 3 | 3200 | 316 | 0.099 | 4800 | 921 | 0.192 |
| | 3200 | 1190 | 0.372 | | | |
| PHASE 4 | NA | | | NA | | |

$\sum_i (V/C)_i$

| | |
|---|---|
| PHASE 1 | 0.120 |
| PHASE 2 | 0.279 |
| PHASE 3 | 0.372 |
| PHASE 4 | |

ICU = 0.871

LOS = D

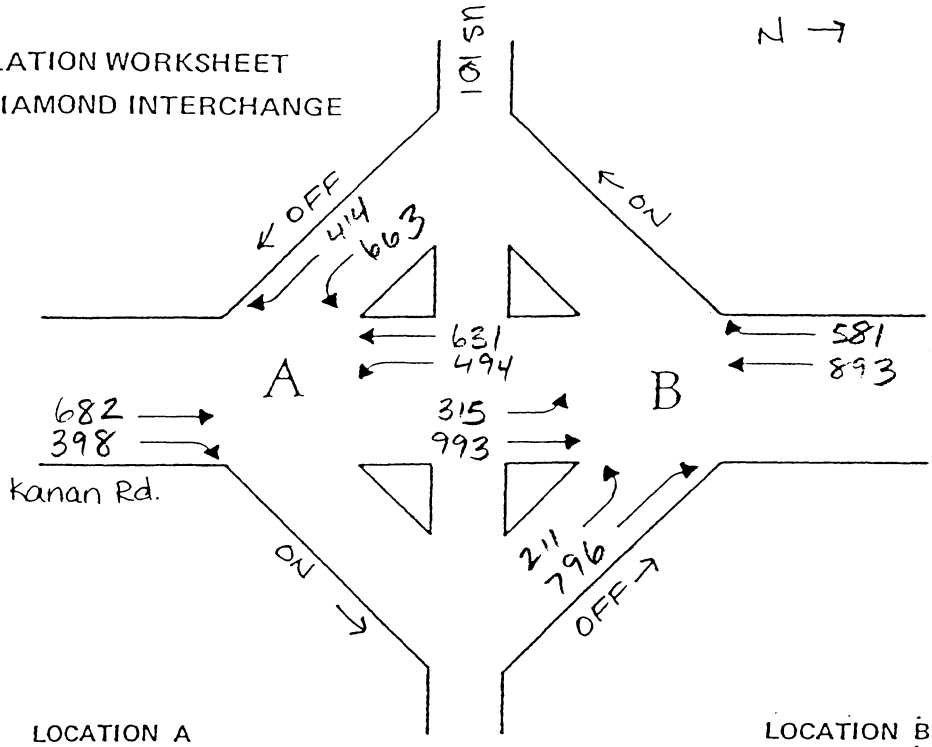
| | |
|---|---|
| RIGHT-TURN COMPONENT | — |
| CLEARANCE | 0.100 |

Kanan Road at US 101 Interchange

AM Peak Hour - EXISTING CONDITIONS

Kimley-Horn and Associates, Inc.

# ICU CALCULATION WORKSHEET
# FOR A TIGHT-DIAMOND INTERCHANGE



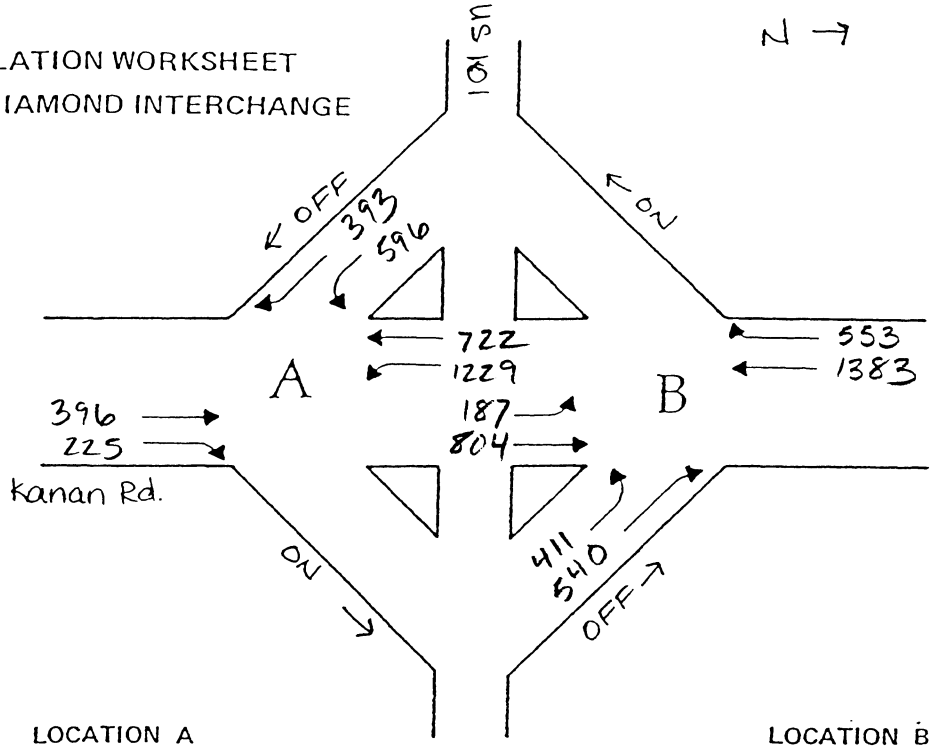

| | LOCATION A | | | LOCATION B | | |
|---|---|---|---|---|---|---|
| | CAP. | VOL. | V/C | CAP. | VOL. | V/C |
| PHASE 1 | 3200 | 631 | 0.197 | 1600 | 315 | 0.197 |
| | 3200 | 682 | 0.213 | 3200 | 315 | 0.098 |
| PHASE 2 | 4800 | 1077 | 0.224 | 3200 | 678 | 0.212 |
| | | | | 4800 | 893 | 0.186 |
| PHASE 3 | 3200 | 0 | 0.000 | 1600 | 211 | 0.132 |
| | 3200 | 494 | 0.154 | 3200 | 796 | 0.249 |
| PHASE 4 | NA | | | NA | | |

| | | |
|---|---|---|
| $\sum_i (V/C)_i$ | PHASE 1 0.213<br>PHASE 2 0.224<br>PHASE 3 0.249<br>PHASE 4 — | ICU = 0.786<br>LOS = C |
| RIGHT-TURN COMPONENT | — | |
| CLEARANCE | 0.100 | |

Kanan Road at US 101 Interchange
PM Peak Hour - Existing Conditions

Kimley–Horn and Associates, Inc.

# ICU CALCULATION WORKSHEET
# FOR A TIGHT-DIAMOND INTERCHANGE




| | LOCATION A | | | LOCATION B | | |
|---|---|---|---|---|---|---|
| | CAP. | VOL. | V/C | CAP. | VOL. | V/C |
| PHASE 1 | 3200 | 396 | 0.124 | 1600 | 187 | 0.117 |
| | 3200 | 396 | 0.124 | 3200 | 187 | 0.058 |
| PHASE 2 | 4800 | 989 | 0.206 | 3200 | 617 | 0.193 |
| | | | | 4800 | 1383 | 0.288 |
| PHASE 3 | 3200 | 326 | 0.102 | | | |
| | 3200 | 1229 | 0.384 | 4800 | 951 | 0.198 |
| PHASE 4 | NA | | | NA | | |

| | | |
|---|---|---|
| $\sum_i (V/C)_i$ | PHASE 1 0.124<br>PHASE 2 0.288<br>PHASE 3 0.384<br>PHASE 4 — | ICU = 0.896<br>LOS = D |
| RIGHT-TURN COMPONENT | — | |
| CLEARANCE | 0.100 | |

Kanan Road at US 101 Interchange

AM Peak Hour - EXISTING PLUS GROWTH CONDITIONS

Kimley–Horn and Associates, Inc.

# TWO-WAY STOP CONTROL SUMMARY

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | | Intersection | Kanan / Roadside |
| Agency/Co. | Agoura Hills | Jurisdiction | |
| Date Performed | 7/1/2003 | Analysis Year | |
| Analysis Time Period | PM Peak | | |
| Project Description | Triangle Ranch - Existing Conditions | | |
| East/West Street: | Roadside Drive | North/South Street: | Kanan Road |
| Intersection Orientation: | North-South | Study Period (hrs): | 0.25 |

## Vehicle Volumes and Adjustments

| Major Street | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 36 | 885 | 55 | 312 | 683 | 52 |
| Peak-Hour Factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly Flow Rate, HFR | 36 | 885 | 55 | 312 | 683 | 52 |
| Percent Heavy Vehicles | 0 | – | – | 0 | – | – |
| Median Type | Undivided | | | | | |
| RT Channelized | | | 0 | | | 0 |
| Lanes | 1 | 2 | 1 | 1 | 2 | 0 |
| Configuration | L | T | R | L | T | TR |
| Upstream Signal | | 0 | | | 0 | |

| Minor Street | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 0 | 0 | 205 | 27 | 7 | 24 |
| Peak-Hour Factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly Flow Rate, HFR | 0 | 0 | 205 | 27 | 7 | 24 |
| Percent Heavy Vehicles | 0 | 0 | 0 | 0 | 0 | 0 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach | | N | | | Y | |
| Storage | | 0 | | | 0 | |
| RT Channelized | | | 0 | | | 0 |
| Lanes | 0 | 0 | 1 | 0 | 1 | 1 |
| Configuration | | | R | LT | | R |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Configuration | L | L | | | R | LT | | R |
| v (vph) | 36 | 312 | | | 205 | 34 | | 24 |
| C (m) (vph) | 879 | 737 | | | 569 | 20 | | 635 |
| v/c | 0.04 | 0.42 | | | 0.36 | 1.70 | | 0.04 |
| 95% queue length | 0.13 | 2.12 | | | 1.63 | 4.55 | | 0.12 |
| Control Delay | 9.3 | 13.4 | | | 14.8 | 745.6 | | 10.9 |
| LOS | A | B | | | B | F | | B |
| Approach Delay | – | – | 14.8 | | | 441.6 | | |
| Approach LOS | – | – | B | | | F | | |

>

*HCS2000*™ Copyright © 2000 University of Florida, All Rights Reserved Version 4.11

# TWO-WAY STOP CONTROL SUMMARY

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | | Intersection | *Kanan / Roadside* |
| Agency/Co. | *Agoura Hills* | Jurisdiction | |
| Date Performed | *7/1/2003* | Analysis Year | |
| Analysis Time Period | *AM Peak* | | |

| | |
|---|---|
| Project Description | *Triangle Ranch - Existing Plus Growth* |
| East/West Street: *Roadside Drive* | North/South Street: *Kanan Road* |
| Intersection Orientation: *North-South* | Study Period (hrs): *0.25* |

## Vehicle Volumes and Adjustments

| **Major Street** | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | *9* | *568* | *30* | *293* | *865* | *67* |
| Peak-Hour Factor, PHF | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* |
| Hourly Flow Rate, HFR | *9* | *568* | *30* | *293* | *865* | *67* |
| Percent Heavy Vehicles | *0* | -- | -- | *0* | -- | -- |
| Median Type | *Undivided* | | | | | |
| RT Channelized | | | *0* | | | *0* |
| Lanes | *1* | *2* | *1* | *1* | *2* | *0* |
| Configuration | *L* | *T* | *R* | *L* | *T* | *TR* |
| Upstream Signal | | *0* | | | *0* | |

| **Minor Street** | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | *0* | *0* | *95* | *28* | *24* | *27* |
| Peak-Hour Factor, PHF | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* |
| Hourly Flow Rate, HFR | *0* | *0* | *95* | *28* | *24* | *27* |
| Percent Heavy Vehicles | *0* | *0* | *0* | *0* | *0* | *0* |
| Percent Grade (%) | | *0* | | | *0* | |
| Flared Approach | | *N* | | | *Y* | |
| Storage | | *0* | | | *0* | |
| RT Channelized | | | *0* | | | *0* |
| Lanes | *0* | *0* | *1* | *0* | *1* | *1* |
| Configuration | | | *R* | *LT* | | *R* |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Configuration | *L* | *L* | | | *R* | *LT* | | *R* |
| v (vph) | *9* | *293* | | | *95* | *52* | | *27* |
| C (m) (vph) | *743* | *989* | | | *719* | *35* | | *549* |
| v/c | *0.01* | *0.30* | | | *0.13* | *1.49* | | *0.05* |
| 95% queue length | *0.04* | *1.25* | | | *0.45* | *5.60* | | *0.15* |
| Control Delay | *9.9* | *10.2* | | | *10.8* | *501.2* | | *11.9* |
| LOS | *A* | *B* | | | *B* | *F* | | *B* |
| Approach Delay | -- | -- | *10.8* | | | *334.0* | | |
| Approach LOS | -- | -- | *B* | | | *F* | | |

>

*HCS2000™* Copyright © 2000 University of Florida, All Rights Reserved Version 4.1b

# TWO-WAY STOP CONTROL SUMMARY

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | | Intersection | *Kanan / Roadside* |
| Agency/Co. | *Agoura Hills* | Jurisdiction | |
| Date Performed | *7/1/2003* | Analysis Year | |
| Analysis Time Period | *PM Peak* | | |

| | |
|---|---|
| Project Description | *Triangle Ranch - Existing Plus Growth* |
| East/West Street: *Roadside Drive* | North/South Street: *Kanan Road* |
| Intersection Orientation: *North-South* | Study Period (hrs): *0.25* |

## Vehicle Volumes and Adjustments

| **Major Street** | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | *37* | *914* | *57* | *322* | *706* | *54* |
| Peak-Hour Factor, PHF | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* |
| Hourly Flow Rate, HFR | *37* | *914* | *57* | *322* | *706* | *54* |
| Percent Heavy Vehicles | *0* | – | – | *0* | – | – |
| Median Type | *Undivided* | | | | | |
| RT Channelized | | | *0* | | | *0* |
| Lanes | *1* | *2* | *1* | *1* | *2* | *0* |
| Configuration | *L* | *T* | *R* | *L* | *T* | *TR* |
| Upstream Signal | | *0* | | | *0* | |

| **Minor Street** | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | *0* | *0* | *212* | *28* | *7* | *25* |
| Peak-Hour Factor, PHF | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* |
| Hourly Flow Rate, HFR | *0* | *0* | *212* | *28* | *7* | *25* |
| Percent Heavy Vehicles | *0* | *0* | *0* | *0* | *0* | *0* |
| Percent Grade (%) | | *0* | | | *0* | |
| Flared Approach | | *N* | | | *Y* | |
| Storage | | *0* | | | *0* | |
| RT Channelized | | | *0* | | | *0* |
| Lanes | *0* | *0* | *1* | *0* | *1* | *1* |
| Configuration | | | *R* | *LT* | | *R* |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Configuration | *L* | *L* | | | *R* | *LT* | | *R* |
| v (vph) | *37* | *322* | | | *212* | *35* | | *25* |
| C (m) (vph) | *861* | *718* | | | *556* | *16* | | *624* |
| v/c | *0.04* | *0.45* | | | *0.38* | *2.19* | | *0.04* |
| 95% queue length | *0.13* | *2.33* | | | *1.78* | *5.00* | | *0.13* |
| Control Delay | *9.4* | *14.0* | | | *15.4* | | | *11.0* |
| LOS | *A* | *B* | | | *C* | *F* | | *B* |
| Approach Delay | – | – | *15.4* | | | *610.3* | | |
| Approach LOS | – | – | *C* | | | *F* | | |

>

*HCS2000*™ Copyright © 2000 University of Florida, All Rights Reserved Version 4.1b

# TWO-WAY STOP CONTROL SUMMARY

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | | Intersection | *Kanan / Roadside* |
| Agency/Co. | *Agoura Hills* | Jurisdiction | |
| Date Performed | *7/1/2003* | Analysis Year | |
| Analysis Time Period | *AM Peak* | | |
| Project Description | *Triangle Ranch - Existing + Growth + Project* | | |
| East/West Street: | *Roadside Drive* | North/South Street: | *Kanan Road* |
| Intersection Orientation: | *North-South* | Study Period (hrs): | *0.25* |

## Vehicle Volumes and Adjustments

| **Major Street** | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | *10* | *588* | *30* | *293* | *871* | *67* |
| Peak-Hour Factor, PHF | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* |
| Hourly Flow Rate, HFR | *10* | *588* | *30* | *293* | *871* | *67* |
| Percent Heavy Vehicles | *0* | – | – | *0* | – | – |
| Median Type | *Undivided* | | | | | |
| RT Channelized | | | *0* | | | *0* |
| Lanes | *1* | *2* | *1* | *1* | *2* | *0* |
| Configuration | *L* | *T* | *R* | *L* | *T* | *TR* |
| Upstream Signal | | *0* | | | *0* | |

| **Minor Street** | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | *0* | *0* | *95* | *28* | *27* | *24* |
| Peak-Hour Factor, PHF | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* |
| Hourly Flow Rate, HFR | *0* | *0* | *95* | *28* | *27* | *24* |
| Percent Heavy Vehicles | *0* | *0* | *0* | *0* | *0* | *0* |
| Percent Grade (%) | | *0* | | | *0* | |
| Flared Approach | | *N* | | | *Y* | |
| Storage | | *0* | | | *0* | |
| RT Channelized | | | *0* | | | *0* |
| Lanes | *0* | *0* | *1* | *0* | *1* | *1* |
| Configuration | | | *R* | *LT* | | *R* |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Configuration | *L* | *L* | | | *R* | *LT* | | *R* |
| v (vph) | *10* | *293* | | | *95* | *55* | | *24* |
| C (m) (vph) | *739* | *972* | | | *708* | *34* | | *546* |
| v/c | *0.01* | *0.30* | | | *0.13* | *1.62* | | *0.04* |
| 95% queue length | *0.04* | *1.28* | | | *0.46* | *6.04* | | *0.14* |
| Control Delay | *9.9* | *10.3* | | | *10.9* | *560.3* | | *11.9* |
| LOS | *A* | *B* | | | *B* | *F* | | *B* |
| Approach Delay | – | – | *10.9* | | | *393.7* | | |
| Approach LOS | – | – | *B* | | | *F* | | |

>

*HCS2000*™ Copyright © 2000 University of Florida, All Rights Reserved Version 4.1b

# TWO-WAY STOP CONTROL SUMMARY

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | | Intersection | *Kanan / Roadside* |
| Agency/Co. | *Agoura Hills* | Jurisdiction | |
| Date Performed | *7/1/2003* | Analysis Year | |
| Analysis Time Period | *PM Peak* | | |

| | |
|---|---|
| Project Description | *Triangle Ranch - Existing + Growth + Project* |
| East/West Street: *Roadside Drive* | North/South Street: *Kanan Road* |
| Intersection Orientation: *North-South* | Study Period (hrs): *0.25* |

## Vehicle Volumes and Adjustments

| **Major Street** | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | *38* | *927* | *57* | *322* | *728* | *54* |
| Peak-Hour Factor, PHF | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* |
| Hourly Flow Rate, HFR | *38* | *927* | *57* | *322* | *728* | *54* |
| Percent Heavy Vehicles | *0* | – | – | *0* | – | – |
| Median Type | *Undivided* | | | | | |
| RT Channelized | | | *0* | | | *0* |
| Lanes | *1* | *2* | *1* | *1* | *2* | *0* |
| Configuration | *L* | *T* | *R* | *L* | *T* | *TR* |
| Upstream Signal | | *0* | | | *0* | |

| **Minor Street** | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | *0* | *0* | *212* | *28* | *7* | *26* |
| Peak-Hour Factor, PHF | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* |
| Hourly Flow Rate, HFR | *0* | *0* | *212* | *28* | *7* | *26* |
| Percent Heavy Vehicles | *0* | *0* | *0* | *0* | *0* | *0* |
| Percent Grade (%) | | *0* | | | *0* | |
| Flared Approach | | *N* | | | *Y* | |
| Storage | | *0* | | | *0* | |
| RT Channelized | | | *0* | | | *0* |
| Lanes | *0* | *0* | *1* | *0* | *1* | *1* |
| Configuration | | | *R* | *LT* | | *R* |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Configuration | *L* | *L* | | | *R* | *LT* | | *R* |
| v (vph) | *38* | *322* | | | *212* | *35* | | *26* |
| C (m) (vph) | *845* | *710* | | | *550* | *15* | | *614* |
| v/c | *0.04* | *0.45* | | | *0.39* | *2.33* | | *0.04* |
| 95% queue length | *0.14* | *2.37* | | | *1.80* | *5.08* | | *0.13* |
| Control Delay | *9.5* | *14.2* | | | *15.6* | | | *11.1* |
| LOS | *A* | *B* | | | *C* | *F* | | *B* |
| Approach Delay | – | – | *15.6* | | | *653.0* | | |
| Approach LOS | – | – | *C* | | | *F* | | |

>


Copyright © 2000 University of Florida, All Rights Reserved

# TWO-WAY STOP CONTROL SUMMARY

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | JAR | Intersection | Kanan & Cornell |
| Agency/Co. | Kimley-Horn & Assoc. | Jurisdiction | Agoura Hills |
| Date Performed | 6/23/2003 | Analysis Year | Existing |
| Analysis Time Period | AM Peak Period | | |

| | |
|---|---|
| Project Description | Triangle Ranch |
| East/West Street: | Cornell Rd |
| North/South Street: | Kanan Rd |
| Intersection Orientation: | North-South |
| Study Period (hrs): | 0.25 |

## Vehicle Volumes and Adjustments

| Major Street | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 0 | 453 | 18 | 124 | 553 | 0 |
| Peak-Hour Factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly Flow Rate, HFR | 0 | 453 | 18 | 124 | 553 | 0 |
| Percent Heavy Vehicles | 0 | -- | -- | 0 | -- | -- |
| Median Type | Undivided | | | | | |
| RT Channelized | | | 0 | | | 0 |
| Lanes | 0 | 1 | 0 | 1 | 1 | 0 |
| Configuration | | | TR | L | T | |
| Upstream Signal | | 0 | | | 0 | |

| Minor Street | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 22 | 0 | 118 | 0 | 0 | 0 |
| Peak-Hour Factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly Flow Rate, HFR | 22 | 0 | 118 | 0 | 0 | 0 |
| Percent Heavy Vehicles | 0 | 0 | 0 | 0 | 0 | 0 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach | | N | | | N | |
| Storage | | 0 | | | 0 | |
| RT Channelized | | | 0 | | | 0 |
| Lanes | 0 | 0 | 0 | 0 | 0 | 0 |
| Configuration | | LR | | | | |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Configuration | | L | | LR | | | | |
| v (vph) | | 124 | | 140 | | | | |
| C (m) (vph) | | 1101 | | 429 | | | | |
| v/c | | 0.11 | | 0.33 | | | | |
| 95% queue length | | 0.38 | | 1.40 | | | | |
| Control Delay | | 8.7 | | 17.4 | | | | |
| LOS | | A | | C | | | | |
| Approach Delay | -- | -- | 17.4 | | | | | |
| Approach LOS | -- | -- | C | | | | | |

>


Copyright © 2000 University of Florida, All Rights Reserved

# TWO-WAY STOP CONTROL SUMMARY

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | JAR | Intersection | Kanan & Cornell |
| Agency/Co. | Kimley-Horn & Assoc. | Jurisdiction | Agoura Hills |
| Date Performed | 6/23/2003 | Analysis Year | Existing |
| Analysis Time Period | PM Peak Period | | |

Project Description: Triangle Ranch

East/West Street: Cornell Rd | North/South Street: Kanan Rd

Intersection Orientation: North-South | Study Period (hrs): 0.25

## Vehicle Volumes and Adjustments

| Major Street | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 0 | 557 | 29 | 108 | 500 | 0 |
| Peak-Hour Factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly Flow Rate, HFR | 0 | 557 | 29 | 108 | 500 | 0 |
| Percent Heavy Vehicles | 0 | -- | -- | 0 | -- | -- |
| Median Type | Undivided | | | | | |
| RT Channelized | | | 0 | | | 0 |
| Lanes | 0 | 1 | 0 | 1 | 1 | 0 |
| Configuration | | | TR | L | T | |
| Upstream Signal | | 0 | | | 0 | |

| Minor Street | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 4 | 0 | 96 | 0 | 0 | 0 |
| Peak-Hour Factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly Flow Rate, HFR | 4 | 0 | 96 | 0 | 0 | 0 |
| Percent Heavy Vehicles | 0 | 0 | 0 | 0 | 0 | 0 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach | | N | | | N | |
| Storage | | 0 | | | 0 | |
| RT Channelized | | | 0 | | | 0 |
| Lanes | 0 | 0 | 0 | 0 | 0 | 0 |
| Configuration | | LR | | | | |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Configuration | | L | | LR | | | | |
| v (vph) | | 108 | | 100 | | | | |
| C (m) (vph) | | 999 | | 481 | | | | |
| v/c | | 0.11 | | 0.21 | | | | |
| 95% queue length | | 0.36 | | 0.77 | | | | |
| Control Delay | | 9.0 | | 14.4 | | | | |
| LOS | | A | | B | | | | |
| Approach Delay | -- | -- | 14.4 | | | | | |
| Approach LOS | -- | -- | B | | | | | |

>


Copyright © 2000 University of Florida, All Rights Reserved

# TWO-WAY STOP CONTROL SUMMARY

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | JAR | Intersection | Kanan & Cornell |
| Agency/Co. | Kimley-Horn & Assoc. | Jurisdiction | Agoura Hills |
| Date Performed | 6/23/2003 | Analysis Year | Existing + Growth |
| Analysis Time Period | AM Peak Period | | |

| | |
|---|---|
| Project Description | Triangle Ranch |
| East/West Street: | Cornell Rd |
| North/South Street: | Kanan Rd |
| Intersection Orientation: | North-South |
| Study Period (hrs): | 0.25 |

## Vehicle Volumes and Adjustments

| Major Street | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 0 | 468 | 19 | 128 | 571 | 0 |
| Peak-Hour Factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly Flow Rate, HFR | 0 | 468 | 19 | 128 | 571 | 0 |
| Percent Heavy Vehicles | 0 | -- | -- | 0 | -- | -- |
| Median Type | Undivided | | | | | |
| RT Channelized | | | 0 | | | 0 |
| Lanes | 0 | 1 | 0 | 1 | 1 | 0 |
| Configuration | | | TR | L | T | |
| Upstream Signal | | 0 | | | 0 | |

| Minor Street | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 23 | 0 | 122 | 0 | 0 | 0 |
| Peak-Hour Factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly Flow Rate, HFR | 23 | 0 | 122 | 0 | 0 | 0 |
| Percent Heavy Vehicles | 0 | 0 | 0 | 0 | 0 | 0 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach | | N | | | N | |
| Storage | | 0 | | | 0 | |
| RT Channelized | | | 0 | | | 0 |
| Lanes | 0 | 0 | 0 | 0 | 0 | 0 |
| Configuration | | LR | | | | |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Configuration | | L | | LR | | | | |
| v (vph) | | 128 | | 145 | | | | |
| C (m) (vph) | | 1086 | | 411 | | | | |
| v/c | | 0.12 | | 0.35 | | | | |
| 95% queue length | | 0.40 | | 1.56 | | | | |
| Control Delay | | 8.8 | | 18.5 | | | | |
| LOS | | A | | C | | | | |
| Approach Delay | -- | -- | 18.5 | | | | | |
| Approach LOS | -- | -- | C | | | | | |

>


Copyright © 2000 University of Florida, All Rights Reserved

# TWO-WAY STOP CONTROL SUMMARY

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | JAR | Intersection | Kanan & Cornell |
| Agency/Co. | Kimley-Horn & Assoc. | Jurisdiction | Agoura Hills |
| Date Performed | 6/23/2003 | Analysis Year | Existing + Growth |
| Analysis Time Period | PM Peak Period | | |

| | |
|---|---|
| Project Description | Triangle Ranch |
| East/West Street: | Cornell Rd |
| North/South Street: | Kanan Rd |
| Intersection Orientation: | North-South |
| Study Period (hrs): | 0.25 |

## Vehicle Volumes and Adjustments

| Major Street | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 0 | 575 | 30 | 112 | 517 | 0 |
| Peak-Hour Factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly Flow Rate, HFR | 0 | 575 | 30 | 112 | 517 | 0 |
| Percent Heavy Vehicles | 0 | -- | -- | 0 | -- | -- |
| Median Type | Undivided | | | | | |
| RT Channelized | | | 0 | | | 0 |
| Lanes | 0 | 1 | 0 | 1 | 1 | 0 |
| Configuration | | | TR | L | T | |
| Upstream Signal | | 0 | | | 0 | |

| Minor Street | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 4 | 0 | 99 | 0 | 0 | 0 |
| Peak-Hour Factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly Flow Rate, HFR | 4 | 0 | 99 | 0 | 0 | 0 |
| Percent Heavy Vehicles | 0 | 0 | 0 | 0 | 0 | 0 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach | | N | | | N | |
| Storage | | 0 | | | 0 | |
| RT Channelized | | | 0 | | | 0 |
| Lanes | 0 | 0 | 0 | 0 | 0 | 0 |
| Configuration | | LR | | | | |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Configuration | | L | | LR | | | | |
| v (vph) | | 112 | | 103 | | | | |
| C (m) (vph) | | 983 | | 468 | | | | |
| v/c | | 0.11 | | 0.22 | | | | |
| 95% queue length | | 0.38 | | 0.83 | | | | |
| Control Delay | | 9.1 | | 14.8 | | | | |
| LOS | | A | | B | | | | |
| Approach Delay | -- | -- | 14.8 | | | | | |
| Approach LOS | -- | -- | B | | | | | |

>


Copyright © 2000 University of Florida, All Rights Reserved

# TWO-WAY STOP CONTROL SUMMARY

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | JAR | Intersection | Kanan & Cornell |
| Agency/Co. | Kimley-Horn & Assoc. | Jurisdiction | Agoura Hills |
| Date Performed | 6/23/2003 | Analysis Year | Existing + Growth + Proj |
| Analysis Time Period | AM Peak Period | | |

| | |
|---|---|
| Project Description | Triangle Ranch |
| East/West Street: | Cornell Rd |
| North/South Street: | Kanan Rd |
| Intersection Orientation: | North-South |
| Study Period (hrs): | 0.25 |

## Vehicle Volumes and Adjustments

| Major Street | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 0 | 495 | 19 | 131 | 581 | 0 |
| Peak-Hour Factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly Flow Rate, HFR | 0 | 495 | 19 | 131 | 581 | 0 |
| Percent Heavy Vehicles | 0 | -- | -- | 0 | -- | -- |
| Median Type | Undivided | | | | | |
| RT Channelized | | | 0 | | | 0 |
| Lanes | 0 | 1 | 0 | 1 | 1 | 0 |
| Configuration | | | TR | L | T | |
| Upstream Signal | | 0 | | | 0 | |

| Minor Street | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 23 | 0 | 130 | 0 | 0 | 0 |
| Peak-Hour Factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly Flow Rate, HFR | 23 | 0 | 130 | 0 | 0 | 0 |
| Percent Heavy Vehicles | 0 | 0 | 0 | 0 | 0 | 0 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach | | N | | | N | |
| Storage | | 0 | | | 0 | |
| RT Channelized | | | 0 | | | 0 |
| Lanes | 0 | 0 | 0 | 0 | 0 | 0 |
| Configuration | | LR | | | | |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Configuration | | L | | LR | | | | |
| v (vph) | | 131 | | 153 | | | | |
| C (m) (vph) | | 1062 | | 399 | | | | |
| v/c | | 0.12 | | 0.38 | | | | |
| 95% queue length | | 0.42 | | 1.76 | | | | |
| Control Delay | | 8.9 | | 19.5 | | | | |
| LOS | | A | | C | | | | |
| Approach Delay | -- | -- | 19.5 | | | | | |
| Approach LOS | -- | -- | C | | | | | |

>


Copyright © 2000 University of Florida, All Rights Reserved

# TWO-WAY STOP CONTROL SUMMARY

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | JAR | Intersection | Kanan & Cornell |
| Agency/Co. | Kimley-Horn & Assoc. | Jurisdiction | Agoura Hills |
| Date Performed | 6/23/2003 | Analysis Year | Existing + Growth + Proj |
| Analysis Time Period | PM Peak Period | | |

| | |
|---|---|
| Project Description | Triangle Ranch |
| East/West Street: | Cornell Rd |
| North/South Street: | Kanan Rd |
| Intersection Orientation: | North-South |
| Study Period (hrs): | 0.25 |

## Vehicle Volumes and Adjustments

| Major Street | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 0 | 593 | 30 | 121 | 548 | 0 |
| Peak-Hour Factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly Flow Rate, HFR | 0 | 593 | 30 | 121 | 548 | 0 |
| Percent Heavy Vehicles | 0 | -- | -- | 0 | -- | -- |
| Median Type | Undivided | | | | | |
| RT Channelized | | | 0 | | | 0 |
| Lanes | 0 | 1 | 0 | 1 | 1 | 0 |
| Configuration | | | TR | L | T | |
| Upstream Signal | | 0 | | | 0 | |

| Minor Street | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 4 | 0 | 104 | 0 | 0 | 0 |
| Peak-Hour Factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly Flow Rate, HFR | 4 | 0 | 104 | 0 | 0 | 0 |
| Percent Heavy Vehicles | 0 | 0 | 0 | 0 | 0 | 0 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach | | N | | | N | |
| Storage | | 0 | | | 0 | |
| RT Channelized | | | 0 | | | 0 |
| Lanes | 0 | 0 | 0 | 0 | 0 | 0 |
| Configuration | | LR | | | | |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Configuration | | L | | LR | | | | |
| v (vph) | | 121 | | 108 | | | | |
| C (m) (vph) | | 968 | | 455 | | | | |
| v/c | | 0.13 | | 0.24 | | | | |
| 95% queue length | | 0.43 | | 0.91 | | | | |
| Control Delay | | 9.2 | | 15.4 | | | | |
| LOS | | A | | C | | | | |
| Approach Delay | -- | -- | 15.4 | | | | | |
| Approach LOS | -- | -- | C | | | | | |

>

HCS2000™ Copyright © 2000 University of Florida, All Rights Reserved Version 4.1b

# TWO-WAY STOP CONTROL SUMMARY

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | JAR | Intersection | Kanan & Cornell |
| Agency/Co. | Kimley-Horn & Assoc. | Jurisdiction | Agoura Hills |
| Date Performed | 6/23/2003 | Analysis Year | Existing + Growth + Proj+Reltd |
| Analysis Time Period | AM Peak Period | | |

| | |
|---|---|
| Project Description | Triangle Ranch |
| East/West Street: | Cornell Rd |
| North/South Street: | Kanan Rd |
| Intersection Orientation: | North-South |
| Study Period (hrs): | 0.25 |

## Vehicle Volumes and Adjustments

| Major Street | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 0 | 570 | 28 | 131 | 597 | 0 |
| Peak-Hour Factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly Flow Rate, HFR | 0 | 570 | 28 | 131 | 597 | 0 |
| Percent Heavy Vehicles | 0 | -- | -- | 0 | -- | -- |
| Median Type | Undivided | | | | | |
| RT Channelized | | | 0 | | | 0 |
| Lanes | 0 | 1 | 0 | 1 | 1 | 0 |
| Configuration | | | TR | L | T | |
| Upstream Signal | | 0 | | | 0 | |

| Minor Street | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 26 | 0 | 130 | 0 | 0 | 0 |
| Peak-Hour Factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly Flow Rate, HFR | 26 | 0 | 130 | 0 | 0 | 0 |
| Percent Heavy Vehicles | 0 | 0 | 0 | 0 | 0 | 0 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach | | N | | | N | |
| Storage | | 0 | | | 0 | |
| RT Channelized | | | 0 | | | 0 |
| Lanes | 0 | 0 | 0 | 0 | 0 | 0 |
| Configuration | | LR | | | | |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Configuration | | L | | LR | | | | |
| v (vph) | | 131 | | 156 | | | | |
| C (m) (vph) | | 989 | | 342 | | | | |
| v/c | | 0.13 | | 0.46 | | | | |
| 95% queue length | | 0.46 | | 2.29 | | | | |
| Control Delay | | 9.2 | | 24.1 | | | | |
| LOS | | A | | C | | | | |
| Approach Delay | -- | -- | 24.1 | | | | | |
| Approach LOS | -- | -- | C | | | | | |

>


Copyright © 2000 University of Florida, All Rights Reserved

# TWO-WAY STOP CONTROL SUMMARY

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | JAR | Intersection | Kanan & Cornell |
| Agency/Co. | Kimley-Horn & Assoc. | Jurisdiction | Agoura Hills |
| Date Performed | 6/23/2003 | Analysis Year | Existing + Growth + Proj+Reltd |
| Analysis Time Period | PM Peak Period | | |

Project Description: Triangle Ranch

East/West Street: Cornell Rd | North/South Street: Kanan Rd

Intersection Orientation: North-South | Study Period (hrs): 0.25

## Vehicle Volumes and Adjustments

| Major Street | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 0 | 649 | 35 | 121 | 646 | 0 |
| Peak-Hour Factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly Flow Rate, HFR | 0 | 649 | 35 | 121 | 646 | 0 |
| Percent Heavy Vehicles | 0 | -- | -- | 0 | -- | -- |
| Median Type | Undivided | | | | | |
| RT Channelized | | | 0 | | | 0 |
| Lanes | 0 | 1 | 0 | 1 | 1 | 0 |
| Configuration | | | TR | L | T | |
| Upstream Signal | | 0 | | | 0 | |

| Minor Street | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 11 | 0 | 104 | 0 | 0 | 0 |
| Peak-Hour Factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly Flow Rate, HFR | 11 | 0 | 104 | 0 | 0 | 0 |
| Percent Heavy Vehicles | 0 | 0 | 0 | 0 | 0 | 0 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach | | N | | | N | |
| Storage | | 0 | | | 0 | |
| RT Channelized | | | 0 | | | 0 |
| Lanes | 0 | 0 | 0 | 0 | 0 | 0 |
| Configuration | | LR | | | | |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Configuration | | L | | LR | | | | |
| v (vph) | | 121 | | 115 | | | | |
| C (m) (vph) | | 919 | | 353 | | | | |
| v/c | | 0.13 | | 0.33 | | | | |
| 95% queue length | | 0.45 | | 1.39 | | | | |
| Control Delay | | 9.5 | | 20.0 | | | | |
| LOS | | A | | C | | | | |
| Approach Delay | -- | -- | 20.0 | | | | | |
| Approach LOS | -- | -- | C | | | | | |

>

HCS2000™ Copyright © 2000 University of Florida, All Rights Reserved Version 4.1b

# ALL-WAY STOP CONTROL ANALYSIS

## General Information

| | |
|---|---|
| Analyst | JAR |
| Agency/Co. | Kimley-Horn & Assoc. |
| Date Performed | 6/23/2003 |
| Analysis Time Period | AM Peak Period |

## Site Information

| | |
|---|---|
| Intersection | Agoura & Cornell |
| Jurisdiction | Agoura Hills |
| Analysis Year | Existing |

Project ID *Triangle Ranch*

East/West Street: *Agoura Rd* | North/South Street: *Cornell Rd*

## Volume Adjustments and Site Characteristics

| Approach | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|
| Movement | L | T | R | L | T | R |
| Volume | 13 | 158 | 8 | 17 | 180 | 9 |
| %Thrus Left Lane | 50 | | | 50 | | |

| Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | L | T | R | L | T | R |
| Volume | 12 | 4 | 22 | 18 | 5 | 26 |
| %Thrus Left Lane | 50 | | | 50 | | |

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Configuration | LTR | | LTR | | LTR | | LTR | |
| PHF | 1.00 | | 1.00 | | 1.00 | | 1.00 | |
| Flow Rate | 179 | | 206 | | 38 | | 49 | |
| % Heavy Vehicles | 0 | | 0 | | 0 | | 0 | |
| No. Lanes | 1 | | 1 | | 1 | | 1 | |
| Geometry Group | 1 | | 1 | | 1 | | 1 | |
| Duration, T | 0.25 | | | | | | | |

## Saturation Headway Adjustment Worksheet

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Prop. Left-Turns | 0.1 | | 0.1 | | 0.3 | | 0.4 | |
| Prop. Right-Turns | 0.0 | | 0.0 | | 0.6 | | 0.5 | |
| Prop. Heavy Vehicle | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| hLT-adj | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| hRT-adj | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 |
| hHV-adj | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| hadj, computed | 4.31 | | 4.31 | | 4.31 | | 4.31 | |

## Departure Headway and Service Time

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| hd, initial value | 3.20 | | 3.20 | | 3.20 | | 3.20 | |
| x, initial | 0.16 | | 0.18 | | 0.03 | | 0.04 | |
| hd, final value | 4.31 | | 4.31 | | 4.31 | | 4.31 | |
| x, final value | 0.21 | | 0.25 | | 0.05 | | 0.06 | |
| Move-up time, m | 2.0 | | 2.0 | | 2.0 | | 2.0 | |
| Service Time | 2.3 | | 2.3 | | 2.3 | | 2.3 | |

## Capacity and Level of Service

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Capacity | 429 | | 456 | | 288 | | 299 | |
| Delay | 8.49 | | 8.68 | | 7.76 | | 7.86 | |
| LOS | A | | A | | A | | A | |
| Approach: Delay | 8.49 | | 8.68 | | 7.76 | | 7.86 | |
| LOS | A | | A | | A | | A | |
| Intersection Delay | 8.45 | | | | | | | |
| Intersection LOS | A | | | | | | | |


Copyright © 2000 University of Florida, All Rights Reserved

# ALL-WAY STOP CONTROL ANALYSIS

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | JAR | Intersection | Agoura & Cornell |
| Agency/Co. | Kimley-Horn & Assoc. | Jurisdiction | Agoura Hills |
| Date Performed | 6/23/2003 | Analysis Year | Existing |
| Analysis Time Period | PM Peak Period | | |

Project ID *Triangle Ranch*

East/West Street: *Agoura Rd* | North/South Street: *Cornell Rd*

## Volume Adjustments and Site Characteristics

| Approach | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|
| Movement | L | T | R | L | T | R |
| Volume | 18 | 278 | 7 | 46 | 289 | 58 |
| %Thrus Left Lane | 50 | | | 50 | | |

| Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | L | T | R | L | T | R |
| Volume | 2 | 2 | 16 | 40 | 13 | 90 |
| %Thrus Left Lane | 50 | | | 50 | | |

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Configuration | LTR | | LTR | | LTR | | LTR | |
| PHF | 1.00 | | 1.00 | | 1.00 | | 1.00 | |
| Flow Rate | 303 | | 393 | | 20 | | 143 | |
| % Heavy Vehicles | 0 | | 0 | | 0 | | 0 | |
| No. Lanes | 1 | | 1 | | 1 | | 1 | |
| Geometry Group | 1 | | 1 | | 1 | | 1 | |
| Duration, T | 0.25 | | | | | | | |

## Saturation Headway Adjustment Worksheet

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Prop. Left-Turns | 0.1 | | 0.1 | | 0.1 | | 0.3 | |
| Prop. Right-Turns | 0.0 | | 0.1 | | 0.8 | | 0.6 | |
| Prop. Heavy Vehicle | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| hLT-adj | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| hRT-adj | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 |
| hHV-adj | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| hadj, computed | 4.83 | | 4.83 | | 4.83 | | 4.83 | |

## Departure Headway and Service Time

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| hd, initial value | 3.20 | | 3.20 | | 3.20 | | 3.20 | |
| x, initial | 0.27 | | 0.35 | | 0.02 | | 0.13 | |
| hd, final value | 4.83 | | 4.83 | | 4.83 | | 4.83 | |
| x, final value | 0.41 | | 0.51 | | 0.03 | | 0.21 | |
| Move-up time, m | 2.0 | | 2.0 | | 2.0 | | 2.0 | |
| Service Time | 2.8 | | 2.8 | | 2.8 | | 2.8 | |

## Capacity and Level of Service

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Capacity | 553 | | 643 | | 270 | | 393 | |
| Delay | 11.11 | | 12.44 | | 8.54 | | 9.64 | |
| LOS | B | | B | | A | | A | |
| Approach: Delay | 11.11 | | 12.44 | | 8.54 | | 9.64 | |
| LOS | B | | B | | A | | A | |
| Intersection Delay | 11.41 | | | | | | | |
| Intersection LOS | B | | | | | | | |

*HCS2000™* Copyright © 2000 University of Florida, All Rights Reserved Version 4.1b

# ALL-WAY STOP CONTROL ANALYSIS

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | JAR | Intersection | Agoura & Cornell |
| Agency/Co. | Kimley-Horn & Assoc. | Jurisdiction | Agoura Hills |
| Date Performed | 6/23/2003 | Analysis Year | Existing + Growth |
| Analysis Time Period | AM Peak Period | | |

Project ID *Triangle Ranch*

East/West Street: *Agoura Rd* | North/South Street: *Cornell Rd*

## Volume Adjustments and Site Characteristics

| Approach | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|
| Movement | L | T | R | L | T | R |
| Volume | 13 | 163 | 8 | 18 | 186 | 9 |
| %Thrus Left Lane | 50 | | | 50 | | |

| Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | L | T | R | L | T | R |
| Volume | 12 | 4 | 23 | 19 | 5 | 27 |
| %Thrus Left Lane | 50 | | | 50 | | |

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Configuration | LTR | | LTR | | LTR | | LTR | |
| PHF | 1.00 | | 1.00 | | 1.00 | | 1.00 | |
| Flow Rate | 184 | | 213 | | 39 | | 51 | |
| % Heavy Vehicles | 0 | | 0 | | 0 | | 0 | |
| No. Lanes | 1 | | 1 | | 1 | | 1 | |
| Geometry Group | 1 | | 1 | | 1 | | 1 | |
| Duration, T | 0.25 | | | | | | | |

## Saturation Headway Adjustment Worksheet

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Prop. Left-Turns | 0.1 | | 0.1 | | 0.3 | | 0.4 | |
| Prop. Right-Turns | 0.0 | | 0.0 | | 0.6 | | 0.5 | |
| Prop. Heavy Vehicle | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| hLT-adj | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| hRT-adj | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 |
| hHV-adj | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| hadj, computed | 4.33 | | 4.33 | | 4.33 | | 4.33 | |

## Departure Headway and Service Time

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| hd, initial value | 3.20 | | 3.20 | | 3.20 | | 3.20 | |
| x, initial | 0.16 | | 0.19 | | 0.03 | | 0.05 | |
| hd, final value | 4.33 | | 4.33 | | 4.33 | | 4.33 | |
| x, final value | 0.22 | | 0.25 | | 0.05 | | 0.07 | |
| Move-up time, m | 2.0 | | 2.0 | | 2.0 | | 2.0 | |
| Service Time | 2.3 | | 2.3 | | 2.3 | | 2.3 | |

## Capacity and Level of Service

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Capacity | 434 | | 463 | | 289 | | 301 | |
| Delay | 8.56 | | 8.77 | | 7.80 | | 7.91 | |
| LOS | A | | A | | A | | A | |
| Approach: Delay | 8.56 | | 8.77 | | 7.80 | | 7.91 | |
| LOS | A | | A | | A | | A | |
| Intersection Delay | 8.52 | | | | | | | |
| Intersection LOS | A | | | | | | | |


Copyright © 2000 University of Florida, All Rights Reserved

# ALL-WAY STOP CONTROL ANALYSIS

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | JAR | Intersection | Agoura & Cornell |
| Agency/Co. | Kimley-Horn & Assoc. | Jurisdiction | Agoura Hills |
| Date Performed | 6/23/2003 | Analysis Year | Existing + Growth |
| Analysis Time Period | PM Peak Period | | |

Project ID *Triangle Ranch*

East/West Street: *Agoura Rd* | North/South Street: *Cornell Rd*

## Volume Adjustments and Site Characteristics

| Approach | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|
| Movement | L | T | R | L | T | R |
| Volume | 19 | 287 | 7 | 48 | 299 | 60 |
| %Thrus Left Lane | 50 | | | 50 | | |

| Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | L | T | R | L | T | R |
| Volume | 2 | 2 | 17 | 41 | 13 | 93 |
| %Thrus Left Lane | 50 | | | 50 | | |

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Configuration | LTR | | LTR | | LTR | | LTR | |
| PHF | 1.00 | | 1.00 | | 1.00 | | 1.00 | |
| Flow Rate | 313 | | 407 | | 21 | | 147 | |
| % Heavy Vehicles | 0 | | 0 | | 0 | | 0 | |
| No. Lanes | 1 | | 1 | | 1 | | 1 | |
| Geometry Group | 1 | | 1 | | 1 | | 1 | |
| Duration, T | 0.25 | | | | | | | |

## Saturation Headway Adjustment Worksheet

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Prop. Left-Turns | 0.1 | | 0.1 | | 0.1 | | 0.3 | |
| Prop. Right-Turns | 0.0 | | 0.1 | | 0.8 | | 0.6 | |
| Prop. Heavy Vehicle | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| hLT-adj | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| hRT-adj | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 |
| hHV-adj | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| hadj, computed | 4.88 | | 4.88 | | 4.88 | | 4.88 | |

## Departure Headway and Service Time

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| hd, initial value | 3.20 | | 3.20 | | 3.20 | | 3.20 | |
| x, initial | 0.28 | | 0.36 | | 0.02 | | 0.13 | |
| hd, final value | 4.88 | | 4.88 | | 4.88 | | 4.88 | |
| x, final value | 0.42 | | 0.53 | | 0.03 | | 0.22 | |
| Move-up time, m | 2.0 | | 2.0 | | 2.0 | | 2.0 | |
| Service Time | 2.9 | | 2.9 | | 2.9 | | 2.9 | |

## Capacity and Level of Service

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Capacity | 563 | | 657 | | 271 | | 397 | |
| Delay | 11.42 | | 12.95 | | 8.63 | | 9.79 | |
| LOS | B | | B | | A | | A | |
| Approach: Delay | 11.42 | | 12.95 | | 8.63 | | 9.79 | |
| LOS | B | | B | | A | | A | |
| Intersection Delay | 11.79 | | | | | | | |
| Intersection LOS | B | | | | | | | |


Copyright © 2000 University of Florida, All Rights Reserved

# ALL-WAY STOP CONTROL ANALYSIS

## General Information

| | |
|---|---|
| Analyst | JAR |
| Agency/Co. | Kimley-Horn & Assoc. |
| Date Performed | 6/23/2003 |
| Analysis Time Period | AM Peak Period |

## Site Information

| | |
|---|---|
| Intersection | Agoura & Cornell |
| Jurisdiction | Agoura Hills |
| Analysis Year | Existing + Growth + Proj |

Project ID *Triangle Ranch*

East/West Street: *Agoura Rd* | North/South Street: *Cornell Rd*

## Volume Adjustments and Site Characteristics

| Approach | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|
| Movement | L | T | R | L | T | R |
| Volume | 13 | 166 | 8 | 20 | 187 | 9 |
| %Thrus Left Lane | 50 | | | 50 | | |

| Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | L | T | R | L | T | R |
| Volume | 12 | 7 | 30 | 19 | 6 | 27 |
| %Thrus Left Lane | 50 | | | 50 | | |

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Configuration | LTR | | LTR | | LTR | | LTR | |
| PHF | 1.00 | | 1.00 | | 1.00 | | 1.00 | |
| Flow Rate | 187 | | 216 | | 49 | | 52 | |
| % Heavy Vehicles | 0 | | 0 | | 0 | | 0 | |
| No. Lanes | 1 | | 1 | | 1 | | 1 | |
| Geometry Group | 1 | | 1 | | 1 | | 1 | |
| Duration, T | 0.25 | | | | | | | |

## Saturation Headway Adjustment Worksheet

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Prop. Left-Turns | 0.1 | | 0.1 | | 0.2 | | 0.4 | |
| Prop. Right-Turns | 0.0 | | 0.0 | | 0.6 | | 0.5 | |
| Prop. Heavy Vehicle | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| hLT-adj | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| hRT-adj | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 |
| hHV-adj | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| hadj, computed | 4.37 | | 4.37 | | 4.37 | | 4.37 | |

## Departure Headway and Service Time

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| hd, initial value | 3.20 | | 3.20 | | 3.20 | | 3.20 | |
| x, initial | 0.17 | | 0.19 | | 0.04 | | 0.05 | |
| hd, final value | 4.37 | | 4.37 | | 4.37 | | 4.37 | |
| x, final value | 0.23 | | 0.26 | | 0.06 | | 0.07 | |
| Move-up time, m | 2.0 | | 2.0 | | 2.0 | | 2.0 | |
| Service Time | 2.4 | | 2.4 | | 2.4 | | 2.4 | |

## Capacity and Level of Service

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Capacity | 437 | | 466 | | 299 | | 302 | |
| Delay | 8.64 | | 8.86 | | 7.86 | | 7.96 | |
| LOS | A | | A | | A | | A | |
| Approach: Delay | 8.64 | | 8.86 | | 7.86 | | 7.96 | |
| LOS | A | | A | | A | | A | |
| Intersection Delay | 8.59 | | | | | | | |
| Intersection LOS | A | | | | | | | |

*HCS2000™* Copyright © 2000 University of Florida, All Rights Reserved Version 4.1b

# ALL-WAY STOP CONTROL ANALYSIS

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | JAR | Intersection | Agoura & Cornell |
| Agency/Co. | Kimley-Horn & Assoc. | Jurisdiction | Agoura Hills |
| Date Performed | 6/23/2003 | Analysis Year | Existing + Growth + Proj |
| Analysis Time Period | PM Peak Period | | |

Project ID *Triangle Ranch*

East/West Street: *Agoura Rd* | North/South Street: *Cornell Rd*

## Volume Adjustments and Site Characteristics

| Approach | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|
| Movement | L | T | R | L | T | R |
| Volume | 19 | 289 | 7 | 56 | 301 | 60 |
| %Thrus Left Lane | 50 | | | 50 | | |

| Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | L | T | R | L | T | R |
| Volume | 2 | 4 | 21 | 41 | 16 | 93 |
| %Thrus Left Lane | 50 | | | 50 | | |

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Configuration | LTR | | LTR | | LTR | | LTR | |
| PHF | 1.00 | | 1.00 | | 1.00 | | 1.00 | |
| Flow Rate | 315 | | 417 | | 27 | | 150 | |
| % Heavy Vehicles | 0 | | 0 | | 0 | | 0 | |
| No. Lanes | 1 | | 1 | | 1 | | 1 | |
| Geometry Group | 1 | | 1 | | 1 | | 1 | |
| Duration, T | 0.25 | | | | | | | |

## Saturation Headway Adjustment Worksheet

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| Prop. Left-Turns | 0.1 | | 0.1 | | 0.1 | | 0.3 | |
| Prop. Right-Turns | 0.0 | | 0.1 | | 0.8 | | 0.6 | |
| Prop. Heavy Vehicle | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| hLT-adj | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| hRT-adj | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 |
| hHV-adj | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| hadj, computed | 4.93 | | 4.93 | | 4.93 | | 4.93 | |

## Departure Headway and Service Time

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| hd, initial value | 3.20 | | 3.20 | | 3.20 | | 3.20 | |
| x, initial | 0.28 | | 0.37 | | 0.02 | | 0.13 | |
| hd, final value | 4.93 | | 4.93 | | 4.93 | | 4.93 | |
| x, final value | 0.43 | | 0.55 | | 0.04 | | 0.22 | |
| Move-up time, m | 2.0 | | 2.0 | | 2.0 | | 2.0 | |
| Service Time | 2.9 | | 2.9 | | 2.9 | | 2.9 | |

## Capacity and Level of Service

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Capacity | 565 | | 667 | | 277 | | 400 | |
| Delay | 11.62 | | 13.45 | | 8.76 | | 9.94 | |
| LOS | B | | B | | A | | A | |
| Approach: Delay | 11.62 | | 13.45 | | 8.76 | | 9.94 | |
| LOS | B | | B | | A | | A | |
| Intersection Delay | 12.10 | | | | | | | |
| Intersection LOS | B | | | | | | | |


Copyright © 2000 University of Florida, All Rights Reserved

# ALL-WAY STOP CONTROL ANALYSIS

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | JAR | Intersection | Agoura & Cornell |
| Agency/Co. | Kimley-Horn & Assoc. | Jurisdiction | Agoura Hills |
| Date Performed | 6/23/2003 | Analysis Year | Existing + Growth + Proj+Reltd |
| Analysis Time Period | AM Peak Period | | |

Project ID *Triangle Ranch*

East/West Street: *Agoura Rd* | North/South Street: *Cornell Rd*

## Volume Adjustments and Site Characteristics

| Approach | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|
| Movement | L | T | R | L | T | R |
| Volume | 31 | 239 | 8 | 29 | 333 | 9 |
| %Thrus Left Lane | 50 | | | 50 | | |

| Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | L | T | R | L | T | R |
| Volume | 12 | 7 | 47 | 19 | 6 | 78 |
| %Thrus Left Lane | 50 | | | 50 | | |

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Configuration | LTR | | LTR | | LTR | | LTR | |
| PHF | 1.00 | | 1.00 | | 1.00 | | 1.00 | |
| Flow Rate | 278 | | 371 | | 66 | | 103 | |
| % Heavy Vehicles | 0 | | 0 | | 0 | | 0 | |
| No. Lanes | 1 | | 1 | | 1 | | 1 | |
| Geometry Group | 1 | | 1 | | 1 | | 1 | |
| Duration, T | 0.25 | | | | | | | |

## Saturation Headway Adjustment Worksheet

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Prop. Left-Turns | 0.1 | | 0.1 | | 0.2 | | 0.2 | |
| Prop. Right-Turns | 0.0 | | 0.0 | | 0.7 | | 0.8 | |
| Prop. Heavy Vehicle | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| hLT-adj | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| hRT-adj | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 |
| hHV-adj | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| hadj, computed | 4.83 | | 4.83 | | 4.83 | | 4.83 | |

## Departure Headway and Service Time

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| hd, initial value | 3.20 | | 3.20 | | 3.20 | | 3.20 | |
| x, initial | 0.25 | | 0.33 | | 0.06 | | 0.09 | |
| hd, final value | 4.83 | | 4.83 | | 4.83 | | 4.83 | |
| x, final value | 0.37 | | 0.49 | | 0.10 | | 0.15 | |
| Move-up time, m | 2.0 | | 2.0 | | 2.0 | | 2.0 | |
| Service Time | 2.8 | | 2.8 | | 2.8 | | 2.8 | |

## Capacity and Level of Service

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Capacity | 528 | | 621 | | 316 | | 353 | |
| Delay | 10.67 | | 12.10 | | 8.81 | | 9.04 | |
| LOS | B | | B | | A | | A | |
| Approach: Delay | 10.67 | | 12.10 | | 8.81 | | 9.04 | |
| LOS | B | | B | | A | | A | |
| Intersection Delay | 10.96 | | | | | | | |
| Intersection LOS | B | | | | | | | |

*HCS2000™* Copyright © 2000 University of Florida, All Rights Reserved Version 4.1b

# ALL-WAY STOP CONTROL ANALYSIS

## General Information

| | |
|---|---|
| Analyst | JAR |
| Agency/Co. | Kimley-Horn & Assoc. |
| Date Performed | 6/23/2003 |
| Analysis Time Period | PM Peak Period |

## Site Information

| | |
|---|---|
| Intersection | Agoura & Cornell |
| Jurisdiction | Agoura Hills |
| Analysis Year | Existing + Growth + Proj+Relt |

Project ID *Triangle Ranch*

East/West Street: *Agoura Rd* | North/South Street: *Cornell Rd*

## Volume Adjustments and Site Characteristics

| Approach | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|
| Movement | L | T | R | L | T | R |
| Volume | 107 | 502 | 7 | 64 | 483 | 60 |
| %Thrus Left Lane | 50 | | | 50 | | |

| Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | L | T | R | L | T | R |
| Volume | 2 | 4 | 26 | 41 | 16 | 161 |
| %Thrus Left Lane | 50 | | | 50 | | |

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Configuration | LTR | | LTR | | LTR | | LTR | |
| PHF | 1.00 | | 1.00 | | 1.00 | | 1.00 | |
| Flow Rate | 616 | | 607 | | 32 | | 218 | |
| % Heavy Vehicles | 0 | | 0 | | 0 | | 0 | |
| No. Lanes | 1 | | 1 | | 1 | | 1 | |
| Geometry Group | 1 | | 1 | | 1 | | 1 | |
| Duration, T | 0.25 | | | | | | | |

## Saturation Headway Adjustment Worksheet

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Prop. Left-Turns | 0.2 | | 0.1 | | 0.1 | | 0.2 | |
| Prop. Right-Turns | 0.0 | | 0.1 | | 0.8 | | 0.7 | |
| Prop. Heavy Vehicle | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| hLT-adj | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| hRT-adj | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 |
| hHV-adj | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| hadj, computed | 5.91 | | 5.91 | | 5.91 | | 5.91 | |

## Departure Headway and Service Time

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| hd, initial value | 3.20 | | 3.20 | | 3.20 | | 3.20 | |
| x, initial | 0.55 | | 0.54 | | 0.03 | | 0.19 | |
| hd, final value | 5.91 | | 5.91 | | 5.91 | | 5.91 | |
| x, final value | 1.01 | | 0.99 | | 0.07 | | 0.42 | |
| Move-up time, m | 2.0 | | 2.0 | | 2.0 | | 2.0 | |
| Service Time | 3.9 | | 3.9 | | 3.9 | | 3.9 | |

## Capacity and Level of Service

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Capacity | 616 | | 615 | | 282 | | 468 | |
| Delay | 63.22 | | 57.01 | | 11.29 | | 14.67 | |
| LOS | F | | F | | B | | B | |
| Approach: Delay | 63.22 | | 57.01 | | 11.29 | | 14.67 | |
| LOS | F | | F | | B | | B | |
| Intersection Delay | 52.35 | | | | | | | |
| Intersection LOS | F | | | | | | | |


Copyright © 2000 University of Florida, All Rights Reserved

# APPENDIX D

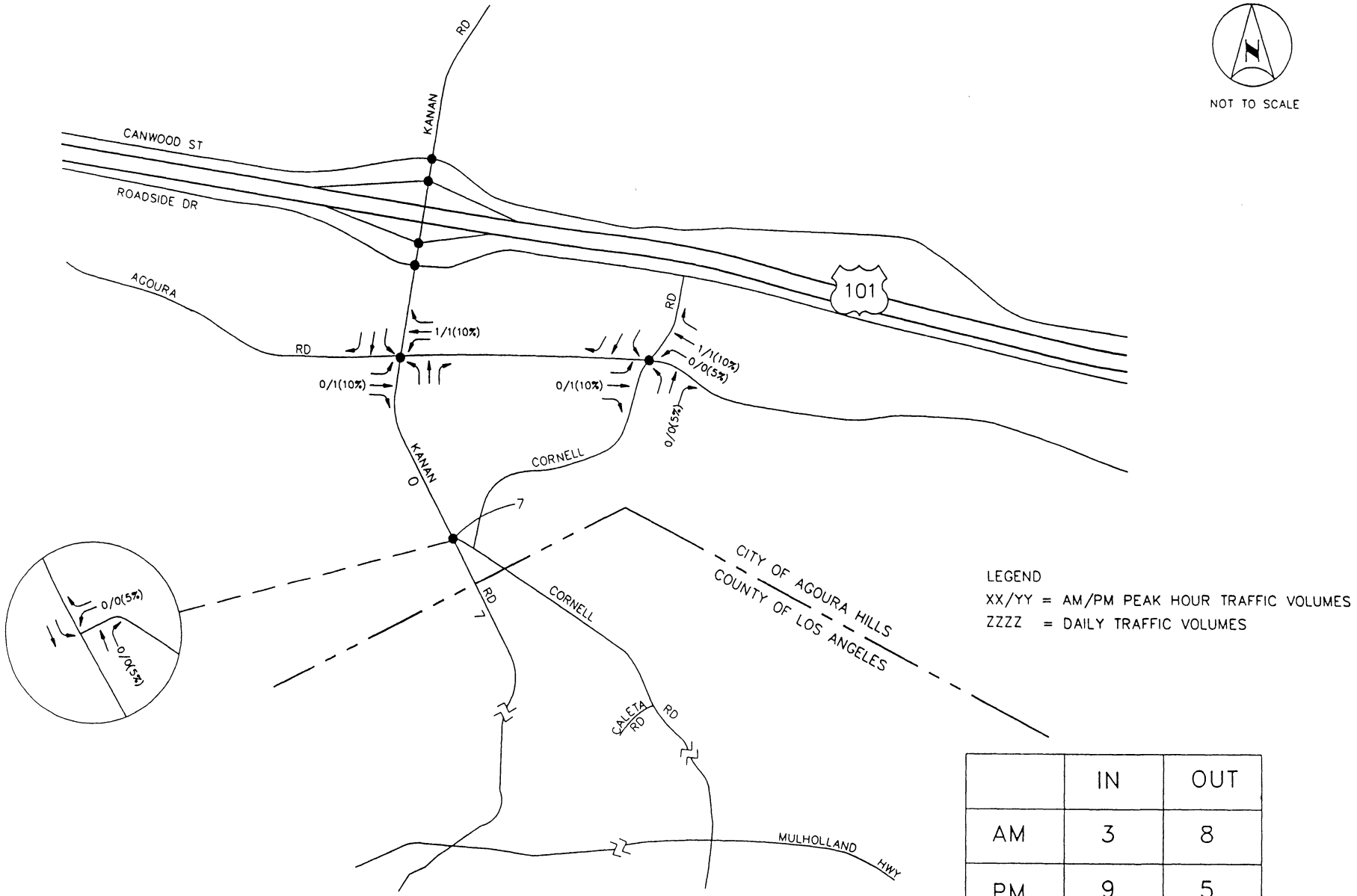
# RELATED PROJECTS
# PEAK HOUR TRAFFIC

## LIST OF RELATED PROJECTS

| No. | Project Description and Location | Project Size | Location |
|---|---|---|---|
| *City of Agoura Hills - Residential* | | | |
| 1 | Riopharm 1 - single family residences | 14 DU | 27754 Agoura Rd SE of Agoura and Montecillo |
| 2 | Riopharm 2 - single family residences | 14 DU | 26750 Agoura Rd SE of Agoura and Ropharm |
| 3 | Stockton - 4-unit apartment building | 4 DU | 5310 Colodny Dr |
| 4 | Schneider - 4-unit condominium project | 4 DU | 5276 Colodny Dr |
| 5 | Minder - 19-unit condominium project | 19 DU | 5241 Colodny Dr. |
| *City of Agoura Hills - Commercial* | | | |
| 6 | Creekside - Retail Center | 93 KSF | SWC Kanan Road and Agoura Rd. |
| 7 | Burgandy Creek Bistro - New restaurant and reception hall | 11 KSF | Vacant lot west of 28818 Agoura Rd |
| 8 | St. Paul's Lutheran Church | 91.04 KSF | 30125 Agoura Rd. |
| 9 | Alesco Development - Office Buildings | 67 KSF | NEC Chesebro and Agoura Rds |
| 10 | Ted Moore - Agoura Village mixed use land development | Mixed: 10 Acres<br>Open: 8 Acres | SEC of Agoura and Kanan |
| 11 | Ball Properties (Centerpointe) - 2 office buildings | 8 KSF | Ladyface Cir |
| 12 | Riverwalk - Residential, office buildings, & resturaunts | Res: 336 Apts<br>Office: 93 KSF<br>Rest: 19 KSF | NEC Canwood and Kanan |
| 13 | Silagi "Canwood Plaza" - Office building | 22.896 KSF | NW corner of Canwood and Kanan |
| 14 | Semler (Alan Hartley) - 2 office buildings | 125 KSF | NEC Canwood and Derry St |
| 15 | Levy, Moshe - office building w/underground parking | 20.830 KSF | Roadside Dr, west of Lewis Rd |
| 16 | Wickman "Agoura Furniture Center" | 38.760 KSF | N/S Canwood St and Chesebro Rd |
| 17 | Reyes Adobe Partners - Matress and Bedroom showroom | 14.5 KSF | Reyes Adobe Rd, directly south of US 101 |
| 18 | Leaders Carpets | 14.080 KSF | 28350 Roadside Dr |
| 19 | So. Cal Food Services for Wendy's | 3.2 KSF | Lots 29 & 30 on Dorothy Dr |
| 20 | Silagi "Center Court" - Office Building | 49 KSF | 29475 Canwood St |
| 21 | Scheu (Corp. Point) - 2 new buildings | 81 KSF | S/S Agoura Rd @ Reyes Adobe Rd |
| 22 | Development Partners - 2 story office building | 31.160 KSF | 30101 Agoura Ct |
| 23 | Realty Bancorp Equities - 2 story commercial building | 76.750 KSF | 29901 Agoura Rd |
| *County of Los Angeles* | | | |
| 24 | Private School, K-8 | 750 Students | E of Palo Comado Cyn Rd and Chesebro |
| 25 | Six story office building w/parking structure | 140 Employees | 26585 Agoura Rd, Calabasas |
| 26 | 5 SF Lots | 5 DU | 3155 Kanan Rd |

## RELATED PROJECTS TRIP GENERATION SUMMARY

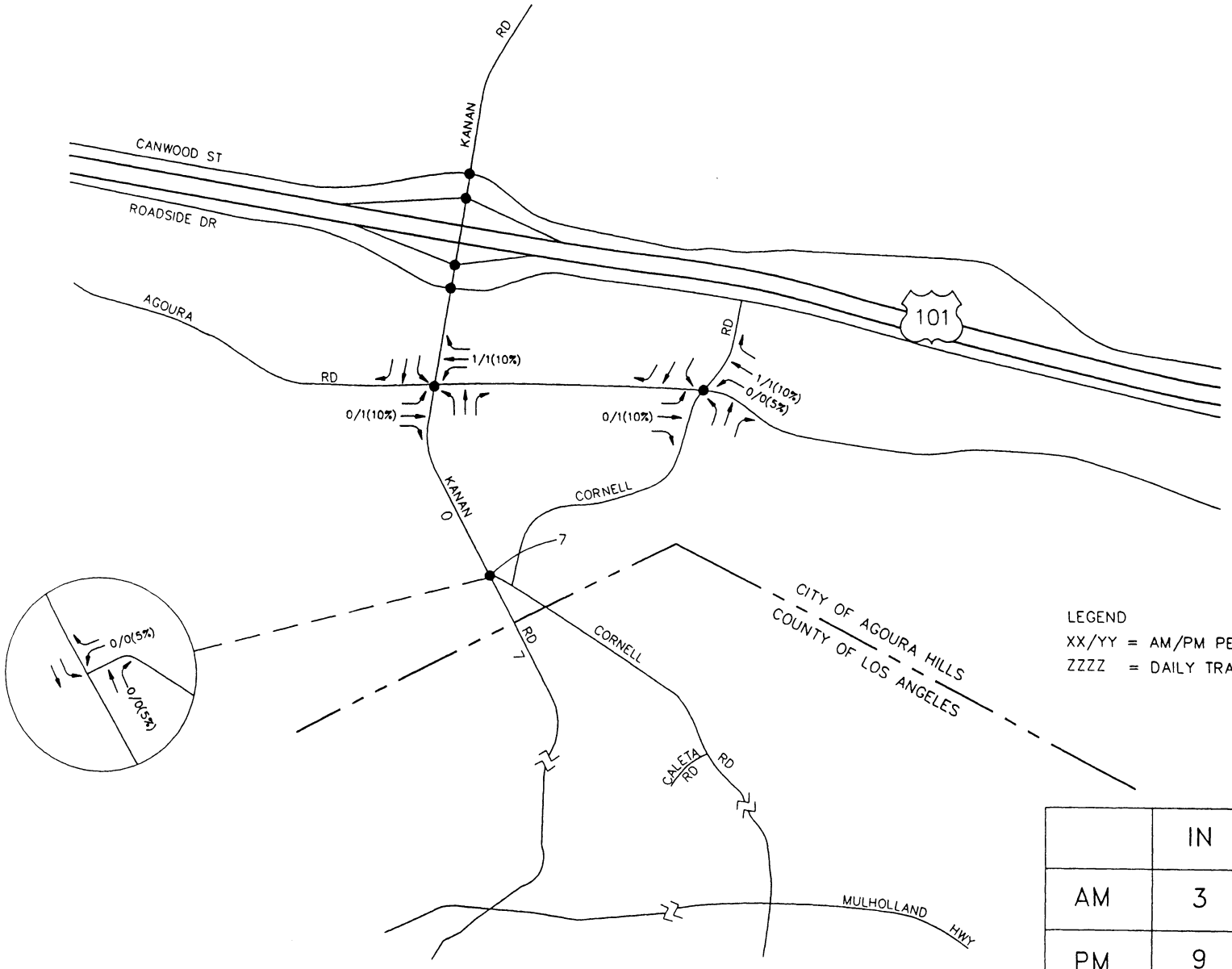
| No. | Project | Project Size | ADT | AM Peak Hour | | | PM Peak Hour | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | In | Out | Total | In | Out | Total |
| *City of Agoura Hills - Residential* | | | | | | | | | |
| 1 | Single Family Residences | 14 DU | 134 | 3 | 8 | 11 | 9 | 5 | 14 |
| 2 | Single Family Residences | 14 DU | 134 | 3 | 8 | 11 | 9 | 5 | 14 |
| 3 | Apartments | 4 DU | 26 | 0 | 2 | 2 | 2 | 1 | 3 |
| 4 | Condominium | 4 DU | 23 | 0 | 1 | 2 | 1 | 1 | 2 |
| 5 | Condominium | 19 DU | 111 | 1 | 7 | 8 | 7 | 3 | 10 |
| *City of Agoura Hills (Residential) Related Projects Trip Generation Potential* | | | 429 | 7 | 26 | 33 | 28 | 15 | 43 |
| *City of Agoura Hills - Commercial* | | | | | | | | | |
| 6 | Creekside - Retail Center | 93 KSF | 6,506 | 91 | 58 | 150 | 287 | 311 | 599 |
| 7 | Burgandy Creek Bistro - New restaurant and reception hall | 11 KSF | 1,434 | 53 | 49 | 102 | 72 | 48 | 119 |
| 8 | St. Paul's Lutheran Church | 91.04 KSF | 84 | 3 | 1 | 3 | 3 | 3 | 7 |
| 9 | Alesco Development - Office Buildings | 67 KSF | 976 | 122 | 17 | 139 | 22 | 109 | 132 |
| 10 | Ted Moore - Agoura Village mixed use land development | Mixed: 10 Acres<br>Open: 8 Acres | 8,276 | 375 | 83 | 457 | 327 | 527 | 854 |
| 11 | Ball Properties (Centerpointe) - 2 office buildings | 8 KSF | 191 | 24 | 3 | 27 | 4 | 21 | 26 |
| 12 | Riverwalk - Residential, office buildings, & resturaunts | | | | | | | | |
| | Residential - Apartments | 336 Apts | 2,174 | 27 | 141 | 168 | 144 | 67 | 212 |
| | Office | 93 KSF | 1,255 | 157 | 21 | 178 | 29 | 141 | 169 |
| | Restaurants | 19 KSF | 2,476 | 92 | 85 | 176 | 124 | 82 | 206 |
| 13 | Silagi "Canwood Plaza" - Office building | 22.896 KSF | 428 | 53 | 7 | 61 | 10 | 48 | 58 |
| 14 | Semler (Alan Hartley) - 2 office buildings | 125 KSF | 1,575 | 197 | 27 | 224 | 36 | 177 | 213 |
| 15 | Levy, Moshe - office building w/underground parking | 20.830 KSF | 398 | 50 | 7 | 56 | 9 | 45 | 54 |
| 16 | Wickman "Agoura Furniture Center" | 38.760 KSF | 1,576 | 24 | 16 | 40 | 43 | 57 | 100 |
| 17 | Reyes Adobe Partners - Mattress and Bedroom showroom | 14.5 KSF | 590 | 9 | 6 | 15 | 16 | 21 | 38 |
| 18 | Leaders Carpets | 14.080 KSF | 573 | 9 | 6 | 15 | 16 | 21 | 36 |
| 19 | So. Cal Food Services for Wendy's | 3.2 KSF | 1,588 | 81 | 78 | 160 | 56 | 51 | 107 |
| 20 | Silagi "Center Court" - Office Building | 49 KSF | 767 | 96 | 13 | 109 | 18 | 86 | 104 |
| 21 | Scheu (Corp. Point) - 2 new buildings | 81 KSF | 1,129 | 141 | 19 | 160 | 26 | 126 | 152 |
| 22 | Development Partners - 2 story office building | 31.160 KSF | 542 | 68 | 9 | 77 | 12 | 61 | 73 |
| 23 | Realty Bancorp Equities - 2 story commercial building | 76.750 KSF | 4,601 | 65 | 38 | 104 | 216 | 216 | 431 |
| *City of Agoura Hills (Commercial) Related Projects Trip Generation Potential* | | | 37,138 | 1,736 | 684 | 2,420 | 1,470 | 2,219 | 3,690 |
| *County of Los Angeles* | | | | | | | | | |
| 24 | Private School, K-8 | | | | | | | | |
| | K-8th Grade Private School | 660 Students | 2,231 | 381 | 265 | 647 | 0 | 40 | 40 |
| | Pre-School Day Care | 90 Students | 407 | 39 | 34 | 73 | 18 | 21 | 39 |
| 25 | Six story office building w/parking structure | 140 Employees | 465 | 59 | 8 | 67 | 11 | 53 | 64 |
| 26 | 5 SF Lots | 5 DU | 49 | 1 | 3 | 4 | 3 | 2 | 5 |
| *County of Los Angeles Related Projects Trip Generation Potential* | | | 3,151 | 480 | 310 | 791 | 32 | 116 | 148 |
| *TOTAL RELATED PROJECTS TRIP GENERATION POTENTIAL* | | | 40,718 | 2,224 | 1,020 | 3,244 | 1,531 | 2,350 | 3,881 |




| | IN | OUT |
|---|---|---|
| AM | 3 | 8 |
| PM | 9 | 5 |

APPROVED PROJECT TRAFFIC
#1 - SINGLE FAMILY RESIDENCES (14DU)

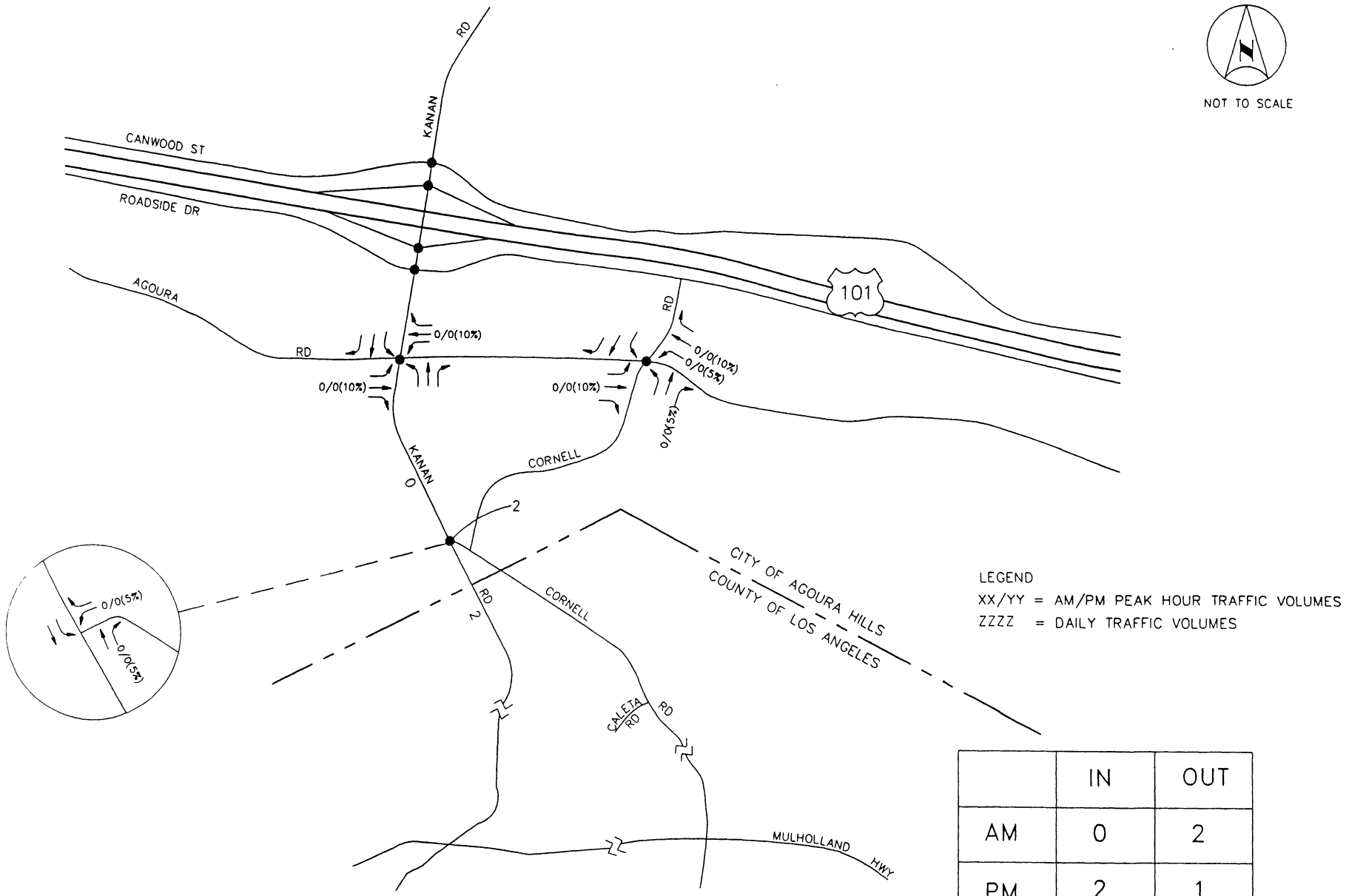
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 3 | 8 |
| PM | 9 | 5 |

APPROVED PROJECT TRAFFIC
#2 - SINGLE FAMILY RESIDENCES (14DU)

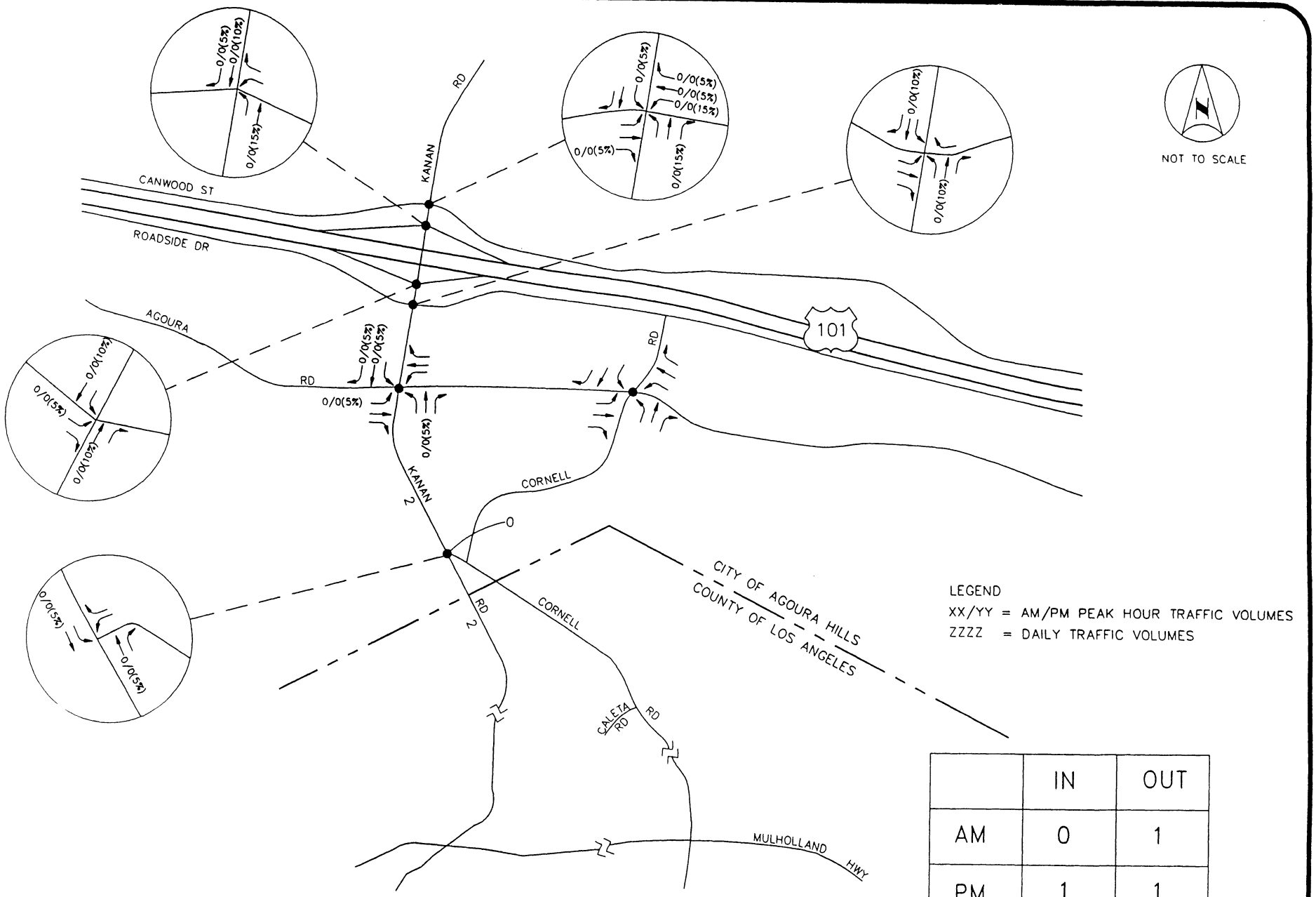
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 0 | 2 |
| PM | 2 | 1 |

APPROVED PROJECT TRAFFIC
#3 - APARTMENTS (4DU)

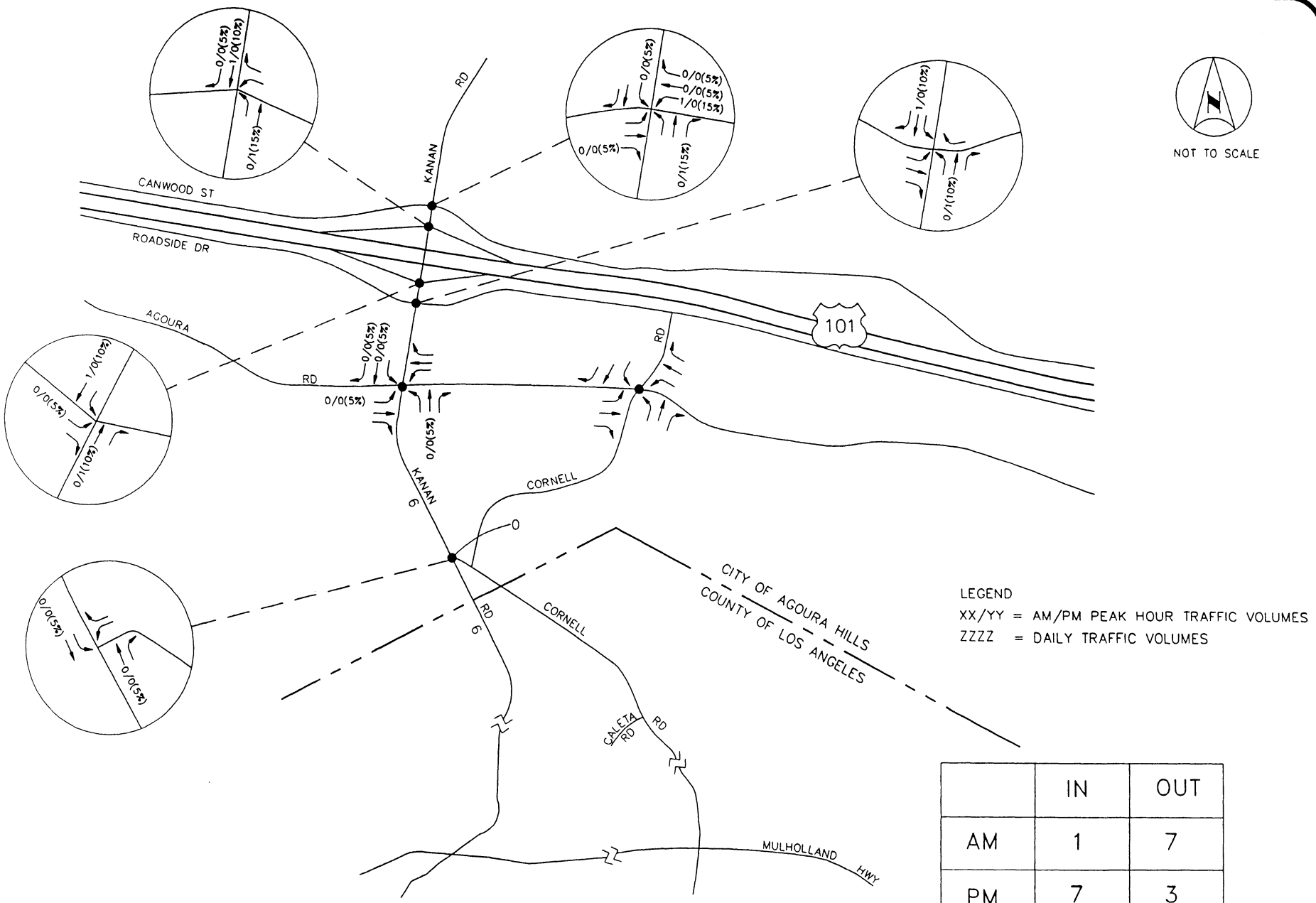
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 0 | 1 |
| PM | 1 | 1 |

# APPROVED PROJECT TRAFFIC
# #4 - CONDOMINIUM (4DU)

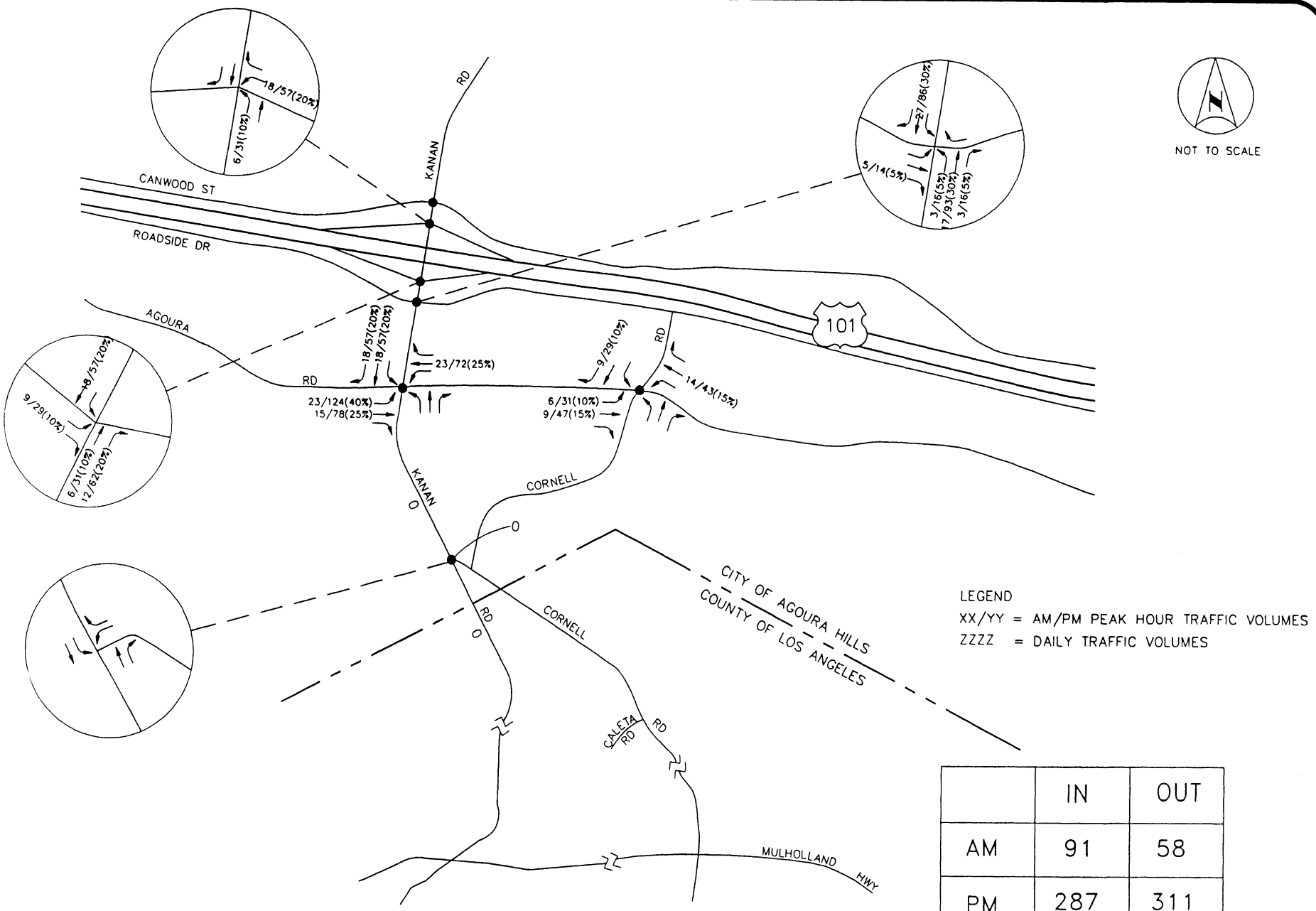
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 1 | 7 |
| PM | 7 | 3 |

# APPROVED PROJECT TRAFFIC
# #5 - CONDOMINIUM (19DU)

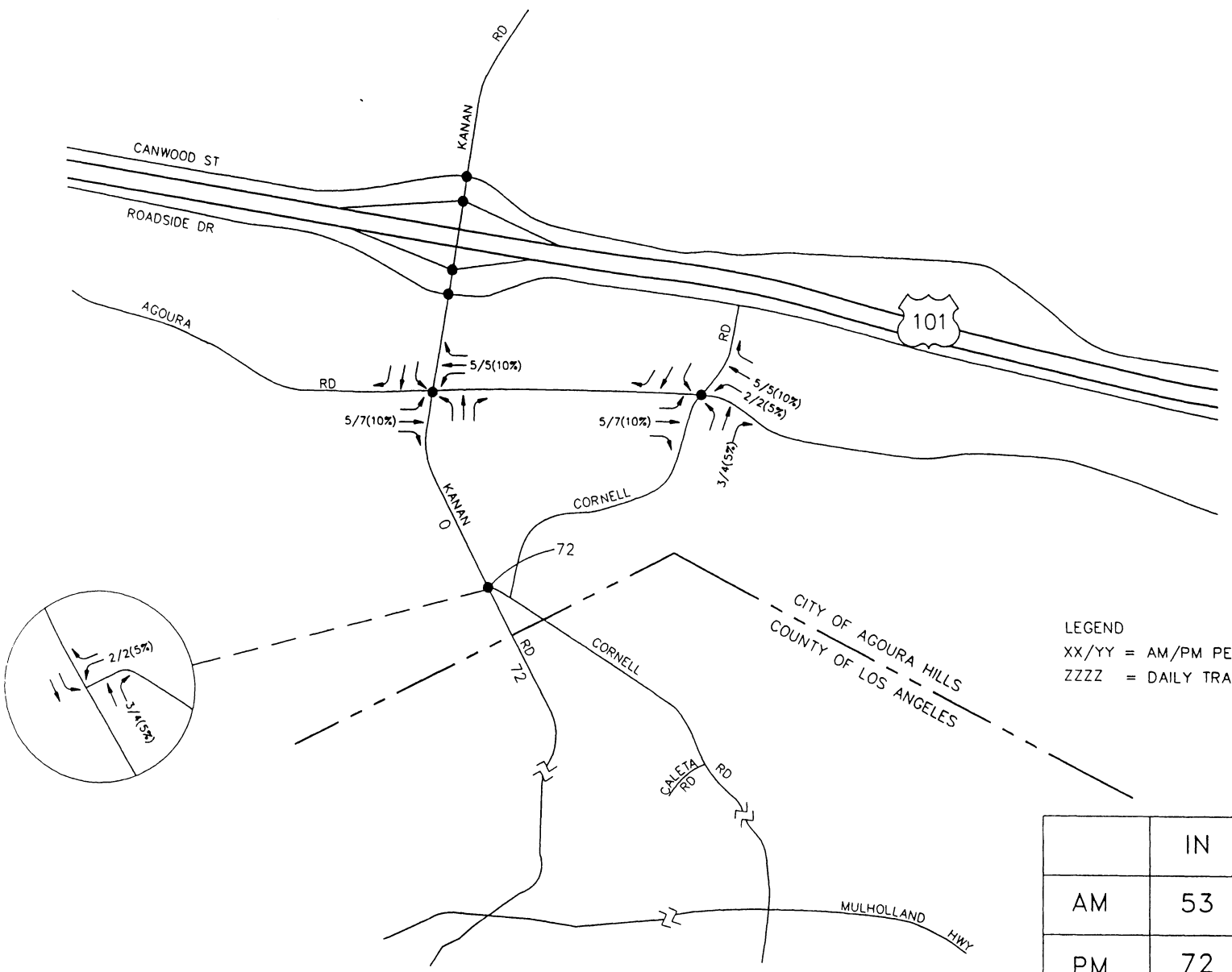
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 91 | 58 |
| PM | 287 | 311 |

APPROVED PROJECT TRAFFIC
#6 - CREEKSIDE RETAIL CENTER (93 KSF)

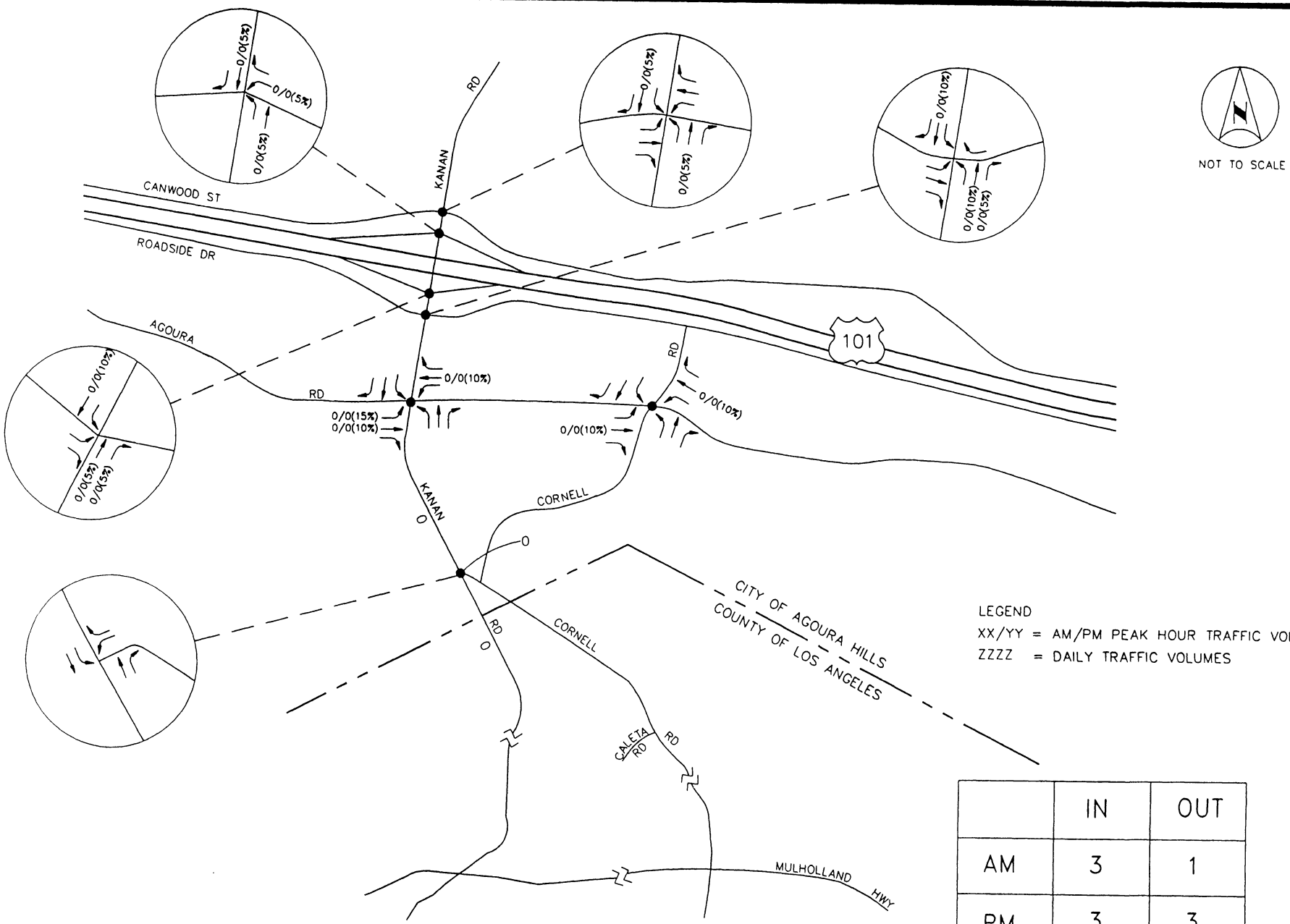
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 53 | 49 |
| PM | 72 | 48 |

APPROVED PROJECT TRAFFIC
#7 - BURGANDY CREEK BISTRO RESTUARANT (11 KSF)

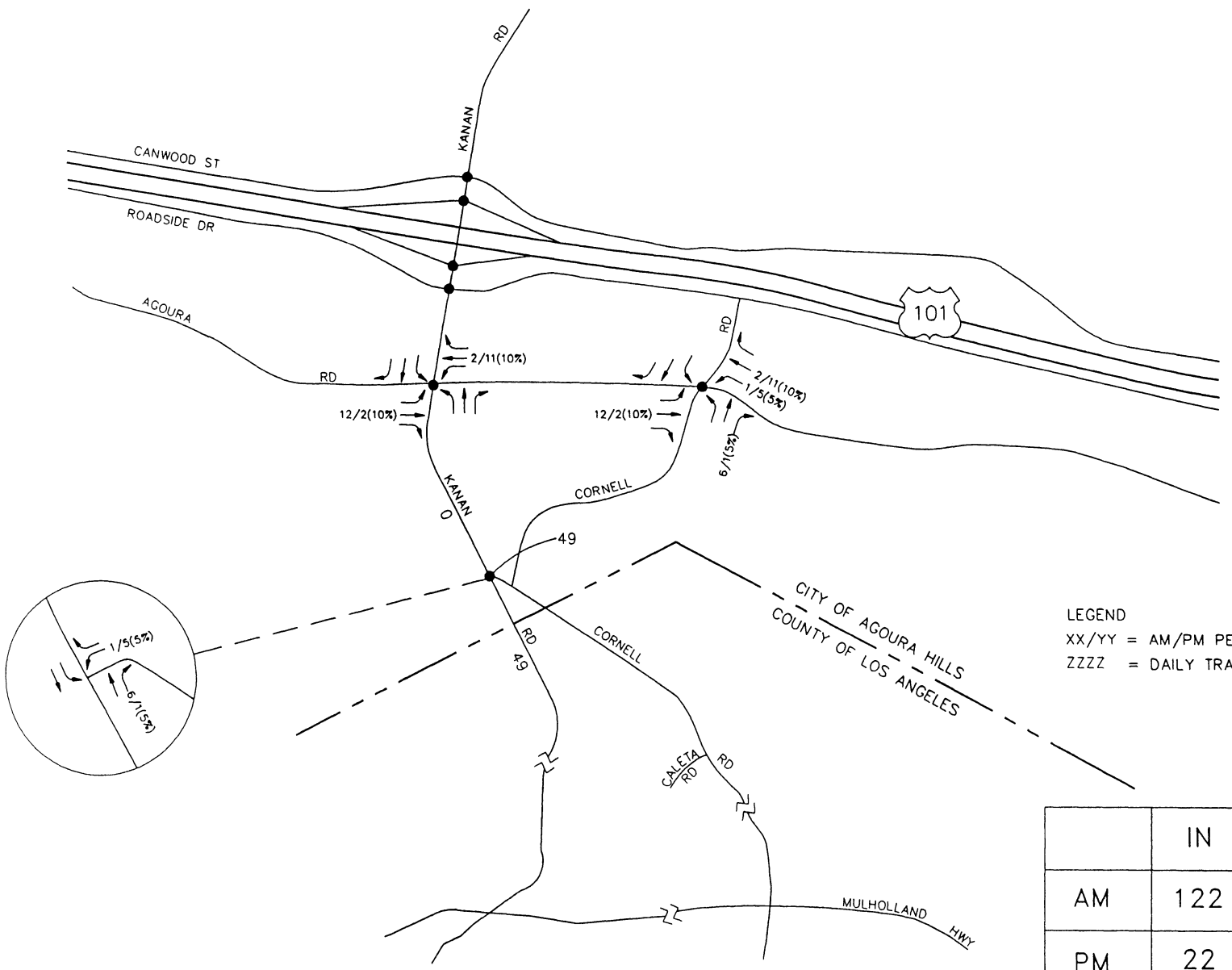
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 3 | 1 |
| PM | 3 | 3 |

## APPROVED PROJECT TRAFFIC
## #8 - ST. PAULS LUTHERAN CHURCH (91.04 KSF)

Kimley-Horn and Associates, Inc.



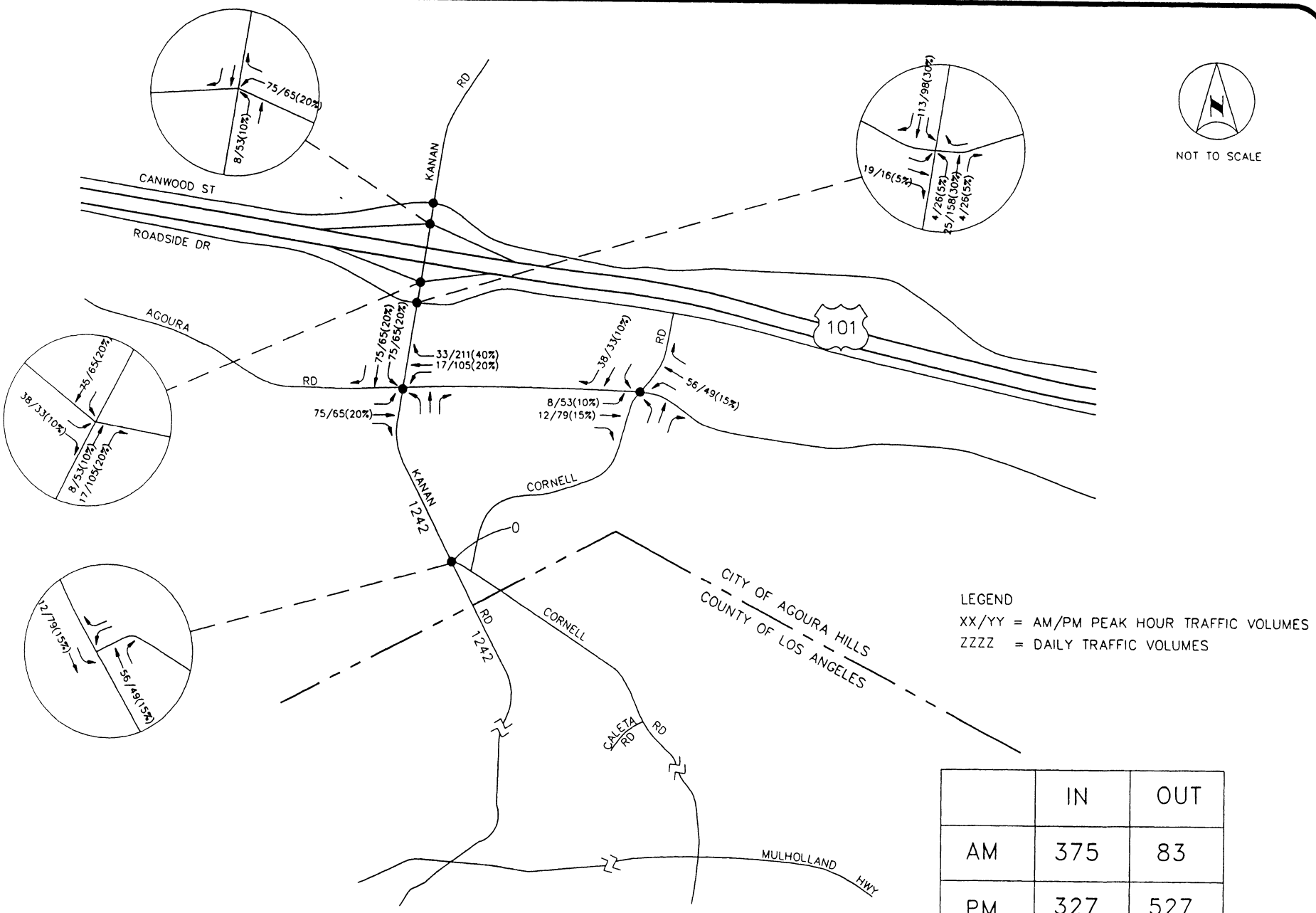

NOT TO SCALE

LEGEND
XX/YY = AM/PM PEAK HOUR TRAFFIC VOLUMES
ZZZZ = DAILY TRAFFIC VOLUMES

| | IN | OUT |
|---|---|---|
| AM | 122 | 17 |
| PM | 22 | 109 |

# APPROVED PROJECT TRAFFIC
# #9 - ALESCO DEVELOPMENT - OFFICE (67 KSF)

Kimley-Horn and Associates, Inc.

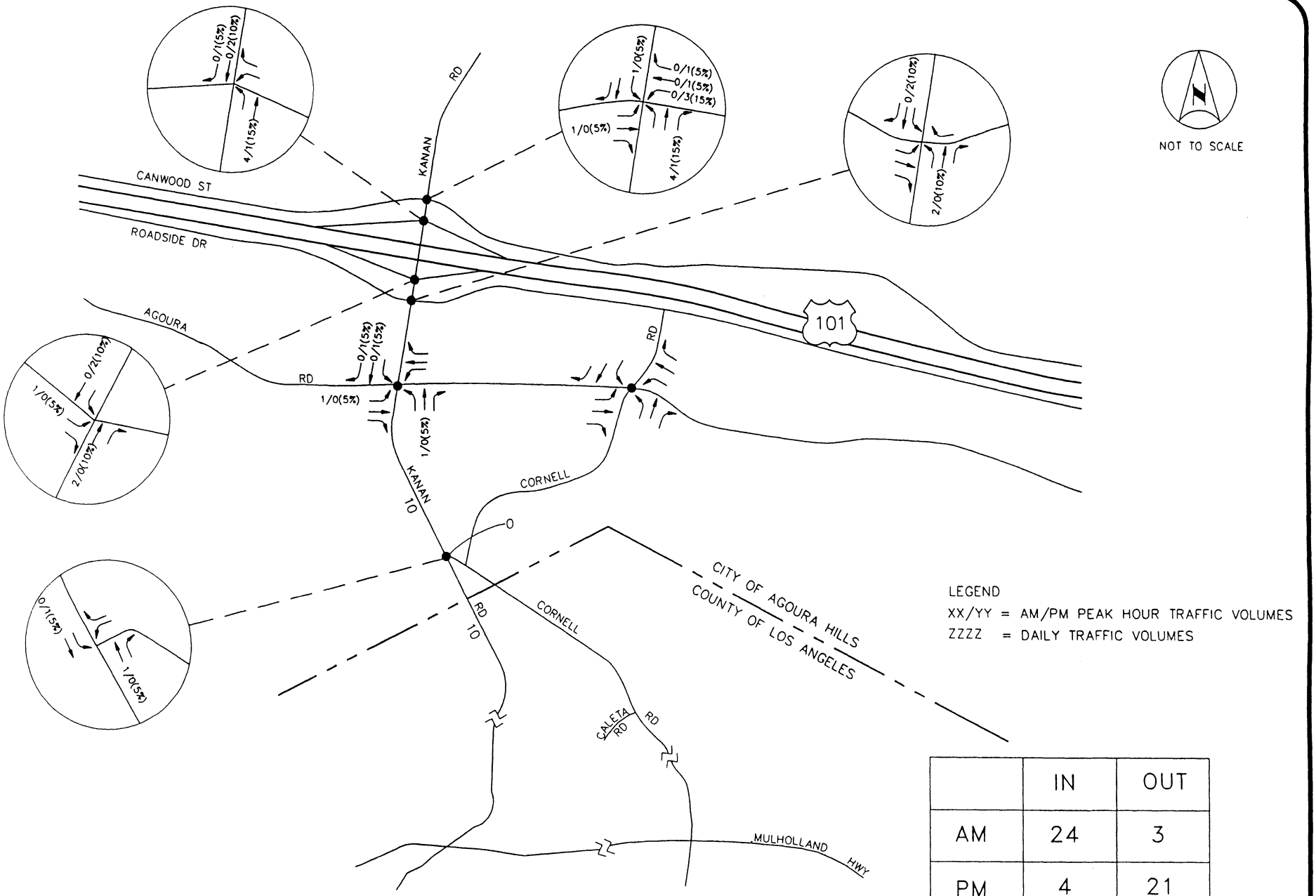



| | IN | OUT |
|---|---|---|
| AM | 375 | 83 |
| PM | 327 | 527 |

APPROVED PROJECT TRAFFIC

#10 - TED MOORE MIXED LAND USE DEVELOPMENT

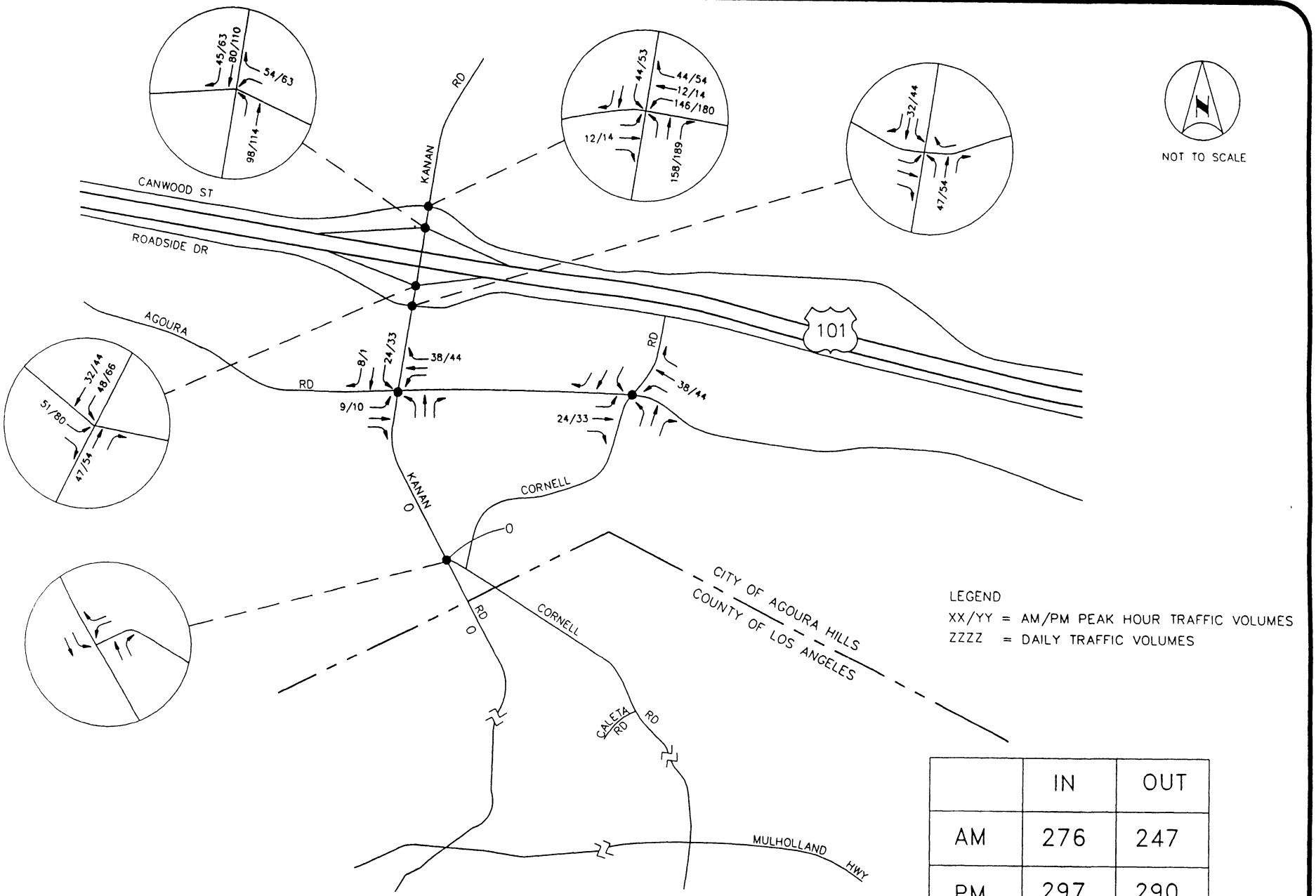
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 24 | 3 |
| PM | 4 | 21 |

APPROVED PROJECT TRAFFIC
#11 - BALL PROPERTIES OFFICE (8 KSF)

Kimley-Horn and Associates, Inc.

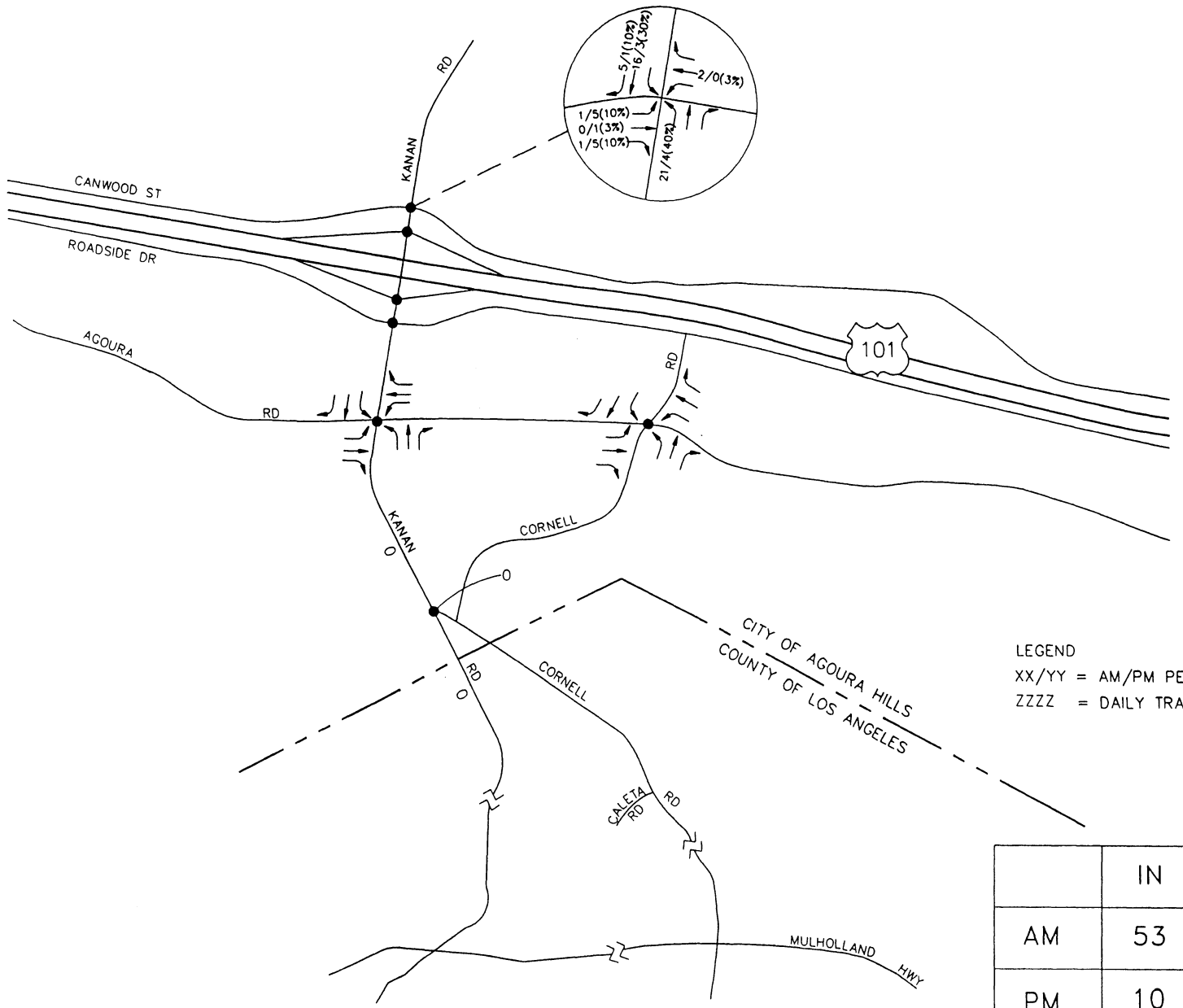



| | IN | OUT |
|---|---|---|
| AM | 276 | 247 |
| PM | 297 | 290 |

APPROVED PROJECT TRAFFIC

#12 - RIVERWALK RESIDENTIAL, OFFICE, RESTAURANT

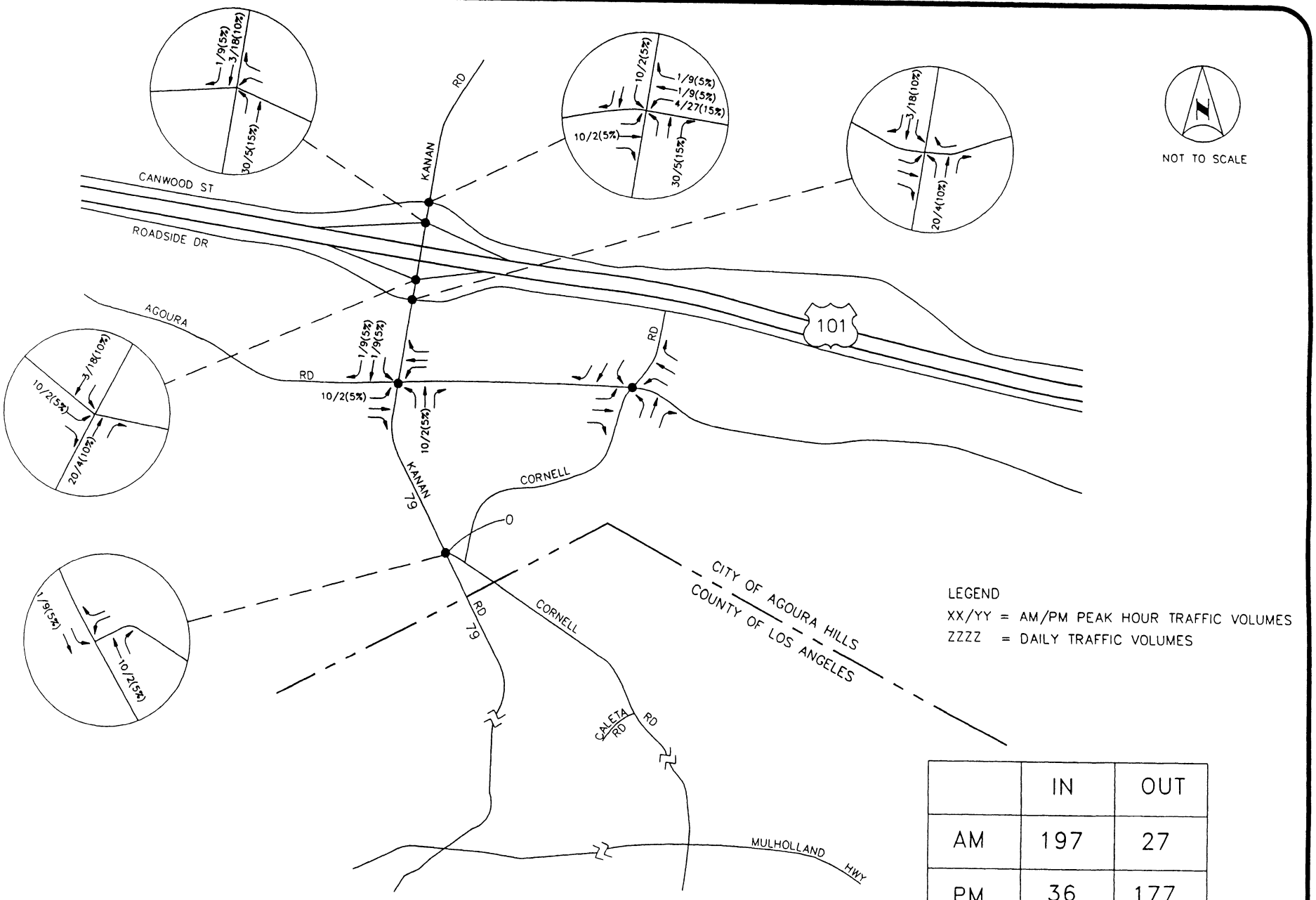
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 53 | 7 |
| PM | 10 | 48 |

# APPROVED PROJECT TRAFFIC
# #13 - SILAGI "CANWOOD PLAZA"

Kimley-Horn and Associates, Inc.

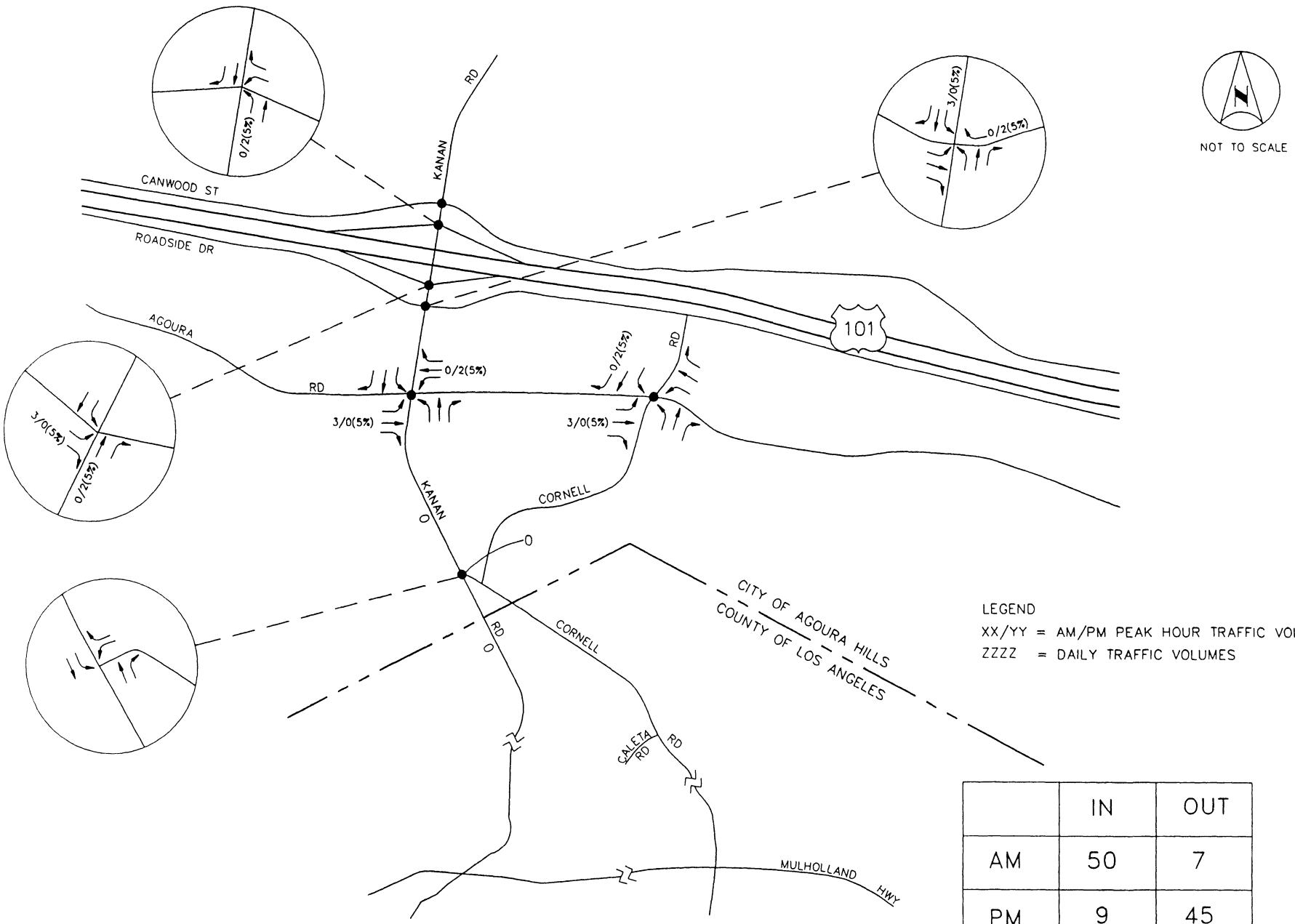



| | IN | OUT |
|---|---|---|
| AM | 197 | 27 |
| PM | 36 | 177 |

APPROVED PROJECT TRAFFIC

#14 - SEMLER (ALAN HARTLEY) - 2 OFFICE BUILDINGS

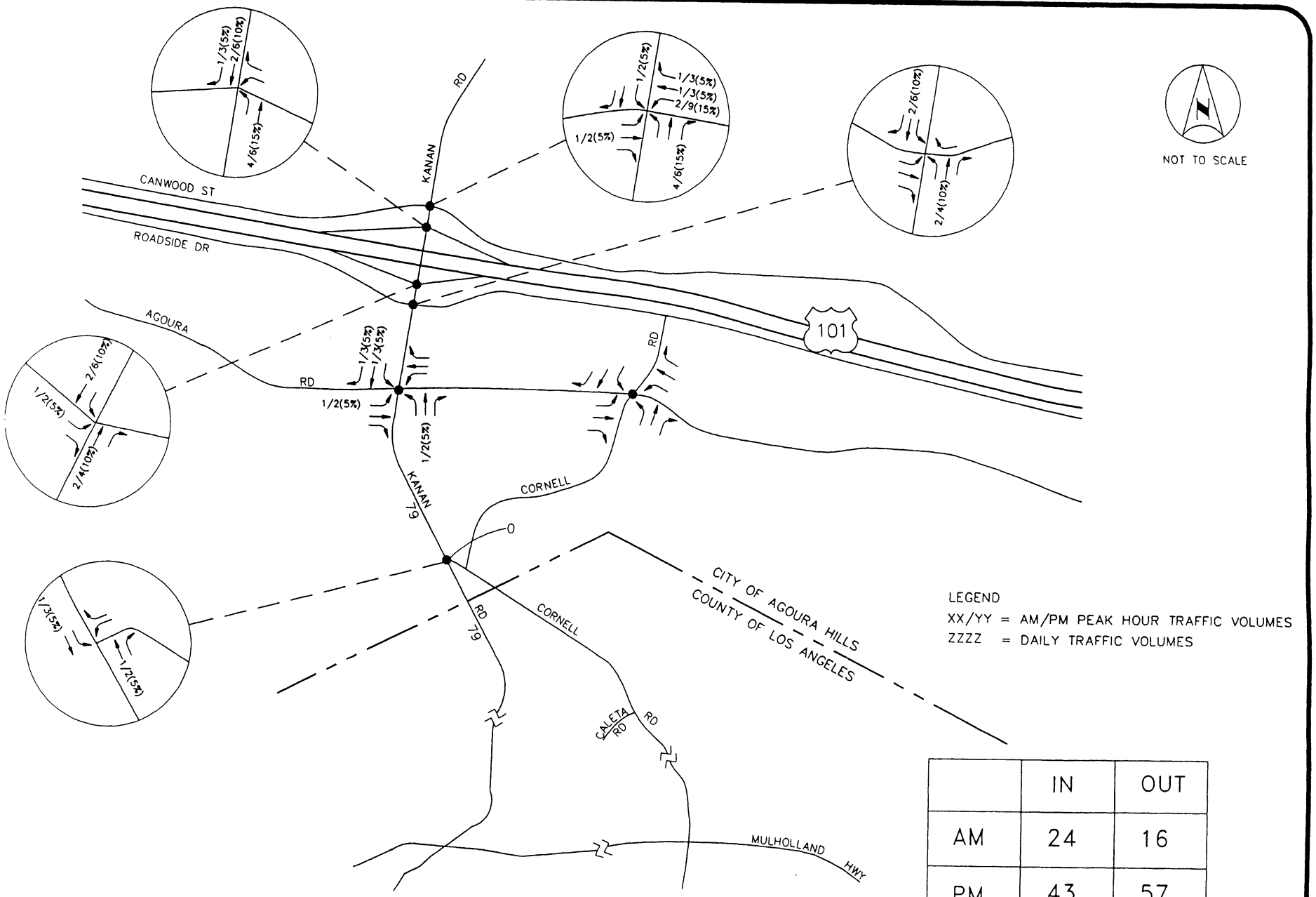
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 50 | 7 |
| PM | 9 | 45 |

# APPROVED PROJECT TRAFFIC
# #15 - MOSHE LEVY OFFICE BUILDING

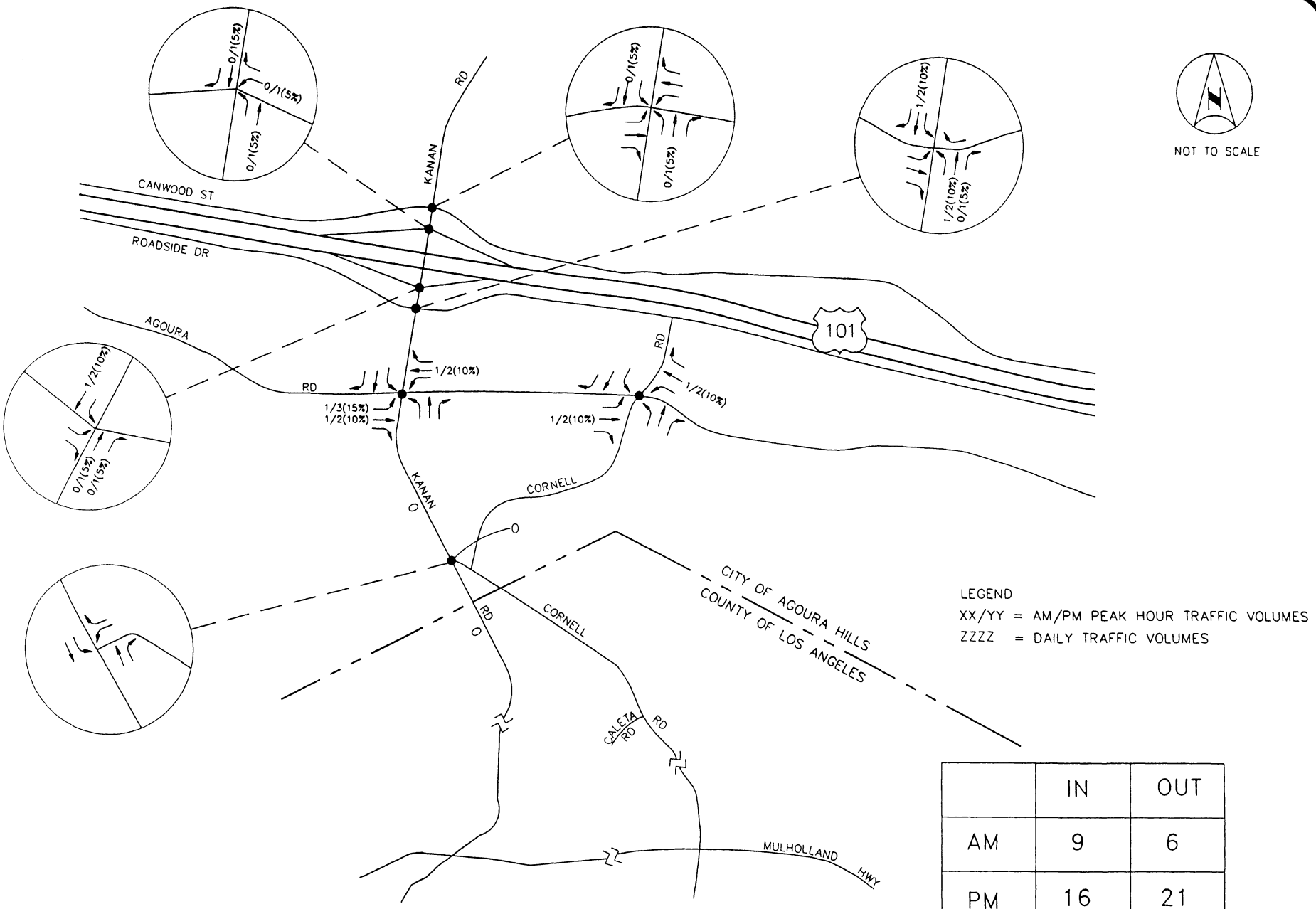
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 24 | 16 |
| PM | 43 | 57 |

# APPROVED PROJECT TRAFFIC
## #16 - WICKMAN "AGOURA FURNITURE CENTER"

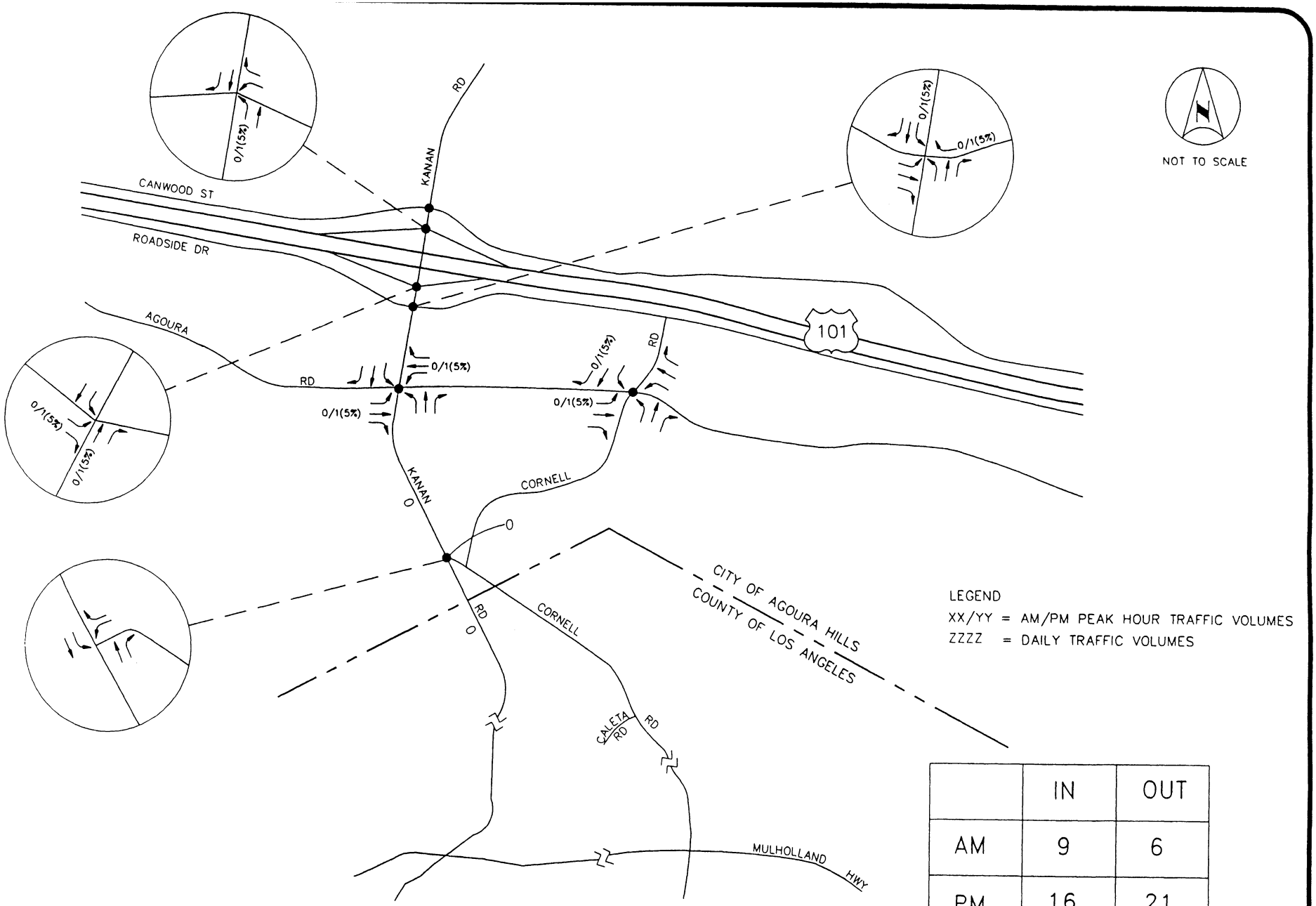
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 9 | 6 |
| PM | 16 | 21 |

APPROVED PROJECT TRAFFIC
#17 - REYES ADOBE PARTNERS MATTRESS AND BEDROOM SHOWROOM

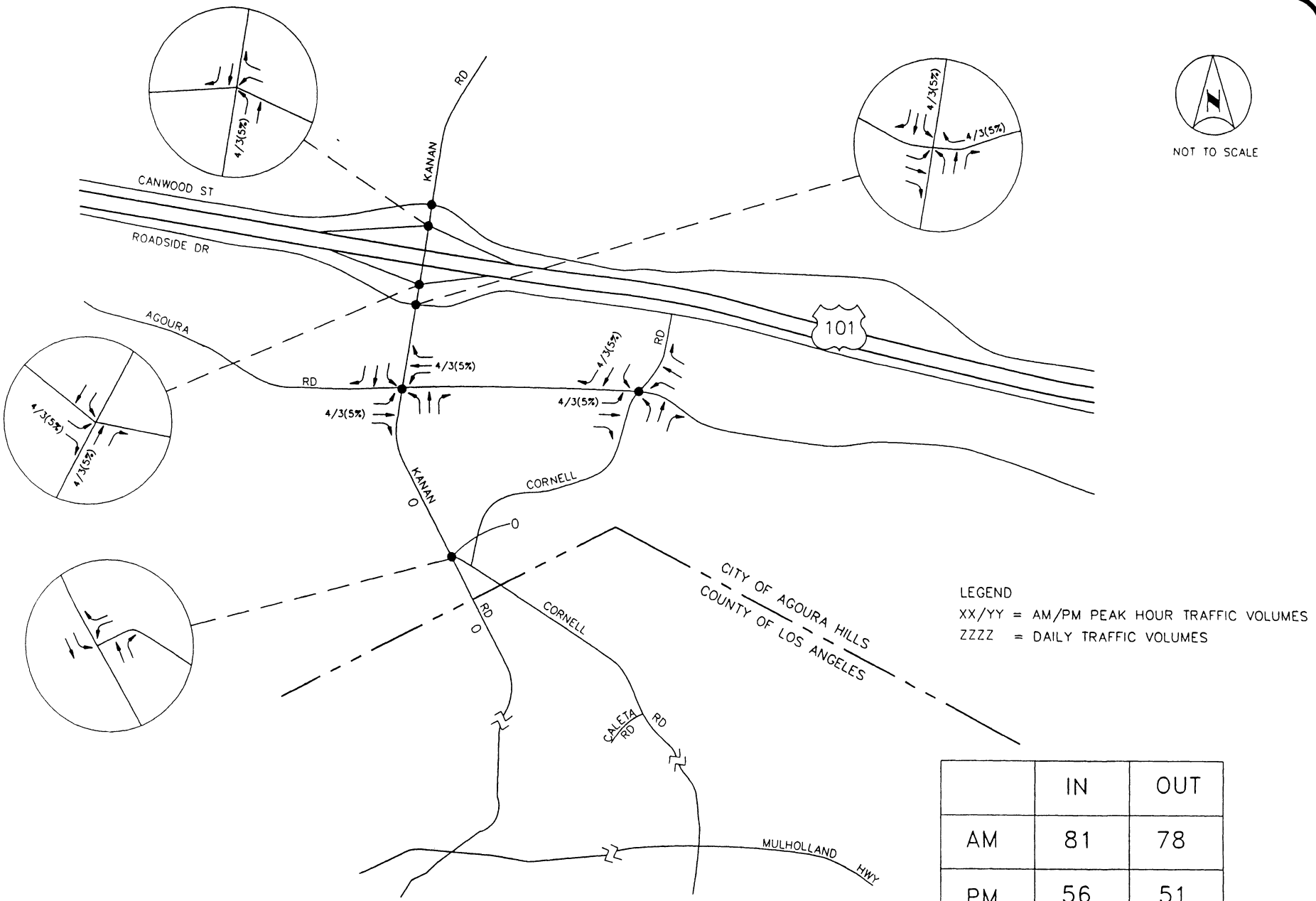
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 9 | 6 |
| PM | 16 | 21 |

# APPROVED PROJECT TRAFFIC
# #18 - LEADERS SARPETS

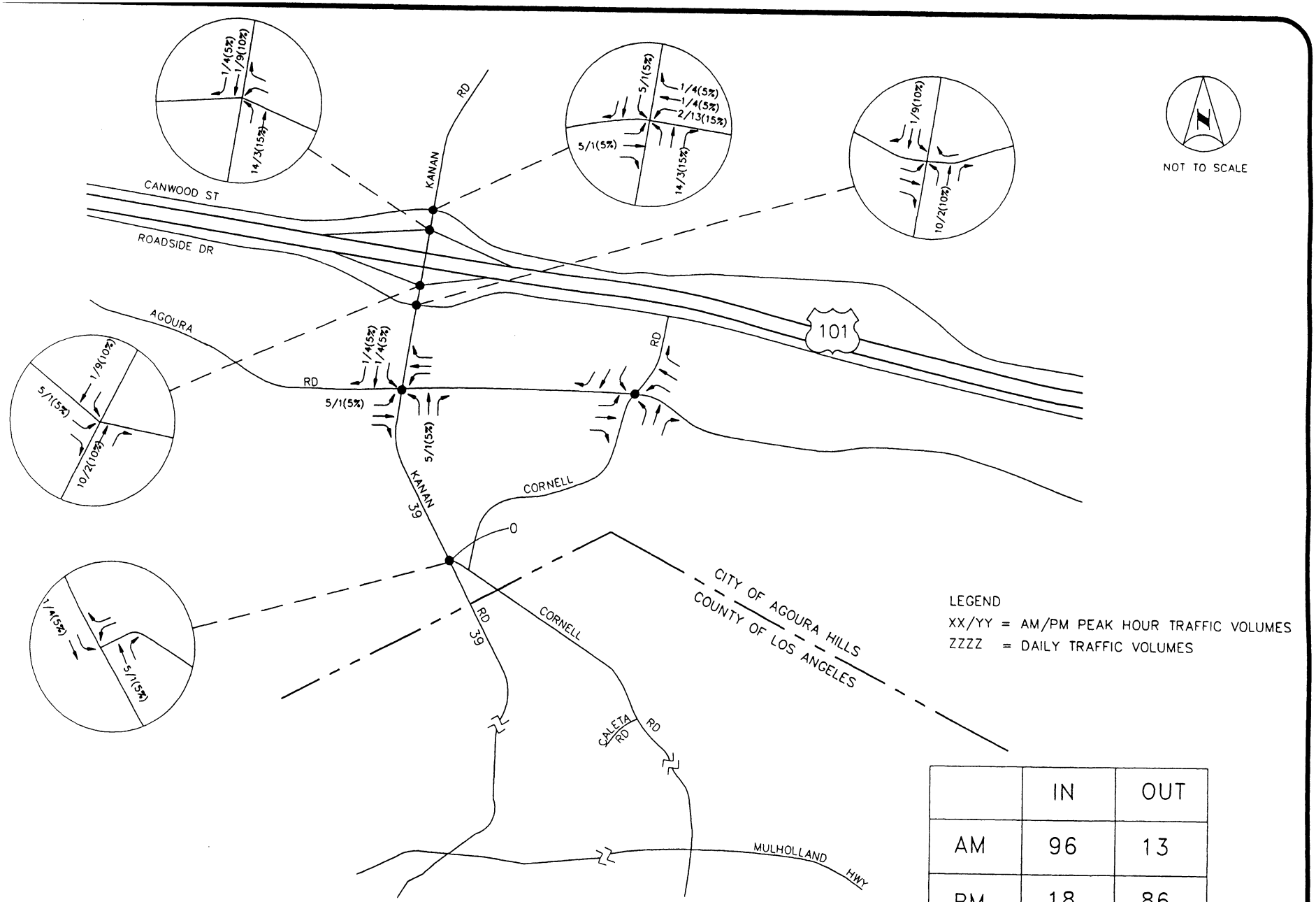
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 81 | 78 |
| PM | 56 | 51 |

## APPROVED PROJECT TRAFFIC
## #19 - SO CAL FOOD SERVICES FOR WENDY'S

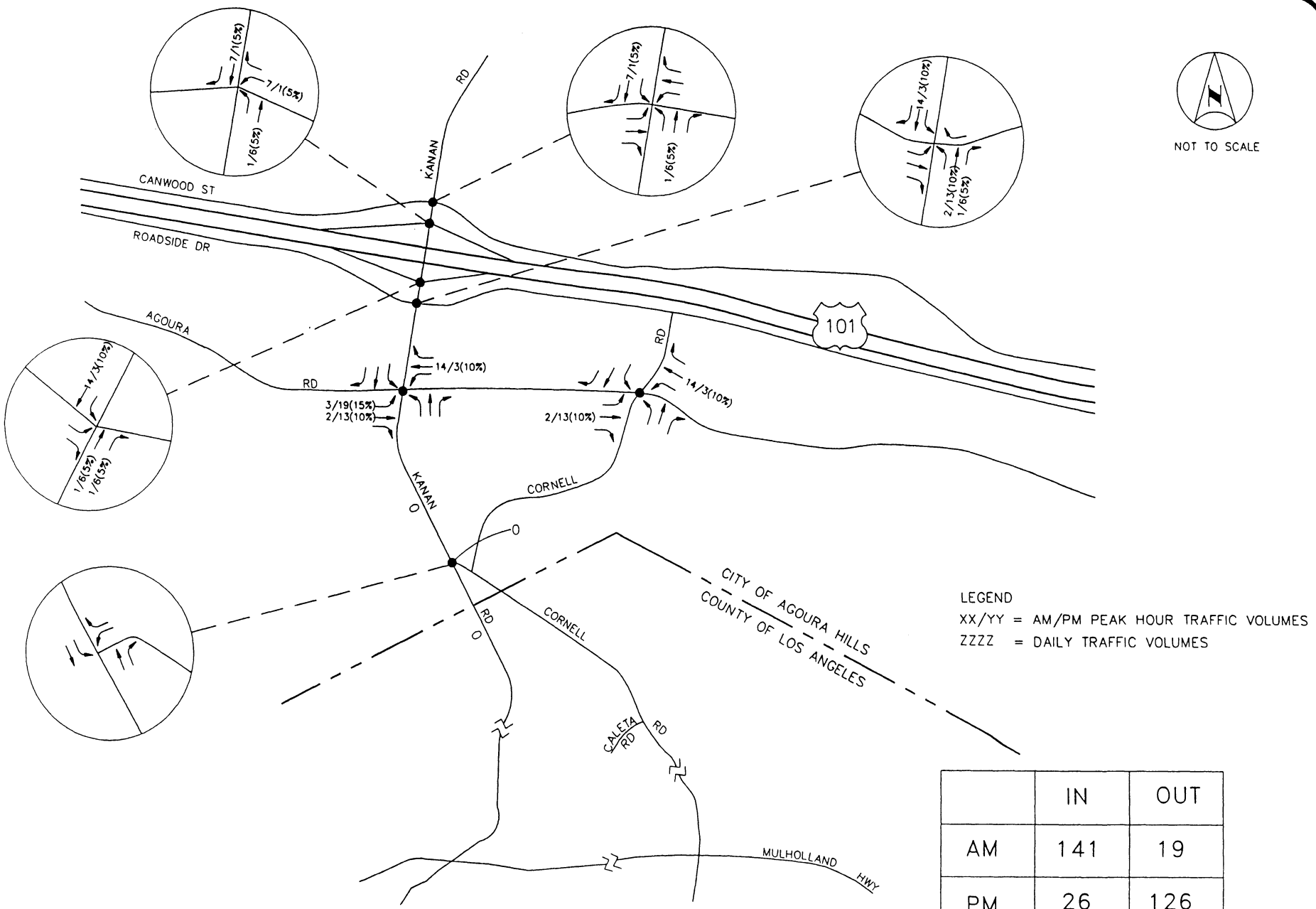
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 96 | 13 |
| PM | 18 | 86 |

# APPROVED PROJECT TRAFFIC
# #20 - SILAGI "CENTER COURT" OFFICE

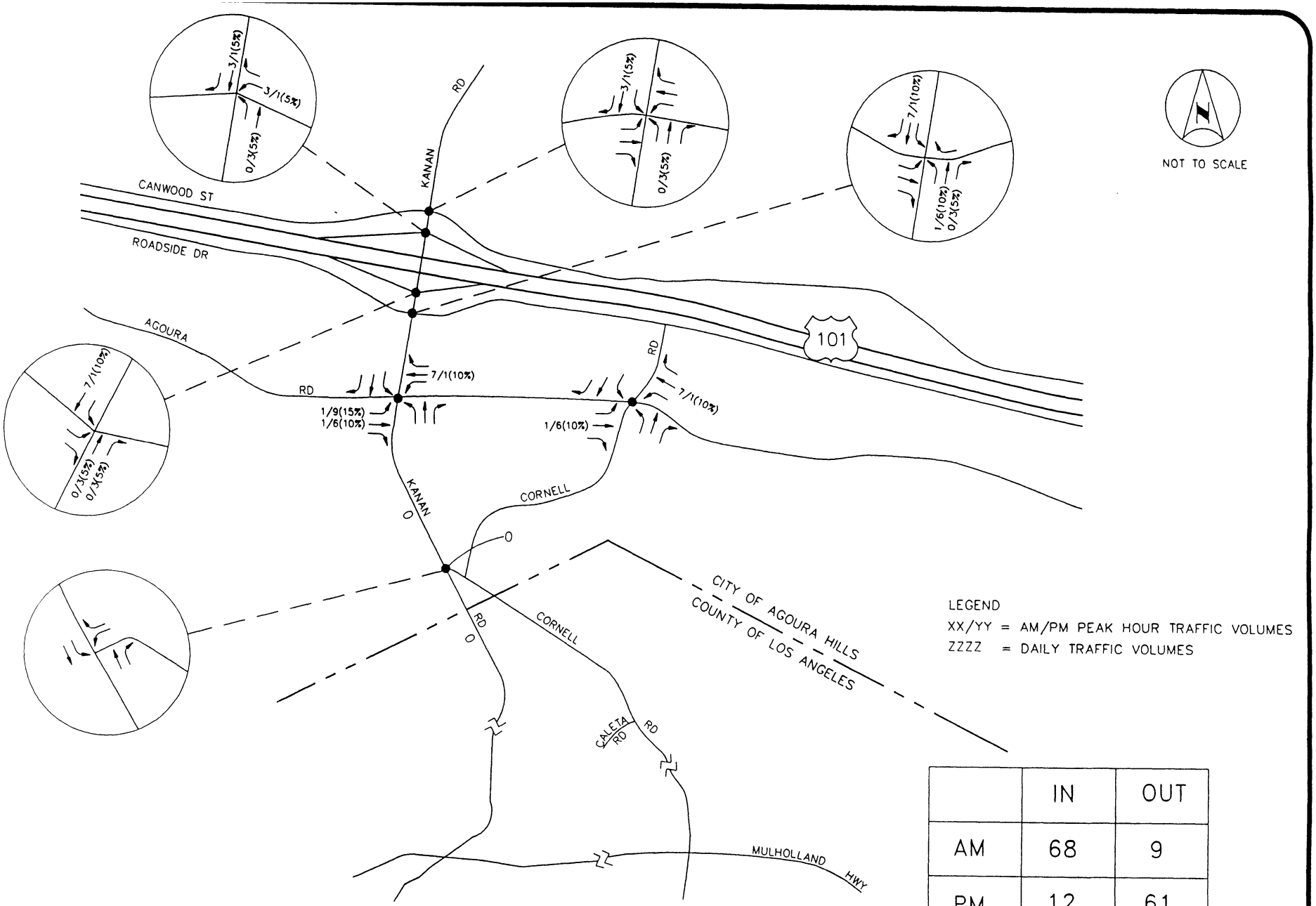
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 141 | 19 |
| PM | 26 | 126 |

# APPROVED PROJECT TRAFFIC
# #21 - SCHEU (COPR POINT)

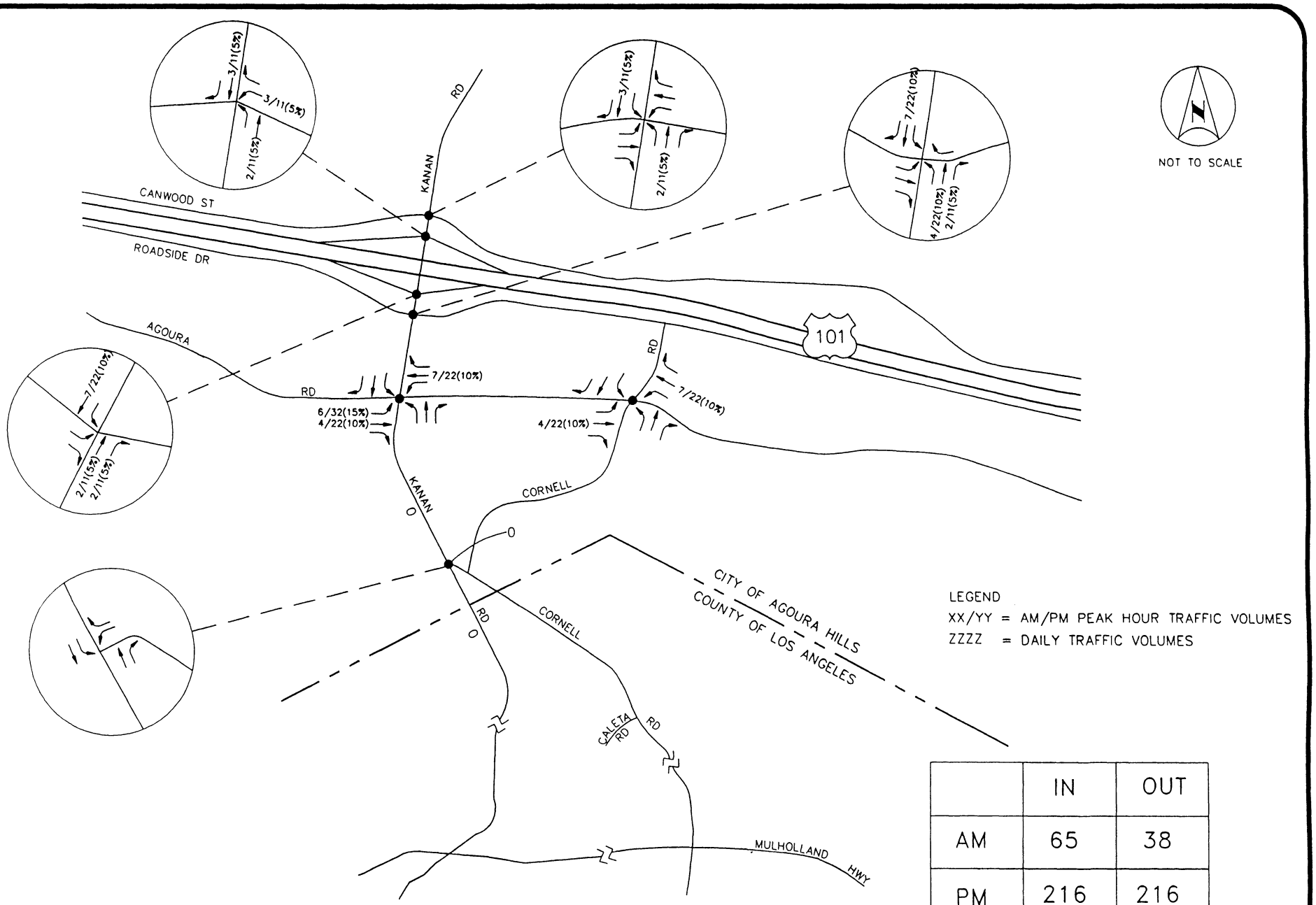
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 68 | 9 |
| PM | 12 | 61 |

# APPROVED PROJECT TRAFFIC
# #22 - DEVELOPMENT PARTNERS (OFFICE)

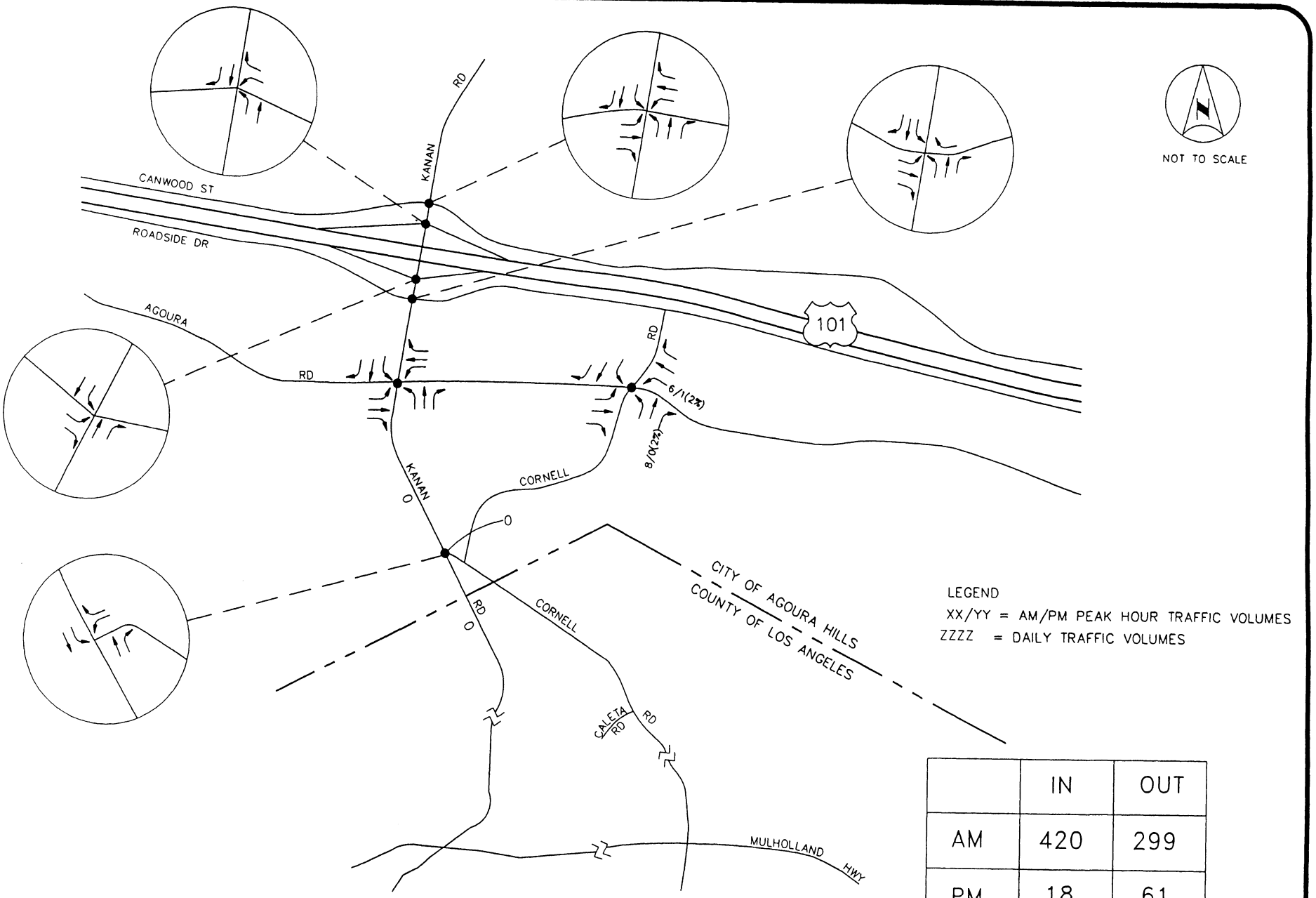
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 65 | 38 |
| PM | 216 | 216 |

# APPROVED PROJECT TRAFFIC
# #23 - REALTY BANCORP EQUITIES

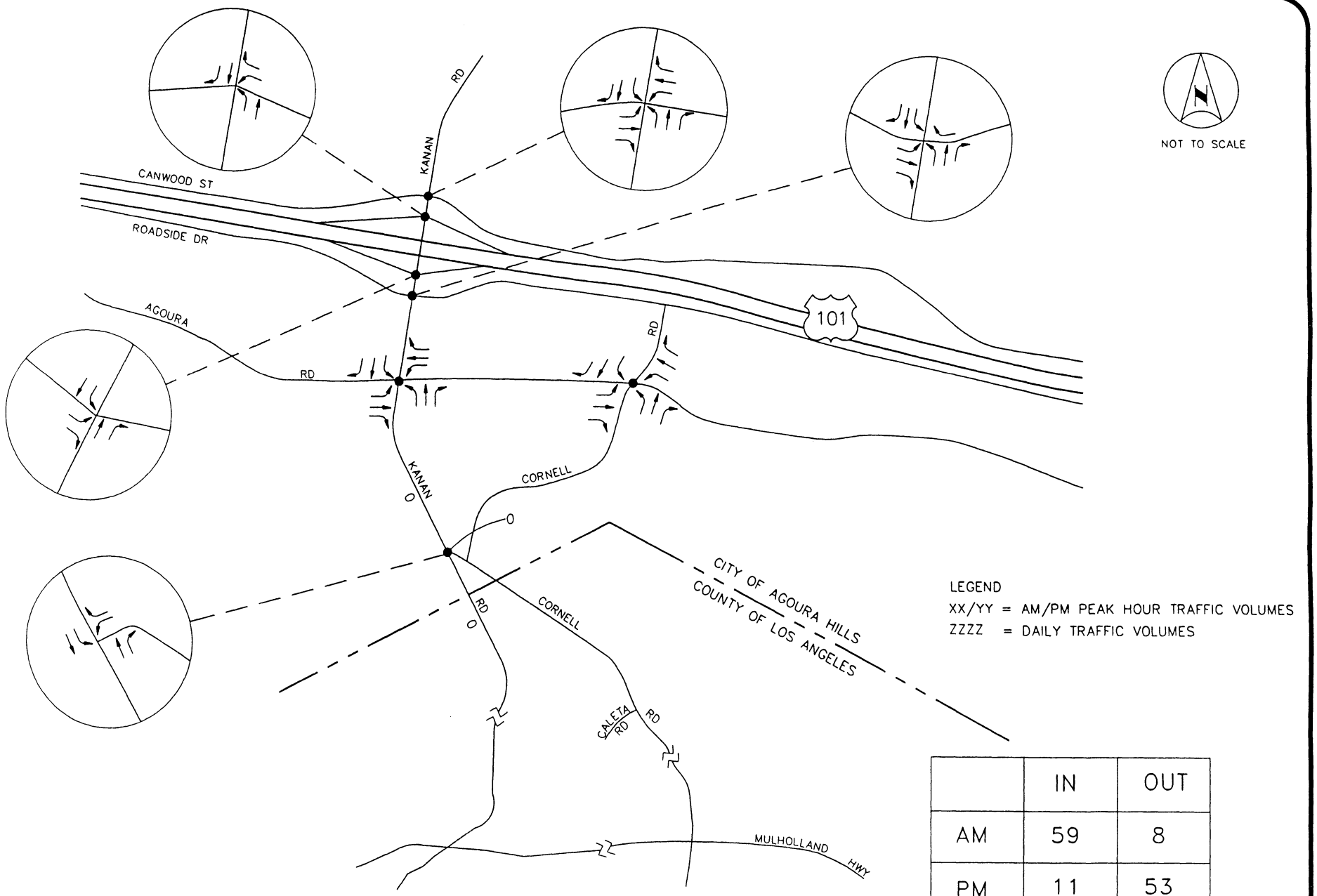
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 420 | 299 |
| PM | 18 | 61 |

# APPROVED PROJECT TRAFFIC
# #24 - PRIVATE SCHOOL K-8

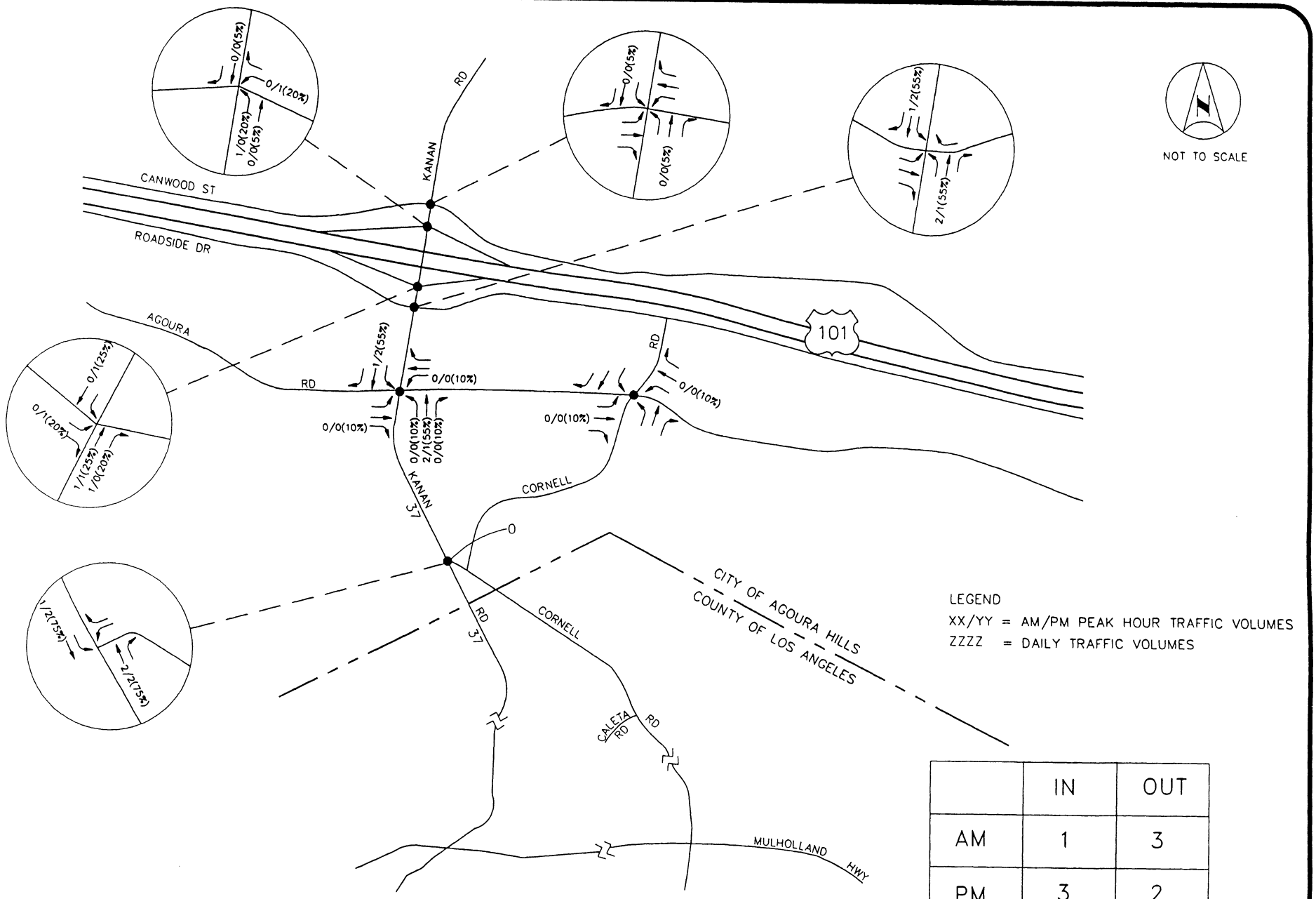
Kimley-Horn and Associates, Inc.




| | IN | OUT |
|---|---|---|
| AM | 59 | 8 |
| PM | 11 | 53 |

APPROVED PROJECT TRAFFIC
#25 - OFFICE BUILDING

Kimley-Horn and Associates, Inc.




LEGEND

XX/YY = AM/PM PEAK HOUR TRAFFIC VOLUMES

ZZZZ = DAILY TRAFFIC VOLUMES

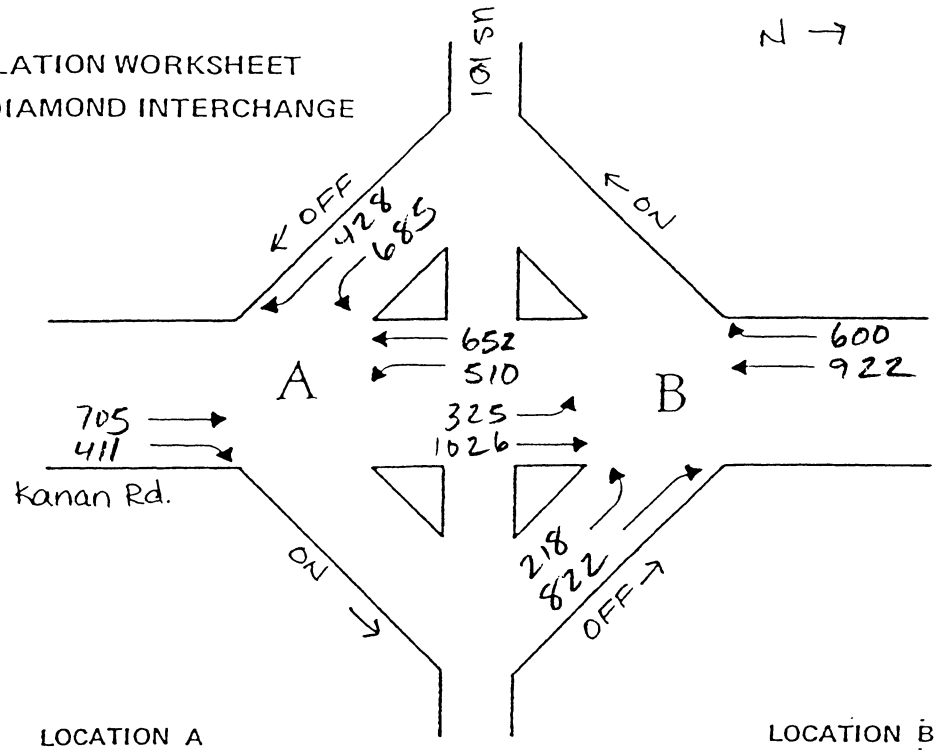
| | IN | OUT |
|---|---|---|
| AM | 1 | 3 |
| PM | 3 | 2 |

# APPROVED PROJECT TRAFFIC

## #26 - SINGLE FAMILY RESIDENCES (5 DU)

Kimley-Horn and Associates, Inc.

## ICU CALCULATION WORKSHEET
## FOR A TIGHT-DIAMOND INTERCHANGE



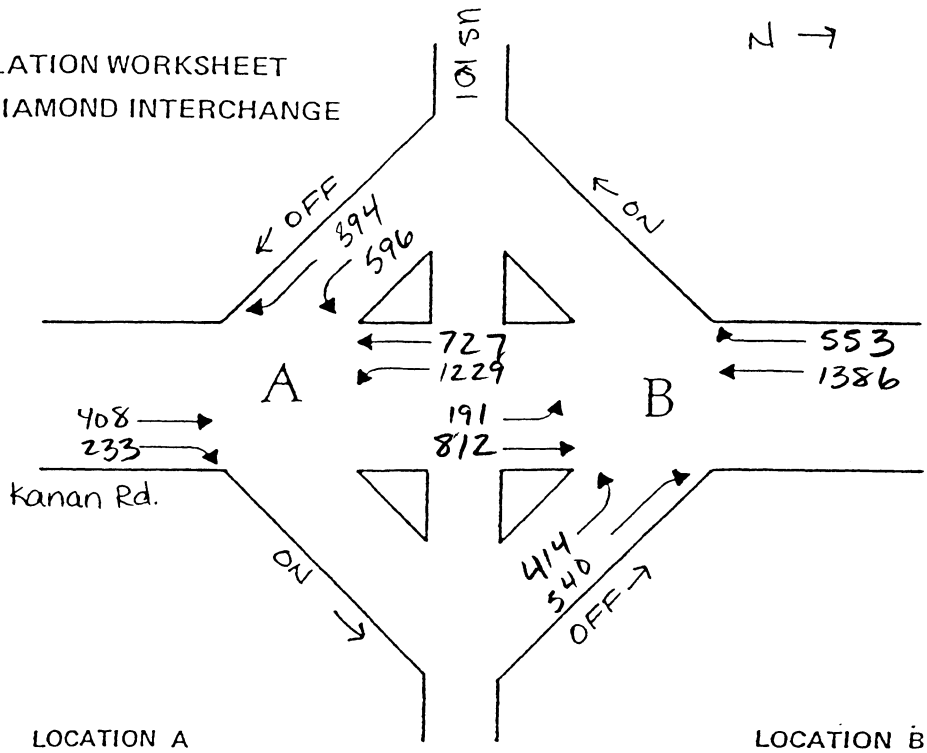

| | LOCATION A | | | LOCATION B | | |
|---|---|---|---|---|---|---|
| | CAP. | VOL. | V/C | CAP. | VOL. | V/C |
| PHASE 1 | 3200 | 652 | 0.204 | 1600 | 325 | 0.203 |
| | 3200 | 705 | 0.220 | 3200 | 325 | 0.102 |
| PHASE 2 | 4800 | 1113 | 0.232 | 3200 | 701 | 0.219 |
| | | | | 4800 | 922 | 0.192 |
| PHASE 3 | 3200 | 0 | 0.000 | 1600 | 218 | 0.136 |
| | 3200 | 510 | 0.159 | 3200 | 822 | 0.257 |
| PHASE 4 | NA | | | NA | | |

| | | |
|---|---|---|
| $\sum_i (V/C)_i$ | PHASE 1 0.220<br>PHASE 2 0.232<br>PHASE 3 0.257<br>PHASE 4 — | ICU = 0.809<br>LOS = C |
| RIGHT-TURN COMPONENT | — | |
| CLEARANCE | 0.100 | |

Kanan Road at US 101 Interchange
PM Peak Hour - Existing plus Growth Conditions

Kimley–Horn and Associates, Inc.

ICU CALCULATION WORKSHEET
FOR A TIGHT-DIAMOND INTERCHANGE



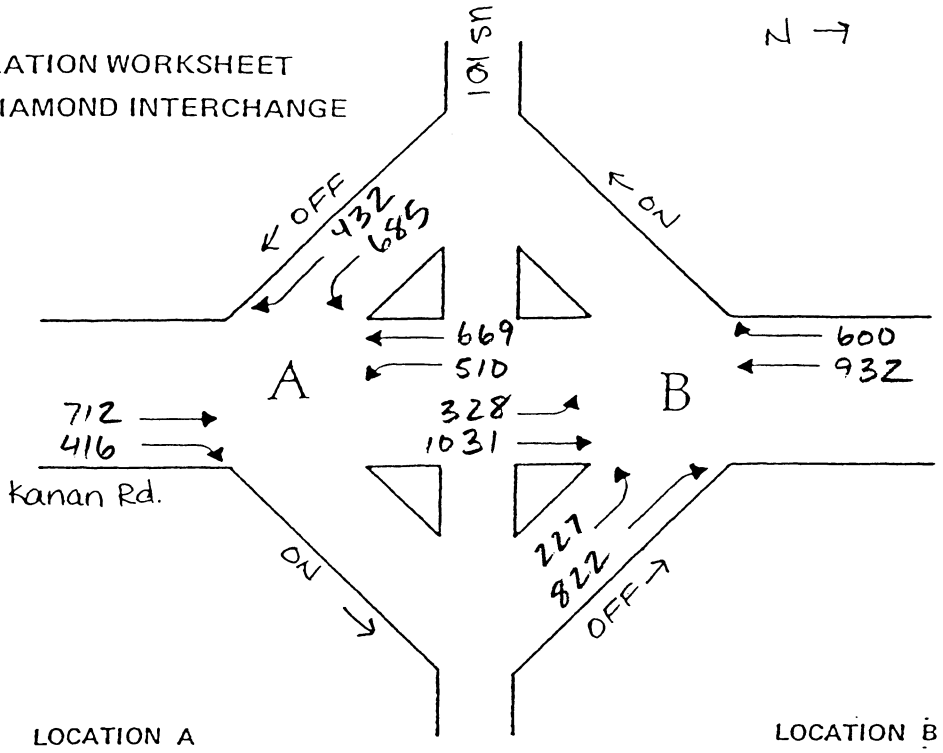

| | LOCATION A | | | LOCATION B | | |
|---|---|---|---|---|---|---|
| | CAP. | VOL. | V/C | CAP. | VOL. | V/C |
| PHASE 1 | 3200 | 408 | 0.128 | 1600 | 191 | 0.119 |
| | 3200 | 408 | 0.128 | 3200 | 191 | 0.060 |
| PHASE 2 | 4800 | 990 | 0.206 | 3200 | 621 | 0.194 |
| | | | | 4800 | 1386 | 0.289 |
| PHASE 3 | 3200 | 319 | 0.100 | 4800 | 954 | 0.199 |
| | 3200 | 1229 | 0.384 | | | |
| PHASE 4 | NA | | | NA | | |

| | | |
|---|---|---|
| $\sum_i (V/C)_i$ | PHASE 1 0.128<br>PHASE 2 0.289<br>PHASE 3 0.384<br>PHASE 4 — | ICU = 0.901<br>LOS = D |
| RIGHT-TURN COMPONENT | — | |
| CLEARANCE | 0.100 | |

Kanan Road at US 101 Interchange
AM Peak Hour - EXISTING plus GROWTH plus PROJECT Conditions

Kimley-Horn and Associates, Inc.

## ICU CALCULATION WORKSHEET
## FOR A TIGHT-DIAMOND INTERCHANGE




| | LOCATION A | | | LOCATION B | | |
|---|---|---|---|---|---|---|
| | CAP. | VOL. | V/C | CAP. | VOL. | V/C |
| PHASE 1 | 3200 | 669 | 0.209 | 1600 | 328 | 0.205 |
| | 3200 | 712 | 0.223 | 3200 | 328 | 0.103 |
| PHASE 2 | 4800 | 1117 | 0.233 | 3200 | 703 | 0.220 |
| | | | | 4800 | 932 | 0.194 |
| PHASE 3 | 3200 | 0 | 0.000 | 1600 | 227 | 0.142 |
| | 3200 | 510 | 0.159 | 3200 | 822 | 0.257 |
| PHASE 4 | NA | | | NA | | |

$\sum_i (V/C)_i$

PHASE 1 0.223
PHASE 2 0.233
PHASE 3 0.257
PHASE 4

RIGHT-TURN COMPONENT —

CLEARANCE 0.100

ICU = 0.813

LOS = C

Kanan Road at US 101 Interchange

PM Peak Hour - Existing plus Growth plus Project Conditions

Kimley–Horn and Associates, Inc.

## INTERSECTION CAPACITY UTILIZATION WORKSHEET

**INTERSECTION:** # 1 **N/S:** Kanan Road **E/W:** US-101 WB / Canwood
**DATE OF COUNTS:** **Notes:** 2020 Volumes with Interchange
**ANALYSIS PERIOD:** AM Peak Hour Improvements

| | | Future 2020 With Interchange | | | | Future 2020 with Project | | | |
|---|---|---|---|---|---|---|---|---|---|
| Movemnt | No. Lanes | Cap. | Vol. | AM Peak V/C | Crit. Mvmt. | PROJ. VOL. | Vol. | AM Peak V/C | Crit. Mvmt. |
| NL | 1 | 1,600 | 90 | 0.056 | 1 | 2 | 92 | 0.058 | 1 |
| NR | 1 | 1,600 | 210 | 0.131 | 0 | 4 | 214 | 0.134 | 0 |
| NT | 2 | 3,200 | 711 | 0.222 | 0 | 8 | 719 | 0.225 | 0 |
| SL | 0 | 0 | 0 | 0.000 | 0 | | - | 0.000 | 0 |
| SR | 1 | 1,600 | 218 | 0.136 | 0 | | 218 | 0.136 | 0 |
| ST | 3 | 4,800 | 2038 | 0.425 | 1 | 3 | 2,041 | 0.425 | 1 |
| EL | 1 | 1,600 | 78 | 0.049 | 1 | | 78 | 0.049 | 1 |
| ER | 1 | 1,600 | 120 | 0.075 | 1 | 1 | 121 | 0.076 | 1 |
| ET | 0 | 0 | 0 | 0.000 | 0 | | - | 0.000 | 0 |
| WL | 2 | 3,200 | 680 | 0.213 | 0 | 3 | 683 | 0.213 | 0 |
| WR | #N/A | #N/A | 559 | #N/A | 0 | | 559 | #N/A | 0 |
| WT | 2 | 3,200 | 40 | 0.187 | 1 | | 40 | 0.187 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| | N/S component | 0.481 | | N/S component | 0.483 |
| | E/W component | 0.236 | | E/W component | 0.236 |
| | Rt.Tn. Component | 0.019 | | Rt.Tn. Component | 0.018 |
| | Clearance Interval | 0.100 | | Clearance Interval | 0.100 |
| | ICU | 0.836 | | ICU | 0.837 |
| | LOS | D | | LOS | D |

Critical movement identified by a 1. Project Impact: 0.001
Ten lanes for a right turn indicates free movement.
#N/A - Not Applicable

## INTERSECTION CAPACITY UTILIZATION WORKSHEET

**INTERSECTION:** # 1 **N/S:** Kanan Road **E/W:** US-101 WB / Canwood
**DATE OF COUNTS:** ####### **Notes:** 2020 Volumes with Interchange
**ANALYSIS PERIOD:** PM Peak Hour Improvements

| | | Existing Conditions | | | | Future 2020 with Project | | | |
|---|---|---|---|---|---|---|---|---|---|
| Movemnt | No. Lanes | Cap. | Vol. | PM Peak V/C | Crit. Mvmt. | PROJ. VOL. | Vol. | PM Peak V/C | Crit. Mvmt. |
| NL | 1 | 1,600 | 110 | 0 | 0 | 1 | 111 | 0.07 | 0 |
| NR | 1 | 1,600 | 450 | 0.28 | 0 | 3 | 453 | 0.28 | 0 |
| NT | 2 | 3,200 | 1312 | 0.41 | 1 | 5 | 1,317 | 0.41 | 1 |
| SL | 0 | 0 | 0 | 0.00 | 1 | | - | 0.00 | 1 |
| SR | 1 | 1,600 | 207 | 0.13 | 0 | | 207 | 0.13 | 0 |
| ST | 3 | 4,800 | 1490 | 0.31 | 0 | 9 | 1,499 | 0.31 | 0 |
| EL | 1 | 1,600 | 117 | 0.07 | 1 | | 117 | 0.07 | 1 |
| ER | 1 | 1,600 | 220 | 0.14 | 1 | 2 | 222 | 0.14 | 1 |
| ET | 0 | 0 | 0 | 0.00 | 0 | | - | 0.00 | 0 |
| WL | 2 | 3,200 | 670 | 0.21 | 0 | 9 | 679 | 0.21 | 0 |
| WR | #N/A | #N/A | 907 | #N/A | 0 | | 907 | #N/A | 0 |
| WT | 2 | 3,200 | 50 | 0.30 | 1 | | 50 | 0.30 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| | N/S component | 0.410 | | N/S component | 0.412 |
| | E/W component | 0.372 | | E/W component | 0.372 |
| | Rt.Tn. Component | 0.069 | | Rt.Tn. Component | 0.069 |
| | Clearance Interval | 0.100 | | Clearance Interval | 0.100 |
| | ICU | 0.951 | | ICU | 0.953 |
| | LOS | E | | LOS | E |

Critical movement identified by a 1. Project Impact: 0.002
Ten lanes for a right turn indicates free movement.
#N/A - Not Applicable

## INTERSECTION CAPACITY UTILIZATION WORKSHEET

**INTERSECTION:** # 1 **N/S:** Kanan Road **E/W:** US-101 EB/Roadside
**DATE OF COUNTS:** **Notes:** 2020 Volumes with Interchange Improvements
**ANALYSIS PERIOD:** AM Peak Hour

| | | Future 2020 With Interchange | | | | Future 2020 with Project | | | |
|---|---|---|---|---|---|---|---|---|---|
| Movemnt | No. Lanes | Cap. | Vol. | AM Peak V/C | Crit. Mvmt. | PROJ. VOL. | Vol. | AM Peak V/C | Crit. Mvmt. |
| NL | 0 | 0 | 0 | 0.000 | 1 | | - | 0.000 | 1 |
| NR | #N/A | #N/A | 20 | #N/A | 0 | | 20 | #N/A | 0 |
| NT | 3 | 4,800 | 910 | 0.194 | 0 | 20 | 930 | 0.198 | 0 |
| SL | 1 | 1,600 | 200 | 0.125 | 0 | | 200 | 0.125 | 0 |
| SR | 10 | 16,000 | 1031 | 0.064 | 0 | | 1,031 | 0.064 | 0 |
| ST | 2 | 3,200 | 1143 | 0.357 | 1 | 7 | 1,150 | 0.359 | 1 |
| EL | 1.7 | 2,720 | 511 | 0.188 | 1 | | 511 | 0.188 | 1 |
| ER | #N/A | #N/A | 350 | #N/A | 0 | 1 | 351 | #N/A | 0 |
| ET | 1.3 | 2,080 | 10 | 0.173 | 0 | | 10 | 0.174 | 0 |
| WL | 1 | 1,600 | 10 | 0.006 | 0 | | 10 | 0.006 | 0 |
| WR | 1 | 1,600 | 60 | 0.038 | 0 | | 60 | 0.038 | 0 |
| WT | 0 | 0 | 0 | 0.000 | 1 | | - | 0.000 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| N/S component | 0.357 | | N/S component | 0.359 |
| E/W component | 0.188 | | E/W component | 0.188 |
| Rt.Tn. Component | 0.000 | | Rt.Tn. Component | 0.000 |
| Clearance Interval | 0.100 | | Clearance Interval | 0.100 |
| ICU | 0.645 | | ICU | 0.647 |
| LOS | B | | LOS | B |

Critical movement identified by a 1. Project Impact: 0.002
Ten lanes for a right turn indicates free movement.
#N/A - Not Applicable

## INTERSECTION CAPACITY UTILIZATION WORKSHEET

**INTERSECTION:** # 1 **N/S:** Kanan Road **E/W:** US-101 EB/Roadside
**DATE OF COUNTS:** ####### **Notes:** 2020 Volumes with Interchange Improvements
**ANALYSIS PERIOD:** PM Peak Hour

| | | Existing Conditions | | | | Future 2020 with Project | | | |
|---|---|---|---|---|---|---|---|---|---|
| Movemnt | No. Lanes | Cap. | Vol. | PM Peak V/C | Crit. Mvmt. | PROJ. VOL. | Vol. | PM Peak V/C | Crit. Mvmt. |
| NL | 0 | 0 | 0 | 0 | 0 | | - | 0.00 | 0 |
| NR | #N/A | #N/A | 40 | #N/A | 0 | | 40 | #N/A | 0 |
| NT | 3 | 4,800 | 1874 | 0.40 | 1 | 12 | 1,886 | 0.40 | 1 |
| SL | 1 | 1,600 | 270 | 0.17 | 1 | | 270 | 0.17 | 1 |
| SR | 10 | 16,000 | 703 | 0.04 | 0 | | 703 | 0.04 | 0 |
| ST | 2 | 3,200 | 832 | 0.26 | 0 | 22 | 854 | 0.27 | 0 |
| EL | 2 | 2,720 | 738 | 0.27 | 1 | | 738 | 0.27 | 1 |
| ER | #N/A | #N/A | 530 | #N/A | 0 | 5 | 535 | #N/A | 0 |
| ET | 1 | 2,080 | 10 | 0.26 | 0 | | 10 | 0.26 | 0 |
| WL | 1 | 1,600 | 10 | 0.01 | 0 | | 10 | 0.01 | 0 |
| WR | 1 | 1,600 | 180 | 0.11 | 0 | | 180 | 0.11 | 0 |
| WT | 0 | 0 | 0 | 0.00 | 1 | | - | 0.00 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| N/S component | 0.568 | | N/S component | 0.570 |
| E/W component | 0.271 | | E/W component | 0.271 |
| Rt.Tn. Component | 0.000 | | Rt.Tn. Component | 0.000 |
| Clearance Interval | 0.100 | | Clearance Interval | 0.100 |
| ICU | 0.939 | | ICU | 0.941 |
| LOS | E | | LOS | E |

Critical movement identified by a 1. Project Impact: 0.002
Ten lanes for a right turn indicates free movement.
#N/A - Not Applicable

## INTERSECTION CAPACITY UTILIZATION WORKSHEET

**INTERSECTION:** N/S: Kanan Rd E/W: Agoura Rd
**DATE OF COUNTS:** 05/06/03 **Notes:** Triangle Ranch
**ANALYSIS PERIOD:** AM Peak Hour

| | | Existing Conditions | | | | Existing Plus Growth | | | | Existing Plus Growth Plus Project | | | | | Cumulative Conditions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movemnt | No. Lanes | Cap. | Vol. | AM Peak V/C | Crit. Mvmt. | Growth 3.3% | Exist + Growth | AM Peak V/C | Crit. Mvmt. | Growth 3.3% | Project Traffic | xist+Growth + Proj | AM Peak V/C | Crit. Mvmt. | App Projects | xist+Growth + Proj | Exist+App +Gro+Proj | AM Peak V/C | Crit. Mvmt. |
| NL | 1 | 1,600 | 124 | 0.078 | 1 | 4 | 128 | 0.080 | 1 | 4 | 10 | 138 | 0.0863075 | 1 | 0 | 138 | 138 | 0.0863075 | 1 |
| NR | #N/A | #N/A | 22 | #N/A | 0 | 1 | 23 | #N/A | 0 | 1 | 5 | 28 | #N/A | 0 | 0 | 28 | 28 | #N/A | 0 |
| NT | 2 | 3,200 | 386 | 0.128 | 0 | 13 | 399 | 0.132 | 0 | 13 | 21 | 419 | 0.140 | 0 | 19 | 419 | 438 | 0.146 | 0 |
| SL | 1 | 1,600 | 103 | 0.064 | 0 | 3 | 106 | 0.066 | 0 | 3 | 0 | 106 | 0.0664994 | 0 | 99 | 106 | 205 | 0.1283744 | 0 |
| SR | 1 | 1600 | 175 | 0.109 | 0 | 6 | 181 | 0.113 | 0 | 6 | 0 | 181 | 0.113 | 0 | 29 | 181 | 210 | 0.131 | 0 |
| ST | 1 | 1,600 | 548 | 0.343 | 1 | 18 | 566 | 0.354 | 1 | 18 | 7 | 573 | 0.358 | 1 | 97 | 573 | 670 | 0.419 | 1 |
| EL | 1 | 1,600 | 92 | 0.058 | 0 | 3 | 95 | 0.059 | 0 | 3 | 0 | 95 | 0.059 | 0 | 60 | 95 | 155 | 0.097 | 0 |
| ER | #N/A | #N/A | 63 | #N/A | 0 | 2 | 65 | #N/A | 0 | 2 | 3 | 68 | #N/A | 0 | 0 | 68 | 68 | #N/A | 0 |
| ET | 1 | 1,600 | 72 | 0.084 | 1 | 2 | 74 | 0.087 | 1 | 2 | 0 | 74 | 0.089 | 1 | 122 | 74 | 196 | 0.166 | 1 |
| WL | 1 | 1,600 | 44 | 0.028 | 1 | 1 | 45 | 0.028 | 1 | 1 | 2 | 47 | 0.029 | 1 | 0 | 47 | 47 | 0.029 | 1 |
| WR | 1 | 1600 | 84 | 0.053 | 0 | 3 | 87 | 0.054 | 0 | 3 | 0 | 87 | 0.054 | 0 | 71 | 87 | 158 | 0.099 | 0 |
| WT | 1 | 1,600 | 72 | 0.045 | 0 | 2 | 74 | 0.046 | 0 | 2 | 0 | 74 | 0.046 | 0 | 82 | 74 | 156 | 0.098 | 0 |
| | | | N/S component | | 0.420 | | N/S component | | 0.434 | | 48 | N/S component | | 0.444 | 579 | | N/S component | | 0.505 |
| | | | E/W component | | 0.112 | | E/W component | | 0.116 | | | E/W component | | 0.119 | | | E/W component | | 0.195 |
| | | | Rt.Tn. comp. | | 0.000 | | Rt.Tn. comp. | | 0.000 | | | Rt.Tn. comp. | | 0.000 | | | Rt.Tn. comp. | | 0.000 |
| | | | Clearance Interval | | 0.100 | | Clearance Interval | | 0.100 | | | Clearance Interval | | 0.100 | | | Clearance Interval | | 0.100 |
| | | | ICU | | 0.632 | | ICU | | 0.649 | | | ICU | | 0.663 | | | ICU | | 0.800 |
| | | | LOS | | B | | LOS | | B | | | LOS | | B | | | LOS | | C |
| | | | | | | | | | | | | Project Impact | | 0.014 | | | Cumulative Iject Impact: | | 0.137 |

Critical movement identified by a 1.
Ten lanes for a right turn indicates free movement.
NA - Not Applicable

AM Proj + Cumulative Traffic 627
AM Project % of Cumulative Impact 0.076

## INTERSECTION CAPACITY UTILIZATION WORKSHEET

**INTERSECTION:** N/S: Kanan Rd E/W: Agoura Rd
**DATE OF COUNTS:** 05/06/03 **Notes:** Triangle Ranch
**ANALYSIS PERIOD:** PM Peak Hour

| | | Existing Conditions | | | | Existing Plus Growth | | | | Existing Plus Growth Plus Approved | | | | | Cumulative Conditions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movemnt | No. Lanes | Cap. | Vol. | AM Peak V/C | Crit. Mvmt. | Growth 3.3% | Exist + Growth | AM Peak V/C | Crit. Mvmt. | Growth 3.3% | Project Traffic | xist+Growth + Proj | AM Peak V/C | Crit. Mvmt. | App Projects | xist+Growth + Proj | Exist+App +Gro+Proj | AM Peak V/C | Crit. Mvmt. |
| NL | 1 | 1,600 | 98 | 0.061 | 1 | 3 | 101 | 0.063 | 1 | 3 | 6 | 108 | 0.0672713 | 1 | 0 | 108 | 108 | 0.0672713 | 1 |
| NR | #N/A | #N/A | 25 | #N/A | 0 | 1 | 26 | #N/A | 0 | 1 | 3 | 29 | #N/A | 0 | 0 | 29 | 29 | #N/A | 0 |
| NT | 2 | 3,200 | 551 | 0.180 | 0 | 18 | 569 | 0.186 | 0 | 18 | 13 | 582 | 0.191 | 0 | 6 | 582 | 588 | 0.193 | 0 |
| SL | 1 | 1,600 | 136 | 0.085 | 0 | 4 | 140 | 0.088 | 0 | 4 | 0 | 140 | 0.087805 | 0 | 98 | 140 | 238 | 0.149055 | 0 |
| SR | 1 | 1600 | 140 | 0.088 | 0 | 5 | 145 | 0.090 | 0 | 5 | 0 | 145 | 0.090 | 0 | 75 | 145 | 220 | 0.137 | 0 |
| ST | 1 | 1,600 | 497 | 0.311 | 1 | 16 | 513 | 0.321 | 1 | 16 | 23 | 537 | 0.335 | 1 | 141 | 537 | 678 | 0.424 | 1 |
| EL | 1 | 1,600 | 203 | 0.127 | 1 | 7 | 210 | 0.131 | 1 | 7 | 0 | 210 | 0.131 | 1 | 202 | 210 | 412 | 0.257 | 1 |
| ER | #N/A | #N/A | 83 | #N/A | 0 | 3 | 86 | #N/A | 0 | 3 | 11 | 97 | #N/A | 0 | 0 | 97 | 97 | #N/A | 0 |
| ET | 1 | 1,600 | 164 | 0.154 | 0 | 5 | 169 | 0.159 | 0 | 5 | 0 | 169 | 0.167 | 0 | 201 | 169 | 370 | 0.292 | 0 |
| WL | 1 | 1,600 | 62 | 0.039 | 0 | 2 | 64 | 0.040 | 0 | 2 | 6 | 70 | 0.044 | 0 | 0 | 70 | 70 | 0.044 | 0 |
| WR | 1 | 1600 | 183 | 0.114 | 0 | 6 | 189 | 0.118 | 0 | 6 | 0 | 189 | 0.118 | 0 | 255 | 189 | 444 | 0.278 | 0 |
| WT | 1 | 1,600 | 173 | 0.108 | 1 | 6 | 179 | 0.112 | 1 | 6 | 0 | 179 | 0.112 | 1 | 229 | 179 | 408 | 0.255 | 1 |
| | | | N/S component | | 0.372 | | N/S component | | 0.384 | | 63 | N/S component | | 0.403 | 1207 | | N/S component | | 0.491 |
| | | | E/W component | | 0.235 | | E/W component | | 0.243 | | | E/W component | | 0.243 | | | E/W component | | 0.512 |
| | | | Rt.Tn. comp. | | 0.000 | | Rt.Tn. comp. | | 0.000 | | | Rt.Tn. comp. | | 0.000 | | | Rt.Tn. comp. | | 0.000 |
| | | | Clearance Interval | | 0.100 | | Clearance Interval | | 0.100 | | | Clearance Interval | | 0.100 | | | Clearance Interval | | 0.100 |
| | | | ICU | | 0.707 | | ICU | | 0.727 | | | ICU | | 0.746 | | | ICU | | 1.103 |
| | | | LOS | | C | | LOS | | C | | | LOS | | C | | | LOS | | F |
| | | | | | | | | | | | | Project Impact | | 0.019 | | | Cumulative Impact | | 0.358 |

Critical movement identified by a 1.
Ten lanes for a right turn indicates free movement.
NA - Not Applicable

PM Proj + Cumulative Traffic 1270
PM Project % of Cumulative Impact 0.050

## INTERSECTION CAPACITY UTILIZATION WORKSHEET

**INTERSECTION:** N/S: Kanan Rd E/W: Agoura Rd
**DATE OF COUNTS:** 05/06/03 **Notes:** Triangle Ranch
**ANALYSIS PERIOD:** AM Peak Hour With Mitigation - Add SBL, EBR, EBT, WBT

| | | Existing Conditions | | | | Existing Plus Growth | | | | Existing Plus Growth Plus Project | | | | | Cumulative Conditions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movemnt | No. Lanes | Cap. | Vol. | AM Peak V/C | Crit. Mvmt. | Growth 3.3% | Exist + Growth | AM Peak V/C | Crit. Mvmt. | Growth 3.3% | Project Traffic | xist+Growth + Proj | AM Peak V/C | Crit. Mvmt. | App Projects | xist+Growth + Proj | Exist+App +Gro+Proj | AM Peak V/C | Crit. Mvmt. |
| NL | 1 | 1,600 | 124 | 0.078 | 1 | 4 | 128 | 0.080 | 1 | 4 | 10 | 138 | 0.0863075 | 1 | 0 | 138 | 138 | 0.0863075 | 1 |
| NR | #N/A | #N/A | 22 | #N/A | 0 | 1 | 23 | #N/A | 0 | 1 | 5 | 28 | #N/A | 0 | 0 | 28 | 28 | #N/A | 0 |
| NT | 2 | 3,200 | 386 | 0.128 | 0 | 13 | 399 | 0.132 | 0 | 13 | 21 | 419 | 0.140 | 0 | 19 | 419 | 438 | 0.146 | 0 |
| SL | 1 | 1,600 | 103 | 0.064 | 0 | 3 | 106 | 0.066 | 0 | 3 | 0 | 106 | 0.0664994 | 0 | 99 | 106 | 205 | 0.1283744 | 0 |
| SR | 1 | 1600 | 175 | 0.109 | 0 | 6 | 181 | 0.113 | 0 | 6 | 0 | 181 | 0.113 | 0 | 29 | 181 | 210 | 0.131 | 0 |
| ST | 2 | 3,200 | 548 | 0.171 | 1 | 18 | 566 | 0.177 | 1 | 18 | 7 | 573 | 0.179 | 1 | 97 | 573 | 670 | 0.209 | 1 |
| EL | 2 | 2,880 | 92 | 0.032 | 0 | 3 | 95 | 0.033 | 0 | 3 | 0 | 95 | 0.033 | 0 | 60 | 95 | 155 | 0.054 | 0 |
| ER | #N/A | #N/A | 63 | #N/A | 0 | 2 | 65 | #N/A | 0 | 2 | 3 | 68 | #N/A | 0 | 0 | 68 | 68 | #N/A | 0 |
| ET | 2 | 3,200 | 72 | 0.042 | 1 | 2 | 74 | 0.044 | 1 | 2 | 0 | 74 | 0.045 | 1 | 122 | 74 | 196 | 0.083 | 1 |
| WL | 1 | 1,600 | 44 | 0.028 | 1 | 1 | 45 | 0.028 | 1 | 1 | 2 | 47 | 0.029 | 1 | 0 | 47 | 47 | 0.029 | 1 |
| WR | 1 | 1600 | 84 | 0.053 | 0 | 3 | 87 | 0.054 | 0 | 3 | 0 | 87 | 0.054 | 0 | 71 | 87 | 158 | 0.099 | 0 |
| WT | 2 | 3,200 | 72 | 0.023 | 0 | 2 | 74 | 0.023 | 0 | 2 | 0 | 74 | 0.023 | 0 | 82 | 74 | 156 | 0.049 | 0 |
| | | | N/S component | | 0.249 | | N/S component | | 0.257 | | | N/S component | | 0.265 | | | | N/S component | 0.296 |
| | | | E/W component | | 0.070 | | E/W component | | 0.072 | | | E/W component | | 0.074 | | | | E/W component | 0.112 |
| | | | Rt.Tn. comp. | | 0.000 | | Rt.Tn. comp. | | 0.000 | | | Rt.Tn. comp. | | 0.000 | | | | Rt.Tn. comp. | 0.000 |
| | | | Clearance Interval | | 0.100 | | Clearance Interval | | 0.100 | | | Clearance Interval | | 0.100 | | | | Clearance Interval | 0.100 |
| | | | ICU | | 0.418 | | ICU | | 0.429 | | | ICU | | 0.439 | | | | ICU | 0.508 |
| | | | LOS | | A | | LOS | | A | | | LOS | | A | | | | LOS | A |
| | | | | | | | | | | | | | | | | | | Project Impact: | 0.068 |

Critical movement identified by a 1.
Ten lanes for a right turn indicates free movement.
NA - Not Applicable

## INTERSECTION CAPACITY UTILIZATION WORKSHEET

**INTERSECTION:** N/S: Kanan Rd E/W: Agoura Rd
**DATE OF COUNTS:** 05/06/03 **Notes:** Triangle Ranch
**ANALYSIS PERIOD:** PM Peak Hour

| | | Existing Conditions | | | | Existing Plus Growth | | | | Existing Plus Growth Plus Approved | | | | | Cumulative Conditions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movemnt | No. Lanes | Cap. | Vol. | AM Peak V/C | Crit. Mvmt. | Growth 3.3% | Exist + Growth | AM Peak V/C | Crit. Mvmt. | Growth 3.3% | Project Traffic | xist+Growth + Proj | AM Peak V/C | Crit. Mvmt. | App Projects | xist+Growth + Proj | Exist+App +Gro+Proj | AM Peak V/C | Crit. Mvmt. |
| NL | 1 | 1,600 | 98 | 0.061 | 0 | 3 | 101 | 0.063 | 0 | 3 | 6 | 108 | 0.0672713 | 0 | 0 | 108 | 108 | 0.0672713 | 0 |
| NR | #N/A | #N/A | 25 | #N/A | 0 | 1 | 26 | #N/A | 0 | 1 | 3 | 29 | #N/A | 0 | 0 | 29 | 29 | #N/A | 0 |
| NT | 2 | 3,200 | 551 | 0.180 | 1 | 18 | 569 | 0.186 | 1 | 18 | 13 | 582 | 0.191 | 1 | 6 | 582 | 588 | 0.193 | 1 |
| SL | 1 | 1,600 | 136 | 0.085 | 1 | 4 | 140 | 0.088 | 1 | 4 | 0 | 140 | 0.087805 | 1 | 98 | 140 | 238 | 0.149055 | 1 |
| SR | 1 | 1600 | 140 | 0.088 | 0 | 5 | 145 | 0.090 | 0 | 5 | 0 | 145 | 0.090 | 0 | 75 | 145 | 220 | 0.137 | 0 |
| ST | 2 | 3,200 | 497 | 0.155 | 0 | 16 | 513 | 0.160 | 0 | 16 | 23 | 537 | 0.168 | 0 | 141 | 537 | 678 | 0.212 | 0 |
| EL | 2 | 2,880 | 203 | 0.070 | 1 | 7 | 210 | 0.073 | 1 | 7 | 0 | 210 | 0.073 | 1 | 202 | 210 | 412 | 0.143 | 1 |
| ER | #N/A | #N/A | 83 | #N/A | 0 | 3 | 86 | #N/A | 0 | 3 | 11 | 97 | #N/A | 0 | 0 | 97 | 97 | #N/A | 0 |
| ET | 2 | 3,200 | 164 | 0.077 | 0 | 5 | 169 | 0.080 | 0 | 5 | 0 | 169 | 0.083 | 0 | 201 | 169 | 370 | 0.146 | 0 |
| WL | 1 | 1,600 | 62 | 0.039 | 0 | 2 | 64 | 0.040 | 0 | 2 | 6 | 70 | 0.044 | 0 | 0 | 70 | 70 | 0.044 | 0 |
| WR | 1 | 1600 | 183 | 0.114 | 0 | 6 | 189 | 0.118 | 0 | 6 | 0 | 189 | 0.118 | 0 | 255 | 189 | 444 | 0.278 | 1 |
| WT | 2 | 3,200 | 173 | 0.054 | 1 | 6 | 179 | 0.056 | 1 | 6 | 0 | 179 | 0.056 | 1 | 229 | 179 | 408 | 0.127 | 1 |
| | | | N/S component | | 0.265 | | N/S component | | 0.274 | | | N/S component | | 0.279 | | | | N/S component | 0.342 |
| | | | E/W component | | 0.125 | | E/W component | | 0.129 | | | E/W component | | 0.129 | | | | E/W component | 0.270 |
| | | | Rt.Tn. comp. | | 0.000 | | Rt.Tn. comp. | | 0.000 | | | Rt.Tn. comp. | | 0.000 | | | | Rt.Tn. comp. | 0.001 |
| | | | Clearance Interval | | 0.100 | | Clearance Interval | | 0.100 | | | Clearance Interval | | 0.100 | | | | Clearance Interval | 0.100 |
| | | | ICU | | 0.490 | | ICU | | 0.502 | | | ICU | | 0.508 | | | | ICU | 0.713 |
| | | | LOS | | A | | LOS | | A | | | LOS | | A | | | | LOS | C |
| | | | | | | | | | | | | | | | | | | Project Impact: | 0.206 |

Critical movement identified by a 1.
Ten lanes for a right turn indicates free movement.
NA - Not Applicable

# TWO-WAY STOP CONTROL SUMMARY

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | | Intersection | *Kanan / Roadside* |
| Agency/Co. | *Agoura Hills* | Jurisdiction | |
| Date Performed | *7/1/2003* | Analysis Year | |
| Analysis Time Period | *AM Peak* | | |
| Project Description | *Triangle Ranch - Existing Conditions* | | |
| East/West Street: | *Roadside Drive* | North/South Street: | *Kanan Road* |
| Intersection Orientation: | *North-South* | Study Period (hrs): | *0.25* |

## Vehicle Volumes and Adjustments

| **Major Street** | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | *9* | *550* | *29* | *284* | *837* | *65* |
| Peak-Hour Factor, PHF | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* |
| Hourly Flow Rate, HFR | *9* | *550* | *29* | *284* | *837* | *65* |
| Percent Heavy Vehicles | *0* | – | – | *0* | – | – |
| Median Type | *Undivided* | | | | | |
| RT Channelized | | | *0* | | | *0* |
| Lanes | *1* | *2* | *1* | *1* | *2* | *0* |
| Configuration | *L* | *T* | *R* | *L* | *T* | *TR* |
| Upstream Signal | | *0* | | | *0* | |

| **Minor Street** | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | *0* | *0* | *92* | *27* | *26* | *23* |
| Peak-Hour Factor, PHF | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* | *1.00* |
| Hourly Flow Rate, HFR | *0* | *0* | *92* | *27* | *26* | *23* |
| Percent Heavy Vehicles | *0* | *0* | *0* | *0* | *0* | *0* |
| Percent Grade (%) | | *0* | | | *0* | |
| Flared Approach | | *N* | | | *Y* | |
| Storage | | *0* | | | *0* | |
| RT Channelized | | | *0* | | | *0* |
| Lanes | *0* | *0* | *1* | *0* | *1* | *1* |
| Configuration | | | *R* | *LT* | | *R* |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Configuration | *L* | *L* | | | *R* | *LT* | | *R* |
| v (vph) | *9* | *284* | | | *92* | *53* | | *23* |
| C (m) (vph) | *762* | *1005* | | | *729* | *40* | | *561* |
| v/c | *0.01* | *0.28* | | | *0.13* | *1.33* | | *0.04* |
| 95% queue length | *0.04* | *1.17* | | | *0.43* | *5.34* | | *0.13* |
| Control Delay | *9.8* | *10.0-* | | | *10.7* | *411.0* | | *11.7* |
| LOS | *A* | *A* | | | *B* | *F* | | *B* |
| Approach Delay | – | – | *10.7* | | | *290.2* | | |
| Approach LOS | – | – | *B* | | | *F* | | |

>

*HCS2000*™ Copyright © 2000 University of Florida, All Rights Reserved Version 4 1[illegible]

# APPENDIX E

**Drainage Concept, Hydrology Calculations and Urban Stormwater Mitigation Plan (SUSMP), Tentative Tract 52419, Triangle Ranch, prepared by Wagner Halladay, Inc.: October 2003 (Revised October 2004)**

# DRAINAGE CONCEPT, HYDROLOGY CALCULATIONS and STANDARD URBAN STORMWATER MITIGATION PLAN (SUSMP)

## TENTATIVE TRACT 52419

## TRIANGLE RANCH
## COUNTY OF LOS ANGELES

PREPARED FOR:

**SAGE COMMUNITY GROUP**
3 Corporate Plaza, Suite 102
Newport Beach, CA 92660
(949) 644-3514

PREPARED BY:

**WAGNER HALLADAY, INC.**
201 E. Yorba Linda Boulevard
Placentia, CA 92870
(714) 993-4500

Wagner Halladay
INCORPORATED
CIVIL ENGINEERS
SURVEYORS

210-01-98

Prepared Under the Supervision of:

Dana S. Halladay

October 2003
Revised: July 2004
Revised: October 2004

# TABLE OF CONTENTS


I. INTRODUCTION ..... 1

II. CHARACTERISTICS OF THE SITE ..... 1

III. HYDROLOGY ..... 2

IV. DRAINAGE CONCEPT PLAN ..... 7

V. BEST MANAGEMENT PRACTICES ..... 9

VI. CONCLUSION ..... 11

VII. APPENDICES

- A. REFERENCES
- B. DEVELOPED MORA CALCULATIONS
- C. UNDEVELOPED MORA CALCULATIONS
- D. MORA AND Tc CALCULATIONS – DISK
- E. PEAK MITIGATED FLOW CALCULATIONS
- F. MISCELLANEOUS CALCULATIONS
- G. HYDROLOGY MAPS, EXISTING AND PROPOSED
- H. DRAINAGE CONCEPT PLAN
- I. MEDEA CREEK FLOODWAY MAP

# Drainage Concept, Hydrology Calculations
# and
# Standard Urban Stormwater Mitigation Plan (SUSMP)
# Tract 52419 (Revised)
# Triangle Ranch
# Agoura Hills, County of Los Angeles

October 15, 2004

## I. INTRODUCTION

This Drainage Concept and SUSMP has been prepared for submittal with the revised Tentative Tract Map 52419, at the request of Sage Community Group.

The plan addresses the proposed implementation of storm drainage control and conveyance improvements for the proposed 82 lot, 46 acre hillside residential development. The plan, while demonstrating the site's hydrologic conditions, is also intended to demonstrate that a proposed storm drainage system consisting of two (2) separate storm drain lines, one (1) set designed to convey only urban storm water runoff and a second set to convey debris carrying or bulked flows, is suitable to provide protection to the proposed development.

The total drainage area addressed in this drainage concept plan and hydrology study, and contributing directly to Medea Creek, is 517 acres.

## II. CHARACTERISTICS OF THE SITE

### Location

The site is located on the north flank of the Santa Monica Mountains, in the western portion of the range. The USGS map location of the site is as follows: portions of the Thousand Oaks and Calabasas 7.5-minute quadrangles, Range 18W, Township 1N, in unsectioned parts of both maps. The site is bounded on the north by Malibu Junction, on the west by Ladyface Mountain, on the south by Silver Creek Road and residential development, and to the east by undeveloped (private) areas.

The site lies generally south of the junction of Cornell and Kanan Roads, and is bisected by Medea Creek as it flows between these roads. The southern portion of the site encompasses the Los Angeles County Fire Station No. 65 and residential development between Caleta Road on the north and Silver Creek Road to the south, all of which are not part of the site. Silver Creek Rd. once crossed Medea Creek south of the site but was washed out and dead ends at the main channel of Medea Creek from both Cornell and Kanan Roads. The City of Agoura Hills lies to the north, and various estate developments lie to the south.

### Existing Land Use

The site covers approximately 46 acres, excluding all open space and clustered in-holdings. The clustered in-holdings include Fire Station No. 65, scattered residential development, and Cornell and Kanan Roads, which pass through the site. At some

locations along Kanan and Cornell Roads, there are turnouts (and various unpaved roads) which have altered some of the natural landscape. Along Kanan Road in the northwesterly half of the site there has been heavy machinery operation which has disturbed but not significantly altered the natural topography. Several areas between Kanan Road and Cornell Road along Medea Creek are developed as residential and equestrian uses.

**Watershed Boundaries/Drainage Patterns**

The site lies within the Medea Creek watershed. This watershed is comprised of four sub-drainages: Medea Creek, Lindero, Palo Comado and Cheeseboro Canyons. The four (4) drainages originate from the south slope of the Simi Hills, and converge in the vicinity of Malibu Junction, just to the north of the project site. These tributaries are concrete-channelized as they pass through the City of Agoura Hills. The tributary drainage area upstream of the project site is approximately 15,125 acres.

The main stem of Medea Creek downstream from Malibu Junction has cut a narrow passage through the Santa Monica Mountains, carrying the combined flow of all four (4) sub-drainages past the project site. Beyond the project site southward, the stream widens passing through several developments before emptying into Malibou Lake.

Slopes on the west side of the project site drain easterly under and past Kanan Road and into Medea Creek, while slopes on the east side drain westerly under and past Cornell Road and into the creek. Medea Creek bisects the site as the stream passes between Cornell and Kanan Roads. The site also contains portions of several tributaries to Medea Creek, three (3) of which are shown as blue-line streams on USGS maps. The blue-line streams include Medea Creek, an unnamed tributary on the northwest and another unnamed tributary to Medea Creek on the southeast.

## III. HYDROLOGY

The location of Triangle Ranch with several blue-line streams requires Capital Flood level protection. Hydrology calculations must therefore use a 50-year recurrence interval storm, hereafter termed the 50-year design storm. Calculations analyzed the undeveloped (existing) and developed conditions of the project site to assess the impacts of the proposed development. The calculations are enclosed with this report following the summary of the study findings outlined below and in Tables 1 and 2.

**Drainage Criteria:**

- Rainfall: 2002 Addendum to 1991 Manual - Isoheytal 7.6 inches northerly- 7.8 inches southerly;
- Soil: 028, Easterly offsite area: 036;
- Hydrologic analysis: Los Angeles County Department of Public Works (LACDPW) Modified Rational Method of Hydrology (MORA), Program F0601A supplemented by the TC Calculator (2002 County Program);
- Developed impervious area: 35%;
- Debris Potential Area: DPA-6 throughout the site, DPA-7 along Medea Creek;

- Total drainage area of 518 acres;
- Medea Creek: The County of Los Angeles identified the floodway of Medea Creek by the Adopted Watershed 370-ML9-ML11. Estimated flow in Medea Creek passing through the proposed development is 18,500 cfs;
- Two separate MORA runs were conducted for the developed and existing conditions each:
    1) Clear runoff computed using runoff coefficients published in the Los Angeles County Hydrology Manual (2002 addendum);
    2) Burned runoff computed using burned runoff coefficients supplied by the Water Resources division of LACDPW. Burned runoff coefficients are part of the MORA input data file(s) ( .DAT) for developed and undeveloped (existing) conditions;
- All runoff draining from natural open space are computed for clear and burned runoff flows using MORA. Burned runoff is multiplied by the appropriate bulking factor to calculate bulked flow. The bulking factor is a function of tributary drainage area and the DPA(s) published in the Los Angeles County Hydrology/Sedimentation, Appendix P (1993), Figure P-4. They are 1.61 for DPA-6 and 1.57 for DPA-7.

**Easterly Existing Conditions draining to Cornell Road and Medea Creek**
The easterly drainage basin was divided into subareas and 50 year discharges (clear, burned, and bulked) were calculated for each area and then tabled to points of discharge at Cornell Road and Medea Creek. The times of concentration were individually calculated.

**Westerly Existing Conditions draining to Kanan Road and Medea Creek**
The analysis of the westerly drainage area was conducted in the same manner as described above.

The existing watersheds draining to Medea Creek from the east and west are in natural condition except for existing culverts under Cornell and Kanan Road. There are no other drainage improvements in the subject area. The capacity of the existing road culverts were not analyzed for hydraulic capacity.

**Easterly Developed Condition draining to Cornell Road and Medea Creek**
The "existing conditions" hydrology study was revised to include the proposed development. 50 year discharges (clear, burned and bulked) were computed and tabulated for each subarea and a hydrograph generated for the main easterly tributary (node 37E). Times of concentration were revised to incorporate the proposed development.

**Westerly Developed Condition draining towards Kanan Road**
The analysis was conducted in the same manner as the eastern drainage area with hydrographs generated for the western half including Medea Creek in the reach extending from the confluence of Lindero Canyon Creek at the northerly limits of the project, to Silver Creek Road (node 26A) at the southerly limits, and a hydrograph inclusive of the entire project site (node 39A).

Two separate storm drain systems are proposed for the developed condition, one for urban runoff-clear flow, and a second storm drain for natural runoff-burned and bulked flow. Both parallel systems will outlet to Medea Creek from the east and west at the existing locations.

**Flow Summary Tables**

Tables 1 and 2 on the following pages summarize the flows at each concentration point (node). Included in the tables are 50-year clear runoff, burned, burned and bulked runoff, debris production volumes, and bulking factors. Hydrology maps illustrating drainage areas, acreage, flow paths, and concentration points, are included in the appendix.

The amount of storm runoff decreases 6% to 7% from the undeveloped to the developed condition. The steep, natural terrain with good vegetative cover is left in the existing state while the lower sections of the hills are developed with high percentages of pervious surfaces and grading that creates lower slope rates. The developed portion also increases the runoff flow path length with higher times of concentration and more opportunities for infiltration in landscaped areas with gradual slopes. The majority of the project site, approximately 80%, will remain natural and undisturbed.

The cumulative time of concentration for the project site are much less than the time that upstream contributary peak flows in Medea Creek reach the project site. As a consequence, the project peak flows are attenuated.

## TABLE 1: FLOW SUMMARY FOR EXISTING CONDITION

| AREA | AREA [ac] | AREA [sq mi] | Q [cfs] | $Q_B$ [cfs] | $Q_{BB}$ [cfs] | DPA Zone | Bulking Factor | DPR [cy/sqmi] | DPV [cy] |
|---|---|---|---|---|---|---|---|---|---|
| 1A | 18 | 0.028 | 46 | 55 | 89 | 6 | 1.61 | 48000 | 1350 |
| 2A | 22 | 0.034 | 48 | 59 | 95 | 6 | 1.61 | 48000 | 1650 |
| 3A | 41 | 0.064 | 90 | 110 | 177 | 6 | 1.61 | 48000 | 3075 |
| 4A | 14 | 0.022 | 33 | 40 | 64 | 6 | 1.61 | 48000 | 1050 |
| 5A | 11 | 0.017 | 17 | 21 | 33 | 7 | 1.57 | 28000 | 481 |
| 6A | 31 | 0.048 | 68 | 83 | 134 | 6 | 1.61 | 48000 | 2325 |
| 7A | 8 | 0.013 | 19 | 23 | 36 | 7 | 1.57 | 28000 | 350 |
| 8B | 17 | 0.027 | 41 | 50 | 81 | 6 | 1.61 | 48000 | 1275 |
| 9B | 17 | 0.027 | 37 | 46 | 74 | 6 | 1.61 | 48000 | 1275 |
| 10B | 8 | 0.013 | 19 | 24 | 39 | 6 | 1.61 | 48000 | 600 |
| 11AB | 187 | 0.292 | 209 | 295 | 475 | VARIES | 1.61 | VARIES | 9788 |
| 12A | 11 | 0.017 | 29 | 35 | 56 | 6 | 1.61 | 48000 | 825 |
| 13A | 6 | 0.009 | 17 | 19 | 30 | 7 | 1.57 | 28000 | 263 |
| 14D | 12 | 0.019 | 35 | 42 | 68 | 6 | 1.61 | 48000 | 900 |
| 15D | 22 | 0.034 | 47 | 58 | 93 | 6 | 1.61 | 48000 | 1650 |
| 16AD | 238 | 0.372 | 243 | 354 | 570 | VARIES | 1.61 | VARIES | 11528 |
| 17A | 4 | 0.006 | 9 | 11 | 18 | 6 | 1.61 | 48000 | 300 |
| 18A | 26 | 0.041 | 57 | 70 | 113 | 6 | 1.61 | 48000 | 1950 |
| 19A | 14 | 0.022 | 29 | 36 | 57 | 7 | 1.57 | 28000 | 613 |
| 20A | 13 | 0.020 | 34 | 41 | 66 | 6 | 1.61 | 48000 | 975 |
| 21A | 7 | 0.011 | 18 | 21 | 33 | 7 | 1.57 | 28000 | 306 |
| 22C | 14 | 0.022 | 31 | 38 | 61 | 6 | 1.61 | 48000 | 1050 |
| 23C | 10 | 0.016 | 27 | 30 | 48 | 6 | 1.61 | 48000 | 750 |
| 24AC | 326 | 0.509 | 251 | 384 | 618 | VARIES | 1.61 | VARIES | 14517 |
| 25A | 9 | 0.014 | 30 | 35 | 55 | 7 | 1.57 | 28000 | 394 |
| 26A | 335 | 0.523 | 251 | 386 | 621 | VARIES | 1.61 | VARIES | 14656 |
| 27E | 19 | 0.030 | 67 | 70 | 113 | 6 | 1.61 | 48000 | 1425 |
| 28E | 20 | 0.031 | 77 | 80 | 129 | 6 | 1.61 | 48000 | 1500 |
| 29E | 30 | 0.047 | 116 | 121 | 195 | 6 | 1.61 | 48000 | 2250 |
| 30E | 9 | 0.014 | 26 | 31 | 50 | 6 | 1.61 | 48000 | 675 |
| 31E | 28 | 0.044 | 60 | 74 | 119 | 6 | 1.61 | 48000 | 2100 |
| 32E | 20 | 0.031 | 47 | 57 | 92 | 6 | 1.61 | 48000 | 1500 |
| 33E | 18 | 0.028 | 39 | 48 | 77 | 6 | 1.61 | 48000 | 1350 |
| 34E | 4 | 0.006 | 12 | 14 | 23 | 6 | 1.61 | 48000 | 300 |
| 35E | 21 | 0.033 | 45 | 55 | 89 | 6 | 1.61 | 48000 | 1575 |
| 36E | 13 | 0.020 | 26 | 32 | 52 | 6 | 1.61 | 48000 | 975 |
| 37E | 182 | 0.284 | 240 | 299 | 481 | 6 | 1.61 | 34000 | 9669 |
| 38AE | 517 | 0.808 | 490 | 685 | 1103 | VARIES | 1.61 | VARIES | 21225 |
| 39A | 517 | 0.808 | 490 | 685 | 1103 | VARIES | 1.61 | VARIES | 21225 |

## TABLE 2: FLOW SUMMARY FOR PROPOSED CONDITION

| SUB-AREA | AREA [ac] | AREA [sq mi] | $Q_{50}$ [cfs] | $Q_B$ [cfs] | $Q_{BB}$ [cfs] | DPA Zone | Bulking Factor | DPR [cy/sqmi] | DPV [cy] |
|---|---|---|---|---|---|---|---|---|---|
| 1A | 18 | 0.028 | 47 | 57 | 92 | 6 | 1.61 | 48000 | 1350 |
| 2A | 22 | 0.034 | 56 | 68 | 109 | 6 | 1.61 | 48000 | 1650 |
| 3A | 41 | 0.064 | 104 | 126 | 203 | 6 | 1.61 | 48000 | 3075 |
| 4A | 9 | 0.014 | 21 | 26 | 42 | 6 | 1.61 | 48000 | 675 |
| 5A | 2 | 0.003 | 6 | 8 | 13 | 7 | 1.57 | 28000 | 88 |
| 6A | 16 | 0.025 | 37 | - | - | 6 | - | 48000 | - |
| 7A | 8 | 0.013 | 12 | 16 | 25 | 7 | 1.57 | 28000 | 350 |
| 8A | 31 | 0.048 | 70 | 86 | 138 | 6 | 1.61 | 48000 | 2325 |
| 9A | 8 | 0.013 | 19 | 23 | 36 | 7 | 1.57 | 28000 | 350 |
| 10B | 17 | 0.027 | 41 | 50 | 81 | 6 | 1.61 | 48000 | 1275 |
| 11B | 13 | 0.020 | 25 | 31 | 50 | 6 | 1.61 | 48000 | 975 |
| 12AB | 185 | 0.289 | 203 | 276 | 444 | VARIES | 1.61 | VARIES | 9539 |
| 13A | 7 | 0.011 | 16 | 19 | 31 | 6 | 1.61 | 48000 | 525 |
| 14A | 10 | 0.016 | 23 | - | - | 6 | 1.61 | 48000 | - |
| 15A | 6 | 0.009 | 17 | 17 | 27 | 7 | 1.57 | 28000 | 263 |
| 16C | 12 | 0.019 | 35 | 42 | 68 | 6 | 1.61 | 48000 | 900 |
| 17C | 21 | 0.033 | 45 | 55 | 89 | 6 | 1.61 | 48000 | 1575 |
| 18AC | 241 | 0.377 | 205 | 295 | 475 | VARIES | 1.61 | VARIES | 11485 |
| 19A | 19 | 0.030 | 43 | 53 | 85 | 6 | 1.61 | 48000 | 1425 |
| 20A | 4 | 0.006 | 9 | 11 | 17 | 7 | 1.57 | 28000 | 175 |
| 21A | 14 | 0.022 | 29 | 36 | 57 | 7 | 1.57 | 28000 | 613 |
| 22A | 11 | 0.017 | 29 | 35 | 56 | 6 | 1.61 | 48000 | 825 |
| 23A | 7 | 0.011 | 18 | 18 | 28 | 7 | 1.57 | 28000 | 306 |
| 24D | 11 | 0.017 | 31 | 37 | 60 | 6 | 1.61 | 48000 | 825 |
| 25D | 20 | 0.031 | 51 | - | - | 6 | - | 48000 | - |
| 26AD | 327 | 0.511 | 211 | 316 | 509 | VARIES | 1.61 | VARIES | 14562 |
| 27A | 9 | 0.014 | 30 | 35 | 55 | 7 | 1.57 | 28000 | 394 |
| 28A | 336 | 0.525 | 211 | 318 | 512 | VARIES | 1.61 | VARIES | 14700 |
| 29E | 19 | 0.030 | 67 | 70 | 113 | 6 | 1.61 | 48000 | 1425 |
| 30E | 20 | 0.031 | 77 | 80 | 129 | 6 | 1.61 | 48000 | 1500 |
| 31E | 30 | 0.047 | 116 | 121 | 195 | 6 | 1.61 | 48000 | 2250 |
| 32E | 9 | 0.014 | 26 | 31 | 50 | 6 | 1.61 | 48000 | 675 |
| 33E | 35 | 0.055 | 75 | 92 | 148 | 6 | 1.61 | 48000 | 2625 |
| 34E | 31 | 0.048 | 70 | 85 | 137 | 6 | 1.61 | 48000 | 2325 |
| 35E | 25 | 0.039 | 51 | 64 | 103 | 6 | 1.61 | 48000 | 1875 |
| 36E | 13 | 0.020 | 26 | 32 | 52 | 6 | 1.61 | 48000 | 975 |
| 37E | 182 | 0.284 | 296 | 364 | 586 | 6 | 1.61 | 34000 | 9669 |
| 38AE | 518 | 0.809 | 460 | 638 | 1027 | VARIES | 1.61 | VARIES | 20003 |
| 39A | 518 | 0.809 | 460 | 638 | 1027 | VARIES | 1.61 | VARIES | 20003 |

## IV. DRAINAGE CONCEPT PLAN

The drainage concept proposed for the 81 residential lots include design provisions for both the project site's existing terrain and soils characteristics and the County of Los Angeles' requirements for the Standard Urban Storm Water Mitigation Plan (SUSMP).

The storm drain facilities proposed for the development will consist of two (2) separate systems:

**"Debris Flow" Storm Drain System**

The debris storm drain system is a series of 36 to 42-inch pipes proposed to convey burned and bulked debris flows from the natural open space into Medea Creek, or into natural drainage courses east of Cornell Road. The debris storm drains are separated according to drainage areas so that the debris potential passing through any pipe does not exceed 1,000 cubic yards (cy).

Collectively, two (2) debris storm drains, Lines "E" and "F", extend from the open spaces west of project improvements and drain east into Medea Creek. Line "E" conveys 546 cy of debris and Line "F" conveys 482 cy of debris into Medea Creek. A desilting basin is proposed at the upstream end of Line "E-1" intended to intercept 1673 cy of debris that will not be conveyed in the debris storm drain. At the preliminary design stage, the estimated capacity of the desilting basin is approximately 2,320 cy. The total debris potential from the westerly open spaces is approximately 11,907 cy. 9,587 cy (80%) are conveyed to Medea Creek and 8,559 cy (72%) are conveyed in natural drainage courses not impacted by the development.

Three (3) debris storm drains are proposed east of Cornell Rd. Line "A" will convey 825 cy debris to an existing drainage course. Line "B" conveys 503 cy, and Line "C" conveys 143 cy debris into the main easterly tributary in the southeasterly section of the property. A "J" channel is proposed at the easterly limits of the improvements and is proposed to convey 1328 cy debris to the main tributary. The total debris potential easterly of Cornell Rd. is approximately 13,044 cy. 9,969 cy (76%) are conveyed by the main easterly tributary to Medea Creek, another 2,250 cy (17%) are conveyed by two existing culverts northerly of project improvements to Medea Creek. The remaining debris is conveyed by Line "A".

Overall, the total debris potential generated by the site in the existing state is 20,195 cy. The developed site reduces the debris potential by more than 46 acres resulting in a debris potential volume of 19,135 cy. The desilting basin intercepts 1,673 cy resulting in a total of 17,462 cy of debris generated by the developed site.

The Debris Production Rate(s) (DPR) used to estimate the debris potential are published in the Los Angeles County Hydrology/Sedimentation Appendix P (1993), Figure P-1. Generally, the DPR is 48,000 cy and 28,000 cy per square mile for DPA-6 and DPA-7 respectively. DPR is a function of the tributary drainage area and the DPA zone.

Table 3 tabulates the burned and bulked flows tributary to each bulked flow inlet and the debris production volume at each inlet and debris flow storm drain.

**TABLE 3: CULVERTS AND BULKED FLOW INLET FLOWS AND DEBRIS VOLUME**

| EAST | AREA | | AREA | Q | $Q_B$ | $Q_{BB}$ | DPA- | Blk'g. | DPR | DPV |
|---|---|---|---|---|---|---|---|---|---|---|
| LINE | [ac] | [$mi^2$] | LABEL | [cfs] | [cfs] | [cfs] | Zone | Fac | [$cy/mi^2$] | [cy] |
| A-1 | 1.8 | 0.003 | 24D | 5 | 6 | 10 | 6 | 1.61 | 48000 | 135 |
| A-2 | 6.8 | 0.011 | 24D | 19 | 23 | 37 | 6 | 1.61 | 48000 | 510 |
| A-4 | 2.4 | 0.004 | 24D | 7 | 8 | 13 | 6 | 1.61 | 48000 | 180 |
| B | 6.7 | 0.010 | 34E | 15 | 18 | 30 | 6 | 1.61 | 48000 | 503 |
| C-1 | 1.9 | 0.003 | 34E | 4 | 5 | 8 | 6 | 1.61 | 48000 | 143 |
| J-CH | 17.7 | 0.028 | 33E/34E | 39 | 48 | 77 | 6 | 1.61 | 48000 | 1328 |
| CULV | 11 | 0.017 | 8A | 70 | 86 | 138 | 6 | 1.61 | 48000 | 825 |
| CULV | 19 | 0.030 | 19A | 43 | 53 | 85 | 6 | 1.61 | 48000 | 1425 |
| CULV | 182 | 0.284 | 36E | 296 | 364 | 586 | 6 | 1.61 | 34000 | 9669 |
| **WEST** | | | | | | | | | | |
| E-1 | 22.3 | 0.035 | 11B | 47 | 58 | 93 | 6 | 1.61 | 48000 | 1673 |
| E-2 | 1.6 | 0.002 | 11B | 3 | 4 | 7 | 6 | 1.61 | 48000 | 118 |
| E-4 | 5.7 | 0.009 | 11B | 12 | 15 | 24 | 6 | 1.61 | 48000 | 428 |
| F-1 | 3.3 | 0.005 | 13A | 7 | 8 | 14 | 6 | 1.61 | 48000 | 244 |
| F-2 | 2.2 | 0.003 | 13A | 5 | 6 | 9 | 6 | 1.61 | 48000 | 164 |
| F-4 | 1.0 | 0.002 | 13A | 2 | 3 | 4 | 6 | 1.61 | 48000 | 74 |
| CULV | 90 | 0.141 | 4A | 196 | 245 | 394 | 6 | 1.61 | 42000 | 5906 |
| CULV | 33 | 0.052 | 17C | 76 | 94 | 151 | 6 | 1.61 | 48000 | 2475 |
| CULV | 11 | 0.017 | 22A | 29 | 35 | 56 | 6 | 1.61 | 48000 | 825 |

**"Urban Storm Water Runoff" Storm Drain System**

The second component to the proposed storm drainage system is a separate set of storm drain lines proposed to intercept and convey storm runoff from the developed, or "urban" areas of the project.

The urban storm drain system will intercept runoff generated from streets, residential lots, and landscaped areas. The urban runoff is separated from debris flows generated from natural open spaces. All urban storm drains, Lines "D, H, and I", will direct urban runoff to clarifiers and/or approved treatment control BMPs to mitigate nuisance-flows and "first flush" runoff before discharge to Medea Creek. These BMPs are proposed with diversion structures to bypass higher storm flows after the first flush has passed. Line "C" is a bulked flow storm drain with one catch basin at the Cul-de-Sac of Street "H". The catch basin shall be designed with a filter or other approved treatment control BMP. Peak mitigated flows, $Q_{pm}$, are quantified using methodology outlined in the LACDPW Manual for the SUSMP (Sep 2002), Appendix A.

Developed site conditions required that catch basins be constructed on the interior streets to intercept urban runoff before the 50 year flow quantities exceed street capacities. The catch basins are located to provide the optimal pick up of storm flows and to guard against flooding outside the street right-of-way. Additional catch

basins may be added, or locations varied, upon final design of tract improvements and sizing of basins during preparation of storm drain hydraulic calculations.

$Q_{pm}$ and the Mitigation Volume ($V_m$) for urban storm drains are included in the calculations following this narrative. Table 4 summarizes the results.

**TABLE 4: PEAK MITIGATED FLOWS**

| Line | $Q_{pm}$ [cfs] | $V_m$ [cf] |
|---|---|---|
| "C" | 0.303 | 4242 |
| "D" | 0.885 | 12,311 |
| "H" | 0.740 | 10,346 |
| "I" | 1.183 | 16,553 |

The precise design and/or specification of the clarifier apparatus, or other alternative means of urban storm water mitigation, will be addressed during final design of engineering plans for the proposed storm drain systems.

## V. BEST MANAGEMENT PRACTICES FOR CONSTRUCTION ACTIVITIES

During the construction phase BMPS for the site shall be implemented on a year-round basis, not just during the part of the year when there is a high probability or precipitation. BMPs will be implemented in a proactive manner during all seasons while construction is occurring, as appropriate to protect water quality during the life of the project. At a minimum, during the traditional Southern California rainy season (generally from September 30 to May 1, but actual dates depend upon actual periods of elevated precipitation), an effective combination of erosion and sediment control BMPs will be implemented along the site perimeter and at all operational storm drain inlets. At a minimum, during the traditional Southern California dry season, sediment control BMPs will implemented at the downstream perimeter and at all operational storm drain inlets in the event of predicted storm.

The following BMP's are identified at locations throughout the project site:
CA - Contractor Activities, and ESC - Erosion and Sediment Control

### CA003 STRUCTURE CONSTRUCTION AND PAINTING

Proper disposal of all wastes is required to keep pollutants from the storm water runoff which will be conveyed into the storm water drain system. The proper handling of all materials is required.

### CA011 MATERIAL USE

Hazardous materials, fertilizers, pesticides, plasters, solvents, paints and other compounds must be properly handled in order to reduce the risk of pollution or contamination. Training and information on procedures for the proper use and handling of all materials must be available to the contractors, subcontractors and employees that apply such materials.

**CA012 SPILL PREVENTION AND CONTROL**
Identify spill prevention and control measures that must be taken for all construction materials. Identify the methods by which accidental spills will be cleaned and properly disposed.

**CA021 HAZARDOUS WASTE MANAGEMENT**
Hazardous materials must be disposed of in accordance with State and Federal regulations. Identify the proposed methods of disposal and any special handling contracts that may be applicable.

**CA024 SANITARY/SEPTIC WASTE MANAGEMENT**
Untreated raw waste water is not to be discharged or buried. Sanitary sewer facilities on site are required to be in compliance with local health agency requirements. Sanitary or septic wastes must be treated or disposed of in accordance with state and local requirements.

**CA040 EMPLOYEE/SUBCONTRACTOR TRAINING**
Integrate training regarding storm water quality management into existing training programs.

**ESC01 SCHEDULING**
Proper construction activity sequencing should be scheduled in order to reduce the site erosion potential. Minimize disturbance of highly erodible areas. Plan around heavy rains and make provisions for year round stabilization.

**ESC02 PRESERVATION OF EXISTING VEGETATION**
Identify the areas inwhich existing vegetation will remain undisturbed. Sensitive areas which may require preservation include steep slopes, watercourses, and wooded sites. Protection is required for vernal pools, wetlands, marshes and oak tree sites.

**ESC11 MULCHING**
Identify the specific locations that mulching will be used as a soil stabilizer. Specify the specific material mixture that the mulch will consist of.

**ESC21 DUST CONTROL**
Dust control is required for clearing, grading, construction, soil stockpiling, and site work during dry weather, as well as for unimproved roadways. Identify the means by which dust control will be performed on site and note the frequency in which it will occur.

**ESC23 CONSTRUCTION ROAD STABILIZATION**
All private roads and parking areas require stabilization by the application of rock, watering or other from of dust control or paving. Maintenance and necessary post construction BMPs are required for all roadways.

**ESC31 TEMPORARY DRAINS AND SWALES**
Drains and swales are required as specified by an engineer for a designed erosion and construction related pollution plan.

**ESC41 CHECK DAMS**
Check dams are required to reduce the velocity of concentrated flow. Identify the specific locations and design of the proposed check dams. Regular maintenance is required for such devices.

**ESC50 SILT FENCE**
A silt fence is useful for retention of sediment in the location of sheet flow or wind erosion. Identify the specific locations silt fences will be used for sediment retention. Such devices require a regular (frequent) maintenance schedule.

**ESC51 STRAW BALE BARRIER**
Identify the specific locations where straw bales will be used for sediment retention or velocity reducers. A maintenance schedule is required for such devices.

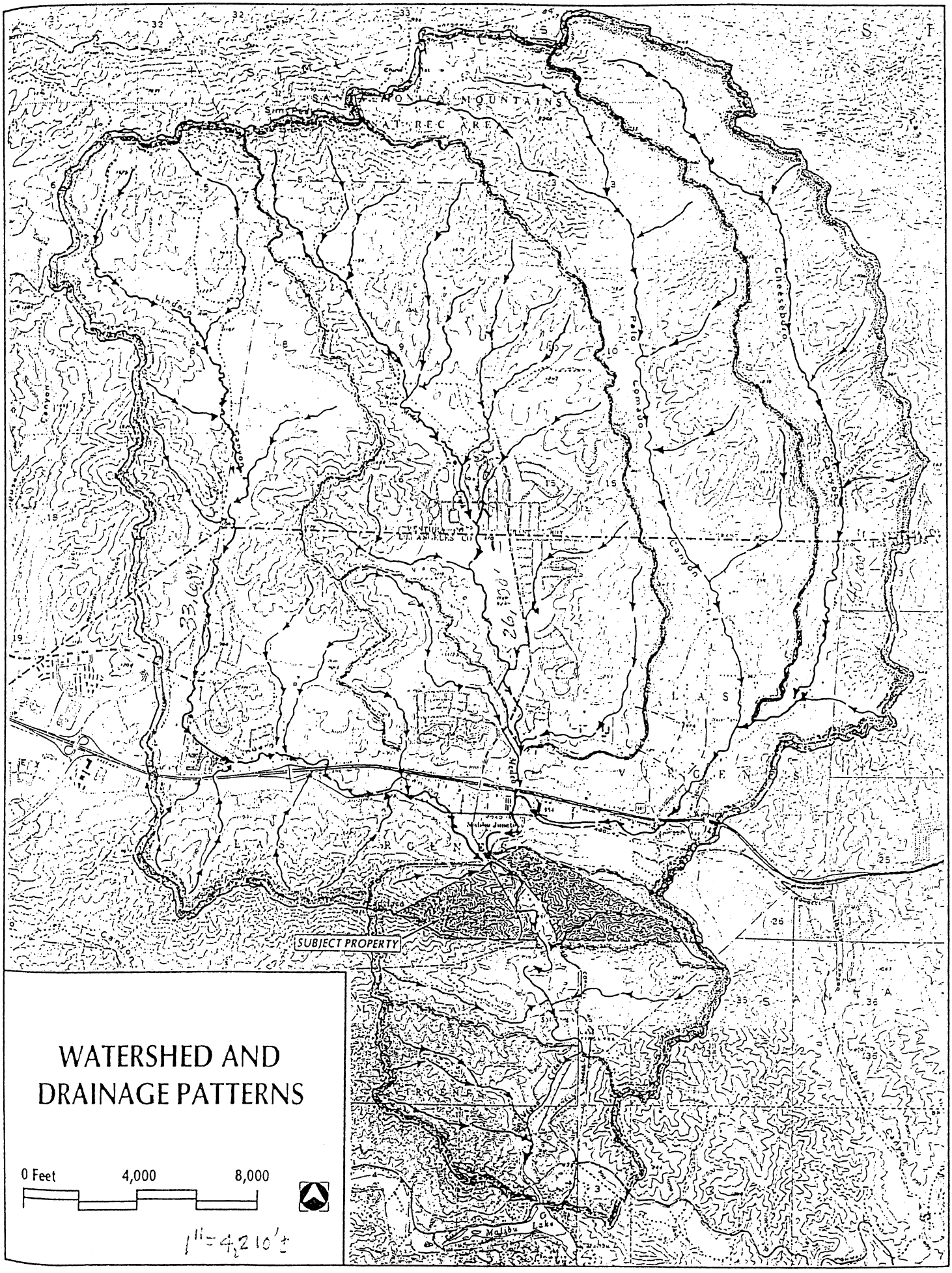
**ESC52 SAND BAG BARRIER**
Sand bag barriers are useful in a great variety of locations for the control of erosion. Sand bags will function in a similar manner as check dams, barriers, clarifiers and many other types of erosion control devises with similar uses. Sand bag devices may apply to a greater number of sites for reasons of versatility and standard use. Identify the specific locations and design of sand bag barriers and note the schedule by which they will be maintained.

## V. CONCLUSION

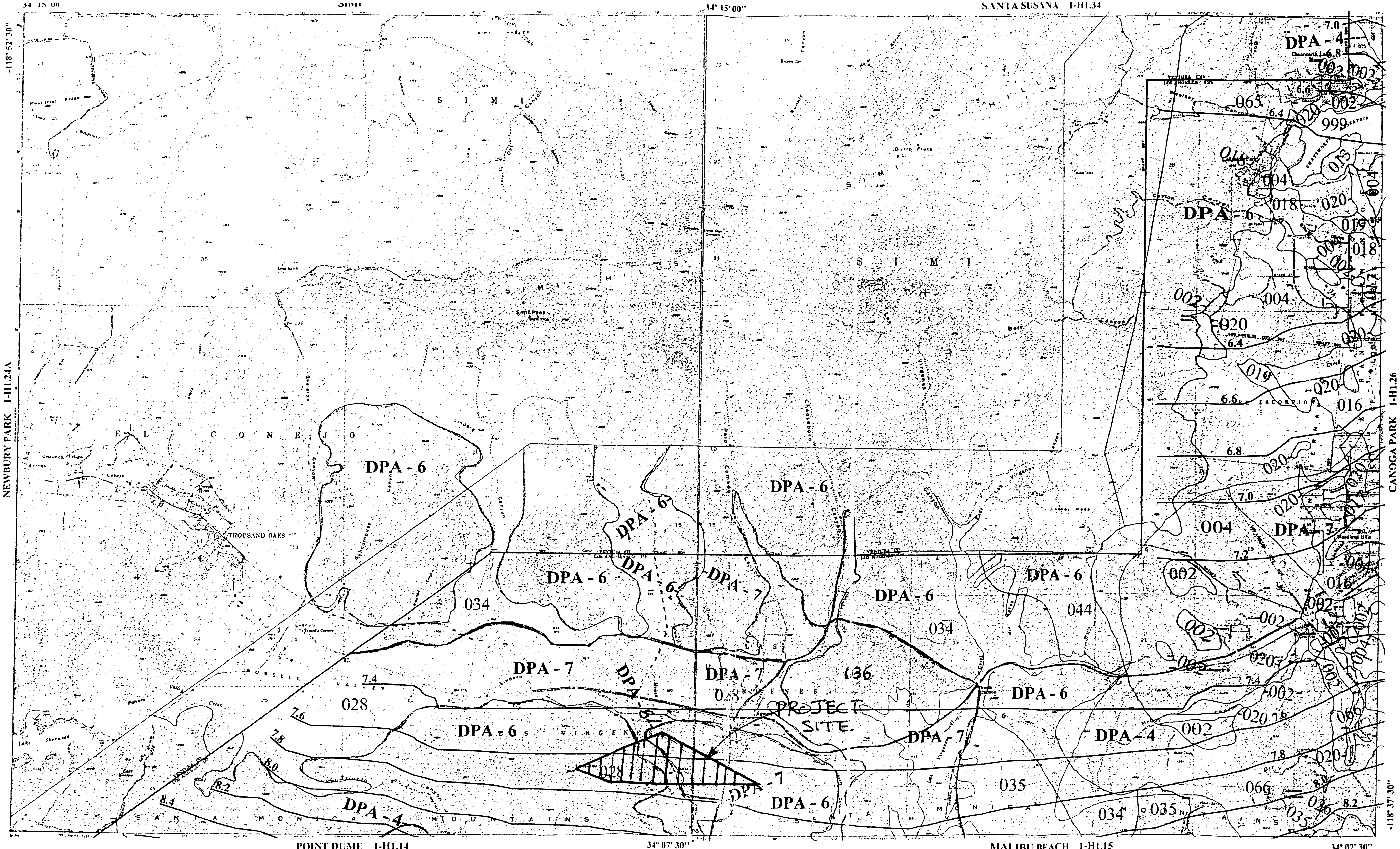
The hydrology study and drainage concept plan prepared for the Triangle Ranch Development, Tentative Tract 52419, show by way of MORA program calculations, that the storm water runoff generated within the project's tributary drainage areas, can be safely passed through the proposed development by means of standard designed and constructed storm drainage improvements and conveyance of storm waters within street sections. The proposal to construct two (2) separate drainage systems, one (1) for burned and bulked-debris runoff and one (1) to convey urban runoff, can be implemented within the design criteria and parameters of the County of Los Angeles.

The study results show that the proposed development will reduce the 50-yr peak flow ($Q_{BB}$) reaching Medea Creek from 1,103 cfs to 1,027 cfs, and the debris production volume by 1,225 cubic yards.

# A. REFERENCES




# WATERSHED AND DRAINAGE PATTERNS




016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

**THOUSAND OAKS**
**50-YEAR 24-HOUR ISOHYET**

**1-H1.24**

LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works

016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

**CALABASAS**
**50-YEAR 24-HOUR ISOHYET**

**1-H1.25**

LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works

$C_D = (0.9 * IMP) + (1.0 - IMP) * Cu$

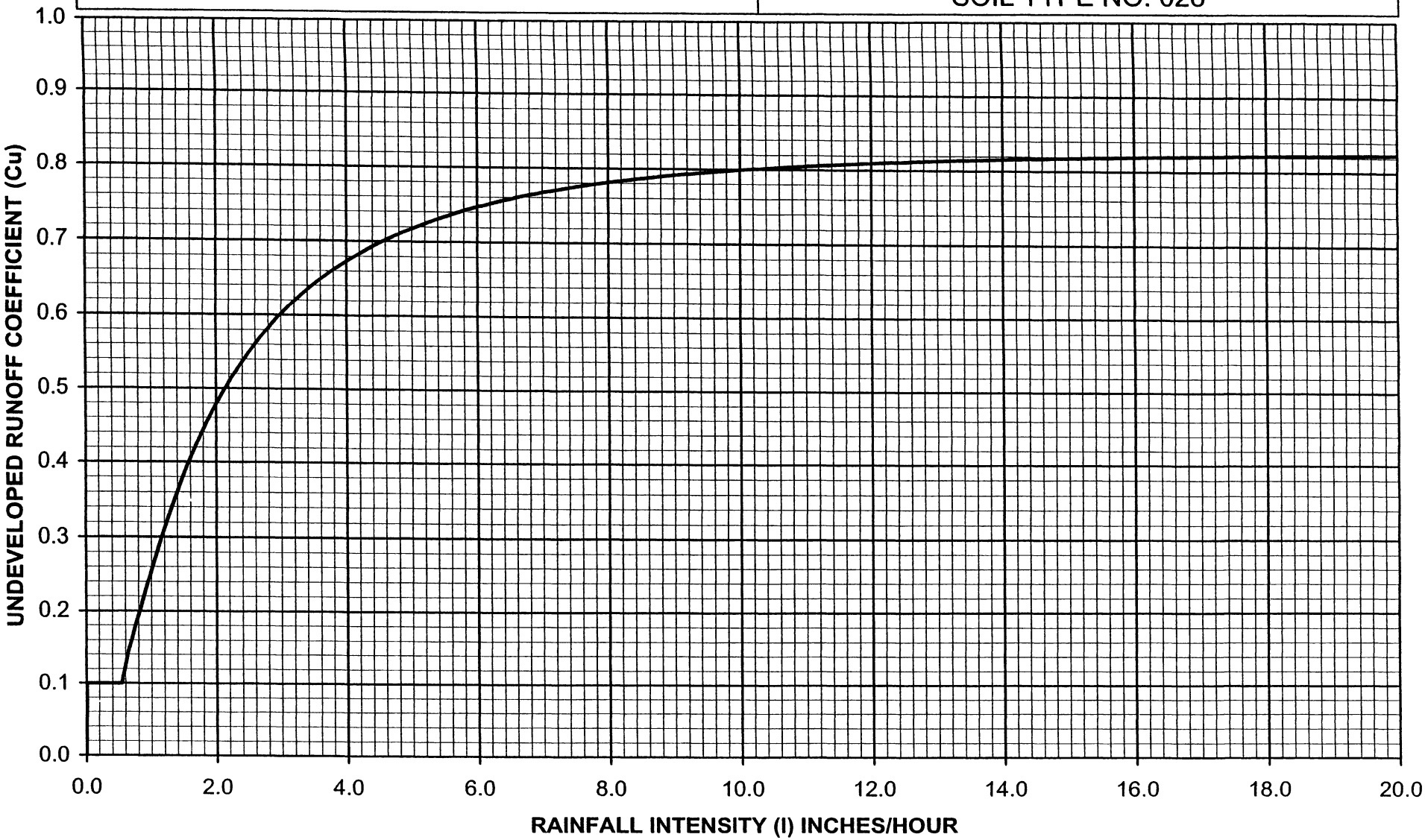
Where: $C_D$ = Developed Runoff Coefficient

IMP = Proportion Impervious

$C_U$ = Undeveloped runoff coefficient

Los Angeles County Department of Public Works

# RUNOFF COEFFICIENT CURVE
# SOIL TYPE NO. 028



$C_D = (0.9 * IMP) + (1.0 - IMP) * Cu$

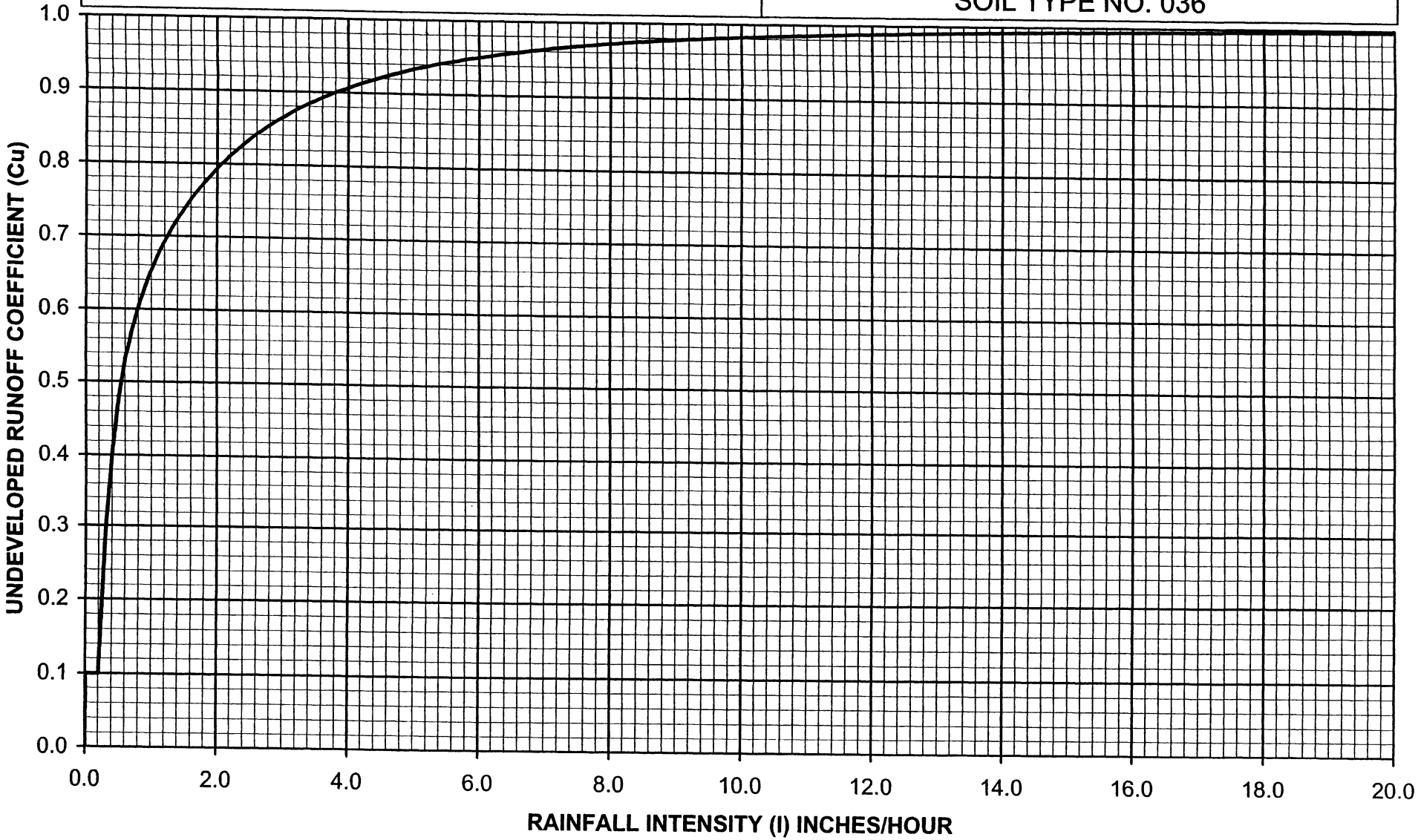
Where: $C_D$ = Developed Runoff Coefficient

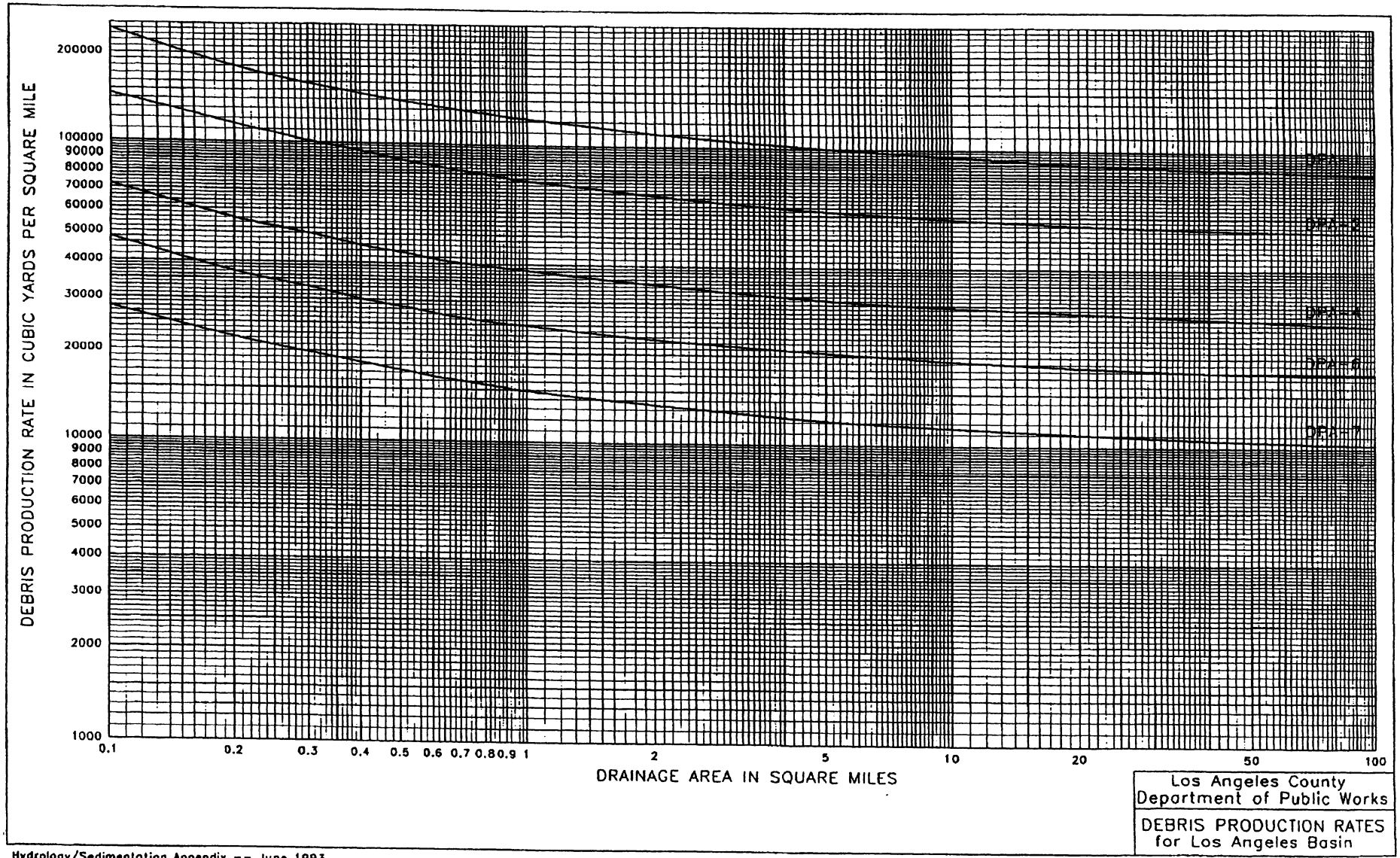
IMP = Proportion Impervious

$C_U$ = Undeveloped runoff coefficient

Los Angeles County Department of Public Works

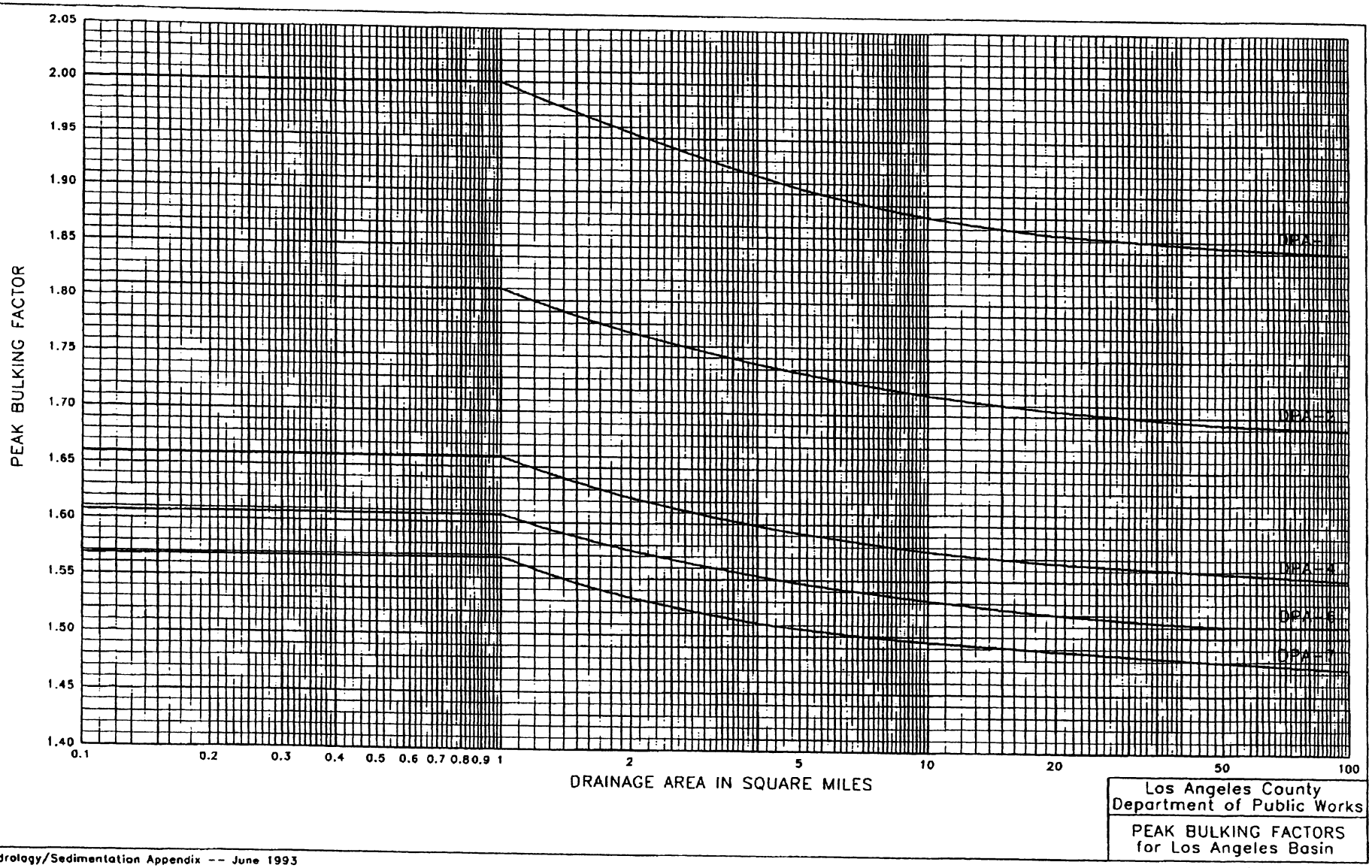
# RUNOFF COEFFICIENT CURVE
# SOIL TYPE NO. 036






Los Angeles County
Department of Public Works

DEBRIS PRODUCTION RATES
for Los Angeles Basin




Los Angeles County
Department of Public Works

PEAK BULKING FACTORS
for Los Angeles Basin

# APPENDIX E: Proportion Impervious Values

*Residential*

| | |
|---|---|
| Single-Family | 0.418 |
| Two-Unit | 0.418 |
| Three-Unit | 0.682 |
| Four-Unit | 0.819 |
| Five-Unit | 0.855 |

*Commercial*

| | |
|---|---|
| Stores, Office Buildings, Manufacturing Outlets | 0.909 |
| Shopping Centers (Regional), Restaurants, Service Shops, Auto Equipment, Parking Lots | 0.946 |
| Shopping Centers (Neighborhood), Motels, Hotels, Kennels, Professional Buildings, Banks, Service Stations | 0.958 |
| Supermarkets | 0.976 |
| Department Stores | 0.985 |

*Industrial*

| | |
|---|---|
| Mineral Processing | 0.473 |
| Open Storage | 0.655 |
| Motion Picture, Radio, Television | 0.819 |
| Manufacturing, Warehousing, Storage, Parking | 0.909 |
| Food Processing Plants, Lumber Yards | 0.958 |

*Institutional Property*

| | |
|---|---|
| Colleges, Universities | 0.473 |
| Homes for the Aged | 0.682 |
| Hospitals, Cemeteries, Mausoleums, Mortuaries | 0.744 |
| Churches, Schools | 0.819 |

*Undeveloped Property*

| | |
|---|---|
| Rural | 0.01 |

# B. DEVELOPED MORA CALCULATIONS

**TRIANGLE RANCH; TRACT 52419, COUNTY OF LOS ANGELES**
**FLOW SUMMARY FOR DEVELOPED CONDITION**

| SUB-AREA | AREA [ac] | AREA [sq mi] | Q [cfs] | $Q_B$ [cfs] | $Q_{BB}$ [cfs] | DPA-Zone [-] | Blk'g Fac. [-] | DPR [cy/sq mi] | DPV [cy] |
|---|---|---|---|---|---|---|---|---|---|
| 1A | 18 | 0.028 | 47 | 57 | 92 | 6 | 1.61 | 48000 | 1350 |
| 2A | 22 | 0.034 | 56 | 68 | 109 | 6 | 1.61 | 48000 | 1650 |
| 3A | 41 | 0.064 | 104 | 126 | 203 | 6 | 1.61 | 48000 | 3075 |
| 4A | 9 | 0.014 | 21 | 26 | 42 | 6 | 1.61 | 48000 | 675 |
| 5A | 2 | 0.003 | 6 | 8 | 13 | 7 | 1.57 | 28000 | 88 |
| 6A | 16 | 0.025 | 37 | - | - | 6 | - | 48000 | - |
| 7A | 8 | 0.013 | 12 | 16 | 25 | 7 | 1.57 | 28000 | 350 |
| 8A | 31 | 0.048 | 70 | 86 | 138 | 6 | 1.61 | 48000 | 2325 |
| 9A | 8 | 0.013 | 19 | 23 | 36 | 7 | 1.57 | 28000 | 350 |
| 10B | 17 | 0.027 | 41 | 50 | 81 | 6 | 1.61 | 48000 | 1275 |
| 11B | 13 | 0.020 | 25 | 31 | 50 | 6 | 1.61 | 48000 | 975 |
| 12AB | 185 | 0.289 | 203 | 276 | 444 | VARIES | 1.61 | VARIES | 9539 |
| 13A | 7 | 0.011 | 16 | 19 | 31 | 6 | 1.61 | 48000 | 525 |
| 14A | 10 | 0.016 | 23 | - | - | 6 | 1.61 | 48000 | - |
| 15A | 6 | 0.009 | 17 | 17 | 27 | 7 | 1.57 | 28000 | 263 |
| 16C | 12 | 0.019 | 35 | 42 | 68 | 6 | 1.61 | 48000 | 900 |
| 17C | 21 | 0.033 | 45 | 55 | 89 | 6 | 1.61 | 48000 | 1575 |
| 18AC | 241 | 0.377 | 205 | 295 | 475 | VARIES | 1.61 | VARIES | 11485 |
| 19A | 19 | 0.030 | 43 | 53 | 85 | 6 | 1.61 | 48000 | 1425 |
| 20A | 4 | 0.006 | 9 | 11 | 17 | 7 | 1.57 | 28000 | 175 |
| 21A | 14 | 0.022 | 29 | 36 | 57 | 7 | 1.57 | 28000 | 613 |
| 22A | 11 | 0.017 | 29 | 35 | 56 | 6 | 1.61 | 48000 | 825 |
| 23A | 7 | 0.011 | 18 | 18 | 28 | 7 | 1.57 | 28000 | 306 |
| 24D | 11 | 0.017 | 31 | 37 | 60 | 6 | 1.61 | 48000 | 825 |
| 25D | 20 | 0.031 | 51 | - | - | 6 | - | 48000 | - |
| 26AD | 327 | 0.511 | 211 | 316 | 509 | VARIES | 1.61 | VARIES | 14562 |
| 27A | 9 | 0.014 | 30 | 35 | 55 | 7 | 1.57 | 28000 | 394 |
| 28A | 336 | 0.525 | 211 | 318 | 512 | VARIES | 1.61 | VARIES | 14700 |
| 29E | 19 | 0.030 | 67 | 70 | 113 | 6 | 1.61 | 48000 | 1425 |
| 30E | 20 | 0.031 | 77 | 80 | 129 | 6 | 1.61 | 48000 | 1500 |
| 31E | 30 | 0.047 | 116 | 121 | 195 | 6 | 1.61 | 48000 | 2250 |
| 32E | 9 | 0.014 | 26 | 31 | 50 | 6 | 1.61 | 48000 | 675 |
| 33E | 35 | 0.055 | 75 | 92 | 148 | 6 | 1.61 | 48000 | 2625 |
| 34E | 31 | 0.048 | 70 | 85 | 137 | 6 | 1.61 | 48000 | 2325 |
| 35E | 25 | 0.039 | 51 | 64 | 103 | 6 | 1.61 | 48000 | 1875 |
| 36E | 13 | 0.020 | 26 | 32 | 52 | 6 | 1.61 | 48000 | 975 |
| 37E | 182 | 0.284 | 296 | 364 | 586 | 6 | 1.61 | 34000 | 9669 |
| 38AE | 518 | 0.809 | 460 | 638 | 1027 | VARIES | 1.61 | VARIES | 20003 |
| 39A | 518 | 0.809 | 460 | 638 | 1027 | VARIES | 1.61 | VARIES | 20003 |

**TIME OF CONCENTRATION MODEL**
**COUNTY OF LOS ANGELES, TRACT No. 52419**
**DEVELOPED AREA**

| Project | Subarea | Area (acres) | % Imp | Frequency | Soil Type | Length (ft) | Slope (ft/ft) | Isohyet (in.) | Tc-calc'd (min.) | Intensity (in./hr) | $C_u$ | $C_d$ | Flowrate (cfs) | Rainfall Mass CN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Triangle Ranch | 1A | 18 | 0.01 | 50 | 28 | 1439 | 0.518 | 7.6 | 7 | 3.87 | 0.66 | 0.66 | 45.98 | 38 |
| Triangle Ranch | 2A | 22 | 0.01 | 50 | 28 | 1071 | 0.233 | 7.6 | 7 | 3.87 | 0.66 | 0.66 | 56.19 | 38 |
| Triangle Ranch | 3A | 41 | 0.01 | 50 | 28 | 955 | 0.141 | 7.6 | 7 | 3.87 | 0.66 | 0.66 | 104.72 | 38 |
| Triangle Ranch | 4A | 9 | 0.01 | 50 | 28 | 986 | 0.086 | 7.6 | 8 | 3.64 | 0.65 | 0.65 | 21.29 | 38 |
| Triangle Ranch | 5A | 2 | 0.01 | 50 | 28 | 350 | 0.029 | 7.6 | 5 | 4.53 | 0.69 | 0.69 | 6.25 | 38 |
| Triangle Ranch | 6A | 16 | 0.35 | 50 | 28 | 1691 | 0.056 | 7.6 | 11 | 3.13 | 0.6 | 0.71 | 35.56 | 38 |
| Triangle Ranch | 7A | 8 | 0.02 | 50 | 28 | 1414 | 0.009 | 7.6 | 16 | 2.62 | 0.55 | 0.56 | 11.74 | 38 |
| Triangle Ranch | 8A | 31 | 0.01 | 50 | 28 | 1670 | 0.240 | 7.8 | 9 | 3.53 | 0.64 | 0.64 | 70.04 | 39 |
| Triangle Ranch | 9A | 8 | 0.02 | 50 | 28 | 529 | 0.006 | 7.6 | 8 | 3.64 | 0.65 | 0.66 | 19.22 | 38 |
| Triangle Ranch | 10B | 17 | 0.01 | 50 | 28 | 1599 | 0.491 | 7.7 | 8 | 3.68 | 0.65 | 0.65 | 40.66 | 39 |
| Triangle Ranch | 11B | 13 | 0.01 | 50 | 28 | 1710 | 0.085 | 7.7 | 12 | 3.04 | 0.59 | 0.59 | 23.32 | 39 |
| Triangle Ranch | 12AB | CONFLUENCE | | | | | | | | | | | | |
| Triangle Ranch | 13A | 7 | 0.01 | 50 | 28 | 1526 | 0.243 | 7.7 | 9 | 3.49 | 0.64 | 0.64 | 15.64 | 39 |
| Triangle Ranch | 14A | 10 | 0.35 | 50 | 28 | 1853 | 0.051 | 7.7 | 12 | 3.04 | 0.59 | 0.7 | 21.28 | 39 |
| Triangle Ranch | 15A | 6 | 0.203 | 50 | 28 | 333 | 0.003 | 7.6 | 7 | 3.87 | 0.66 | 0.71 | 16.49 | 38 |
| Triangle Ranch | 16C | 12 | 0.01 | 50 | 28 | 1250 | 0.496 | 7.7 | 6 | 4.22 | 0.68 | 0.68 | 34.44 | 39 |
| Triangle Ranch | 17C | 21 | 0.01 | 50 | 28 | 1623 | 0.136 | 7.7 | 10 | 3.32 | 0.63 | 0.63 | 43.92 | 39 |
| Triangle Ranch | 18AC | CONFLUENCE | | | | | | | | | | | | |
| Triangle Ranch | 19A | 19 | 0.02 | 50 | 28 | 1655 | 0.248 | 7.7 | 9 | 3.49 | 0.64 | 0.65 | 43.1 | 39 |
| Triangle Ranch | 20A | 4 | 0.05 | 50 | 28 | 446 | 0.002 | 7.7 | 9 | 3.49 | 0.64 | 0.65 | 9.07 | 39 |
| Triangle Ranch | 21A | 14 | 0.09 | 50 | 28 | 836 | 0.006 | 7.8 | 11 | 3.21 | 0.61 | 0.64 | 28.76 | 39 |
| Triangle Ranch | 22A | 11 | 0.01 | 50 | 28 | 1391 | 0.383 | 7.7 | 7 | 3.92 | 0.66 | 0.66 | 28.46 | 39 |
| Triangle Ranch | 23A | 7 | 0.15 | 50 | 28 | 507 | 0.006 | 7.8 | 8 | 3.73 | 0.65 | 0.69 | 18.02 | 39 |
| Triangle Ranch | 24D | 11 | 0.01 | 50 | 28 | 1041 | 0.330 | 7.6 | 6 | 4.16 | 0.67 | 0.67 | 30.66 | 38 |
| Triangle Ranch | 25D | 20 | 0.35 | 50 | 28 | 1595 | 0.088 | 7.7 | 10 | 3.32 | 0.63 | 0.72 | 47.81 | 39 |
| Triangle Ranch | 26AD | CONFLUENCE | | | | | | | | | | | | |
| Triangle Ranch | 27A | 9 | 0.03 | 50 | 28 | 296 | 0.007 | 7.8 | 5 | 4.65 | 0.7 | 0.71 | 29.71 | 39 |
| Triangle Ranch | 28A | HYDROGRAPH | | | | | | | | | | | | |
| Triangle Ranch | 29E | 19 | 0.01 | 50 | 36 | 1506 | 0.153 | 7.7 | 7 | 3.90 | 0.9 | 0.9 | 66.69 | 39 |
| Triangle Ranch | 30E | 20 | 0.01 | 50 | 36 | 1071 | 0.108 | 7.7 | 6 | 4.22 | 0.91 | 0.9 | 75.96 | 39 |
| Triangle Ranch | 31E | 30 | 0.01 | 50 | 36 | 1039 | 0.089 | 7.7 | 6 | 4.22 | 0.91 | 0.9 | 113.94 | 39 |
| Triangle Ranch | 32E | 9 | 0.01 | 50 | 28 | 1090 | 0.318 | 7.7 | 6 | 4.22 | 0.68 | 0.68 | 25.83 | 39 |
| Triangle Ranch | 33E | 35 | 0.01 | 50 | 28 | 1150 | 0.046 | 7.7 | 10 | 3.32 | 0.63 | 0.63 | 73.21 | 39 |
| Triangle Ranch | 34E | 31 | 0.06 | 50 | 28 | 1763 | 0.256 | 7.6 | 9 | 3.44 | 0.64 | 0.66 | 70.38 | 38 |
| Triangle Ranch | 35E | 25 | 0.01 | 50 | 28 | 1832 | 0.231 | 7.6 | 10 | 3.27 | 0.62 | 0.62 | 50.69 | 38 |
| Triangle Ranch | 36E | 13 | 0.01 | 50 | 28 | 1081 | 0.022 | 7.7 | 11 | 3.17 | 0.61 | 0.61 | 25.14 | 39 |
| Triangle Ranch | 37E | HYDROGRAPH | | | | | | | | | | | | |
| Triangle Ranch | 38AE | CONFLUENCE | | | | | | | | | | | | |
| Triangle Ranch | 39A | HYDROGRAPH | | | | | | | | | | | | |

Tc Equation

Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

```
04LADEPTH.RDT
 5     99    1A TRIANGLE RANCH DEVELOPED  FILE R52419D,DAT
 5     99   28A HYDROGRAPH AT NODE 28
 5     99   37E HYDROGRAPH AT NODE 37E
 5     99   39A HYDROGRAPH AT LOWER END OF PROJECT (SILVERCREEK RD)
 6     99    1A 028  1  18 7A391 1439 51800                        G1
 6     99    2A 028  1  22 7A381 1071 23300
 6     99    3A 028  1  41 7A381  955 14100
 6     99    4A 028  1   9 8A381  986 08600
 6     99    5A 028  1   2 5A382  350 02900
 6     99    6A 028 35  1611A383 1691 05600
 6     99    7A 028  2   816A382 1414 00900
 6     99    8A 028  1  31 9A391 1670 24000
 6     99    9A 028  2   8 8A382  529 00600
 6     99   10B 028  1  17 8A391 1599 49100
 6     99   11B 028  1  1312A391 1710 08500
 6     99   12AB028         A39                                   1
 6     99   13A 028  1   7 9A391 1526 24300
 6     99   14A 028 35  1012A393 1853 05100
 6     99   15A 028 20   6 7A382  333 00300
 6     99   16C 028  1  12 6A391 1250 49600
 6     99   17C 028  1  2110A391 1623 13600
 6     99   18AC028         A39                                   1
 6     99   19A 028  2  19 9A391 1655 24800
 6     99   20A 028  5   4 9A392  446 00200
 6     99   21A 028 09  1411A392  836 00600
 6     99   22A 028  1  11 7A391 1391 38300
 6     99   23A 028 15   7 8A392  507 00600
 6     99   24D 028  1  11 6A381 1041 33000
 6     99   25D 028 35  2010A393 1595 08800
 6     99   26AD028         A39                                   1
 6     99   27A 028  3   9 5A392  296 00700
 6     99   28A 028  0    99A39                                  1
 6     99   29E 036  1  19 7A391 1506 15300
 6     99   30E 036  1  20 6A391 1071 10800
 6     99   31E 036  1  30 6A391 1039 08900
 6     99   32E 028  1   9 6A391 1090 31800
 6     99   33E 028  1  3510A391 1150 04600
 6     99   34E 028  6  31 9A381 1763 25600
 6     99   35E 028  1  2510A381 1832 23100
 6     99   36E 028  1  1311A391 1081 02200
 6     99   37E 028  0    99A39                                  1
 6     99   38AE028  0      A39                                   1
 6     99   39A 028       99A39                                  1  2
```

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY


TRIANGLE RANCH DEVELOPED FILE R52419D,DAT

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | STORM DAY 4 RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 1A | 18. | 47. | 18. | 47. | 1 | 1439. | 0.51800 | 0.00 | 0.00 | 0. | 28 | 7 | A39 | 0.01 |
| 99 | 2A | 22. | 56. | 40. | 98. | 1 | 1071. | 0.23300 | 0.00 | 0.00 | 0. | 28 | 7 | A38 | 0.01 |
| 99 | 3A | 41. | 104. | 81. | 186. | 1 | 955. | 0.14100 | 0.00 | 0.00 | 0. | 28 | 7 | A38 | 0.01 |
| 99 | 4A | 9. | 21. | 90. | 196. | 1 | 986. | 0.08600 | 0.00 | 0.00 | 0. | 28 | 8 | A38 | 0.01 |
| 99 | 5A | 2. | 6. | 92. | 189. | 2 | 350. | 0.02900 | 0.00 | 0.00 | 0. | 28 | 5 | A38 | 0.01 |
| 99 | 6A | 16. | 37. | 108. | 216. | 3 | 1691. | 0.05600 | 0.00 | 0.00 | 0. | 28 | 11 | A38 | 0.35 |
| 99 | 7A | 8. | 12. | 116. | 213. | 2 | 1414. | 0.00900 | 0.00 | 0.00 | 0. | 28 | 16 | A38 | 0.02 |
| 99 | 8A | 31. | 70. | 147. | 191. | 1 | 1670. | 0.24000 | 0.00 | 0.00 | 0. | 28 | 9 | A39 | 0.01 |
| 99 | 9A | 8. | 19. | 155. | 188. | 2 | 529. | 0.00600 | 0.00 | 0.00 | 0. | 28 | 8 | A38 | 0.02 |
| 99 | 10B | 17. | 41. | 17. | 41. | 1 | 1599. | 0.49100 | 0.00 | 0.00 | 0. | 28 | 8 | A39 | 0.01 |
| 99 | 11B | 13. | 25. | 30. | 63. | 1 | 1710. | 0.08500 | 0.00 | 0.00 | 0. | 28 | 12 | A39 | 0.01 |

CONFLUENCE Q'S

99 12A TA 1173 QA 183. QAB 202. QB 19.
99 12AB TAB 1172 QAB 203. QA 181. QB 22.
99 12B TB 1163 QB 54. QBA 172. QA 118.

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 12AB | 30. | 54. | 185. | 203. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 28 | 0 | A39 | 0.00 |
| 99 | 13A | 7. | 16. | 192. | 204. | 1 | 1526. | 0.24300 | 0.00 | 0.00 | 0. | 28 | 9 | A39 | 0.01 |
| 99 | 14A | 10. | 23. | 202. | 204. | 3 | 1853. | 0.05100 | 0.00 | 0.00 | 0. | 28 | 12 | A39 | 0.35 |
| 99 | 15A | 6. | 17. | 208. | 201. | 2 | 333. | 0.00300 | 0.00 | 0.00 | 0. | 28 | 7 | A38 | 0.20 |
| 99 | 16C | 12. | 35. | 12. | 35. | 1 | 1250. | 0.49600 | 0.00 | 0.00 | 0. | 28 | 6 | A39 | 0.01 |
| 99 | 17C | 21. | 45. | 33. | 76. | 1 | 1623. | 0.13600 | 0.00 | 0.00 | 0. | 28 | 10 | A39 | 0.01 |

CONFLUENCE Q'S

99 18A TA 1180 QA 199. QAC 205. QC 6.
99 18AC TAC 1180 QAC 205. QA 199. QC 6.
99 18C TC 1160 QC 68. QCA 170. QA 101.

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 18AC | 33. | 68. | 241. | 205. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 28 | 0 | A39 | 0.00 |
| 99 | 19A | 19. | 43. | 260. | 207. | 1 | 1655. | 0.24800 | 0.00 | 0.00 | 0. | 28 | 9 | A39 | 0.02 |
| 99 | 20A | 4. | 9. | 264. | 206. | 2 | 446. | 0.00200 | 0.00 | 0.00 | 0. | 28 | 9 | A39 | 0.05 |
| 99 | 21A | 14. | 29. | 278. | 205. | 2 | 836. | 0.00600 | 0.00 | 0.00 | 0. | 28 | 11 | A39 | 0.09 |
| 99 | 22A | 11. | 29. | 289. | 204. | 1 | 1391. | 0.38300 | 0.00 | 0.00 | 0. | 28 | 7 | A39 | 0.01 |
| 99 | 23A | 7. | 18. | 296. | 204. | 2 | 507. | 0.00600 | 0.00 | 0.00 | 0. | 28 | 8 | A39 | 0.15 |
| 99 | 24D | 11. | 31. | 11. | 31. | 1 | 1041. | 0.33000 | 0.00 | 0.00 | 0. | 28 | 6 | A38 | 0.01 |
| 99 | 25D | 20. | 51. | 31. | 78. | 3 | 1595. | 0.08800 | 0.00 | 0.00 | 0. | 28 | 10 | A39 | 0.35 |

CONFLUENCE Q'S

99 26A TA 1181 QA 204. QAD 211. QD 7.
99 26AD TAD 1181 QAD 211. QA 204. QD 7.
99 26D TD 1158 QD 74. QDA 180. QA 107.

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY



TRIANGLE RANCH DEVELOPED FILE R52419D,DAT

STORM DAY 4

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 26AD | 31. | 74. | 327. | 211. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 28 | 0 | A39 | 0.00 |
| 99 | 27A | 9. | 30. | 336. | 212. | 2 | 296. | 0.00700 | 0.00 | 0.00 | 0. | 28 | 5 | A39 | 0.03 |
| 99 | 28A | 0. | 0. | 336. | 211. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 28 | 99 | A39 | 0.00 |
| 99 | 29E | 19. | 67. | 19. | 67. | 1 | 1506. | 0.15300 | 0.00 | 0.00 | 0. | 36 | 7 | A39 | 0.01 |
| 99 | 30E | 20. | 77. | 39. | 121. | 1 | 1071. | 0.10800 | 0.00 | 0.00 | 0. | 36 | 6 | A39 | 0.01 |
| 99 | 31E | 30. | 116. | 69. | 203. | 1 | 1039. | 0.08900 | 0.00 | 0.00 | 0. | 36 | 6 | A39 | 0.01 |
| 99 | 32E | 9. | 26. | 78. | 208. | 1 | 1090. | 0.31800 | 0.00 | 0.00 | 0. | 28 | 6 | A39 | 0.01 |
| 99 | 33E | 35. | 75. | 113. | 272. | 1 | 1150. | 0.04600 | 0.00 | 0.00 | 0. | 28 | 10 | A39 | 0.01 |
| 99 | 34E | 31. | 70. | 144. | 288. | 1 | 1763. | 0.25600 | 0.00 | 0.00 | 0. | 28 | 9 | A38 | 0.06 |
| 99 | 35E | 25. | 51. | 169. | 305. | 1 | 1832. | 0.23100 | 0.00 | 0.00 | 0. | 28 | 10 | A38 | 0.01 |
| 99 | 36E | 13. | 26. | 182. | 310. | 1 | 1081. | 0.02200 | 0.00 | 0.00 | 0. | 28 | 11 | A39 | 0.01 |
| 99 | 37E | 0. | 0. | 182. | 296. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 28 | 99 | A39 | 0.00 |

CONFLUENCE Q'S

99 38A TA 1182 QA 211. QAE 340. QE 128.

99 38E TE 1167 QE 296. QEA 460. QA 164.

99 38AE TAE 1167 QAE 460. QA 164. QE 296.

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 38AE | 182. | 296. | 518. | 460. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 28 | 0 | A39 | 0.00 |
| 99 | 39A | 0. | 0. | 518. | 460. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 28 | 99 | A39 | 0.00 |

10- 8-2004 SITE LICENSEE: WAGNER-HALLADAY, INC.

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY
HYDROGRAPH AT NODE 28

DEVELOPED HYDROGRAPH AT 99 28A STORM DAY 4 REDUCTION FACTOR = 1.000

| TIME | Q | TIME | Q | TIME | Q | TIME | Q | TIME | Q |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0. | 100 | 10. | 200 | 10. | 300 | 10. | 400 | 11. |
| 500 | 12. | 600 | 12. | 700 | 13. | 800 | 14. | 900 | 16. |
| 1000 | 19. | 1050 | 22. | 1100 | 29. | 1110 | 32. | 1120 | 37. |
| 1130 | 44. | 1131 | 45. | 1132 | 46. | 1133 | 47. | 1134 | 48. |
| 1135 | 49. | 1136 | 50. | 1137 | 52. | 1138 | 53. | 1139 | 55. |
| 1140 | 56. | 1141 | 58. | 1142 | 60. | 1143 | 62. | 1144 | 64. |
| 1145 | 67. | 1146 | 70. | 1147 | 73. | 1148 | 76. | 1149 | 80. |
| 1150 | 86. | 1151 | 94. | 1152 | 104. | 1153 | 116. | 1154 | 131. |
| 1155 | 145. | 1156 | 157. | 1157 | 169. | 1158 | 178. | 1159 | 184. |
| 1160 | 187. | 1161 | 187. | 1162 | 184. | 1163 | 178. | 1164 | 172. |
| 1165 | 166. | 1166 | 163. | 1167 | 164. | 1168 | 167. | 1169 | 172. |
| 1170 | 178. | 1171 | 184. | 1172 | 190. | 1173 | 194. | 1174 | 197. |
| 1175 | 200. | 1176 | 203. | 1177 | 205. | 1178 | 207. | 1179 | 209. |
| 1180 | 210. | 1181 | 211. | 1182 | 211. | 1183 | 211. | 1184 | 210. |
| 1185 | 209. | 1186 | 208. | 1187 | 207. | 1188 | 206. | 1189 | 206. |
| 1190 | 207. | 1191 | 207. | 1192 | 208. | 1193 | 209. | 1194 | 209. |
| 1195 | 208. | 1196 | 206. | 1197 | 203. | 1198 | 199. | 1199 | 195. |
| 1200 | 190. | 1201 | 184. | 1202 | 178. | 1203 | 173. | 1204 | 166. |
| 1205 | 160. | 1206 | 154. | 1207 | 149. | 1208 | 143. | 1209 | 137. |
| 1210 | 132. | 1211 | 127. | 1212 | 122. | 1213 | 117. | 1214 | 113. |
| 1215 | 108. | 1216 | 104. | 1217 | 100. | 1218 | 96. | 1219 | 93. |
| 1220 | 90. | 1221 | 86. | 1222 | 83. | 1223 | 80. | 1224 | 78. |
| 1225 | 75. | 1226 | 72. | 1227 | 70. | 1228 | 68. | 1229 | 66. |
| 1230 | 63. | 1231 | 61. | 1232 | 60. | 1233 | 58. | 1234 | 56. |
| 1235 | 54. | 1236 | 53. | 1237 | 51. | 1238 | 50. | 1239 | 49. |
| 1240 | 47. | 1241 | 46. | 1242 | 45. | 1243 | 44. | 1244 | 43. |
| 1245 | 42. | 1246 | 41. | 1247 | 40. | 1248 | 39. | 1249 | 38. |
| 1250 | 37. | 1251 | 36. | 1252 | 36. | 1253 | 35. | 1254 | 34. |
| 1255 | 33. | 1256 | 33. | 1257 | 32. | 1258 | 31. | 1259 | 31. |
| 1260 | 30. | 1261 | 30. | 1262 | 29. | 1263 | 29. | 1264 | 28. |
| 1265 | 28. | 1266 | 27. | 1267 | 27. | 1268 | 26. | 1269 | 26. |
| 1270 | 26. | 1271 | 25. | 1272 | 25. | 1273 | 25. | 1274 | 24. |
| 1275 | 24. | 1276 | 24. | 1277 | 23. | 1278 | 23. | 1279 | 23. |
| 1280 | 22. | 1281 | 22. | 1282 | 22. | 1283 | 22. | 1284 | 21. |
| 1285 | 21. | 1286 | 21. | 1287 | 21. | 1288 | 20. | 1289 | 20. |
| 1290 | 20. | 1291 | 20. | 1292 | 20. | 1293 | 19. | 1294 | 19. |
| 1295 | 19. | 1296 | 19. | 1297 | 19. | 1298 | 19. | 1299 | 19. |
| 1300 | 18. | 1310 | 17. | 1320 | 16. | 1330 | 15. | 1340 | 15. |
| 1350 | 14. | 1360 | 14. | 1370 | 13. | 1380 | 13. | 1390 | 13. |
| 1400 | 12. | 1420 | 12. | 1440 | 11. | 1460 | 10. | 1500 | 10. |

Total Runoff = 46.483 Acre-Ft.
Peak Q = 211 CFS
Time to Peak Q = 1181 Minutes

10- 8-2004 SITE LICENSEE: WAGNER-HALLADAY, INC.

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY
HYDROGRAPH AT NODE 37E

DEVELOPED HYDROGRAPH AT 99 37E STORM DAY 4 REDUCTION FACTOR = 1.000

| TIME | Q | TIME | Q | TIME | Q | TIME | Q | TIME | Q |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0. | 100 | 4. | 200 | 4. | 300 | 4. | 400 | 4. |
| 500 | 5. | 600 | 6. | 700 | 7. | 800 | 9. | 900 | 11. |
| 1000 | 15. | 1050 | 19. | 1100 | 27. | 1110 | 30. | 1120 | 35. |
| 1130 | 44. | 1131 | 45. | 1132 | 46. | 1133 | 47. | 1134 | 49. |
| 1135 | 50. | 1136 | 51. | 1137 | 52. | 1138 | 54. | 1139 | 55. |
| 1140 | 57. | 1141 | 58. | 1142 | 60. | 1143 | 62. | 1144 | 64. |
| 1145 | 66. | 1146 | 69. | 1147 | 71. | 1148 | 74. | 1149 | 77. |
| 1150 | 81. | 1151 | 85. | 1152 | 90. | 1153 | 96. | 1154 | 104. |
| 1155 | 114. | 1156 | 126. | 1157 | 141. | 1158 | 159. | 1159 | 178. |
| 1160 | 199. | 1161 | 220. | 1162 | 242. | 1163 | 261. | 1164 | 277. |
| 1165 | 289. | 1166 | 295. | 1167 | 296. | 1168 | 292. | 1169 | 285. |
| 1170 | 274. | 1171 | 262. | 1172 | 248. | 1173 | 233. | 1174 | 219. |
| 1175 | 205. | 1176 | 191. | 1177 | 179. | 1178 | 167. | 1179 | 156. |
| 1180 | 146. | 1181 | 137. | 1182 | 128. | 1183 | 120. | 1184 | 113. |
| 1185 | 106. | 1186 | 100. | 1187 | 94. | 1188 | 89. | 1189 | 84. |
| 1190 | 80. | 1191 | 75. | 1192 | 72. | 1193 | 68. | 1194 | 65. |
| 1195 | 62. | 1196 | 59. | 1197 | 56. | 1198 | 54. | 1199 | 52. |
| 1200 | 50. | 1201 | 48. | 1202 | 46. | 1203 | 44. | 1204 | 43. |
| 1205 | 41. | 1206 | 40. | 1207 | 39. | 1208 | 37. | 1209 | 36. |
| 1210 | 35. | 1211 | 34. | 1212 | 33. | 1213 | 32. | 1214 | 32. |
| 1215 | 31. | 1216 | 30. | 1217 | 30. | 1218 | 29. | 1219 | 28. |
| 1220 | 28. | 1221 | 27. | 1222 | 27. | 1223 | 26. | 1224 | 25. |
| 1225 | 25. | 1226 | 24. | 1227 | 24. | 1228 | 24. | 1229 | 23. |
| 1230 | 23. | 1231 | 22. | 1232 | 22. | 1233 | 22. | 1234 | 21. |
| 1235 | 21. | 1236 | 21. | 1237 | 20. | 1238 | 20. | 1239 | 20. |
| 1240 | 19. | 1241 | 19. | 1242 | 19. | 1243 | 19. | 1244 | 18. |
| 1245 | 18. | 1246 | 18. | 1247 | 18. | 1248 | 17. | 1249 | 17. |
| 1250 | 17. | 1251 | 17. | 1252 | 17. | 1253 | 16. | 1254 | 16. |
| 1255 | 16. | 1256 | 16. | 1257 | 16. | 1258 | 15. | 1259 | 15. |
| 1260 | 15. | 1261 | 15. | 1262 | 15. | 1263 | 15. | 1264 | 14. |
| 1265 | 14. | 1266 | 14. | 1267 | 14. | 1268 | 14. | 1269 | 14. |
| 1270 | 14. | 1271 | 13. | 1272 | 13. | 1273 | 13. | 1274 | 13. |
| 1275 | 13. | 1276 | 13. | 1277 | 13. | 1278 | 12. | 1279 | 12. |
| 1280 | 12. | 1281 | 12. | 1282 | 12. | 1283 | 12. | 1284 | 12. |
| 1285 | 12. | 1286 | 11. | 1287 | 11. | 1288 | 11. | 1289 | 11. |
| 1290 | 11. | 1291 | 11. | 1292 | 11. | 1293 | 11. | 1294 | 11. |
| 1295 | 11. | 1296 | 11. | 1297 | 10. | 1298 | 10. | 1299 | 10. |
| 1300 | 10. | 1310 | 9. | 1320 | 9. | 1330 | 8. | 1340 | 8. |
| 1350 | 7. | 1360 | 7. | 1370 | 7. | 1380 | 6. | 1390 | 6. |
| 1400 | 5. | 1420 | 5. | 1440 | 4. | 1460 | 4. | 1500 | 4. |

Total Runoff = 29.242 Acre-Ft.
Peak Q = 296 CFS
Time to Peak Q = 1167 Minutes

110- 8-2004 SITE LICENSEE: WAGNER-HALLADAY, INC.

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY
HYDROGRAPH AT LOWER END OF PROJECT (SILVERCREEK RD)

DEVELOPED HYDROGRAPH AT 99 39A STORM DAY 4 REDUCTION FACTOR = 1.000

| TIME | Q | TIME | Q | TIME | Q | TIME | Q | TIME | Q |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0. | 100 | 14. | 200 | 14. | 300 | 14. | 400 | 15. |
| 500 | 16. | 600 | 18. | 700 | 20. | 800 | 23. | 900 | 27. |
| 1000 | 34. | 1050 | 41. | 1100 | 56. | 1110 | 62. | 1120 | 72. |
| 1130 | 89. | 1131 | 90. | 1132 | 92. | 1133 | 95. | 1134 | 97. |
| 1135 | 99. | 1136 | 102. | 1137 | 104. | 1138 | 107. | 1139 | 110. |
| 1140 | 113. | 1141 | 116. | 1142 | 120. | 1143 | 124. | 1144 | 128. |
| 1145 | 133. | 1146 | 139. | 1147 | 144. | 1148 | 151. | 1149 | 158. |
| 1150 | 167. | 1151 | 179. | 1152 | 194. | 1153 | 212. | 1154 | 234. |
| 1155 | 258. | 1156 | 283. | 1157 | 310. | 1158 | 337. | 1159 | 362. |
| 1160 | 386. | 1161 | 407. | 1162 | 425. | 1163 | 439. | 1164 | 449. |
| 1165 | 455. | 1166 | 459. | 1167 | 460. | 1168 | 459. | 1169 | 456. |
| 1170 | 452. | 1171 | 446. | 1172 | 437. | 1173 | 427. | 1174 | 416. |
| 1175 | 405. | 1176 | 394. | 1177 | 384. | 1178 | 374. | 1179 | 365. |
| 1180 | 356. | 1181 | 348. | 1182 | 340. | 1183 | 331. | 1184 | 323. |
| 1185 | 315. | 1186 | 308. | 1187 | 301. | 1188 | 295. | 1189 | 290. |
| 1190 | 286. | 1191 | 283. | 1192 | 280. | 1193 | 277. | 1194 | 273. |
| 1195 | 269. | 1196 | 265. | 1197 | 259. | 1198 | 253. | 1199 | 247. |
| 1200 | 239. | 1201 | 232. | 1202 | 225. | 1203 | 217. | 1204 | 209. |
| 1205 | 202. | 1206 | 194. | 1207 | 187. | 1208 | 180. | 1209 | 174. |
| 1210 | 167. | 1211 | 161. | 1212 | 155. | 1213 | 150. | 1214 | 144. |
| 1215 | 139. | 1216 | 134. | 1217 | 130. | 1218 | 125. | 1219 | 121. |
| 1220 | 117. | 1221 | 113. | 1222 | 110. | 1223 | 106. | 1224 | 103. |
| 1225 | 100. | 1226 | 97. | 1227 | 94. | 1228 | 91. | 1229 | 89. |
| 1230 | 86. | 1231 | 84. | 1232 | 82. | 1233 | 79. | 1234 | 77. |
| 1235 | 75. | 1236 | 73. | 1237 | 72. | 1238 | 70. | 1239 | 68. |
| 1240 | 67. | 1241 | 65. | 1242 | 64. | 1243 | 62. | 1244 | 61. |
| 1245 | 60. | 1246 | 59. | 1247 | 57. | 1248 | 56. | 1249 | 55. |
| 1250 | 54. | 1251 | 53. | 1252 | 52. | 1253 | 51. | 1254 | 50. |
| 1255 | 49. | 1256 | 48. | 1257 | 48. | 1258 | 47. | 1259 | 46. |
| 1260 | 45. | 1261 | 45. | 1262 | 44. | 1263 | 43. | 1264 | 43. |
| 1265 | 42. | 1266 | 41. | 1267 | 41. | 1268 | 40. | 1269 | 40. |
| 1270 | 39. | 1271 | 39. | 1272 | 38. | 1273 | 38. | 1274 | 37. |
| 1275 | 37. | 1276 | 36. | 1277 | 36. | 1278 | 35. | 1279 | 35. |
| 1280 | 35. | 1281 | 34. | 1282 | 34. | 1283 | 33. | 1284 | 33. |
| 1285 | 33. | 1286 | 32. | 1287 | 32. | 1288 | 32. | 1289 | 31. |
| 1290 | 31. | 1291 | 31. | 1292 | 31. | 1293 | 30. | 1294 | 30. |
| 1295 | 30. | 1296 | 30. | 1297 | 29. | 1298 | 29. | 1299 | 29. |
| 1300 | 29. | 1310 | 27. | 1320 | 25. | 1330 | 24. | 1340 | 23. |
| 1350 | 22. | 1360 | 21. | 1370 | 20. | 1380 | 19. | 1390 | 18. |
| 1400 | 18. | 1420 | 17. | 1440 | 16. | 1460 | 14. | 1500 | 14. |

Total Runoff = 75.674 Acre-Ft.
Peak Q = 460 CFS
Time to Peak Q = 1167 Minutes

```
04LADEPTH.RDT
 5     99    1A TRIANGLE RANCH BURNED DEVELOPED  FILE R52419DB,DAT
 5     99   28A HYDROGRAPH AT NODE 28
 5     99   37E HYDROGRAPH AT NODE 37E
 5     99   39A HYDROGRAPH AT LOWER END OF PROJECT (SILVERCREEK RD)
 6     99    1A 178  1  18 7A391 1439 51800                     G1
 6     99    2A 178  1  22 7A381 1071 23300
 6     99    3A 178  1  41 7A381  955 14100
 6     99    4A 178  1   9 8A381  986 08600
 6     99    5A 178  1   2 5A382  350 02900
 6     99    6A 028 35  1611A383 1691 05600
 6     99    7A 178  2   816A382 1414 00900
 6     99    8A 178  1  31 9A391 1670 24000
 6     99    9A 178  2   8 8A382  529 00600
 6     99   10B 178  1  17 8A391 1599 49100
 6     99   11B 178  1  1312A391 1710 08500
 6     99   12AB178         A39                              1
 6     99   13A 178  1   7 9A391 1526 24300
 6     99   14A 028 35  1012A393 1853 05100
 6     99   15A 028 20   6 7A382  333 00300
 6     99   16C 178  1  12 6A391 1250 49600
 6     99   17C 178  1  2110A391 1623 13600
 6     99   18AC178         A39                              1
 6     99   19A 178  2  19 9A391 1655 24800
 6     99   20A 178  5   4 9A392  446 00200
 6     99   21A 178 09  1411A392  836 00600
 6     99   22A 178  1  11 7A391 1391 38300
 6     99   23A 028 15   7 8A392  507 00600
 6     99   24D 178  1  11 6A381 1041 33000
 6     99   25D 028 35  2010A393 1595 08800
 6     99   26AD178         A39                              1
 6     99   27A 178  3   9 5A392  296 00700
 6     99   28A 178  0    99A39                             1
 6     99   29E 186  1  19 7A391 1506 15300
 6     99   30E 186  1  20 6A391 1071 10800
 6     99   31E 186  1  30 6A391 1039 08900
 6     99   32E 178  1   9 6A391 1090 31800
 6     99   33E 178  1  3510A391 1150 04600
 6     99   34E 178  6  31 9A381 1763 25600
 6     99   35E 178  1  2510A381 1832 23100
 6     99   36E 178  1  1311A391 1081 02200
 6     99   37E 178  0    99A39                             1
 6     99   38AE178  0      A39                              1
 6     99   39A 178       99A39                             1  2
91781 14  7 000 0000 170 0000 410 0680 455 0820 498 0970 606 1500 675 2000
91781 14 14 724 2500 763 3000 790 3500 827 4500 840 5000 859 6000 873 7000
91861 14  7 000 0000 100 0000 100 0160 380 0230 472 0300 645 0540 727 0800
91861 14 14 766 0990 804 1240 841 1590 871 2000 918 3000 946 4000 980 7000
```

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY

TRIANGLE RANCH BURNED DEVELOPED FILE R52419DB,DAT

STORM DAY 4

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 1A | 18. | 57. | 18. | 57. | 1 | 1439. | 0.51800 | 0.00 | 0.00 | 0. | 178 | 7 | A39 | 0.01 |
| 99 | 2A | 22. | 68. | 40. | 120. | 1 | 1071. | 0.23300 | 0.00 | 0.00 | 0. | 178 | 7 | A38 | 0.01 |
| 99 | 3A | 41. | 126. | 81. | 231. | 1 | 955. | 0.14100 | 0.00 | 0.00 | 0. | 178 | 7 | A38 | 0.01 |
| 99 | 4A | 9. | 26. | 90. | 245. | 1 | 986. | 0.08600 | 0.00 | 0.00 | 0. | 178 | 8 | A38 | 0.01 |
| 99 | 5A | 2. | 8. | 92. | 238. | 2 | 350. | 0.02900 | 0.00 | 0.00 | 0. | 178 | 5 | A38 | 0.01 |
| 99 | 6A | 16. | 37. | 108. | 269. | 3 | 1691. | 0.05600 | 0.00 | 0.00 | 0. | 28 | 11 | A38 | 0.35 |
| 99 | 7A | 8. | 16. | 116. | 268. | 2 | 1414. | 0.00900 | 0.00 | 0.00 | 0. | 178 | 16 | A38 | 0.02 |
| 99 | 8A | 31. | 86. | 147. | 252. | 1 | 1670. | 0.24000 | 0.00 | 0.00 | 0. | 178 | 9 | A39 | 0.01 |
| 99 | 9A | 8. | 23. | 155. | 251. | 2 | 529. | 0.00600 | 0.00 | 0.00 | 0. | 178 | 8 | A38 | 0.02 |
| 99 | 10B | 17. | 50. | 17. | 50. | 1 | 1599. | 0.49100 | 0.00 | 0.00 | 0. | 178 | 8 | A39 | 0.01 |
| 99 | 11B | 13. | 31. | 30. | 78. | 1 | 1710. | 0.08500 | 0.00 | 0.00 | 0. | 178 | 12 | A39 | 0.01 |

CONFLUENCE Q'S

99 12A TA 1171 QA 245. QAB 276. QB 31. 99 12B TB 1162 QB 70. QBA 248. QA 178.
99 12AB TAB 1171 QAB 276. QA 245. QB 31.

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 12AB | 30. | 70. | 185. | 276. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 178 | 0 | A39 | 0.00 |
| 99 | 13A | 7. | 19. | 192. | 278. | 1 | 1526. | 0.24300 | 0.00 | 0.00 | 0. | 178 | 9 | A39 | 0.01 |
| 99 | 14A | 10. | 23. | 202. | 279. | 3 | 1853. | 0.05100 | 0.00 | 0.00 | 0. | 28 | 12 | A39 | 0.35 |
| 99 | 15A | 6. | 17. | 208. | 276. | 2 | 333. | 0.00300 | 0.00 | 0.00 | 0. | 28 | 7 | A38 | 0.20 |
| 99 | 16C | 12. | 42. | 12. | 42. | 1 | 1250. | 0.49600 | 0.00 | 0.00 | 0. | 178 | 6 | A39 | 0.01 |
| 99 | 17C | 21. | 55. | 33. | 94. | 1 | 1623. | 0.13600 | 0.00 | 0.00 | 0. | 178 | 10 | A39 | 0.01 |

CONFLUENCE Q'S

99 18A TA 1177 QA 275. QAC 288. QC 13. 99 18C TC 1159 QC 86. QCA 248. QA 162.
99 18AC TAC 1166 QAC 295. QA 253. QC 42.

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 18AC | 33. | 86. | 241. | 295. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 178 | 0 | A39 | 0.00 |
| 99 | 19A | 19. | 53. | 260. | 303. | 1 | 1655. | 0.24800 | 0.00 | 0.00 | 0. | 178 | 9 | A39 | 0.02 |
| 99 | 20A | 4. | 11. | 264. | 303. | 2 | 446. | 0.00200 | 0.00 | 0.00 | 0. | 178 | 9 | A39 | 0.05 |
| 99 | 21A | 14. | 36. | 278. | 305. | 2 | 836. | 0.00600 | 0.00 | 0.00 | 0. | 178 | 11 | A39 | 0.09 |
| 99 | 22A | 11. | 35. | 289. | 306. | 1 | 1391. | 0.38300 | 0.00 | 0.00 | 0. | 178 | 7 | A39 | 0.01 |
| 99 | 23A | 7. | 18. | 296. | 307. | 2 | 507. | 0.00600 | 0.00 | 0.00 | 0. | 28 | 8 | A39 | 0.15 |
| 99 | 24D | 11. | 37. | 11. | 37. | 1 | 1041. | 0.33000 | 0.00 | 0.00 | 0. | 178 | 6 | A38 | 0.01 |
| 99 | 25D | 20. | 51. | 31. | 85. | 3 | 1595. | 0.08800 | 0.00 | 0.00 | 0. | 28 | 10 | A39 | 0.35 |

CONFLUENCE Q'S

99 26A TA 1178 QA 306. QAD 316. QD 10. 99 26D TD 1158 QD 80. QDA 270. QA 190.
99 26AD TAD 1177 QAD 316. QA 306. QD 10.

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY



TRIANGLE RANCH BURNED DEVELOPED FILE R52419DB,DAT STORM DAY 4

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 26AD | 31. | 80. | 327. | 316. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 178 | 0 | A39 | 0.00 |
| 99 | 27A | 9. | 35. | 336. | 319. | 2 | 296. | 0.00700 | 0.00 | 0.00 | 0. | 178 | 5 | A39 | 0.03 |
| 99 | 28A | 0. | 0. | 336. | 318. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 178 | 99 | A39 | 0.00 |
| 99 | 29E | 19. | 70. | 19. | 70. | 1 | 1506. | 0.15300 | 0.00 | 0.00 | 0. | 186 | 7 | A39 | 0.01 |
| 99 | 30E | 20. | 80. | 39. | 127. | 1 | 1071. | 0.10800 | 0.00 | 0.00 | 0. | 186 | 6 | A39 | 0.01 |
| 99 | 31E | 30. | 121. | 69. | 214. | 1 | 1039. | 0.08900 | 0.00 | 0.00 | 0. | 186 | 6 | A39 | 0.01 |
| 99 | 32E | 9. | 31. | 78. | 224. | 1 | 1090. | 0.31800 | 0.00 | 0.00 | 0. | 178 | 6 | A39 | 0.01 |
| 99 | 33E | 35. | 92. | 113. | 305. | 1 | 1150. | 0.04600 | 0.00 | 0.00 | 0. | 178 | 10 | A39 | 0.01 |
| 99 | 34E | 31. | 85. | 144. | 337. | 1 | 1763. | 0.25600 | 0.00 | 0.00 | 0. | 178 | 9 | A38 | 0.06 |
| 99 | 35E | 25. | 64. | 169. | 368. | 1 | 1832. | 0.23100 | 0.00 | 0.00 | 0. | 178 | 10 | A38 | 0.01 |
| 99 | 36E | 13. | 32. | 182. | 379. | 1 | 1081. | 0.02200 | 0.00 | 0.00 | 0. | 178 | 11 | A39 | 0.01 |
| 99 | 37E | 0. | 0. | 182. | 364. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 178 | 99 | A39 | 0.00 |

**********

CONFLUENCE Q'S

99 38A TA 1178 QA 318. QAE 510. QE 192.

99 38E TE 1166 QE 364. QEA 638. QA 274.

99 38AE TAE 1166 QAE 638. QA 274. QE 364.

**********

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 38AE | 182. | 364. | 518. | 638. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 178 | 0 | A39 | 0.00 |
| 99 | 39A | 0. | 0. | 518. | 638. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 178 | 99 | A39 | 0.00 |

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY HYDROGRAPH AT NODE 28
DEVELOPED BURNED HYDROGRAPH AT 99 28A STORM DAY 4 REDUCTION FACTOR = 1.000

| TIME | Q | TIME | Q | TIME | Q | TIME | Q | TIME | Q |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0. | 100 | 24. | 200 | 25. | 300 | 26. | 400 | 27. |
| 500 | 29. | 600 | 31. | 700 | 34. | 800 | 37. | 900 | 42. |
| 1000 | 50. | 1050 | 57. | 1100 | 71. | 1110 | 77. | 1120 | 86. |
| 1130 | 98. | 1131 | 99. | 1132 | 101. | 1133 | 102. | 1134 | 104. |
| 1135 | 106. | 1136 | 107. | 1137 | 109. | 1138 | 112. | 1139 | 114. |
| 1140 | 116. | 1141 | 119. | 1142 | 122. | 1143 | 125. | 1144 | 128. |
| 1145 | 132. | 1146 | 136. | 1147 | 140. | 1148 | 145. | 1149 | 151. |
| 1150 | 159. | 1151 | 169. | 1152 | 182. | 1153 | 197. | 1154 | 215. |
| 1155 | 232. | 1156 | 247. | 1157 | 261. | 1158 | 271. | 1159 | 277. |
| 1160 | 280. | 1161 | 281. | 1162 | 278. | 1163 | 274. | 1164 | 271. |
| 1165 | 271. | 1166 | 274. | 1167 | 279. | 1168 | 285. | 1169 | 292. |
| 1170 | 298. | 1171 | 303. | 1172 | 307. | 1173 | 310. | 1174 | 312. |
| 1175 | 314. | 1176 | 316. | 1177 | 318. | 1178 | 318. | 1179 | 318. |
| 1180 | 317. | 1181 | 315. | 1182 | 312. | 1183 | 310. | 1184 | 308. |
| 1185 | 307. | 1186 | 306. | 1187 | 305. | 1188 | 305. | 1189 | 305. |
| 1190 | 303. | 1191 | 301. | 1192 | 298. | 1193 | 293. | 1194 | 287. |
| 1195 | 280. | 1196 | 272. | 1197 | 264. | 1198 | 255. | 1199 | 246. |
| 1200 | 238. | 1201 | 229. | 1202 | 220. | 1203 | 212. | 1204 | 204. |
| 1205 | 196. | 1206 | 188. | 1207 | 181. | 1208 | 174. | 1209 | 168. |
| 1210 | 162. | 1211 | 156. | 1212 | 150. | 1213 | 145. | 1214 | 140. |
| 1215 | 135. | 1216 | 131. | 1217 | 126. | 1218 | 122. | 1219 | 119. |
| 1220 | 115. | 1221 | 112. | 1222 | 108. | 1223 | 105. | 1224 | 102. |
| 1225 | 100. | 1226 | 97. | 1227 | 95. | 1228 | 92. | 1229 | 90. |
| 1230 | 88. | 1231 | 86. | 1232 | 84. | 1233 | 82. | 1234 | 80. |
| 1235 | 79. | 1236 | 77. | 1237 | 76. | 1238 | 74. | 1239 | 73. |
| 1240 | 71. | 1241 | 70. | 1242 | 69. | 1243 | 68. | 1244 | 67. |
| 1245 | 66. | 1246 | 65. | 1247 | 64. | 1248 | 63. | 1249 | 62. |
| 1250 | 62. | 1251 | 61. | 1252 | 60. | 1253 | 59. | 1254 | 58. |
| 1255 | 58. | 1256 | 57. | 1257 | 57. | 1258 | 56. | 1259 | 55. |
| 1260 | 55. | 1261 | 54. | 1262 | 54. | 1263 | 53. | 1264 | 53. |
| 1265 | 52. | 1266 | 52. | 1267 | 51. | 1268 | 51. | 1269 | 51. |
| 1270 | 50. | 1271 | 50. | 1272 | 49. | 1273 | 49. | 1274 | 49. |
| 1275 | 48. | 1276 | 48. | 1277 | 48. | 1278 | 47. | 1279 | 47. |
| 1280 | 47. | 1281 | 46. | 1282 | 46. | 1283 | 46. | 1284 | 45. |
| 1285 | 45. | 1286 | 45. | 1287 | 45. | 1288 | 44. | 1289 | 44. |
| 1290 | 44. | 1291 | 44. | 1292 | 43. | 1293 | 43. | 1294 | 43. |
| 1295 | 43. | 1296 | 42. | 1297 | 42. | 1298 | 42. | 1299 | 42. |
| 1300 | 41. | 1310 | 39. | 1320 | 38. | 1330 | 36. | 1340 | 35. |
| 1350 | 34. | 1360 | 33. | 1370 | 32. | 1380 | 31. | 1390 | 30. |
| 1400 | 29. | 1420 | 28. | 1440 | 27. | 1460 | 24. | 1500 | 24. |

Total Runoff = 95.119 Acre-Ft.
Peak Q = 318 CFS
Time to Peak Q = 1177 Minutes

1 9-28-2004
SITE LICENSEE: WAGNER-HALLADAY, INC.

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY HYDROGRAPH AT NODE 37E
DEVELOPED BURNED HYDROGRAPH AT 99 37E STORM DAY 4 REDUCTION FACTOR = 1.000

| TIME | Q | TIME | Q | TIME | Q | TIME | Q | TIME | Q |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0. | 100 | 11. | 200 | 11. | 300 | 12. | 400 | 13. |
| 500 | 15. | 600 | 17. | 700 | 19. | 800 | 21. | 900 | 25. |
| 1000 | 32. | 1050 | 38. | 1100 | 51. | 1110 | 55. | 1120 | 63. |
| 1130 | 75. | 1131 | 77. | 1132 | 79. | 1133 | 80. | 1134 | 82. |
| 1135 | 83. | 1136 | 85. | 1137 | 87. | 1138 | 89. | 1139 | 91. |
| 1140 | 93. | 1141 | 95. | 1142 | 97. | 1143 | 100. | 1144 | 102. |
| 1145 | 105. | 1146 | 108. | 1147 | 112. | 1148 | 115. | 1149 | 120. |
| 1150 | 124. | 1151 | 130. | 1152 | 136. | 1153 | 144. | 1154 | 155. |
| 1155 | 168. | 1156 | 184. | 1157 | 203. | 1158 | 225. | 1159 | 248. |
| 1160 | 273. | 1161 | 297. | 1162 | 320. | 1163 | 340. | 1164 | 355. |
| 1165 | 363. | 1166 | 364. | 1167 | 359. | 1168 | 349. | 1169 | 336. |
| 1170 | 320. | 1171 | 303. | 1172 | 285. | 1173 | 268. | 1174 | 250. |
| 1175 | 234. | 1176 | 219. | 1177 | 205. | 1178 | 192. | 1179 | 180. |
| 1180 | 169. | 1181 | 159. | 1182 | 149. | 1183 | 141. | 1184 | 133. |
| 1185 | 126. | 1186 | 120. | 1187 | 114. | 1188 | 108. | 1189 | 103. |
| 1190 | 98. | 1191 | 94. | 1192 | 90. | 1193 | 86. | 1194 | 83. |
| 1195 | 80. | 1196 | 77. | 1197 | 74. | 1198 | 72. | 1199 | 69. |
| 1200 | 67. | 1201 | 65. | 1202 | 63. | 1203 | 61. | 1204 | 60. |
| 1205 | 58. | 1206 | 57. | 1207 | 55. | 1208 | 54. | 1209 | 53. |
| 1210 | 52. | 1211 | 51. | 1212 | 50. | 1213 | 49. | 1214 | 48. |
| 1215 | 47. | 1216 | 46. | 1217 | 45. | 1218 | 45. | 1219 | 44. |
| 1220 | 43. | 1221 | 42. | 1222 | 42. | 1223 | 41. | 1224 | 41. |
| 1225 | 40. | 1226 | 39. | 1227 | 39. | 1228 | 39. | 1229 | 38. |
| 1230 | 38. | 1231 | 37. | 1232 | 37. | 1233 | 36. | 1234 | 36. |
| 1235 | 35. | 1236 | 35. | 1237 | 35. | 1238 | 34. | 1239 | 34. |
| 1240 | 34. | 1241 | 33. | 1242 | 33. | 1243 | 33. | 1244 | 32. |
| 1245 | 32. | 1246 | 32. | 1247 | 31. | 1248 | 31. | 1249 | 31. |
| 1250 | 31. | 1251 | 30. | 1252 | 30. | 1253 | 30. | 1254 | 29. |
| 1255 | 29. | 1256 | 29. | 1257 | 29. | 1258 | 29. | 1259 | 28. |
| 1260 | 28. | 1261 | 28. | 1262 | 28. | 1263 | 27. | 1264 | 27. |
| 1265 | 27. | 1266 | 27. | 1267 | 26. | 1268 | 26. | 1269 | 26. |
| 1270 | 26. | 1271 | 26. | 1272 | 26. | 1273 | 25. | 1274 | 25. |
| 1275 | 25. | 1276 | 25. | 1277 | 25. | 1278 | 25. | 1279 | 24. |
| 1280 | 24. | 1281 | 24. | 1282 | 24. | 1283 | 24. | 1284 | 24. |
| 1285 | 23. | 1286 | 23. | 1287 | 23. | 1288 | 23. | 1289 | 23. |
| 1290 | 23. | 1291 | 23. | 1292 | 23. | 1293 | 22. | 1294 | 22. |
| 1295 | 22. | 1296 | 22. | 1297 | 22. | 1298 | 22. | 1299 | 22. |
| 1300 | 22. | 1310 | 20. | 1320 | 20. | 1330 | 19. | 1340 | 18. |
| 1350 | 17. | 1360 | 17. | 1370 | 16. | 1380 | 15. | 1390 | 15. |
| 1400 | 14. | 1420 | 13. | 1440 | 12. | 1460 | 11. | 1500 | 11. |

Total Runoff = 54.648 Acre-Ft.
Peak Q = 364 CFS
Time to Peak Q = 1166 Minutes

1 9-28-2004 PROG FO601A
SITE LICENSEE: WAGNER-HALLADAY, INC.

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY HYDROGRAPH AT LOWER END OF PROJECT (SILVERCREEK RD)
DEVELOPED BURNED HYDROGRAPH AT 99 39A STORM DAY 4 REDUCTION FACTOR = 1.000

| TIME | Q | TIME | Q | TIME | Q | TIME | Q | TIME | Q |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0. | 100 | 35. | 200 | 36. | 300 | 38. | 400 | 41. |
| 500 | 44. | 600 | 48. | 700 | 52. | 800 | 58. | 900 | 67. |
| 1000 | 81. | 1050 | 96. | 1100 | 122. | 1110 | 132. | 1120 | 148. |
| 1130 | 173. | 1131 | 176. | 1132 | 179. | 1133 | 182. | 1134 | 185. |
| 1135 | 189. | 1136 | 193. | 1137 | 196. | 1138 | 200. | 1139 | 205. |
| 1140 | 209. | 1141 | 214. | 1142 | 219. | 1143 | 225. | 1144 | 231. |
| 1145 | 237. | 1146 | 244. | 1147 | 252. | 1148 | 261. | 1149 | 270. |
| 1150 | 283. | 1151 | 299. | 1152 | 318. | 1153 | 342. | 1154 | 370. |
| 1155 | 400. | 1156 | 431. | 1157 | 464. | 1158 | 496. | 1159 | 525. |
| 1160 | 553. | 1161 | 577. | 1162 | 598. | 1163 | 615. | 1164 | 626. |
| 1165 | 634. | 1166 | 638. | 1167 | 638. | 1168 | 634. | 1169 | 628. |
| 1170 | 618. | 1171 | 606. | 1172 | 592. | 1173 | 577. | 1174 | 563. |
| 1175 | 548. | 1176 | 535. | 1177 | 522. | 1178 | 510. | 1179 | 498. |
| 1180 | 485. | 1181 | 473. | 1182 | 462. | 1183 | 451. | 1184 | 441. |
| 1185 | 433. | 1186 | 425. | 1187 | 419. | 1188 | 413. | 1189 | 408. |
| 1190 | 402. | 1191 | 395. | 1192 | 387. | 1193 | 379. | 1194 | 370. |
| 1195 | 360. | 1196 | 349. | 1197 | 338. | 1198 | 327. | 1199 | 316. |
| 1200 | 305. | 1201 | 294. | 1202 | 283. | 1203 | 273. | 1204 | 263. |
| 1205 | 254. | 1206 | 245. | 1207 | 237. | 1208 | 229. | 1209 | 221. |
| 1210 | 214. | 1211 | 207. | 1212 | 200. | 1213 | 194. | 1214 | 188. |
| 1215 | 182. | 1216 | 177. | 1217 | 172. | 1218 | 167. | 1219 | 162. |
| 1220 | 158. | 1221 | 154. | 1222 | 150. | 1223 | 146. | 1224 | 143. |
| 1225 | 140. | 1226 | 137. | 1227 | 134. | 1228 | 131. | 1229 | 128. |
| 1230 | 125. | 1231 | 123. | 1232 | 121. | 1233 | 118. | 1234 | 116. |
| 1235 | 114. | 1236 | 112. | 1237 | 110. | 1238 | 108. | 1239 | 107. |
| 1240 | 105. | 1241 | 103. | 1242 | 102. | 1243 | 101. | 1244 | 99. |
| 1245 | 98. | 1246 | 97. | 1247 | 95. | 1248 | 94. | 1249 | 93. |
| 1250 | 92. | 1251 | 91. | 1252 | 90. | 1253 | 89. | 1254 | 88. |
| 1255 | 87. | 1256 | 86. | 1257 | 85. | 1258 | 84. | 1259 | 84. |
| 1260 | 83. | 1261 | 82. | 1262 | 81. | 1263 | 81. | 1264 | 80. |
| 1265 | 79. | 1266 | 79. | 1267 | 78. | 1268 | 77. | 1269 | 77. |
| 1270 | 76. | 1271 | 75. | 1272 | 75. | 1273 | 74. | 1274 | 74. |
| 1275 | 73. | 1276 | 73. | 1277 | 72. | 1278 | 72. | 1279 | 71. |
| 1280 | 71. | 1281 | 70. | 1282 | 70. | 1283 | 70. | 1284 | 69. |
| 1285 | 69. | 1286 | 68. | 1287 | 68. | 1288 | 67. | 1289 | 67. |
| 1290 | 67. | 1291 | 66. | 1292 | 66. | 1293 | 65. | 1294 | 65. |
| 1295 | 65. | 1296 | 64. | 1297 | 64. | 1298 | 64. | 1299 | 63. |
| 1300 | 63. | 1310 | 60. | 1320 | 57. | 1330 | 55. | 1340 | 53. |
| 1350 | 51. | 1360 | 49. | 1370 | 48. | 1380 | 46. | 1390 | 45. |
| 1400 | 44. | 1420 | 41. | 1440 | 39. | 1460 | 35. | 1500 | 35. |

Total Runoff = 149.719 Acre-Ft.
Peak Q = 638 CFS
Time to Peak Q = 1166 Minutes

# C. UNDEVELOPED MORA CALCULATIONS

**TRIANGLE RANCH; TRACT 52419, COUNTY OF LOS ANGELES**
**FLOW SUMMARY FOR EXISTING CONDITION**

| SUB-AREA | AREA [ac] | AREA [sq mi] | Q [cfs] | $Q_B$ [cfs] | $Q_{BB}$ [cfs] | DPA-Zone [-] | Blk'g Fac. [-] | DPR [cy/sq mi] | DPV [cy] |
|---|---|---|---|---|---|---|---|---|---|
| 1A | 18 | 0.028 | 46 | 55 | 89 | 6 | 1.61 | 48000 | 1350 |
| 2A | 22 | 0.034 | 48 | 59 | 95 | 6 | 1.61 | 48000 | 1650 |
| 3A | 41 | 0.064 | 90 | 110 | 177 | 6 | 1.61 | 48000 | 3075 |
| 4A | 14 | 0.022 | 33 | 40 | 64 | 6 | 1.61 | 48000 | 1050 |
| 5A | 11 | 0.017 | 17 | 21 | 33 | 7 | 1.57 | 28000 | 481 |
| 6A | 31 | 0.048 | 68 | 83 | 134 | 6 | 1.61 | 48000 | 2325 |
| 7A | 8 | 0.013 | 19 | 23 | 36 | 7 | 1.57 | 28000 | 350 |
| 8B | 17 | 0.027 | 41 | 50 | 81 | 6 | 1.61 | 48000 | 1275 |
| 9B | 17 | 0.027 | 37 | 46 | 74 | 6 | 1.61 | 48000 | 1275 |
| 10B | 8 | 0.013 | 19 | 24 | 39 | 6 | 1.61 | 48000 | 600 |
| 11AB | 187 | 0.292 | 209 | 295 | 475 | VARIES | 1.61 | VARIES | 9788 |
| 12A | 11 | 0.017 | 29 | 35 | 56 | 6 | 1.61 | 48000 | 825 |
| 13A | 6 | 0.009 | 17 | 19 | 30 | 7 | 1.57 | 28000 | 263 |
| 14D | 12 | 0.019 | 35 | 42 | 68 | 6 | 1.61 | 48000 | 900 |
| 15D | 22 | 0.034 | 47 | 58 | 93 | 6 | 1.61 | 48000 | 1650 |
| 16AD | 238 | 0.372 | 243 | 354 | 570 | VARIES | 1.61 | VARIES | 11528 |
| 17A | 4 | 0.006 | 9 | 11 | 18 | 6 | 1.61 | 48000 | 300 |
| 18A | 26 | 0.041 | 57 | 70 | 113 | 6 | 1.61 | 48000 | 1950 |
| 19A | 14 | 0.022 | 29 | 36 | 57 | 7 | 1.57 | 28000 | 613 |
| 20A | 13 | 0.020 | 34 | 41 | 66 | 6 | 1.61 | 48000 | 975 |
| 21A | 7 | 0.011 | 18 | 21 | 33 | 7 | 1.57 | 28000 | 306 |
| 22C | 14 | 0.022 | 31 | 38 | 61 | 6 | 1.61 | 48000 | 1050 |
| 23C | 10 | 0.016 | 27 | 30 | 48 | 6 | 1.61 | 48000 | 750 |
| 24AC | 326 | 0.509 | 251 | 384 | 618 | VARIES | 1.61 | VARIES | 14517 |
| 25A | 9 | 0.014 | 30 | 35 | 55 | 7 | 1.57 | 28000 | 394 |
| 26A | 335 | 0.523 | 251 | 386 | 621 | VARIES | 1.61 | VARIES | 14656 |
| 27E | 19 | 0.030 | 67 | 70 | 113 | 6 | 1.61 | 48000 | 1425 |
| 28E | 20 | 0.031 | 77 | 80 | 129 | 6 | 1.61 | 48000 | 1500 |
| 29E | 30 | 0.047 | 116 | 121 | 195 | 6 | 1.61 | 48000 | 2250 |
| 30E | 9 | 0.014 | 26 | 31 | 50 | 6 | 1.61 | 48000 | 675 |
| 31E | 28 | 0.044 | 60 | 74 | 119 | 6 | 1.61 | 48000 | 2100 |
| 32E | 20 | 0.031 | 47 | 57 | 92 | 6 | 1.61 | 48000 | 1500 |
| 33E | 18 | 0.028 | 39 | 48 | 77 | 6 | 1.61 | 48000 | 1350 |
| 34E | 4 | 0.006 | 12 | 14 | 23 | 6 | 1.61 | 48000 | 300 |
| 35E | 21 | 0.033 | 45 | 55 | 89 | 6 | 1.61 | 48000 | 1575 |
| 36E | 13 | 0.020 | 26 | 32 | 52 | 6 | 1.61 | 48000 | 975 |
| 37E | 182 | 0.284 | 240 | 299 | 481 | 6 | 1.61 | 34000 | 9669 |
| 38AE | 517 | 0.808 | 490 | 685 | 1103 | VARIES | 1.61 | VARIES | 21225 |
| 39A | 517 | 0.808 | 490 | 685 | 1103 | VARIES | 1.61 | VARIES | 21225 |

**TIME OF CONCENTRATION MODEL**
**COUNTY OF LOS ANGELES; TRACT No. 52419**
**UNDEVELOPED AREA**

| Project | Subarea | Area (acres) | % Imp | Frequency | Soil Type | Length (ft) | Slope (ft/ft) | Isohyet (in.) | Tc-calc'd (min.) | Intensity (in./hr) | $C_u$ | $C_d$ | Flowrate (cfs) | Rainfall Mass CN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Triangle Ranch | 1A | 18 | 0.01 | 50 | 28 | 1439 | 0.518 | 7.60 | 7 | 3.87 | 0.66 | 0.66 | 45.98 | 38 |
| Triangle Ranch | 2A | 22 | 0.01 | 50 | 28 | 2000 | 0.458 | 7.60 | 9 | 3.44 | 0.64 | 0.64 | 48.44 | 38 |
| Triangle Ranch | 3A | 41 | 0.01 | 50 | 28 | 2000 | 0.450 | 7.60 | 9 | 3.44 | 0.64 | 0.64 | 90.27 | 38 |
| Triangle Ranch | 4A | 14 | 0.01 | 50 | 28 | 986 | 0.086 | 7.60 | 8 | 3.64 | 0.65 | 0.65 | 33.12 | 38 |
| Triangle Ranch | 5A | 11 | 0.02 | 50 | 28 | 1414 | 0.009 | 7.60 | 16 | 2.62 | 0.55 | 0.56 | 16.14 | 38 |
| Triangle Ranch | 6A | 31 | 0.01 | 50 | 28 | 1670 | 0.240 | 7.50 | 9 | 3.39 | 0.63 | 0.63 | 66.21 | 38 |
| Triangle Ranch | 7A | 8 | 0.02 | 50 | 28 | 529 | 0.006 | 7.60 | 8 | 3.64 | 0.65 | 0.66 | 19.22 | 38 |
| Triangle Ranch | 8B | 17 | 0.01 | 50 | 28 | 1599 | 0.491 | 7.70 | 8 | 3.68 | 0.65 | 0.65 | 40.66 | 39 |
| Triangle Ranch | 9B | 17 | 0.01 | 50 | 28 | 1364 | 0.103 | 7.60 | 9 | 3.44 | 0.64 | 0.64 | 37.43 | 38 |
| Triangle Ranch | 10B | 8 | 0.01 | 50 | 28 | 1518 | 0.273 | 7.70 | 8 | 3.68 | 0.65 | 0.65 | 19.14 | 39 |
| Triangle Ranch | 11AB | CONFLUENCE | | | | | | | | | | | | |
| Triangle Ranch | 12A | 11 | 0.01 | 50 | 28 | 1170 | 0.295 | 7.70 | 7 | 3.92 | 0.66 | 0.66 | 28.46 | 39 |
| Triangle Ranch | 13A | 6 | 0.20 | 50 | 28 | 333 | 0.003 | 7.60 | 7 | 3.87 | 0.66 | 0.71 | 16.49 | 38 |
| Triangle Ranch | 14D | 12 | 0.01 | 50 | 28 | 1250 | 0.496 | 7.80 | 6 | 4.27 | 0.68 | 0.68 | 34.84 | 39 |
| Triangle Ranch | 15D | 22 | 0.01 | 50 | 28 | 1623 | 0.136 | 7.80 | 10 | 3.36 | 0.63 | 0.63 | 46.57 | 39 |
| Triangle Ranch | 16AD | CONFLUENCE | | | | | | | | | | | | |
| Triangle Ranch | 17A | 4 | 0.05 | 50 | 28 | 446 | 0.002 | 7.70 | 9 | 3.49 | 0.64 | 0.65 | 9.07 | 39 |
| Triangle Ranch | 18A | 26 | 0.01 | 50 | 28 | 1629 | 0.253 | 7.60 | 9 | 3.44 | 0.64 | 0.64 | 57.24 | 38 |
| Triangle Ranch | 19A | 14 | 0.09 | 50 | 28 | 836 | 0.006 | 7.80 | 11 | 3.21 | 0.61 | 0.64 | 28.76 | 39 |
| Triangle Ranch | 20A | 13 | 0.01 | 50 | 28 | 1391 | 0.383 | 7.80 | 7 | 3.97 | 0.66 | 0.66 | 34.06 | 39 |
| Triangle Ranch | 21A | 7 | 0.15 | 50 | 28 | 507 | 0.006 | 7.80 | 8 | 3.73 | 0.65 | 0.69 | 18.02 | 39 |
| Triangle Ranch | 22C | 14 | 0.01 | 50 | 28 | 1641 | 0.266 | 7.60 | 9 | 3.44 | 0.64 | 0.64 | 30.82 | 38 |
| Triangle Ranch | 23C | 10 | 0.01 | 50 | 28 | 919 | 0.061 | 7.70 | 8 | 3.68 | 0.65 | 0.65 | 23.92 | 39 |
| Triangle Ranch | 24AC | CONFLUENCE | | | | | | | | | | | | |
| Triangle Ranch | 25A | 9 | 0.03 | 50 | 28 | 296 | 0.007 | 7.80 | 5 | 4.65 | 0.7 | 0.71 | 29.71 | 39 |
| Triangle Ranch | 26A | HYDROGRAPH | | | | | | | | | | | | |
| Triangle Ranch | 27E | 19 | 0.01 | 50 | 36 | 1506 | 0.153 | 7.65 | 7 | 3.9 | 0.9 | 0.9 | 66.69 | 39 |
| Triangle Ranch | 28E | 20 | 0.01 | 50 | 36 | 1011 | 0.108 | 7.70 | 6 | 4.22 | 0.91 | 0.9 | 75.96 | 39 |
| Triangle Ranch | 29E | 30 | 0.01 | 50 | 36 | 1039 | 0.089 | 7.70 | 6 | 4.22 | 0.91 | 0.9 | 113.94 | 39 |
| Triangle Ranch | 30E | 9 | 0.01 | 50 | 28 | 1090 | 0.318 | 7.70 | 6 | 4.22 | 0.68 | 0.68 | 25.83 | 39 |
| Triangle Ranch | 31E | 28 | 0.01 | 50 | 28 | 1150 | 0.046 | 7.70 | 10 | 3.32 | 0.63 | 0.63 | 58.56 | 39 |
| Triangle Ranch | 32E | 20 | 0.01 | 50 | 28 | 1493 | 0.291 | 7.60 | 8 | 3.64 | 0.65 | 0.65 | 47.32 | 38 |
| Triangle Ranch | 33E | 18 | 0.01 | 50 | 28 | 1657 | 0.273 | 7.60 | 9 | 3.44 | 0.64 | 0.64 | 39.63 | 38 |
| Triangle Ranch | 34E | 4 | 0.01 | 50 | 28 | 610 | 0.043 | 7.70 | 6 | 4.22 | 0.68 | 0.68 | 11.48 | 39 |
| Triangle Ranch | 35E | 21 | 0.01 | 50 | 28 | 1832 | 0.231 | 7.80 | 10 | 3.36 | 0.63 | 0.63 | 44.45 | 39 |
| Triangle Ranch | 36E | 13 | 0.01 | 50 | 28 | 1081 | 0.022 | 7.70 | 11 | 3.17 | 0.61 | 0.61 | 25.14 | 39 |
| Triangle Ranch | 37E | HYDROGRAPH | | | | | | | | | | | | |
| Triangle Ranch | 38AE | CONFLUENCE | | | | | | | | | | | | |
| Triangle Ranch | 39A | HYDROGRAPH | | | | | | | | | | | | |

Tc Equation
Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

```
4LADEPTH.RDT
5    99    1A TRIANGLE RANCH UNDEVELOPED  FILE R52419U,DAT
5    99   26A HYDROGRAPH AT NODE 26A
5    99   37E HYDROGRAPH AT NODE 37E
5    99   39A HYDROGRAPH AT LOWER END OF PROJECT (SILVER CREEK RD)
6    99    1A 028  1  18 7A381 1439 51800                      G1
6    99    2A 028  1  22 9A381 1071 23300
6    99    3A 028  1  41 9A381  955 14100
6    99    4A 028  2  14 8A381  986 08620
6    99    5A 028  2  1116A382 1414 00900
6    99    6A 028  1  31 9A381 1670 24000
6    99    7A 028  2   8 8A382  529 00600
6    99    8B 028  1  17 8A391 1599 49100
6    99    9B 028  1  17 9A381 1364 10300
6    99   10B 028  1   8 8A391 1518 27300
6    99   11AB028         A38                              1
6    99   12A 028  1  11 7A391 1170 29490
6    99   13A 028 20   6 7A382  333 00300
6    99   14D 028  1  12 6A391 1250 49600
6    99   15D 028  1  2210A391 1623 13600
6    99   16AD028         A39                              1
6    99   17A 028  5   4 9A392  446 00200
6    99   18A 028  1  26 9A381 1629 25300
6    99   19A 028  9  1411A392  836 00600
6    99   20A 028  1  13 7A391 1391 38300
6    99   21A 028 15   7 8A392  507 00600
6    99   22C 028  1  14 9A381 1641 26600
6    99   23C 028  1  10 8A391  919 06100
6    99   24AC028         A39                              1
6    99   25A 028  3   9 5A392  296 00700
6    99   26A 028       99A39                             1
6    99   27E 036  1  19 7A391 1506 15300
6    99   28E 036  1  20 6A391 1011 10800
6    99   29E 036  1  30 6A391 1039 08850
6    99   30E 028  1   9 6A391 1090 31830
6    99   31E 028  1  2810A391 1150 04610
6    99   32E 028  1  20 8A381 1493 29070
6    99   33E 028  1  18 9A381 1657 27280
6    99   34E 028  1   4 6A391  610 04260
6    99   35E 028  1  2110A391 1832  2314
6    99   36E 028  1  1311A391 1081 02220
6    99   37E 028       99A39                             1
6    99   38AE028         A39                              1
6    99   39A 028       99A39                             1  2
```

TRIANGLE RANCH UNDEVELOPED FILE R52419U.DAT

STORM DAY 4

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 1A | 18. | 46. | 18. | 46. | 1 | 1439. | 0.51800 | 0.00 | 0.00 | 0. | 28 | 7 | A38 | 0.01 |
| 99 | 2A | 22. | 48. | 40. | 90. | 1 | 1071. | 0.23300 | 0.00 | 0.00 | 0. | 28 | 9 | A38 | 0.01 |
| 99 | 3A | 41. | 90. | 81. | 169. | 1 | 955. | 0.14100 | 0.00 | 0.00 | 0. | 28 | 9 | A38 | 0.01 |
| 99 | 4A | 14. | 33. | 95. | 187. | 1 | 986. | 0.08620 | 0.00 | 0.00 | 0. | 28 | 8 | A38 | 0.02 |
| 99 | 5A | 11. | 17. | 106. | 198. | 2 | 1414. | 0.00900 | 0.00 | 0.00 | 0. | 28 | 16 | A38 | 0.02 |
| 99 | 6A | 31. | 68. | 137. | 178. | 1 | 1670. | 0.24000 | 0.00 | 0.00 | 0. | 28 | 9 | A38 | 0.01 |
| 99 | 7A | 8. | 19. | 145. | 175. | 2 | 529. | 0.00600 | 0.00 | 0.00 | 0. | 28 | 8 | A38 | 0.02 |
| 99 | 8B | 17. | 41. | 17. | 41. | 1 | 1599. | 0.49100 | 0.00 | 0.00 | 0. | 28 | 8 | A39 | 0.01 |
| 99 | 9B | 17. | 37. | 34. | 74. | 1 | 1364. | 0.10300 | 0.00 | 0.00 | 0. | 28 | 9 | A38 | 0.01 |
| 99 | 10B | 8. | 19. | 42. | 76. | 1 | 1518. | 0.27300 | 0.00 | 0.00 | 0. | 28 | 8 | A39 | 0.01 |

CONFLUENCE Q'S

99 11A TA 1170 QA 172. QAB 207. QB 35. 99 11B TB 1162 QB 73. QBA 197. QA 124.

99 11AB TAB 1169 QAB 209. QA 169. QB 40.

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 11AB | 42. | 73. | 187. | 209. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 28 | 0 | A38 | 0.00 |
| 99 | 12A | 11. | 29. | 198. | 210. | 1 | 1170. | 0.29490 | 0.00 | 0.00 | 0. | 28 | 7 | A39 | 0.01 |
| 99 | 13A | 6. | 17. | 204. | 211. | 2 | 333. | 0.00300 | 0.00 | 0.00 | 0. | 28 | 7 | A38 | 0.20 |
| 99 | 14D | 12. | 35. | 12. | 35. | 1 | 1250. | 0.49600 | 0.00 | 0.00 | 0. | 28 | 6 | A39 | 0.01 |
| 99 | 15D | 22. | 47. | 34. | 78. | 1 | 1623. | 0.13600 | 0.00 | 0.00 | 0. | 28 | 10 | A39 | 0.01 |

CONFLUENCE Q'S

99 16A TA 1172 QA 210. QAD 223. QD 14. 99 16D TD 1159 QD 70. QDA 216. QA 145.

99 16AD TAD 1163 QAD 243. QA 188. QD 55.

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 16AD | 34. | 70. | 238. | 243. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 28 | 0 | A39 | 0.00 |
| 99 | 17A | 4. | 9. | 242. | 245. | 2 | 446. | 0.00200 | 0.00 | 0.00 | 0. | 28 | 9 | A39 | 0.05 |
| 99 | 18A | 26. | 57. | 268. | 244. | 1 | 1629. | 0.25300 | 0.00 | 0.00 | 0. | 28 | 9 | A38 | 0.01 |
| 99 | 19A | 14. | 29. | 282. | 246. | 2 | 836. | 0.00600 | 0.00 | 0.00 | 0. | 28 | 11 | A39 | 0.09 |
| 99 | 20A | 13. | 34. | 295. | 243. | 1 | 1391. | 0.38300 | 0.00 | 0.00 | 0. | 28 | 7 | A39 | 0.01 |
| 99 | 21A | 7. | 18. | 302. | 244. | 2 | 507. | 0.00600 | 0.00 | 0.00 | 0. | 28 | 8 | A39 | 0.15 |
| 99 | 22C | 14. | 31. | 14. | 31. | 1 | 1641. | 0.26600 | 0.00 | 0.00 | 0. | 28 | 9 | A38 | 0.01 |
| 99 | 23C | 10. | 24. | 24. | 47. | 1 | 919. | 0.06100 | 0.00 | 0.00 | 0. | 28 | 8 | A39 | 0.01 |

CONFLUENCE Q'S

99 24A TA 1177 QA 243. QAC 251. QC 8. 99 24C TC 1160 QC 42. QCA 177. QA 135.

99 24AC TAC 1176 QAC 251. QA 242. QC 9.

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY

TRIANGLE RANCH UNDEVELOPED FILE R52419U,DAT

STORM DAY 4

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 24AC | 24. | 42. | 326. | 251. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 28 | 0 | A39 | 0.00 |
| 99 | 25A | 9. | 30. | 335. | 252. | 2 | 296. | 0.00700 | 0.00 | 0.00 | 0. | 28 | 5 | A39 | 0.03 |
| 99 | 26A | 0. | 0. | 335. | 251. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 28 | 99 | A39 | 0.00 |
| 99 | 27E | 19. | 67. | 19. | 67. | 1 | 1506. | 0.15300 | 0.00 | 0.00 | 0. | 36 | 7 | A39 | 0.01 |
| 99 | 28E | 20. | 77. | 39. | 121. | 1 | 1011. | 0.10800 | 0.00 | 0.00 | 0. | 36 | 6 | A39 | 0.01 |
| 99 | 29E | 30. | 116. | 69. | 205. | 1 | 1039. | 0.08850 | 0.00 | 0.00 | 0. | 36 | 6 | A39 | 0.01 |
| 99 | 30E | 9. | 26. | 78. | 210. | 1 | 1090. | 0.31830 | 0.00 | 0.00 | 0. | 28 | 6 | A39 | 0.01 |
| 99 | 31E | 28. | 60. | 106. | 260. | 1 | 1150. | 0.04610 | 0.00 | 0.00 | 0. | 28 | 10 | A39 | 0.01 |
| 99 | 32E | 20. | 47. | 126. | 258. | 1 | 1493. | 0.29070 | 0.00 | 0.00 | 0. | 28 | 8 | A38 | 0.01 |
| 99 | 33E | 18. | 39. | 144. | 264. | 1 | 1657. | 0.27280 | 0.00 | 0.00 | 0. | 28 | 9 | A38 | 0.01 |
| 99 | 34E | 4. | 12. | 148. | 262. | 1 | 610. | 0.04260 | 0.00 | 0.00 | 0. | 28 | 6 | A39 | 0.01 |
| 99 | 35E | 21. | 45. | 169. | 265. | 1 | 1832. | 0.02314 | 0.00 | 0.00 | 0. | 28 | 10 | A39 | 0.01 |
| 99 | 36E | 13. | 26. | 182. | 247. | 1 | 1081. | 0.02220 | 0.00 | 0.00 | 0. | 28 | 11 | A39 | 0.01 |
| 99 | 37E | 0. | 0. | 182. | 240. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 28 | 99 | A39 | 0.00 |

**********

CONFLUENCE Q'S

99 38A TA 1178 QA 251. QAE 488. QE 236.

99 38E TE 1176 QE 240. QEA 489. QA 249.

99 38AE TAE 1177 QAE 490. QA 251. QE 239.

**********

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 38AE | 182. | 240. | 517. | 490. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 28 | 0 | A39 | 0.00 |
| 99 | 39A | 0. | 0. | 517. | 490. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 28 | 99 | A39 | 0.00 |

10- 8-2004 SITE LICENSEE: WAGNER-HALLADAY, INC.

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY
HYDROGRAPH AT NODE 26A

UNDEVELOPED HYDROGRAPH AT 99 26A STORM DAY 4 REDUCTION FACTOR = 1.000

| TIME | Q | TIME | Q | TIME | Q | TIME | Q | TIME | Q |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0. | 100 | 7. | 200 | 7. | 300 | 8. | 400 | 8. |
| 500 | 8. | 600 | 9. | 700 | 10. | 800 | 11. | 900 | 12. |
| 1000 | 14. | 1050 | 16. | 1100 | 21. | 1110 | 24. | 1120 | 28. |
| 1130 | 35. | 1131 | 35. | 1132 | 36. | 1133 | 37. | 1134 | 38. |
| 1135 | 39. | 1136 | 40. | 1137 | 42. | 1138 | 43. | 1139 | 44. |
| 1140 | 46. | 1141 | 47. | 1142 | 49. | 1143 | 51. | 1144 | 53. |
| 1145 | 56. | 1146 | 58. | 1147 | 61. | 1148 | 64. | 1149 | 68. |
| 1150 | 73. | 1151 | 81. | 1152 | 89. | 1153 | 100. | 1154 | 112. |
| 1155 | 123. | 1156 | 132. | 1157 | 142. | 1158 | 152. | 1159 | 161. |
| 1160 | 170. | 1161 | 177. | 1162 | 182. | 1163 | 186. | 1164 | 188. |
| 1165 | 191. | 1166 | 194. | 1167 | 198. | 1168 | 203. | 1169 | 209. |
| 1170 | 215. | 1171 | 221. | 1172 | 228. | 1173 | 235. | 1174 | 241. |
| 1175 | 246. | 1176 | 249. | 1177 | 251. | 1178 | 251. | 1179 | 250. |
| 1180 | 249. | 1181 | 247. | 1182 | 244. | 1183 | 242. | 1184 | 239. |
| 1185 | 236. | 1186 | 233. | 1187 | 229. | 1188 | 225. | 1189 | 220. |
| 1190 | 214. | 1191 | 208. | 1192 | 201. | 1193 | 194. | 1194 | 186. |
| 1195 | 179. | 1196 | 171. | 1197 | 164. | 1198 | 156. | 1199 | 149. |
| 1200 | 142. | 1201 | 136. | 1202 | 130. | 1203 | 124. | 1204 | 118. |
| 1205 | 112. | 1206 | 107. | 1207 | 102. | 1208 | 98. | 1209 | 93. |
| 1210 | 89. | 1211 | 85. | 1212 | 82. | 1213 | 78. | 1214 | 75. |
| 1215 | 72. | 1216 | 69. | 1217 | 66. | 1218 | 64. | 1219 | 61. |
| 1220 | 59. | 1221 | 57. | 1222 | 55. | 1223 | 53. | 1224 | 51. |
| 1225 | 49. | 1226 | 48. | 1227 | 46. | 1228 | 45. | 1229 | 43. |
| 1230 | 42. | 1231 | 41. | 1232 | 39. | 1233 | 38. | 1234 | 37. |
| 1235 | 36. | 1236 | 35. | 1237 | 34. | 1238 | 33. | 1239 | 32. |
| 1240 | 31. | 1241 | 31. | 1242 | 30. | 1243 | 29. | 1244 | 28. |
| 1245 | 28. | 1246 | 27. | 1247 | 26. | 1248 | 26. | 1249 | 25. |
| 1250 | 25. | 1251 | 24. | 1252 | 24. | 1253 | 23. | 1254 | 23. |
| 1255 | 22. | 1256 | 22. | 1257 | 22. | 1258 | 21. | 1259 | 21. |
| 1260 | 20. | 1261 | 20. | 1262 | 20. | 1263 | 19. | 1264 | 19. |
| 1265 | 19. | 1266 | 19. | 1267 | 18. | 1268 | 18. | 1269 | 18. |
| 1270 | 18. | 1271 | 17. | 1272 | 17. | 1273 | 17. | 1274 | 17. |
| 1275 | 16. | 1276 | 16. | 1277 | 16. | 1278 | 16. | 1279 | 16. |
| 1280 | 15. | 1281 | 15. | 1282 | 15. | 1283 | 15. | 1284 | 15. |
| 1285 | 15. | 1286 | 15. | 1287 | 14. | 1288 | 14. | 1289 | 14. |
| 1290 | 14. | 1291 | 14. | 1292 | 14. | 1293 | 14. | 1294 | 14. |
| 1295 | 14. | 1296 | 13. | 1297 | 13. | 1298 | 13. | 1299 | 13. |
| 1300 | 13. | 1310 | 12. | 1320 | 12. | 1330 | 11. | 1340 | 11. |
| 1350 | 10. | 1360 | 10. | 1370 | 10. | 1380 | 9. | 1390 | 9. |
| 1400 | 9. | 1420 | 9. | 1440 | 8. | 1460 | 7. | 1500 | 7. |

Total Runoff = 37.872 Acre-Ft.
Peak Q = 251 CFS
Time to Peak Q = 1177 Minutes

10- 8-2004 SITE LICENSEE: WAGNER-HALLADAY, INC.

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY
HYDROGRAPH AT NODE 37E

UNDEVELOPED HYDROGRAPH AT 99 37E STORM DAY 4 REDUCTION FACTOR = 1.000

| TIME | Q | TIME | Q | TIME | Q | TIME | Q | TIME | Q |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0. | 100 | 4. | 200 | 4. | 300 | 4. | 400 | 4. |
| 500 | 4. | 600 | 5. | 700 | 6. | 800 | 8. | 900 | 10. |
| 1000 | 13. | 1050 | 16. | 1100 | 23. | 1110 | 25. | 1120 | 28. |
| 1130 | 33. | 1131 | 34. | 1132 | 35. | 1133 | 35. | 1134 | 36. |
| 1135 | 37. | 1136 | 37. | 1137 | 38. | 1138 | 39. | 1139 | 40. |
| 1140 | 41. | 1141 | 42. | 1142 | 43. | 1143 | 44. | 1144 | 46. |
| 1145 | 47. | 1146 | 48. | 1147 | 50. | 1148 | 52. | 1149 | 53. |
| 1150 | 55. | 1151 | 57. | 1152 | 60. | 1153 | 63. | 1154 | 67. |
| 1155 | 71. | 1156 | 76. | 1157 | 82. | 1158 | 87. | 1159 | 92. |
| 1160 | 98. | 1161 | 105. | 1162 | 112. | 1163 | 121. | 1164 | 129. |
| 1165 | 139. | 1166 | 149. | 1167 | 160. | 1168 | 171. | 1169 | 183. |
| 1170 | 195. | 1171 | 207. | 1172 | 218. | 1173 | 226. | 1174 | 233. |
| 1175 | 238. | 1176 | 240. | 1177 | 239. | 1178 | 236. | 1179 | 232. |
| 1180 | 226. | 1181 | 219. | 1182 | 211. | 1183 | 202. | 1184 | 194. |
| 1185 | 185. | 1186 | 176. | 1187 | 168. | 1188 | 160. | 1189 | 152. |
| 1190 | 145. | 1191 | 138. | 1192 | 131. | 1193 | 125. | 1194 | 119. |
| 1195 | 113. | 1196 | 108. | 1197 | 103. | 1198 | 98. | 1199 | 94. |
| 1200 | 90. | 1201 | 86. | 1202 | 82. | 1203 | 79. | 1204 | 75. |
| 1205 | 72. | 1206 | 69. | 1207 | 67. | 1208 | 64. | 1209 | 62. |
| 1210 | 59. | 1211 | 57. | 1212 | 55. | 1213 | 53. | 1214 | 52. |
| 1215 | 50. | 1216 | 48. | 1217 | 47. | 1218 | 45. | 1219 | 44. |
| 1220 | 43. | 1221 | 41. | 1222 | 40. | 1223 | 39. | 1224 | 38. |
| 1225 | 37. | 1226 | 36. | 1227 | 35. | 1228 | 34. | 1229 | 34. |
| 1230 | 33. | 1231 | 32. | 1232 | 31. | 1233 | 31. | 1234 | 30. |
| 1235 | 29. | 1236 | 29. | 1237 | 28. | 1238 | 28. | 1239 | 27. |
| 1240 | 27. | 1241 | 26. | 1242 | 26. | 1243 | 25. | 1244 | 25. |
| 1245 | 24. | 1246 | 24. | 1247 | 23. | 1248 | 23. | 1249 | 23. |
| 1250 | 22. | 1251 | 22. | 1252 | 22. | 1253 | 21. | 1254 | 21. |
| 1255 | 21. | 1256 | 20. | 1257 | 20. | 1258 | 20. | 1259 | 19. |
| 1260 | 19. | 1261 | 19. | 1262 | 19. | 1263 | 18. | 1264 | 18. |
| 1265 | 18. | 1266 | 18. | 1267 | 17. | 1268 | 17. | 1269 | 17. |
| 1270 | 17. | 1271 | 17. | 1272 | 16. | 1273 | 16. | 1274 | 16. |
| 1275 | 16. | 1276 | 16. | 1277 | 16. | 1278 | 15. | 1279 | 15. |
| 1280 | 15. | 1281 | 15. | 1282 | 15. | 1283 | 15. | 1284 | 14. |
| 1285 | 14. | 1286 | 14. | 1287 | 14. | 1288 | 14. | 1289 | 14. |
| 1290 | 14. | 1291 | 13. | 1292 | 13. | 1293 | 13. | 1294 | 13. |
| 1295 | 13. | 1296 | 13. | 1297 | 13. | 1298 | 13. | 1299 | 12. |
| 1300 | 12. | 1310 | 11. | 1320 | 10. | 1330 | 10. | 1340 | 9. |
| 1350 | 8. | 1360 | 8. | 1370 | 7. | 1380 | 7. | 1390 | 7. |
| 1400 | 6. | 1420 | 6. | 1440 | 5. | 1460 | 4. | 1500 | 4. |

Total Runoff = 28.411 Acre-Ft.
Peak Q = 240 CFS
Time to Peak Q = 1176 Minutes

10- 8-2004 SITE LICENSEE: WAGNER-HALLADAY, INC.

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY
HYDROGRAPH AT LOWER END OF PROJECT (SILVER CREEK RD)

HYDROGRAPH AT 99 39A STORM DAY 4 REDUCTION FACTOR = 1.000

| TIME | Q | TIME | Q | TIME | Q | TIME | Q | TIME | Q |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0. | 100 | 11. | 200 | 11. | 300 | 11. | 400 | 12. |
| 500 | 13. | 600 | 14. | 700 | 16. | 800 | 18. | 900 | 22. |
| 1000 | 27. | 1050 | 32. | 1100 | 45. | 1110 | 49. | 1120 | 56. |
| 1130 | 68. | 1131 | 69. | 1132 | 71. | 1133 | 72. | 1134 | 74. |
| 1135 | 76. | 1136 | 78. | 1137 | 80. | 1138 | 82. | 1139 | 84. |
| 1140 | 87. | 1141 | 89. | 1142 | 92. | 1143 | 96. | 1144 | 99. |
| 1145 | 103. | 1146 | 107. | 1147 | 111. | 1148 | 116. | 1149 | 121. |
| 1150 | 128. | 1151 | 138. | 1152 | 149. | 1153 | 163. | 1154 | 178. |
| 1155 | 194. | 1156 | 209. | 1157 | 224. | 1158 | 239. | 1159 | 253. |
| 1160 | 268. | 1161 | 282. | 1162 | 295. | 1163 | 306. | 1164 | 318. |
| 1165 | 330. | 1166 | 343. | 1167 | 358. | 1168 | 375. | 1169 | 392. |
| 1170 | 410. | 1171 | 428. | 1172 | 445. | 1173 | 461. | 1174 | 474. |
| 1175 | 483. | 1176 | 489. | 1177 | 490. | 1178 | 488. | 1179 | 482. |
| 1180 | 475. | 1181 | 465. | 1182 | 455. | 1183 | 444. | 1184 | 433. |
| 1185 | 421. | 1186 | 410. | 1187 | 398. | 1188 | 385. | 1189 | 372. |
| 1190 | 359. | 1191 | 346. | 1192 | 332. | 1193 | 318. | 1194 | 305. |
| 1195 | 292. | 1196 | 279. | 1197 | 267. | 1198 | 255. | 1199 | 243. |
| 1200 | 232. | 1201 | 222. | 1202 | 212. | 1203 | 202. | 1204 | 193. |
| 1205 | 185. | 1206 | 177. | 1207 | 169. | 1208 | 162. | 1209 | 155. |
| 1210 | 149. | 1211 | 143. | 1212 | 137. | 1213 | 132. | 1214 | 127. |
| 1215 | 122. | 1216 | 117. | 1217 | 113. | 1218 | 109. | 1219 | 105. |
| 1220 | 102. | 1221 | 98. | 1222 | 95. | 1223 | 92. | 1224 | 89. |
| 1225 | 86. | 1226 | 84. | 1227 | 81. | 1228 | 79. | 1229 | 77. |
| 1230 | 75. | 1231 | 73. | 1232 | 71. | 1233 | 69. | 1234 | 67. |
| 1235 | 65. | 1236 | 64. | 1237 | 62. | 1238 | 61. | 1239 | 59. |
| 1240 | 58. | 1241 | 57. | 1242 | 55. | 1243 | 54. | 1244 | 53. |
| 1245 | 52. | 1246 | 51. | 1247 | 50. | 1248 | 49. | 1249 | 48. |
| 1250 | 47. | 1251 | 46. | 1252 | 45. | 1253 | 45. | 1254 | 44. |
| 1255 | 43. | 1256 | 42. | 1257 | 42. | 1258 | 41. | 1259 | 40. |
| 1260 | 40. | 1261 | 39. | 1262 | 38. | 1263 | 38. | 1264 | 37. |
| 1265 | 37. | 1266 | 36. | 1267 | 36. | 1268 | 35. | 1269 | 35. |
| 1270 | 34. | 1271 | 34. | 1272 | 33. | 1273 | 33. | 1274 | 33. |
| 1275 | 32. | 1276 | 32. | 1277 | 32. | 1278 | 31. | 1279 | 31. |
| 1280 | 31. | 1281 | 30. | 1282 | 30. | 1283 | 30. | 1284 | 29. |
| 1285 | 29. | 1286 | 29. | 1287 | 28. | 1288 | 28. | 1289 | 28. |
| 1290 | 28. | 1291 | 27. | 1292 | 27. | 1293 | 27. | 1294 | 27. |
| 1295 | 26. | 1296 | 26. | 1297 | 26. | 1298 | 26. | 1299 | 26. |
| 1300 | 25. | 1310 | 23. | 1320 | 22. | 1330 | 21. | 1340 | 20. |
| 1350 | 19. | 1360 | 18. | 1370 | 17. | 1380 | 16. | 1390 | 16. |
| 1400 | 15. | 1420 | 14. | 1440 | 13. | 1460 | 12. | 1500 | 11. |

Total Runoff = 66.229 Acre-Ft.
Peak Q = 490 CFS
Time to Peak Q = 1177 Minutes

```
4LADEPTH.RDT
5     99    1A TRIANGLE RANCH BURNED UNDEVELOPED  FILE R52419UB,DAT
5     99   26A HYDROGRAPH AT NODE 26A
5     99   37E HYDROGRAPH AT NODE 37E
5     99   39A HYDROGRAPH AT SILVER CREEK RD
6     99    1A 178 01  18 7A381 1439 51800                    G1
6     99    2A 178 01  22 9A381 1071 23300
6     99    3A 178 01  41 9A381  955 14100
6     99    4A 178  2  14 8A381  986 08620
6     99    5A 178 02  1116A382 1414 00900
6     99    6A 178 01  31 9A381 1670 24000
6     99    7A 178 02   8 8A382  529 00600
6     99    8B 178 01  17 8A391 1599 49100
6     99    9B 178 01  17 9A381 1364 10300
6     99   10B 178 01   8 8A391 1518 27300
6     99   11AB178         A38                              1
6     99   12A 178 01  11 7A391 1170 29490
6     99   13A 178 20   6 7A382  333 00300
6     99   14D 178 01  12 6A391 1250 49600
6     99   15D 178 01  2210A391 1623 13600
6     99   16AD178         A39                              1
6     99   17A 178 05   4 9A392  446 00200
6     99   18A 178 01  26 9A381 1629 25300
6     99   19A 178 09  1411A392  836 00600
6     99   20A 178 01  13 7A391 1391 38300
6     99   21A 178 15   7 8A392  507 00600
6     99   22C 178 01  14 9A381 1641 26600
6     99   23C 178 01  10 8A391  919 06100
6     99   24AC178         A39                              1
6     99   25A 178 03   9 5A392  296 00680
6     99   26A 178       99A39                             1
6     99   27E 186 01  19 7A391 1506 15300
6     99   28E 186 01  20 6A391 1011 10800
6     99   29E 186 01  30 6A391 1039 08850
6     99   30E 178 01   9 6A391 1090 31830
6     99   31E 178 01  2810A391 1150 04610
6     99   32E 178 01  20 8A381 1493 29070
6     99   33E 178 01  18 9A381 1657 27280
6     99   34E 178 01   4 6A391  610 04260
6     99   35E 178 01  2110A391 1832  2314
6     99   36E 178 01  1311A391 1081 02220
6     99   37E 178  0    99A39                             1
6     99   38AE178  0      A39                              1
6    99   39A 178       99A39                             1  2
91781 14  7 000 0000 170 0000 410 0680 455 0820 498 0970 606 1500 675 2000
91781 14 14 724 2500 763 3000 790 3500 827 4500 840 5000 859 6000 873 7000
91861 14  7 000 0000 100 0000 100 0160 380 0230 472 0300 645 0540 727 0800
91861 14 14 766 0990 804 1240 841 1590 871 2000 918 3000 946 4000 980 7000
```

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY
PROG FO601A

TRIANGLE RANCH BURNED UNDEVELOPED FILE R52419UB,DAT
STORM DAY 4

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 1A | 18. | 55. | 18. | 55. | 1 | 1439. | 0.51800 | 0.00 | 0.00 | 0. | 178 | 7 | A38 | 0.01 |
| 99 | 2A | 22. | 59. | 40. | 111. | 1 | 1071. | 0.23300 | 0.00 | 0.00 | 0. | 178 | 9 | A38 | 0.01 |
| 99 | 3A | 41. | 110. | 81. | 211. | 1 | 955. | 0.14100 | 0.00 | 0.00 | 0. | 178 | 9 | A38 | 0.01 |
| 99 | 4A | 14. | 40. | 95. | 238. | 1 | 986. | 0.08620 | 0.00 | 0.00 | 0. | 178 | 8 | A38 | 0.02 |
| 99 | 5A | 11. | 21. | 106. | 253. | 2 | 1414. | 0.00900 | 0.00 | 0.00 | 0. | 178 | 16 | A38 | 0.02 |
| 99 | 6A | 31. | 83. | 137. | 241. | 1 | 1670. | 0.24000 | 0.00 | 0.00 | 0. | 178 | 9 | A38 | 0.01 |
| 99 | 7A | 8. | 23. | 145. | 241. | 2 | 529. | 0.00600 | 0.00 | 0.00 | 0. | 178 | 8 | A38 | 0.02 |
| 99 | 8B | 17. | 50. | 17. | 50. | 1 | 1599. | 0.49100 | 0.00 | 0.00 | 0. | 178 | 8 | A39 | 0.01 |
| 99 | 9B | 17. | 46. | 34. | 92. | 1 | 1364. | 0.10300 | 0.00 | 0.00 | 0. | 178 | 9 | A38 | 0.01 |
| 99 | 10B | 8. | 24. | 42. | 98. | 1 | 1518. | 0.27300 | 0.00 | 0.00 | 0. | 178 | 8 | A39 | 0.01 |

CONFLUENCE Q'S

99 11A TA 1169 QA 237. QAB 287. QB 50. 99 11B TB 1161 QB 95. QBA 284. QA 189.
99 11AB TAB 1167 QAB 295. QA 232. QB 63.

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 11AB | 42. | 95. | 187. | 295. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 178 | 0 | A38 | 0.00 |
| 99 | 12A | 11. | 35. | 198. | 299. | 1 | 1170. | 0.29490 | 0.00 | 0.00 | 0. | 178 | 7 | A39 | 0.01 |
| 99 | 13A | 6. | 19. | 204. | 301. | 2 | 333. | 0.00300 | 0.00 | 0.00 | 0. | 178 | 7 | A38 | 0.20 |
| 99 | 14D | 12. | 42. | 12. | 42. | 1 | 1250. | 0.49600 | 0.00 | 0.00 | 0. | 178 | 6 | A39 | 0.01 |
| 99 | 15D | 22. | 58. | 34. | 97. | 1 | 1623. | 0.13600 | 0.00 | 0.00 | 0. | 178 | 10 | A39 | 0.01 |

CONFLUENCE Q'S

99 16A TA 1169 QA 301. QAD 328. QD 27. 99 16D TD 1159 QD 89. QDA 330. QA 241.
99 16AD TAD 1162 QAD 354. QA 278. QD 76.

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 16AD | 34. | 89. | 238. | 354. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 178 | 0 | A39 | 0.00 |
| 99 | 17A | 4. | 11. | 242. | 357. | 2 | 446. | 0.00200 | 0.00 | 0.00 | 0. | 178 | 9 | A39 | 0.05 |
| 99 | 18A | 26. | 70. | 268. | 363. | 1 | 1629. | 0.25300 | 0.00 | 0.00 | 0. | 178 | 9 | A38 | 0.01 |
| 99 | 19A | 14. | 36. | 282. | 368. | 2 | 836. | 0.00600 | 0.00 | 0.00 | 0. | 178 | 11 | A39 | 0.09 |
| 99 | 20A | 13. | 41. | 295. | 368. | 1 | 1391. | 0.38300 | 0.00 | 0.00 | 0. | 178 | 7 | A39 | 0.01 |
| 99 | 21A | 7. | 21. | 302. | 370. | 2 | 507. | 0.00600 | 0.00 | 0.00 | 0. | 178 | 8 | A39 | 0.15 |
| 99 | 22C | 14. | 38. | 14. | 38. | 1 | 1641. | 0.26600 | 0.00 | 0.00 | 0. | 178 | 9 | A38 | 0.01 |
| 99 | 23C | 10. | 30. | 24. | 60. | 1 | 919. | 0.06100 | 0.00 | 0.00 | 0. | 178 | 8 | A39 | 0.01 |

CONFLUENCE Q'S

99 24A TA 1174 QA 369. QAC 384. QC 15. 99 24C TC 1160 QC 55. QCA 307. QA 252.
99 24AC TAC 1173 QAC 384. QA 368. QC 17.

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY

TRIANGLE RANCH BURNED UNDEVELOPED FILE R52419UB,DAT

STORM DAY 4

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 24AC | 24. | 55. | 326. | 384. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 178 | 0 | A39 | 0.00 |
| 99 | 25A | 9. | 35. | 335. | 387. | 2 | 296. | 0.00680 | 0.00 | 0.00 | 0. | 178 | 5 | A39 | 0.03 |
| 99 | 26A | 0. | 0. | 335. | 386. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 178 | 99 | A39 | 0.00 |
| 99 | 27E | 19. | 70. | 19. | 70. | 1 | 1506. | 0.15300 | 0.00 | 0.00 | 0. | 186 | 7 | A39 | 0.01 |
| 99 | 28E | 20. | 80. | 39. | 127. | 1 | 1011. | 0.10800 | 0.00 | 0.00 | 0. | 186 | 6 | A39 | 0.01 |
| 99 | 29E | 30. | 121. | 69. | 216. | 1 | 1039. | 0.08850 | 0.00 | 0.00 | 0. | 186 | 6 | A39 | 0.01 |
| 99 | 30E | 9. | 31. | 78. | 226. | 1 | 1090. | 0.31830 | 0.00 | 0.00 | 0. | 178 | 6 | A39 | 0.01 |
| 99 | 31E | 28. | 74. | 106. | 290. | 1 | 1150. | 0.04610 | 0.00 | 0.00 | 0. | 178 | 10 | A39 | 0.01 |
| 99 | 32E | 20. | 57. | 126. | 297. | 1 | 1493. | 0.29070 | 0.00 | 0.00 | 0. | 178 | 8 | A38 | 0.01 |
| 99 | 33E | 18. | 48. | 144. | 311. | 1 | 1657. | 0.27280 | 0.00 | 0.00 | 0. | 178 | 9 | A38 | 0.01 |
| 99 | 34E | 4. | 14. | 148. | 311. | 1 | 610. | 0.04260 | 0.00 | 0.00 | 0. | 178 | 6 | A39 | 0.01 |
| 99 | 35E | 21. | 55. | 169. | 320. | 1 | 1832. | 0.02314 | 0.00 | 0.00 | 0. | 178 | 10 | A39 | 0.01 |
| 99 | 36E | 13. | 32. | 182. | 306. | 1 | 1081. | 0.02220 | 0.00 | 0.00 | 0. | 178 | 11 | A39 | 0.01 |
| 99 | 37E | 0. | 0. | 182. | 299. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 178 | 99 | A39 | 0.00 |

**********

CONFLUENCE Q'S

99 38A TA 1174 QA 386. QAE 685. QE 299.

99 38E TE 1174 QE 299. QEA 685. QA 386.

99 38AE TAE 1174 QAE 685. QA 386. QE 299.

**********

| LOCATION | | SUBAREA AREA | SUBAREA Q | TOTAL AREA | TOTAL Q | CONV TYPE | CONV LNGTH | CONV SLOPE | CONV SIZE | CONV Z | CONTROL Q | SOIL NAME | TC | RAIN ZONE | PCT IMPV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 38AE | 182. | 299. | 517. | 685. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 178 | 0 | A39 | 0.00 |
| 99 | 39A | 0. | 0. | 517. | 685. | 0 | 0. | 0.00000 | 0.00 | 0.00 | 0. | 178 | 99 | A39 | 0.00 |

10- 8-2004 SITE LICENSEE: WAGNER-HALLADAY, INC.

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY
HYDROGRAPH AT NODE 26A

UNDEVELOPED BURNED HYDROGRAPH AT 99 26A STORM DAY 4 REDUCTION FACTOR = 1.000

| TIME | Q | TIME | Q | TIME | Q | TIME | Q | TIME | Q |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0. | 100 | 25. | 200 | 25. | 300 | 26. | 400 | 28. |
| 500 | 29. | 600 | 32. | 700 | 34. | 800 | 38. | 900 | 43. |
| 1000 | 51. | 1050 | 59. | 1100 | 74. | 1110 | 79. | 1120 | 88. |
| 1130 | 101. | 1131 | 103. | 1132 | 105. | 1133 | 106. | 1134 | 108. |
| 1135 | 110. | 1136 | 112. | 1137 | 114. | 1138 | 117. | 1139 | 119. |
| 1140 | 122. | 1141 | 125. | 1142 | 128. | 1143 | 131. | 1144 | 135. |
| 1145 | 138. | 1146 | 142. | 1147 | 147. | 1148 | 152. | 1149 | 158. |
| 1150 | 167. | 1151 | 177. | 1152 | 190. | 1153 | 205. | 1154 | 222. |
| 1155 | 237. | 1156 | 251. | 1157 | 265. | 1158 | 278. | 1159 | 290. |
| 1160 | 301. | 1161 | 310. | 1162 | 317. | 1163 | 321. | 1164 | 326. |
| 1165 | 331. | 1166 | 339. | 1167 | 347. | 1168 | 355. | 1169 | 364. |
| 1170 | 371. | 1171 | 377. | 1172 | 381. | 1173 | 385. | 1174 | 386. |
| 1175 | 386. | 1176 | 384. | 1177 | 380. | 1178 | 376. | 1179 | 372. |
| 1180 | 367. | 1181 | 362. | 1182 | 356. | 1183 | 350. | 1184 | 342. |
| 1185 | 334. | 1186 | 325. | 1187 | 316. | 1188 | 305. | 1189 | 294. |
| 1190 | 283. | 1191 | 272. | 1192 | 261. | 1193 | 249. | 1194 | 239. |
| 1195 | 228. | 1196 | 218. | 1197 | 208. | 1198 | 199. | 1199 | 191. |
| 1200 | 182. | 1201 | 174. | 1202 | 167. | 1203 | 160. | 1204 | 154. |
| 1205 | 148. | 1206 | 142. | 1207 | 137. | 1208 | 132. | 1209 | 127. |
| 1210 | 123. | 1211 | 118. | 1212 | 114. | 1213 | 111. | 1214 | 107. |
| 1215 | 104. | 1216 | 101. | 1217 | 98. | 1218 | 96. | 1219 | 93. |
| 1220 | 91. | 1221 | 88. | 1222 | 86. | 1223 | 84. | 1224 | 82. |
| 1225 | 81. | 1226 | 79. | 1227 | 77. | 1228 | 76. | 1229 | 74. |
| 1230 | 73. | 1231 | 72. | 1232 | 71. | 1233 | 70. | 1234 | 68. |
| 1235 | 67. | 1236 | 66. | 1237 | 65. | 1238 | 64. | 1239 | 64. |
| 1240 | 63. | 1241 | 62. | 1242 | 61. | 1243 | 60. | 1244 | 60. |
| 1245 | 59. | 1246 | 58. | 1247 | 58. | 1248 | 57. | 1249 | 57. |
| 1250 | 56. | 1251 | 55. | 1252 | 55. | 1253 | 54. | 1254 | 54. |
| 1255 | 53. | 1256 | 53. | 1257 | 53. | 1258 | 52. | 1259 | 52. |
| 1260 | 51. | 1261 | 51. | 1262 | 50. | 1263 | 50. | 1264 | 50. |
| 1265 | 49. | 1266 | 49. | 1267 | 49. | 1268 | 48. | 1269 | 48. |
| 1270 | 48. | 1271 | 47. | 1272 | 47. | 1273 | 47. | 1274 | 46. |
| 1275 | 46. | 1276 | 46. | 1277 | 46. | 1278 | 45. | 1279 | 45. |
| 1280 | 45. | 1281 | 44. | 1282 | 44. | 1283 | 44. | 1284 | 44. |
| 1285 | 43. | 1286 | 43. | 1287 | 43. | 1288 | 43. | 1289 | 42. |
| 1290 | 42. | 1291 | 42. | 1292 | 42. | 1293 | 42. | 1294 | 41. |
| 1295 | 41. | 1296 | 41. | 1297 | 41. | 1298 | 41. | 1299 | 40. |
| 1300 | 40. | 1310 | 39. | 1320 | 37. | 1330 | 36. | 1340 | 34. |
| 1350 | 33. | 1360 | 32. | 1370 | 31. | 1380 | 31. | 1390 | 30. |
| 1400 | 29. | 1420 | 28. | 1440 | 27. | 1460 | 25. | 1500 | 25. |

Total Runoff = 96.063 Acre-Ft.
Peak Q = 386 CFS
Time to Peak Q = 1174 Minutes

10- 8-2004 SITE LICENSEE: WAGNER-HALLADAY, INC.

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY
HYDROGRAPH AT NODE 37E

UNDEVELOPED BURNED HYDROGRAPH AT 99 37E STORM DAY 4 REDUCTION FACTOR = 1.000

| TIME | Q | TIME | Q | TIME | Q | TIME | Q | TIME | Q |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0. | 100 | 11. | 200 | 11. | 300 | 12. | 400 | 13. |
| 500 | 14. | 600 | 16. | 700 | 18. | 800 | 21. | 900 | 24. |
| 1000 | 30. | 1050 | 36. | 1100 | 47. | 1110 | 50. | 1120 | 55. |
| 1130 | 63. | 1131 | 64. | 1132 | 65. | 1133 | 66. | 1134 | 67. |
| 1135 | 68. | 1136 | 69. | 1137 | 70. | 1138 | 72. | 1139 | 73. |
| 1140 | 74. | 1141 | 76. | 1142 | 78. | 1143 | 79. | 1144 | 81. |
| 1145 | 83. | 1146 | 85. | 1147 | 87. | 1148 | 90. | 1149 | 92. |
| 1150 | 95. | 1151 | 98. | 1152 | 102. | 1153 | 106. | 1154 | 111. |
| 1155 | 118. | 1156 | 124. | 1157 | 131. | 1158 | 138. | 1159 | 146. |
| 1160 | 154. | 1161 | 163. | 1162 | 174. | 1163 | 185. | 1164 | 197. |
| 1165 | 210. | 1166 | 223. | 1167 | 236. | 1168 | 249. | 1169 | 262. |
| 1170 | 273. | 1171 | 283. | 1172 | 291. | 1173 | 296. | 1174 | 299. |
| 1175 | 298. | 1176 | 295. | 1177 | 290. | 1178 | 282. | 1179 | 274. |
| 1180 | 264. | 1181 | 253. | 1182 | 243. | 1183 | 232. | 1184 | 221. |
| 1185 | 211. | 1186 | 201. | 1187 | 191. | 1188 | 182. | 1189 | 174. |
| 1190 | 166. | 1191 | 158. | 1192 | 151. | 1193 | 144. | 1194 | 137. |
| 1195 | 131. | 1196 | 126. | 1197 | 120. | 1198 | 115. | 1199 | 111. |
| 1200 | 106. | 1201 | 102. | 1202 | 98. | 1203 | 95. | 1204 | 91. |
| 1205 | 88. | 1206 | 85. | 1207 | 82. | 1208 | 80. | 1209 | 77. |
| 1210 | 75. | 1211 | 73. | 1212 | 70. | 1213 | 69. | 1214 | 67. |
| 1215 | 65. | 1216 | 63. | 1217 | 62. | 1218 | 60. | 1219 | 59. |
| 1220 | 57. | 1221 | 56. | 1222 | 55. | 1223 | 54. | 1224 | 53. |
| 1225 | 52. | 1226 | 51. | 1227 | 50. | 1228 | 49. | 1229 | 48. |
| 1230 | 47. | 1231 | 46. | 1232 | 46. | 1233 | 45. | 1234 | 44. |
| 1235 | 44. | 1236 | 43. | 1237 | 42. | 1238 | 42. | 1239 | 41. |
| 1240 | 40. | 1241 | 40. | 1242 | 39. | 1243 | 39. | 1244 | 38. |
| 1245 | 38. | 1246 | 37. | 1247 | 37. | 1248 | 37. | 1249 | 36. |
| 1250 | 36. | 1251 | 35. | 1252 | 35. | 1253 | 35. | 1254 | 34. |
| 1255 | 34. | 1256 | 34. | 1257 | 33. | 1258 | 33. | 1259 | 33. |
| 1260 | 32. | 1261 | 32. | 1262 | 32. | 1263 | 31. | 1264 | 31. |
| 1265 | 31. | 1266 | 31. | 1267 | 30. | 1268 | 30. | 1269 | 30. |
| 1270 | 30. | 1271 | 29. | 1272 | 29. | 1273 | 29. | 1274 | 29. |
| 1275 | 28. | 1276 | 28. | 1277 | 28. | 1278 | 28. | 1279 | 28. |
| 1280 | 27. | 1281 | 27. | 1282 | 27. | 1283 | 27. | 1284 | 26. |
| 1285 | 26. | 1286 | 26. | 1287 | 26. | 1288 | 26. | 1289 | 26. |
| 1290 | 25. | 1291 | 25. | 1292 | 25. | 1293 | 25. | 1294 | 25. |
| 1295 | 25. | 1296 | 24. | 1297 | 24. | 1298 | 24. | 1299 | 24. |
| 1300 | 24. | 1310 | 22. | 1320 | 21. | 1330 | 20. | 1340 | 19. |
| 1350 | 18. | 1360 | 18. | 1370 | 17. | 1380 | 16. | 1390 | 16. |
| 1400 | 15. | 1420 | 14. | 1440 | 13. | 1460 | 12. | 1500 | 11. |

Total Runoff = 54.322 Acre-Ft.
Peak Q = 299 CFS
Time to Peak Q = 1174 Minutes

10- 8-2004 SITE LICENSEE: WAGNER-HALLADAY, INC

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MODIFIED RATIONAL METHOD HYDROLOGY
HYDROGRAPH AT SILVER CREEK RD

UNDEVELOPED BURNED HYDROGRAPH AT 99 39A STORM DAY 4 REDUCTION FACTOR = 1.000

| TIME | Q | TIME | Q | TIME | Q | TIME | Q | TIME | Q |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0. | 100 | 35. | 200 | 36. | 300 | 38. | 400 | 41. |
| 500 | 44. | 600 | 48. | 700 | 52. | 800 | 58. | 900 | 67. |
| 1000 | 81. | 1050 | 95. | 1100 | 121. | 1110 | 129. | 1120 | 143. |
| 1130 | 164. | 1131 | 167. | 1132 | 169. | 1133 | 172. | 1134 | 175. |
| 1135 | 178. | 1136 | 181. | 1137 | 185. | 1138 | 188. | 1139 | 192. |
| 1140 | 196. | 1141 | 201. | 1142 | 205. | 1143 | 211. | 1144 | 216. |
| 1145 | 221. | 1146 | 228. | 1147 | 235. | 1148 | 242. | 1149 | 251. |
| 1150 | 262. | 1151 | 275. | 1152 | 291. | 1153 | 311. | 1154 | 333. |
| 1155 | 354. | 1156 | 375. | 1157 | 396. | 1158 | 416. | 1159 | 436. |
| 1160 | 455. | 1161 | 474. | 1162 | 491. | 1163 | 507. | 1164 | 523. |
| 1165 | 541. | 1166 | 561. | 1167 | 583. | 1168 | 604. | 1169 | 625. |
| 1170 | 644. | 1171 | 660. | 1172 | 672. | 1173 | 681. | 1174 | 685. |
| 1175 | 684. | 1176 | 679. | 1177 | 670. | 1178 | 659. | 1179 | 645. |
| 1180 | 631. | 1181 | 615. | 1182 | 599. | 1183 | 581. | 1184 | 564. |
| 1185 | 545. | 1186 | 526. | 1187 | 507. | 1188 | 488. | 1189 | 468. |
| 1190 | 449. | 1191 | 430. | 1192 | 411. | 1193 | 393. | 1194 | 376. |
| 1195 | 359. | 1196 | 344. | 1197 | 329. | 1198 | 314. | 1199 | 301. |
| 1200 | 289. | 1201 | 277. | 1202 | 265. | 1203 | 255. | 1204 | 245. |
| 1205 | 236. | 1206 | 227. | 1207 | 219. | 1208 | 211. | 1209 | 204. |
| 1210 | 197. | 1211 | 191. | 1212 | 185. | 1213 | 179. | 1214 | 174. |
| 1215 | 169. | 1216 | 165. | 1217 | 160. | 1218 | 156. | 1219 | 152. |
| 1220 | 148. | 1221 | 145. | 1222 | 141. | 1223 | 138. | 1224 | 135. |
| 1225 | 132. | 1226 | 130. | 1227 | 127. | 1228 | 125. | 1229 | 122. |
| 1230 | 120. | 1231 | 118. | 1232 | 116. | 1233 | 114. | 1234 | 113. |
| 1235 | 111. | 1236 | 109. | 1237 | 108. | 1238 | 106. | 1239 | 105. |
| 1240 | 103. | 1241 | 102. | 1242 | 100. | 1243 | 99. | 1244 | 98. |
| 1245 | 97. | 1246 | 96. | 1247 | 95. | 1248 | 94. | 1249 | 93. |
| 1250 | 92. | 1251 | 91. | 1252 | 90. | 1253 | 89. | 1254 | 88. |
| 1255 | 87. | 1256 | 87. | 1257 | 86. | 1258 | 85. | 1259 | 84. |
| 1260 | 84. | 1261 | 83. | 1262 | 82. | 1263 | 81. | 1264 | 81. |
| 1265 | 80. | 1266 | 80. | 1267 | 79. | 1268 | 78. | 1269 | 78. |
| 1270 | 77. | 1271 | 77. | 1272 | 76. | 1273 | 76. | 1274 | 75. |
| 1275 | 75. | 1276 | 74. | 1277 | 73. | 1278 | 73. | 1279 | 72. |
| 1280 | 72. | 1281 | 72. | 1282 | 71. | 1283 | 71. | 1284 | 70. |
| 1285 | 70. | 1286 | 69. | 1287 | 69. | 1288 | 68. | 1289 | 68. |
| 1290 | 68. | 1291 | 67. | 1292 | 67. | 1293 | 66. | 1294 | 66. |
| 1295 | 66. | 1296 | 65. | 1297 | 65. | 1298 | 65. | 1299 | 64. |
| 1300 | 64. | 1310 | 61. | 1320 | 58. | 1330 | 56. | 1340 | 54. |
| 1350 | 52. | 1360 | 50. | 1370 | 48. | 1380 | 47. | 1390 | 46. |
| 1400 | 44. | 1420 | 42. | 1440 | 40. | 1460 | 36. | 1500 | 35. |

Total Runoff = 150.209 Acre-Ft.
Peak Q = 685 CFS
Time to Peak Q = 1174 Minutes

**To Be Provided:**
**MORA AND Tc CALCULATIONS DISK**

# E. PEAK MITIGATION FLOW CALCULATIONS

# APPENDIX A VOLUME & FLOW RATE CALCULATIONS

## A.1 METHOD FOR CALCULATING STANDARD URBAN STORMWATER MITIGATION PLAN FLOW RATES AND VOLUMES BASED ON 0.75-INCHES OF RAINFALL: WORKSHEET

**PROJECT NAME**

TRACT 52419 ; TRIANGLE RANCH

# APPENDIX A VOLUME & FLOW RATE CALCULATIONS

## NOMENCLATURE

$A_I$ = Impervious Area (acres)
$A_P$ = Pervious Area (acres)
$A_U$ = Contributing Undeveloped Upstream Area (acres)
$A_{Total}$ = Total Area of Development and Contributing Undeveloped Upstream Area (acres)
$C_D$ = Developed Runoff Coefficient
$C_U$ = Undeveloped Runoff Coefficient
$I_X$ = Rainfall Intensity (inches / hour)
$Q_{PM}$ = Peak Mitigation Flow Rate (cfs)
$T_C$ = Time of Concentration (minutes, must be between 5-30 min.)
$V_M$ = Mitigation Volume ($ft^3$)

## EQUATIONS

$A_{Total} = A_I + A_P + A_U$
$A_I = (A_{Total} * \%$ of Development which is Impervious)
$A_P = (A_{Total} * \%$ of Development which is Pervious)
$A_U = (A_{Total} * \%$ of Contributing Undeveloped Upstream Area***)

$C_D = ( 0.9 * Imp. ) + [ ( 1.0 - Imp. ) * C_U ]$ If $C_D < C_U$, use $C_D = C_U$

$Q_{PM} = C_D * I_X * A_{Total} * ( 1$ hour / 3,600 seconds) * (1 ft / 12 inches) * (43,560 $ft^2$ / 1 acre)
$= C_D * I_X * A_{Total} * (1.008333\ ft^3$-hour / acre-inches-seconds)

$T_C = 10^{-0.507} * ( C_D * I_X )^{-0.519} * Length^{0.483} * Slope^{-0.135}$

$V_M = (0.75$ inches) * $[( A_I )( 0.9 ) + (A_P + A_U)( C_U )]$ * (1 ft / 12 inches) * (43,560 $ft^2$ / 1 acre)
$= ( 2{,}722.5\ ft^3$ / acre ) * $[ ( A_I )( 0.9 ) + ( A_P + A_U )( C_U ) ]$

***** Contributing Undeveloped Upstream Area is an area where stormwater runoff from an undeveloped upstream area will flow directly or indirectly to the Post-Construction Best Management Practices (BMPs) proposed for the development. This additional flow must be included in the flow rate and volume calculations to appropriately size the BMPs.**

## TABLE 1

INTENSITY - DURATION DATA FOR 0.75-INCHES OF RAINFALL
FOR ALL RAINFALL ZONES

| Duration, $T_C$ (min) | Rainfall Intensity, $I_X$ (in/hr) |
|---|---|
| 5 | 0.447 |
| 6 | 0.411 |
| 7 | 0.382 |
| 8 | 0.359 |
| 9 | 0.339 |
| 10 | 0.323 |
| 11 | 0.309 |
| 12 | 0.297 |
| 13 | 0.286 |
| 14 | 0.276 |
| 15 | 0.267 |
| 16 | 0.259 |
| 17 | 0.252 |
| 18 | 0.245 |
| 19 | 0.239 |
| 20 | 0.233 |
| 21 | 0.228 |
| 22 | 0.223 |
| 23 | 0.218 |
| 24 | 0.214 |
| 25 | 0.210 |
| 26 | 0.206 |
| 27 | 0.203 |
| 28 | 0.199 |
| 29 | 0.196 |
| 30 | 0.193 |

**DETERMINING THE VOLUME ($V_M$)**

# APPENDIX A VOLUME & FLOW RATE CALCULATIONS

LINE "C"

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

| | | |
|---|---|---|
| $A_{Total}$ | 4.1 | Acres |
| Type of Development | SFR | |
| Predominate Soil Type # | 028 | |
| % of Project Impervious | 35 | |
| % of Project Pervious | 65 | |
| % of Project Contributing Undeveloped Area | ~~0~~ | |
| $A_I$ | 1.4 | Acres |
| $A_P$ | 2.7 | Acres |
| $A_U$ | ~~0~~ | Acres |

LINE "C"

TABLE FOR ITERATIONS:

| Iteration No. | Initial $T_C$ (min) | $I_X$ (in/hr) | $C_U$ | $C_D$ | $C_D*I_X$ (in/hr) | Calculated $T_C$ (min) | Difference (min) |
|---|---|---|---|---|---|---|---|
| 1 | 5 | .447 | 0.1 | 0.38 | 0.1699 | 32.5 | 27.5 |
| 2 | 10 | .323 | 0.1 | 0.38 | 0.1227 | 38.5 | 28.5 |
| 3 | 15 | .267 | 0.1 | 0.38 | 0.1015 | 42.5 | 27.5 |
| 4 | 20 | .233 | 0.1 | 0.38 | 0.0885 | 45.6 | 25.6 |
| 5 | 25 | .210 | 0.1 | 0.38 | 0.0798 | 48.1 | 23.1 |
| 6 | 30 | .193 | 0.1 | 0.38 | 0.0733 | 50.3 | 20.3 |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |

Acceptable $T_C$ value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,
   $Q_{PM} = C_D * I_X * A_{Total} * (1.008333\ ft^3\text{-hour} / \text{acre-inches-seconds})$

$Q_{PM}$ 0.303 cfs

$V_M$ 4242 cf (0.0974 ac-ft)

LINE "D"

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

| | | |
|---|---|---|
| $A_{Total}$ | 11.9 | Acres |
| Type of Development | SFR | |
| Predominate Soil Type # | 028 | |
| % of Project Impervious | 35 | |
| % of Project Pervious | 65 | |
| % of Project Contributing Undeveloped Area | ~~0~~ | |
| $A_I$ | 4.2 | Acres |
| $A_P$ | 7.7 | Acres |
| $A_U$ | ~~0~~ | Acres |

LINE "D"

TABLE FOR ITERATIONS:

| Iteration No. | Initial $T_C$ (min) | $I_X$ (in/hr) | $C_U$ | $C_D$ | $C_D * I_X$ (in/hr) | Calculated $T_C$ (min) | Difference (min) |
|---|---|---|---|---|---|---|---|
| 1 | 5 | .447 | 0.1 | 0.38 | 0.1699 | 37.4 | 32.4 |
| 2 | 10 | .323 | 0.1 | 0.38 | 0.1227 | 44.3 | 34.3 |
| 3 | 15 | .267 | 0.1 | 0.38 | 0.1015 | 48.9 | 33.9 |
| 4 | 20 | .233 | 0.1 | 0.38 | 0.0885 | 52.4 | 32.4 |
| 5 | 25 | .210 | 0.1 | 0.38 | 0.0798 | 55.3 | 30.3 |
| 6 | 30 | .193 | 0.1 | 0.38 | 0.0733 | 57.8 | 27.8 |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |

Acceptable $T_C$ value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,
   $Q_{PM} = C_D * I_X * A_{Total} * (1.008333\ ft^3\text{-hour / acre-inches-seconds})$

$Q_{PM}$ 0.880 cfs

$V_M$ 12,311 cf (0.2826 ac-ft)

LINE "H"

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

| | | |
|---|---|---|
| $A_{Total}$ | 10 | Acres |
| Type of Development | SFR | |
| Predominate Soil Type # | 028 | |
| % of Project Impervious | 35 | |
| % of Project Pervious | 65 | |
| % of Project Contributing Undeveloped Area | ~~0~~ | |
| $A_I$ | 3.5 | Acres |
| $A_P$ | 6.5 | Acres |
| $A_U$ | ~~0~~ | Acres |

LINE "H"

TABLE FOR ITERATIONS:

| Iteration No. | Initial $T_C$ (min) | $I_X$ (in/hr) | $C_U$ | $C_D$ | $C_D*I_X$ (in/hr) | Calculated $T_C$ (min) | Difference (min) |
|---|---|---|---|---|---|---|---|
| 1 | 5 | .447 | 0.1 | 0.38 | 0.1699 | 43.1 | 38.1 |
| 2 | 10 | .323 | 0.1 | 0.38 | 0.1227 | 51.0 | 41.0 |
| 3 | 15 | .267 | 0.1 | 0.38 | 0.1015 | 56.3 | 41.3 |
| 4 | 20 | .233 | 0.1 | 0.38 | 0.0885 | 60.4 | 40.4 |
| 5 | 25 | .210 | 0.1 | 0.38 | 0.0798 | 63.7 | 38.7 |
| 6 | 30 | .193 | 0.1 | 0.38 | 0.0735 | 66.6 | 36.6 |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |

Acceptable $T_C$ value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,
   $Q_{PM} = C_D * I_X * A_{Total} * (1.008333\ ft^3\text{-hour} / \text{acre-inches-seconds})$

$Q_{PM}$ 0.740 cfs

$V_M$ 10,346 cf (0.2375 ac-ft)

LINE "I"

**PROVIDE PROPOSED PROJECT CHARACTERISTICS**

| | | |
|---|---|---|
| $A_{Total}$ | 16 | Acres |
| Type of Development | SFR | |
| Predominate Soil Type # | 028 | |
| % of Project Impervious | 35 | |
| % of Project Pervious | 65 | |
| % of Project Contributing Undeveloped Area | ~~0~~ | |
| $A_I$ | 5.6 | Acres |
| $A_P$ | 10.4 | Acres |
| $A_U$ | ~~0~~ | Acres |

LINE "I"

TABLE FOR ITERATIONS:

| Iteration No. | Initial $T_C$ (min) | $I_X$ (in/hr) | $C_U$ | $C_D$ | $C_D$*$I_X$ (in/hr) | Calculated $T_C$ (min) | Difference (min) |
|---|---|---|---|---|---|---|---|
| 1 | 5 | .447 | 0.1 | 0.38 | 0.1699 | 38.7 | 33.7 |
| 2 | 10 | .323 | 0.1 | 0.38 | 0.1227 | 45.8 | 35.8 |
| 3 | 15 | .267 | 0.1 | 0.38 | 0.1015 | 50.5 | 35.5 |
| 4 | 20 | .233 | 0.1 | 0.38 | 0.0885 | 54.2 | 34.2 |
| 5 | 25 | .210 | 0.1 | 0.38 | 0.0798 | 57.2 | 32.2 |
| 6 | 30 | .193 | 0.1 | 0.38 | 0.0733 | 59.8 | 29.8 |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |

Acceptable $T_C$ value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,
   $Q_{PM} = C_D * I_X * A_{Total}$ * (1.008333 $ft^3$-hour / acre-inches-seconds)

$Q_{PM}$ 1.183 cfs

$V_M$ 16,553 cf (0.38 ac-ft)

# F. MISCELLANEOUS CALCULATIONS

**WAGNER HALLADAY, INC.**
201 E. Yorba Linda Blvd.
PLACENTIA, CALIFORNIA 92870
**(714) 993-4500**
**FAX (714) 993-6837**

JOB TRIANGLE RANCH
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

# DEBRIS PRODUCTION VOLUME
TAKEN OVER ENTIRE PROJECT SITE

## EXISTING

| | | | |
|---|---|---|---|
| DPA-6 | 460 Ac | 0.72 $mi^2$ | 26,000 cy/$mi^2$ |
| | | | $\Rightarrow$ 18,688 cy |
| DPA-7 | 58 Ac | 0.09 $mi^2$ | 28,000 cy/$mi^2$ |
| | | | $\Rightarrow$ 2,537 cy |

TOTAL DPV = 21,225 cy

## PROPOSED

IMPROVED AREA 46 Ac

| | | | |
|---|---|---|---|
| DPA-6 | 414 Ac | 0.647 $mi^2$ | 27,000 cy/$mi^2$ |
| | | | $\Rightarrow$ 17,466 cy |
| DPA-7 | 58 Ac | 0.09 $mi^2$ | 28,000 cy/$mi^2$ |
| | | | $\Rightarrow$ 2,537 cy |

TOTAL DPV = 20,003

$$\frac{21,225 - 20,003}{21,225}(100) = 5.7\%$$ DECREASE DEBRIS VOLUME

**WAGNER HALLADAY, INC.**
201 E. Yorba Linda Blvd.
PLACENTIA, CALIFORNIA 92870
**(714) 993-4500**
**FAX (714) 993-6837**

JOB TRIANGLE RANCH, TRACT 52419
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

# DESILTING BASIN VOLUME

BASIN INVERT - 905.5' (9930 ft²)

BASIN BERM TOP - 910.0 (15820 ft²)

VOLUME = [(15820 + 9930)/2] 4.5

= 57,938 ft³

= 2,145 cy

FINAL DESIGN OF DESILTING BASIN INCLUDING INVERT ELEVATION, SIDESLOPE H:V RATIO, INLET RISER LOCATION & INVERT, BASIN SHAPE & FINAL CONFIGURATION, SHALL BE ADDRESSED AT TIME OF DESIGN OF TRACT UTILITY CONSTRUCTION DRAWINGS

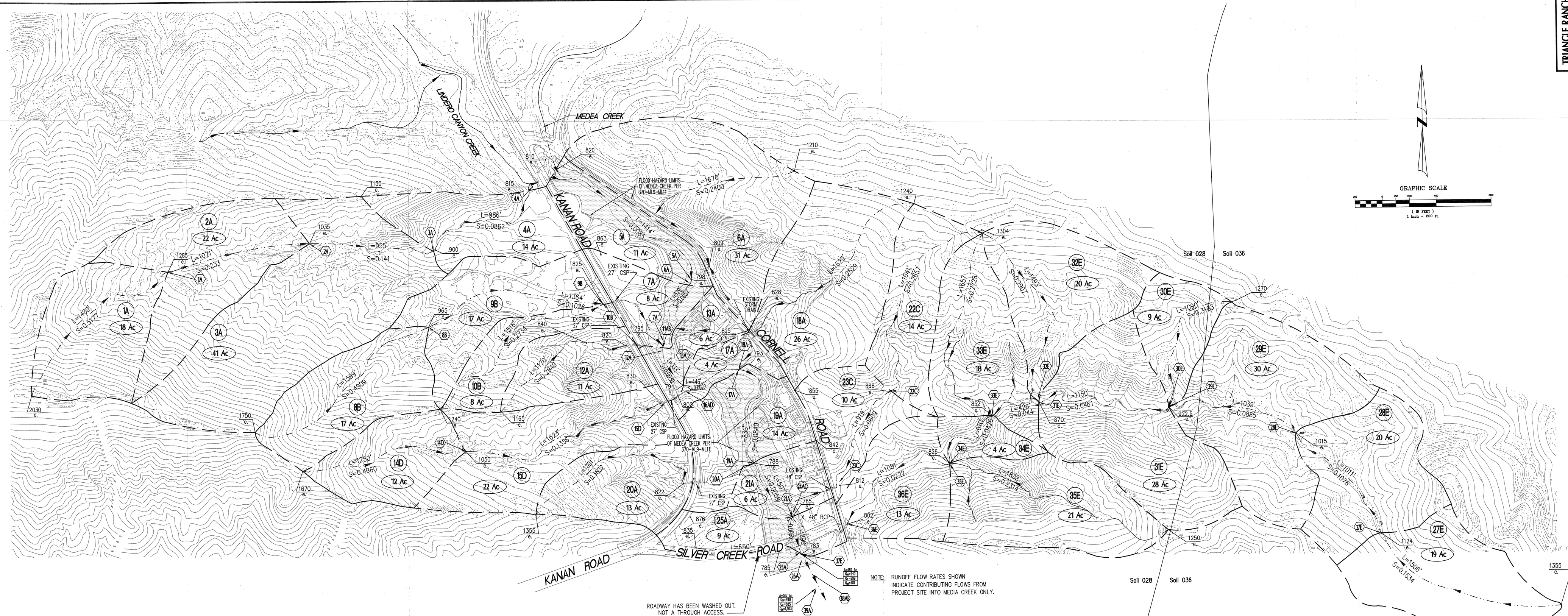
TRACT 52419; COUNTY OF LOS ANGELES
FLOOD HAZARD, EAST TRIBUTARY "E"
33E

```
**********************************************************************
>>>>CHANNEL INPUT INFORMATION<<<<
----------------------------------------------------------------------
    CHANNEL Z(HORIZONTAL/VERTICAL) =    1.25
    BASEWIDTH(FEET) =       .00
    CONSTANT CHANNEL SLOPE(FEET/FEET) =  .046000
    UNIFORM FLOW(CFS) =      491.00
    MANNINGS FRICTION FACTOR =  .0400
======================================================================
    NORMAL-DEPTH FLOW INFORMATION:
----------------------------------------------------------------------
    >>>>> NORMAL DEPTH(FEET) =   5.46
    FLOW TOP- WIDTH(FEET) =        13.64
    FLOW AREA(SQUARE FEET) =           37.22
    HYDRAULIC DEPTH(FEET) =     2.73
    FLOW AVERAGE VELOCITY(FEET/SEC.) =    13.19
    UNIFORM FROUDE NUMBER =    1.407
    PRESSURE + MOMENTUM(POUNDS) =         16776.03
    AVERAGED VELOCITY HEAD(FEET) =       2.702
    SPECIFIC ENERGY(FEET) =       8.159
======================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
----------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =         15.64
    CRITICAL FLOW AREA(SQUARE FEET) =           48.91
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      3.13
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     10.04
    CRITICAL DEPTH(FEET) =      6.25
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         15915.62
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =       1.565
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =       7.820
======================================================================
```

NORMAL DEPTH OF MAIN EASTERLY TRIBUTARY IN THE APPROXIMATE VICINITY OF NODE 33E, THE SOUTHEASTERLY CORNER OF LOT 67

# G. HYDROLOGY MAPS, EXISTING AND PROPOSED

TRIANGLE RANCH



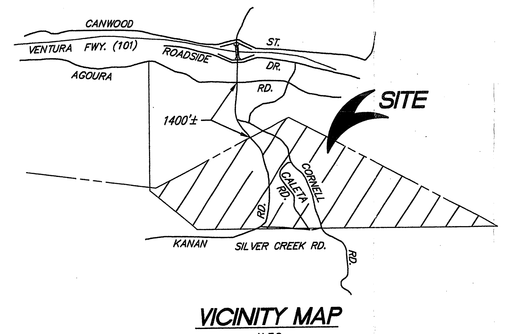

## HYDROLOGY

| SUB AREA | AREA [ACRE] | AREA [SQ MI] | $Q_{50}$ [CFS] | $Q_{\%}$ [CFS] | $Q_{88}$ [CFS] | EPA ZONE | BULKING FACTOR | DPR [CY/SQ MI] | DPV [CY] |
|---|---|---|---|---|---|---|---|---|---|
| 1A | 18 | 0.028 | 46 | 55 | 89 | 6 | 1.61 | 48,000 | 1,350 |
| 2A | 22 | 0.034 | 48 | 59 | 95 | 6 | 1.61 | 48,000 | 1,650 |
| 3A | 41 | 0.064 | 90 | 110 | 177 | 6 | 1.61 | 48,000 | 3,075 |
| 4A | 14 | 0.022 | 33 | 40 | 64 | 6 | 1.61 | 48,000 | 1,050 |
| 5A | 11 | 0.017 | 17 | 21 | 33 | 7 | 1.57 | 28,000 | 481 |
| 6A | 31 | 0.048 | 65 | 83 | 134 | 6 | 1.61 | 48,000 | 2,325 |
| 7A | 8 | 0.013 | 19 | 23 | 36 | 7 | 1.57 | 28,000 | 350 |
| 8B | 17 | 0.027 | 41 | 50 | 81 | 6 | 1.61 | 48,000 | 1,275 |
| 9B | 17 | 0.027 | 37 | 46 | 74 | 6 | 1.61 | 48,000 | 1,275 |
| 10B | 8 | 0.013 | 19 | 24 | 39 | 6 | 1.61 | 48,000 | 600 |
| 11AB | 197 | 0.292 | 209 | 295 | 475 | VARIES | 1.61 | VARIES | 9,786 |
| 12A | 11 | 0.017 | 29 | 35 | 56 | 6 | 1.61 | 48,000 | 825 |
| 13A | 6 | 0.009 | 17 | 19 | 30 | 7 | 1.57 | 28,000 | 263 |
| 14D | 12 | 0.019 | 35 | 42 | 68 | 6 | 1.61 | 48,000 | 900 |
| 15D | 22 | 0.034 | 47 | 58 | 93 | 6 | 1.61 | 48,000 | 1,650 |
| 16AD | 238 | 0.372 | 243 | 354 | 570 | VARIES | 1.61 | VARIES | 11,538 |
| 17A | 4 | 0.006 | 9 | 11 | 18 | 6 | 1.61 | 48,000 | 300 |
| 18A | 26 | 0.041 | 57 | 70 | 113 | 6 | 1.61 | 48,000 | 1,950 |
| 19A | 14 | 0.022 | 29 | 36 | 57 | 7 | 1.57 | 28,000 | 613 |
| 20A | 13 | 0.020 | 34 | 41 | 66 | 6 | 1.61 | 48,000 | 975 |
| 21A | 7 | 0.011 | 18 | 21 | 33 | 7 | 1.57 | 28,000 | 306 |
| 22C | 14 | 0.022 | 31 | 38 | 61 | 6 | 1.61 | 48,000 | 1,050 |
| 23C | 10 | 0.016 | 27 | 32 | 48 | 6 | 1.61 | 48,000 | 750 |
| 24AC | 326 | 0.509 | 253 | 384 | 618 | VARIES | 1.61 | VARIES | 14,577 |
| 25A | 9 | 0.014 | 30 | 35 | 55 | 7 | 1.57 | 28,000 | 394 |
| 26A | 335 | 0.523 | 251 | 396 | 621 | VARIES | 1.61 | VARIES | 14,656 |
| 27E | 19 | 0.030 | 67 | 70 | 113 | 6 | 1.61 | 48,000 | 1,425 |
| 28E | 20 | 0.031 | 77 | 80 | 129 | 6 | 1.61 | 48,000 | 1,425 |
| 29E | 30 | 0.047 | 116 | 121 | 195 | 6 | 1.61 | 48,000 | 2,250 |
| 30E | 9 | 0.014 | 26 | 31 | 50 | 6 | 1.61 | 48,000 | 675 |
| 31E | 28 | 0.044 | 60 | 74 | 118 | 6 | 1.61 | 48,000 | 2,100 |
| 32E | 20 | 0.031 | 47 | 57 | 92 | 6 | 1.61 | 48,000 | 1,500 |
| 33E | 18 | 0.028 | 39 | 48 | 77 | 6 | 1.61 | 48,000 | 1,350 |
| 34E | 4 | 0.006 | 12 | 14 | 23 | 6 | 1.61 | 48,000 | 300 |
| 35E | 21 | 0.033 | 45 | 55 | 89 | 6 | 1.61 | 48,000 | 1,575 |
| 36E | 13 | 0.020 | 26 | 32 | 52 | 6 | 1.61 | 48,000 | 975 |
| 37E | 182 | 0.284 | 240 | 299 | 481 | 6 | 1.61 | 34,000 | 9,669 |
| 38AE | 517 | 0.808 | 490 | 685 | 1,103 | VARIES | 1.61 | VARIES | 21,225 |
| 39E | 517 | 0.808 | 490 | 685 | 1,103 | VARIES | 1.61 | VARIES | 21,225 |

NOTES:
1. PROJECT RUNOFF FLOW RATES SHOWN INDICATE CONTRIBUTING FLOWS FROM PROJECT SITE AND EXCLUDES MEDEA CREEK MAIN-STEM UPSTREAM FLOWS.
2. BURNED RUNOFF FLOWS ARE COMPUTED FROM THE MORA PROGRAM USING BURNED RUNOFF COEFFICIENTS.
3. BULKED AND BURNED FLOWS ARE DERIVED BY MULTIPLYING THE BURNED RUNOFF FLOWS BY THE BULKING FACTOR.
4. CLEAR RUNOFF FLOWS ARE COMPUTED BY THE MORA PROGRAM USING UNBURNED RUNOFF COEFFICIENTS
5. TOTAL TRIBUTARY AREA IS 518 ACRES, TOTAL PROPERTY AREA IS 320 ACRES.

## LEGEND:

- (1A) DRAINAGE AREA NOTATION
- (10 Ac) TRIBUTARY DRAINAGE AREA, ACRES
- (1A) NODE IDENTIFIER PER HYDROLOGY CALCULATIONS
- 1200 e. EXISTING GROUND ELEVATION
- DRAINAGE SUBAREA BOUNDARY
- A=12.2 Ac; $Q_{50}$=28; $Q_{\%}$=46; $Q_{88}$=74 — TRIBUTARY AREA, FLOW QUANTITIES @ CONCENTRATION POINT
- DRAINAGE COURSE
- $Q_{50}$ 50-YEAR CLEAR RUNOFF FLOW
- $Q_{88}$ BURNED 50-YR RUNOFF FLOW
- $Q_{\%}$ BURNED AND BULKED 50-YR RUNOFF FLOW




VICINITY MAP
N.T.S.

| NO. | DATE | BY | DESCRIPTION |
|---|---|---|---|
| | | | |

REVISIONS

# HYDROLOGY MAP OF EXISTING SITE

SUBDIVIDER/APPLICANT

SAGE COMMUNITY GROUP, INC.
3 CORPORATE PLAZA, STE. 102
NEWPORT BEACH, CA. 92660
(949) 644-3514

CIVIL ENGINEER

Wagner Halladay
ENGINEERING
CIVIL ENGINEERS
LAND SURVEYORS
201 E. YORBA LINDA BLVD.
PLACENTIA, CA. 92870-3418
714 993 4200

REGISTERED PROFESSIONAL ENGINEER — DANA S. HALLADAY — No. 34751 — EXP. 9-30-05 — CIVIL — STATE OF CALIFORNIA

DANA S. HALLADAY RCE 34751, EXPIRES 9-30-05 DATE

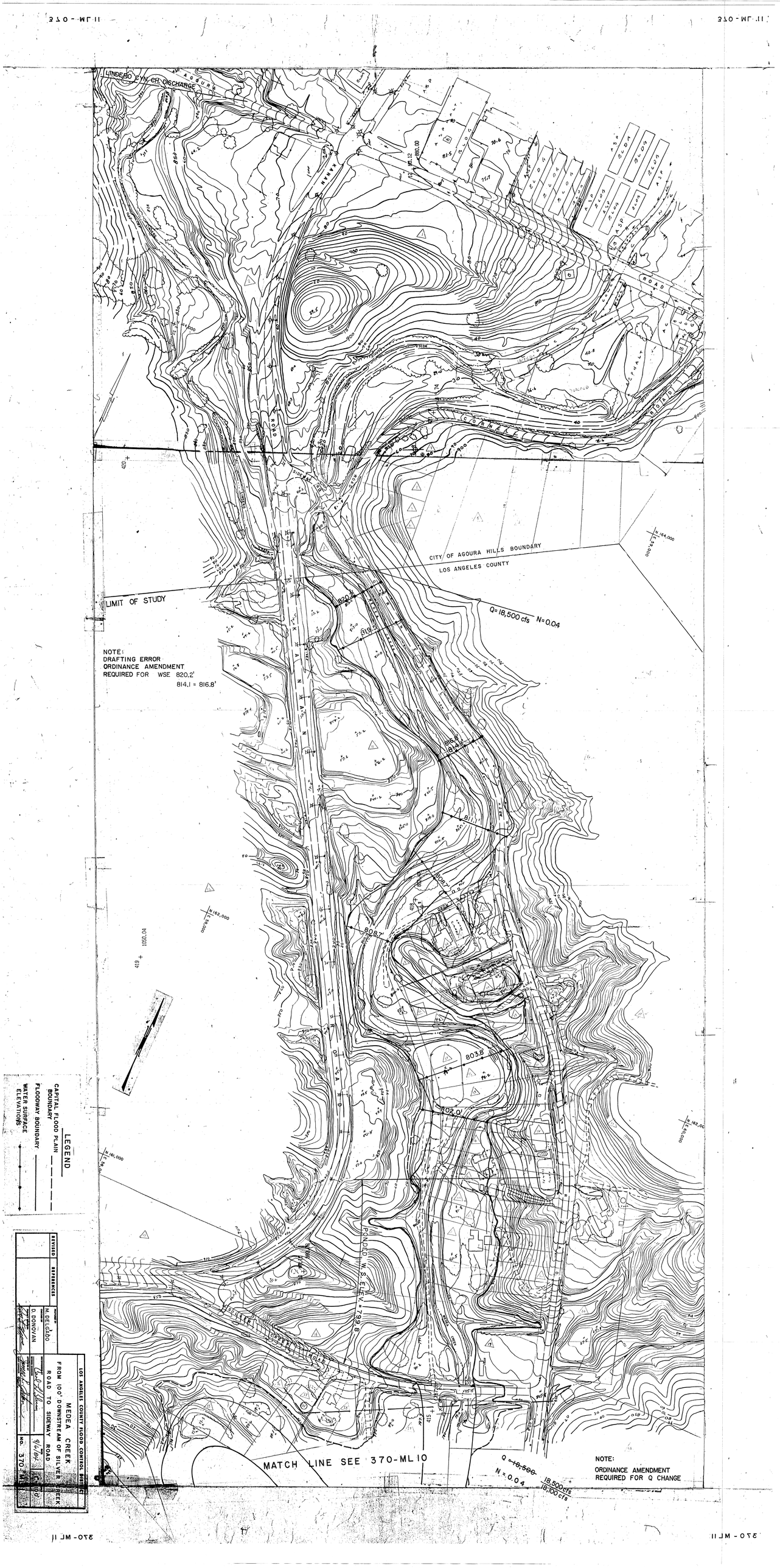
81 RESIDENTIAL LOTS, 5 OPEN SPACE LOTS, AND 4 LANDSCAPE LOTS
320.3 ACRES GROSS.
CONTOUR INTERVAL: 10', 25'

VESTING TENTATIVE TRACT NO. 52419 (REVISED)

# TRIANGLE RANCH

AGOURA HILLS
COUNTY OF LOS ANGELES, CALIFORNIA
OCTOBER 18, 2004

P:\Projects\Triangle Ranch\Hydrology\Hydrology Map.dwg


LINDERO CYN. CH. DISCHARGE
AGOURA ROAD
CITY OF AGOURA HILLS BOUNDARY
LOS ANGELES COUNTY
LIMIT OF STUDY
Q=18,500 cfs N=0.04
NOTE:
DRAFTING ERROR
ORDINANCE AMENDMENT
REQUIRED FOR WSE 820.2'
814.1 = 816.8'
820.4
819.9
816.8
816.4
811.1
808.7
803.6
802.0
PONDED W.S.E. = 798.9
MATCH LINE SEE 370-ML10
Q=18,500
N=0.04
18,500 cfs
18,100 cfs
NOTE:
ORDINANCE AMENDMENT
REQUIRED FOR Q CHANGE
LEGEND
CAPITAL FLOOD PLAIN BOUNDARY
FLOODWAY BOUNDARY
WATER SURFACE ELEVATIONS
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
MEDEA CREEK
FROM 100' DOWNSTREAM OF SILVER SPUR ROAD TO SIDEWAY ROAD
DESIGNED M. DELGADO
DRAWN D. DONOVAN
CHECKED
DATE 9/6/84
SCALE 1"=100'
NO. 370-ML11
REFERENCES
REVISED

# OCT.18, 2004
# OVERSIZE
# 4

# MEDEA CREEK
# OVERSIZE
# 5

# H. DRAINAGE CONCEPT PLAN

## HYDROLOGY

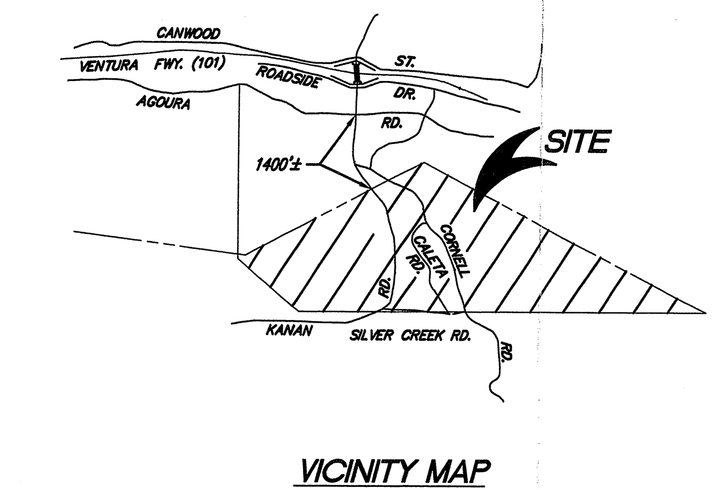
| SUB AREA | AREA [ACRE] | AREA [SQ MI] | $Q_{50}$ [CFS] | $Q_B$ [CFS] | $Q_{BB}$ [CFS] | DPA ZONE | BULKING FACTOR | DPR [CY/SQ MI] | DPV [CY] |
|---|---|---|---|---|---|---|---|---|---|
| 1A | 18 | 0.028 | 47 | 57 | 92 | 6 | 1.61 | 48,000 | 1,350 |
| 2A | 22 | 0.034 | 56 | 68 | 109 | 6 | 1.61 | 48,000 | 1,650 |
| 3A | 41 | 0.064 | 104 | 126 | 203 | 6 | 1.61 | 48,000 | 3,075 |
| 4A | 9 | 0.014 | 21 | 26 | 42 | 6 | 1.61 | 48,000 | 675 |
| 5A | 2 | 0.003 | 6 | 8 | 13 | 7 | 1.57 | 28,000 | 88 |
| 6A | 16 | 0.025 | 37 | – | – | 6 | 1.61 | 48,000 | – |
| 7A | 8 | 0.013 | 12 | 16 | 25 | 7 | 1.57 | 28,000 | 350 |
| 8A | 31 | 0.048 | 70 | 86 | 138 | 6 | 1.61 | 48,000 | 2,325 |
| 9A | 8 | 0.013 | 19 | 23 | 36 | 7 | 1.57 | 28,000 | 350 |
| 10B | 17 | 0.027 | 41 | 50 | 81 | 6 | 1.61 | 48,000 | 1,275 |
| 11B | 13 | 0.020 | 25 | 31 | 50 | 6 | 1.61 | 48,000 | 975 |
| 12AB | 185 | 0.289 | 203 | 276 | 444 | VARIES | 1.61 | VARIES | 9,539 |
| 13A | 7 | 0.011 | 16 | 19 | 31 | 6 | 1.61 | 48,000 | 525 |
| 14A | 10 | 0.016 | 23 | – | – | 6 | 1.61 | 48,000 | – |
| 15A | 6 | 0.009 | 17 | 17 | 27 | 7 | 1.57 | 28,000 | 263 |
| 16C | 12 | 0.019 | 35 | 42 | 68 | 6 | 1.61 | 48,000 | 900 |
| 17C | 21 | 0.033 | 45 | 55 | 89 | 6 | 1.61 | 48,000 | 1,575 |
| 18AC | 241 | 0.377 | 205 | 295 | 475 | VARIES | 1.61 | VARIES | 11,485 |
| 19A | 19 | 0.030 | 43 | 53 | 85 | 6 | 1.61 | 48,000 | 1,425 |
| 20A | 4 | 0.006 | 9 | 11 | 17 | 7 | 1.57 | 28,000 | 175 |
| 21A | 14 | 0.022 | 29 | 36 | 57 | 7 | 1.57 | 28,000 | 613 |
| 22A | 11 | 0.017 | 29 | 35 | 56 | 6 | 1.61 | 48,000 | 825 |
| 23A | 7 | 0.011 | 18 | 18 | 28 | 7 | 1.57 | 28,000 | 306 |
| 24D | 11 | 0.017 | 31 | 37 | 60 | 6 | 1.61 | 48,000 | 825 |
| 25D | 20 | 0.031 | 51 | – | – | 6 | 1.61 | 48,000 | – |
| 26AD | 327 | 0.511 | 211 | 316 | 509 | VARIES | 1.61 | VARIES | 14,562 |
| 27A | 9 | 0.014 | 30 | 35 | 55 | 7 | 1.57 | 28,000 | 394 |
| 28A | 336 | 0.525 | 211 | 318 | 512 | VARIES | 1.61 | VARIES | 14,700 |
| 29E | 19 | 0.030 | 67 | 70 | 113 | 6 | 1.61 | 48,000 | 1,425 |
| 30E | 20 | 0.031 | 77 | 80 | 129 | 6 | 1.61 | 48,000 | 1,500 |
| 31E | 30 | 0.047 | 116 | 121 | 195 | 6 | 1.61 | 48,000 | 2,250 |
| 32E | 9 | 0.014 | 26 | 31 | 50 | 6 | 1.61 | 48,000 | 675 |
| 33E | 35 | 0.055 | 75 | 92 | 148 | 6 | 1.61 | 48,000 | 2,625 |
| 34E | 31 | 0.048 | 70 | 85 | 137 | 6 | 1.61 | 48,000 | 2,325 |
| 35E | 25 | 0.039 | 51 | 64 | 103 | 6 | 1.61 | 48,000 | 1,875 |
| 36E | 13 | 0.020 | 26 | 32 | 52 | 6 | 1.61 | 48,000 | 975 |
| 37E | 182 | 0.284 | 296 | 364 | 586 | 6 | 1.61 | 34,000 | 9,669 |
| 38AE | 518 | 0.808 | 460 | 638 | 1,027 | VARIES | 1.61 | VARIES | 20,003 |
| 39E | 518 | 0.808 | 460 | 638 | 1,027 | VARIES | 1.61 | VARIES | 20,003 |

NOTES:

1. PROJECT RUNOFF FLOW RATES SHOWN INDICATE CONTRIBUTING FLOWS FROM PROJECT SITE AND EXCLUDES MEDEA CREEK MAIN-STEM UPSTREAM FLOWS.
2. BURNED RUNOFF FLOWS ARE COMPUTED FROM THE MORA PROGRAM USING BURNED RUNOFF COEFFICIENTS.
3. BULKED AND BURNED FLOWS ARE DERIVED BY MULTIPLYING THE BURNED RUNOFF FLOWS BY THE BULKING FACTOR.
4. CLEAR RUNOFF FLOWS ARE COMPUTED BY THE MORA PROGRAM USING UNBURNED RUNOFF COEFFICIENTS
5. TOTAL TRIBUTARY AREA IS 518 ACRES, TOTAL PROPERTY AREA IS 320 ACRES.

## LEGEND:

| Symbol | Description |
|---|---|
| (1A) | DRAINAGE AREA NOTATION |
| (10 Ac) | TRIBUTARY DRAINAGE AREA, ACRES |
| 1A (hexagon) | NODE IDENTIFIER PER HYDROLOGY CALCULATIONS |
| 1200 | EXISTING GROUND ELEVATION |
| — — | DRAINAGE SUBAREA BOUNDARY |
| A=12.2 Ac, $Q_{50}$=28, $Q_B$=46, $Q_{BB}$=74 | TRIBUTARY AREA FLOW QUANTITIES @ CONCENTRATION POINT |
| — · — | DRAINAGE COURSE |
| $Q_{50}$ | 50-YEAR CLEAR RUNOFF FLOW |
| $Q_B$ | BURNED 50-YR RUNOFF FLOW |
| $Q_{BB}$ | BURNED AND BULKED 50-YR RUNOFF FLOW |




VICINITY MAP
N.T.S.

| NO. | DATE | BY | DESCRIPTION |
|---|---|---|---|
| | | | |

REVISIONS

# HYDROLOGY MAP OF PROPOSED SITE

SUBDIVIDER/APPLICANT

SAGE COMMUNITY GROUP, INC.
3 CORPORATE PLAZA, STE. 102
NEWPORT BEACH, CA 92660
(949) 644-3514

CIVIL ENGINEER

Wagner Halladay
201 E. YORBA LINDA BLVD.
PLACENTIA, CA 92870-3418
714 993 4500

DANA S. HALLADAY
RCE 34751, EXPIRES 9-30-05
DATE

81 RESIDENTIAL LOTS, 5 OPEN SPACE LOTS, AND 4 LANDSCAPE LOTS
320.3 ACRES GROSS,
CONTOUR INTERVAL: 10', 25'

VESTING TENTATIVE TRACT NO. 52419 (REVISED)

# TRIANGLE RANCH

AGOURA HILLS
COUNTY OF LOS ANGELES, CALIFORNIA
OCTOBER 18, 2004

# OCT.18,2004 -2
# OVERSIZE
# 6

# I. MEDEA CREEK FLOODWAY MAP

## HYDROLOGY

| SUB AREA | AREA [ACRE] | AREA [SQ MI] | $Q_{50}$ [CFS] | $Q_B$ [CFS] | $Q_{BB}$ [CFS] | DPA ZONE | BULKING FACTOR | DPR [CY/SQ MI] | DPV [CY] |
|---|---|---|---|---|---|---|---|---|---|
| 1A | 18 | 0.028 | 47 | 57 | 92 | 6 | 1.61 | 48,000 | 1,350 |
| 2A | 22 | 0.034 | 56 | 68 | 109 | 6 | 1.61 | 48,000 | 1,650 |
| 3A | 41 | 0.064 | 104 | 126 | 203 | 6 | 1.61 | 48,000 | 3,075 |
| 4A | 9 | 0.014 | 21 | 26 | 42 | 6 | 1.61 | 48,000 | 675 |
| 5A | 2 | 0.003 | 6 | 8 | 13 | 7 | 1.57 | 28,000 | 88 |
| 6A | 16 | 0.025 | 37 | – | – | 6 | 1.61 | 48,000 | – |
| 7A | 8 | 0.013 | 12 | 16 | 25 | 7 | 1.57 | 28,000 | 350 |
| 8A | 31 | 0.048 | 70 | 86 | 138 | 6 | 1.61 | 48,000 | 2,325 |
| 9A | 8 | 0.013 | 19 | 23 | 36 | 7 | 1.57 | 28,000 | 350 |
| 10B | 17 | 0.027 | 41 | 50 | 81 | 6 | 1.61 | 48,000 | 1,275 |
| 11B | 13 | 0.020 | 25 | 31 | 50 | 6 | 1.61 | 48,000 | 975 |
| 12AB | 185 | 0.289 | 203 | 276 | 444 | VARIES | 1.61 | VARIES | 9,539 |
| 13A | 7 | 0.011 | 16 | 19 | 31 | 6 | 1.61 | 48,000 | 525 |
| 14A | 10 | 0.016 | 23 | – | – | 6 | 1.61 | 48,000 | – |
| 15A | 6 | 0.009 | 17 | 17 | 27 | 7 | 1.57 | 28,000 | 263 |
| 16C | 12 | 0.019 | 35 | 42 | 68 | 6 | 1.61 | 48,000 | 900 |
| 17C | 21 | 0.033 | 45 | 55 | 89 | 6 | 1.61 | 48,000 | 1,575 |
| 18AC | 241 | 0.377 | 205 | 295 | 475 | VARIES | 1.61 | VARIES | 11,485 |
| 19A | 19 | 0.030 | 43 | 53 | 85 | 6 | 1.61 | 48,000 | 1,425 |
| 20A | 4 | 0.006 | 9 | 11 | 17 | 7 | 1.57 | 28,000 | 175 |
| 21A | 14 | 0.022 | 29 | 36 | 57 | 7 | 1.57 | 28,000 | 613 |
| 22A | 11 | 0.017 | 29 | 35 | 56 | 6 | 1.61 | 48,000 | 825 |
| 23A | 7 | 0.011 | 18 | 18 | 28 | 7 | 1.57 | 28,000 | 306 |
| 24D | 11 | 0.017 | 31 | 37 | 60 | 6 | 1.61 | 48,000 | 825 |
| 25D | 20 | 0.031 | 51 | – | – | 6 | 1.61 | 48,000 | – |
| 26AD | 327 | 0.511 | 211 | 316 | 509 | VARIES | 1.61 | VARIES | 14,562 |
| 27A | 9 | 0.014 | 30 | 35 | 55 | 7 | 1.57 | 28,000 | 394 |
| 28A | 336 | 0.525 | 211 | 318 | 512 | VARIES | 1.61 | VARIES | 14,700 |
| 29E | 19 | 0.030 | 67 | 70 | 113 | 6 | 1.61 | 48,000 | 1,425 |
| 30E | 20 | 0.031 | 77 | 80 | 129 | 6 | 1.61 | 48,000 | 1,500 |
| 31E | 30 | 0.047 | 116 | 121 | 195 | 6 | 1.61 | 48,000 | 2,250 |
| 32E | 9 | 0.014 | 26 | 31 | 50 | 6 | 1.61 | 48,000 | 675 |
| 33E | 35 | 0.055 | 75 | 92 | 148 | 6 | 1.61 | 48,000 | 2,625 |
| 34E | 31 | 0.048 | 70 | 85 | 137 | 6 | 1.61 | 48,000 | 2,325 |
| 35E | 25 | 0.039 | 51 | 64 | 103 | 6 | 1.61 | 48,000 | 1,875 |
| 36E | 13 | 0.020 | 26 | 32 | 52 | 6 | 1.61 | 48,000 | 975 |
| 37E | 182 | 0.284 | 296 | 364 | 586 | 6 | 1.61 | 34,000 | 9,669 |
| 38AE | 518 | 0.808 | 460 | 638 | 1,027 | VARIES | 1.61 | VARIES | 20,003 |
| 39E | 518 | 0.808 | 460 | 638 | 1,027 | VARIES | 1.61 | VARIES | 20,003 |

## HYDROLOGIC CALCULATION

RAINFALL ZONE: M

SOIL TYPE: 028 (TYPE 036 AT THE EASTERLY PORTION OF SITE OUTSIDE THE DEVELOPMENT AREA)

DPA ZONE: ZONE 6 THROUGHOUT PROJECT
ZONE 7 ALONG MEDEA CREEK

% IMPERVIOUS: 35% FOR DEVELOPED AREAS

BULKING FACTOR: 1.61 FOR DPA-6; 1.57 FOR DPA-7

## LEGEND:

| | |
|---|---|
| 2 | DRAINAGE AREA NOTATION |
| 10.0 Ac | TRIBUTARY DRAINAGE AREA, ACRES |
| ○ Qpm | SUSMP CLARIFIER<br>PEAK MITIGATION FLOW RATE FOR FIRST FLUSH CLEANSING BASED ON 0.75-INCHES OF RAINFALL |
| | DRAINAGE COURSE |
| A=185.2 Ac<br>$Q_{50}$=29<br>$Q_B$=35<br>$Q_{BB}$=56 | FLOW QUANTITIES AND CONTRIBUTARY AREA @ CONCENTRATION POINT, 50 YEAR FLOW IN CFS<br>50 YEAR BURNED FLOW IN CFS<br>50 YEAR BURNED AND BULKED FLOW IN CFS |
| | LIMITS OF FLOODWAY PER LOS ANGELES COUNTY ADOPTED WATERSHED 370-ML9-ML11 |
| | RETAINING WALL |
| 886 | PAD ELEVATION |
| x 624 | AERIAL TOPOGRAPHIC ELEVATION |
| 625 | EXISTING TOPOGRAPHIC CONTOUR |
| | PROPERTY LOT/BOUNDARY LINE |
| | DRAINAGE SUBAREA BOUNDARY |
| 675 cy | DEBRIS PRODUCTION VOLUME IN CUBIC YARDS |

## DRAINAGE CONCEPT NOTES:

1. HYDROLOGY INFORMATION AND STORM DRAIN ALIGNMENTS SHOWN ARE NOT NECESSARILY APPROVED.
2. COMPLIANCE OF ALL STREET DRAINAGE REQUIREMENTS WILL BE MET TO THE SATISFACTION OF THE DEPARTMENT OF PUBLIC WORKS.
3. NECESSARY EASEMENTS WILL BE DEDICATED FOR THE STORM DRAIN SYSTEM TO THE SATISFACTION OF THE DEPARTMENT OF PUBLIC WORKS.
4. VEHICULAR ACCESS BE PROVIDED TO ALL INLETS AND OUTLETS TO THE SATISFACTION OF THE DEPARTMENT OF PUBLIC WORKS.
5. APPROVAL OF THE DRAINAGE CONCEPT DOES NOT CONSTITUTE DETERMINATION THAT THE OFFSITE IMPROVEMENTS ARE REQUIRED WITHIN THE MEANING OF GOVERNMENT CODE SECTION 66462.5, (EXCEPT AS NOTED).
6. AN OFFSITE DRAINAGE COVENANT FOR ACCEPTANCE OF DRAINAGE (AND DRAINAGE FACILITIES) MAY BE REQUIRED.
7. THE MEDEA CREEK FLOODWAY LIMITS ARE AS SHOWN ON THE MAP AND LIE OUTSIDE ALL PROPOSED RESIDENTIAL LOTS. THE 50' FLOOD HAZARD SETBACK IS SHOWN AT LOTS 60 THROUGH 67.
8. EXISTING RESIDENCES AND DEVELOPED PROPERTIES ALONG CALETA ROAD AND WITHIN THE MEDEA CREEK FLOODWAY LIMITS ARE NOT A PART OF PROPOSED TRACT 52419.
9. A DRAINAGE BENEFIT ASSESSMENT AREA WILL BE REQUIRED FOR THE MAINTENANCE OF THE PROPOSED STORM DRAIN FACILITIES.
10. TOTAL TRIBUTARY AREA IS 518 ACRES, TOTAL PROPERTY AREA IS 320 ACRES.

HYDROLOGY CALCULATIONS PERFORMED USING THE LOS ANGELES COUNTY MORA PROGRAM

| NO. | DATE | BY | DESCRIPTION |
|---|---|---|---|

REVISIONS

SUBDIVIDER/APPLICANT

BEAUTIFUL CITY HOLDING CO., INC./
SAGE COMMUNITY GROUP, INC.
3 CORPORATE PLAZA, STE. 102
NEWPORT BEACH, CA. 92660
(949) 644-3514

CIVIL ENGINEER

REGISTERED PROFESSIONAL ENGINEER DANA S. HALLADAY No. 34751 EXP. 9-30-05 CIVIL STATE OF CALIFORNIA

Wagner Halladay
INCORPORATED
CIVIL ENGINEERS
SURVEYORS
201 E. YORBA LINDA BLVD.
PLACENTIA, CA. 92870-3418
714 993 4500

DANA S. HALLADAY DATE
RCE 34751, EXPIRES 9-30-03

81 RESIDENTIAL LOTS, 5 OPEN SPACE LOTS & 4 LANDSCAPE LOTS
320.3 ACRES GROSS,
CONTOUR INTERVAL: 10', 25'

# DRAINAGE CONCEPT PLAN & STANDARD URBAN STORMWATER MITIGATION PLAN (SUSMP)

# TRIANGLE RANCH

TENTATIVE TRACT 52419
AGOURA HILLS
COUNTY OF LOS ANGELES, CALIFORNIA
OCTOBER 18, 2004

PLOT DATE: 10/18/04 L:\2100198\2003\hydro\SUSMP-05-14-04.dwg

# Drainage Concept
# OVERSIZE
# 7

# APPENDIX F

**Noise Impact Analysis, Triangle Ranch, Tract No. 52419, County of Los Angeles, California, prepared by Giroux and Associates Environmental Consultants, October 8, 2003**

**Giroux & Associates**
Environmental Consultants

# NOISE IMPACT ANALYSIS

## TRIANGLE RANCH
## TRACT NO. 52419

## COUNTY OF LOS ANGELES, CALIFORNIA

Prepared for:

Christopher A. Joseph and Associates
Attn: Marc Melinkoff
31255 Cedar Valley Drive, Suite 222
Westlake Village, California 91362

Date:

October 8, 2003

Project No.: P03-080

*17744 Sky Park Circle, Suite 210, Irvine, California 92614 - Phone (949) 851-8609 - Fax (949) 851-8612*

## NOISE SETTING

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise is commonly defined as unwanted sound. Sound is characterized by various parameters that describe the rate of oscillation of sound waves, the distance between successive troughs or crests, the speed of propagation, and the pressure level or energy content of a given sound wave. In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level.

The unit of sound pressure ratioed to the level barely detectable by a young person with good auditory acuity is called a decibel (dB). Because sound or noise can vary in intensity by over one million times within the range of human hearing, a logarithmic loudness scale similar to the Richter Scale for earthquake magnitude is used to keep sound intensity numbers at a convenient and manageable level. Since the human ear is not equally sensitive to all sound frequencies within the entire spectrum, noise levels at maximum human sensitivity are factored more heavily into sound descriptions in a process called "A-weighting" written as dB. Any further reference to decibels written as "dB" should be understood to be A-weighted.

Time variations in noise exposure are typically expressed in terms of a steady-state energy level equal to the energy content of the time varying period (called Leq), or, alternately, as a statistical description of the sound level that is exceeded over some fraction of a given observation period. Finally, because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law requires that, for planning purposes, an artificial dB increment be added to quiet time noise levels in a 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL).

An interior CNEL of 45 dB is mandated by multiple family dwellings in Title 24 of the California Code of Regulations. In 1988, the State Building Standards Commission recommended that the 45 dB CNEL interior standard be expanded to include all habitable rooms for all residential occupancy, including single family. The County of Los Angeles requires a 45 dB CNEL interior standard for all residential occupancies. Since typical noise attenuation within residential structures with closed windows is about 20 dB, an exterior noise exposure of 65 dB CNEL is generally the noise/land use compatibility guideline for new residential dwellings in California. A 65 dB CNEL exterior level is also the noise threshold where noise begins to substantially interfere with enjoyment of any outdoor recreational amenity such as a yard, patio, spa/pool, etc. Mitigation of exterior noise to at least 65 dB CNEL is normally required for residential projects in Los Angeles County for any usable outdoor space. A level of 65 dB CNEL exterior and 45 dB CNEL interior is therefore the applicable noise standard for Triangle Ranch.

Existing noise levels around the project site derive mainly from the major and secondary highways in the area. The project site itself is vacant and undeveloped, but because of the semi-developed nature of the surrounding areas and traffic generated on these major roadways, there is elevated baseline noise at the project site that is confined almost exclusively to Kanan and Cornell Roads. Increases due to further area growth will create a small increase on local noise levels. Noise mitigation may be required for project development in very close proximity to Kanan Road. Beyond the immediate Kanan Road vicinity, noise constraints to the proposed project development will be minimal.

Short-term (30 minutes) on-site noise measurements were made in order to define the existing project site baseline noise levels, as well as to help predict project site noise exposure. Monitoring was previously conducted on December 17, 1998. Current noise monitoring was conducted on September 17, 2003, and again on September 25, 2003, due to a malfunction in equipment at the second site. Larson-Davis Labs Model 700 Dosimeter digital sound meter, Serial No. 3203 was used to perform measurements on September 17, 2003, and Serial No. 3109 was used on September 25, 2003.

The sound level meter was placed at two different locations. The meter at Site 1 was placed 50 feet east of the Cornell centerline, near the existing Fire Station. The meter at Site 2 was placed 50 feet west of the Kanan Road centerline, north of the intersection of Silver Creek Road. See Figure 1 for noise monitoring locations. The 2003 Leq readings are slightly higher than the 1998 readings. Results of the noise monitoring for all dates are shown in Table 1.

Experience has shown that observed mid-afternoon, short-term Leqs are 2-3 dB lower than the calculated 24-hour CNEL for typical suburban traffic environments. This relationship would suggest that the current measured level of 62 dB on Cornell Road is equivalent to a CNEL of 64-65 dB at that location. Similarly, the 2003 measured level of 67 dB on Kanan Road translates to an approximate CNEL of 70 dB. Results show that the Cornell Road site has levels that meet the County standard by a small margin within 50 feet of the roadway centerline. The Kanan Road site is above the County standard at this distance and can be attributed to heavier roadway traffic with higher travel speeds.

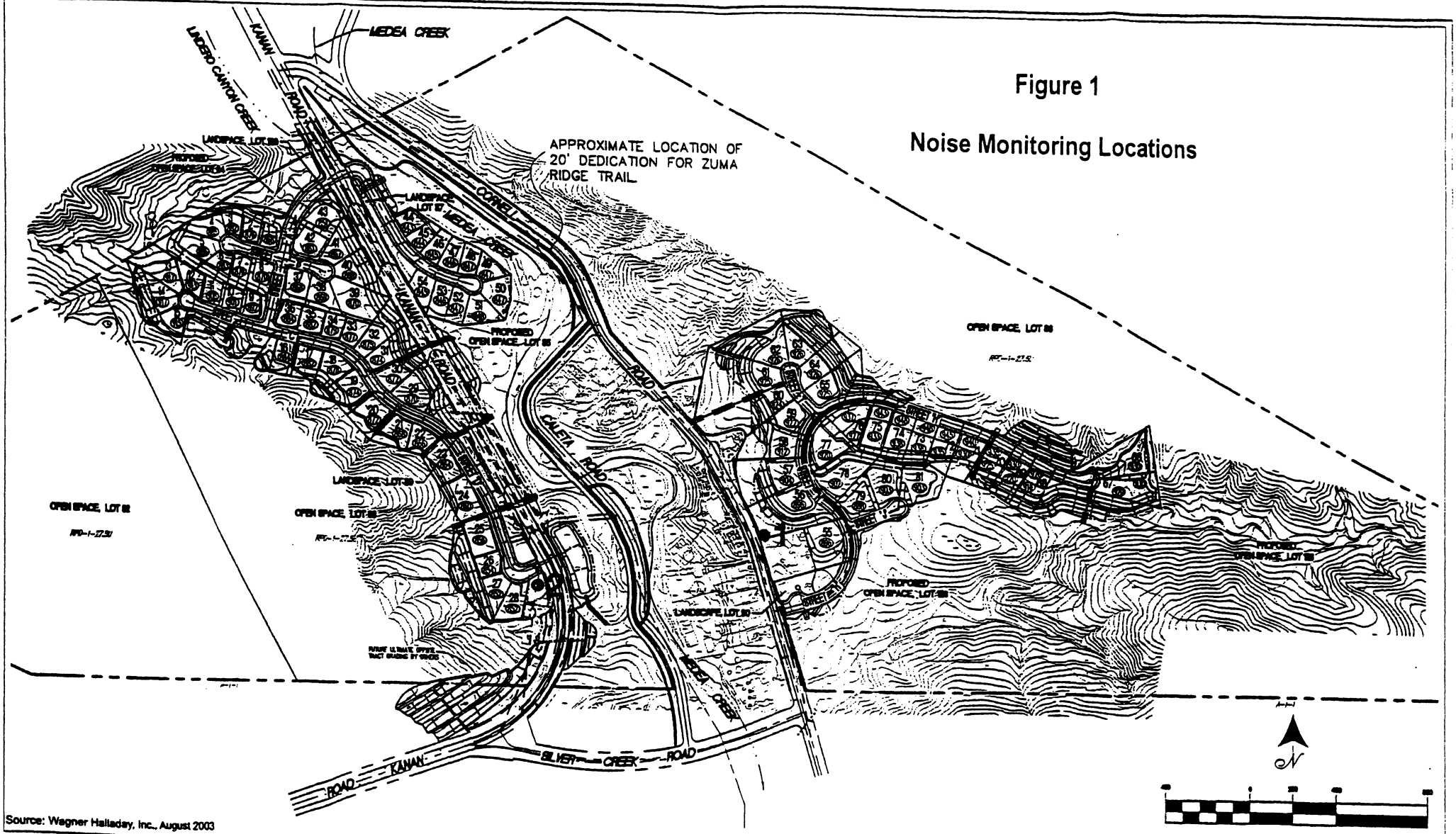
A comparison was made between the sound level measurements made on September 25, 2003, and the levels that would be predicted by the federal highway traffic noise prediction model (FHWA Model) for the observed traffic mix and 45 mph travel speed on Kanan Road at the monitoring site. A similar comparison was made for the Cornell Road site. The measurement versus model calibration was as follows:

| | **Hourly Traffic** | | | | **Sept. 25, 2003** |
|---|---|---|---|---|---|
| **Location** | **Auto** | **Medium Truck** | **Heavy Truck** | **Predicted Noise (dB)** | **Measured Noise (dB)** |
| Kanan Road | 690 | 18 | 16 | 68 | 67 |
| Cornell Road | 146 | 14 | 0 | 62 | 62 |

The calibration was within ±1 dB at both locations. Use of the FHWA Model with a 45 mph assumed travel speed near the measurement location appears to be an appropriate analysis tool for this project requiring no model adjustment.

# Figure 1

## Noise Monitoring Locations




Source: Wagner Halladay, Inc., August 2003

CHRISTOPHER A. JOSEPH & ASSOCIATES
Environmental Planning and Research

Figure I-6
Tentative Tract Detail

## Table 1

## Short-Term Baseline Noise Monitoring Results
## dB

| December 17, 1998 | Leq | Lmax | Lmin | $L_{10}$ | $L_{33}$ | $L_{50}$ | $L_{90}$ |
|---|---|---|---|---|---|---|---|
| **Site 1** | | | | | | | |
| Cornell Road, near Fire Station | 61.5 | 74.5 | 41.0 | 67.0 | 56.5 | 50.0 | 43.5 |
| **Site 2** | | | | | | | |
| Kanan Road, north of Silver Creek Rd. | 66.1 | 75.5 | 45.5 | 70.0 | 66.0 | 63.0 | 51.0 |

| September 17, 2003 | Leq | Lmax | Lmin | $L_{10}$ | $L_{33}$ | $L_{50}$ | $L_{90}$ |
|---|---|---|---|---|---|---|---|
| **Site 1** | | | | | | | |
| Cornell Road, near Fire Station | 61.9 | 78.5 | 43.0 | 66.5 | 57.0 | 51.0 | 45.0 |
| **Site 2** | | | | | | | |
| Kanan Road, north of Silver Creek Rd. | * | * | * | * | * | * | * |

| September 25, 2003 | Leq | Lmax | Lmin | $L_{10}$ | $L_{33}$ | $L_{50}$ | $L_{90}$ |
|---|---|---|---|---|---|---|---|
| **Site 1** | | | | | | | |
| Cornell Road, near Fire Station | 62.2 | 86.5 | 40.0 | 64.5 | 53.0 | 48.5 | 43.0 |
| **Site 2** | | | | | | | |
| Kanan Road, north of Silver Creek Rd. | 66.8 | 83.0 | 44.0 | 70.0 | 64.5 | 60.0 | 49.5 |

*Meter malfunction.

## Table 1

## Short-Term Baseline Noise Monitoring Results
## dB

| December 17, 1998 | Leq | Lmax | Lmin | $L_{10}$ | $L_{33}$ | $L_{50}$ | $L_{90}$ |
|---|---|---|---|---|---|---|---|
| **Site 1** | | | | | | | |
| Cornell Road, near Fire Station | 61.5 | 74.5 | 41.0 | 67.0 | 56.5 | 50.0 | 43.5 |
| **Site 2** | | | | | | | |
| Kanan Road, north of Silver Creek Rd. | 66.1 | 75.5 | 45.5 | 70.0 | 66.0 | 63.0 | 51.0 |

| September 17, 2003 | Leq | Lmax | Lmin | $L_{10}$ | $L_{33}$ | $L_{50}$ | $L_{90}$ |
|---|---|---|---|---|---|---|---|
| **Site 1** | | | | | | | |
| Cornell Road, near Fire Station | 61.9 | 78.5 | 43.0 | 66.5 | 57.0 | 51.0 | 45.0 |
| **Site 2** | | | | | | | |
| Kanan Road, north of Silver Creek Rd. | * | * | * | * | * | * | * |

| September 25, 2003 | Leq | Lmax | Lmin | $L_{10}$ | $L_{33}$ | $L_{50}$ | $L_{90}$ |
|---|---|---|---|---|---|---|---|
| **Site 1** | | | | | | | |
| Cornell Road, near Fire Station | 62.2 | 86.5 | 40.0 | 64.5 | 53.0 | 48.5 | 43.0 |
| **Site 2** | | | | | | | |
| Kanan Road, north of Silver Creek Rd. | 66.8 | 83.0 | 44.0 | 70.0 | 64.5 | 60.0 | 49.5 |

*Meter malfunction.

## NOISE IMPACTS

### Standards of Significance

CEQA Guidelines identify significant impacts as those that cause standards to be exceeded where they are currently met. An impact is also considered significant if it substantially worsens an existing unacceptable noise environment. The tests for potential noise impact significance include the following criteria:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?
- For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

There are no airports or airstrips within the project vicinity. Potential impacts would derive from any violation of applicable standards for noise or vibration, or for any substantial increases above background conditions.

"Substantial" is not defined in any guidelines. The accuracy of sound level meters and of sound propagation computer models is no better than ± 1 dB. This is also the human loudness difference discrimination level under ideal laboratory conditions. As previously noted, most people cannot distinguish a change in the noise environment that differs by less than 3 dB between the pre- and post-project exposure if the change occurs under ambient conditions. For the purposes of this analysis, an increase of 3 dB that creates or worsens an area of noise/land use incompatibility would be considered a significant degradation of noise quality.

Temporary noise sources such as from construction are generally allowed a greater deviation from the background in defining "substantial." Most jurisdictions limit the hours of noise generation to hours of least sensitivity. If a numerical standard is applied, it is typically a property line noise performance standard. Los Angeles County has adopted both time limits and performance standards in establishing impact significance. A violation of either criterion would be considered significant.

For construction activities, the Los Angeles County Noise Ordinance (Section 12.08.440 of the County Code) limits the hours of allowable construction activities and establishes noise performance standards at the nearest residential structures. Section 12.08.440(A) limits the

allowable hours of construction activities to 7:00 a.m. to 7:00 p.m. on Monday through Saturday except in an emergency. The noise performance standards in Section 12.08.440(B) of the Code restrict noise at affected structures.

County Code, Section 12.08.440(B) states as follows:

Noise Restrictions at Affected Structures. The contractor shall conduct construction activities in such a manner that the maximum noise levels at the affected buildings will not exceed those listed in the following schedule:

1. At Residential Structures.

   a. Mobile Equipment. Maximum noise levels for non-scheduled, intermittent, short-term operation (less than 10 days) of mobile equipment:

| | **Single-Family Residential** | **Multi-Family Residential** | **Semi-Residential/ Commercial** |
|---|---|---|---|
| Daily, except Sundays and legal holidays, 7:00 a.m. – 8:00 p.m. | 75 dB(A) | 80 dB(A) | 85 dB(A) |
| Daily, 8:00 p.m. – 7:00 a.m. and all day Sunday and legal holidays | 60 dB(A) | 65 dB(A) | 70 dB(A) |

Noise levels exceeding 75 dB(A) would be significant at the nearest homes to the project site. Stationary emissions sources have more stringent noise performance standards. As per County definition, equipment to be used to develop building pads, construct slopes, excavate utilities, pour foundations, etc. are all considered "mobile equipment."

**Types of Impact**

Noise impacts from residential development typically derive from project-related traffic. Traffic noise from an individual project will be superimposed upon the no-project baseline. Unless there are few cars under baseline conditions, the project noise increment will be masked by the background. Traffic noise impacts at levels causing noise compatibility standards to be exceeded are almost always cumulative from all overall development and not from any single project.

While individual project-related traffic noise impacts are normally less-than-significant, the impact of the ambient acoustic environment on a particular project may actually be of greater concern. The impact of the environment as a constraint on project development, rather than the project on the environment, may be the principal noise impact analysis issue for the Triangle Ranch site.

Temporary construction noise will also result during site preparation and building assembly. Such sources are short-term and will thus not affect the long-term noise exposure in the project vicinity.

## Construction Noise Impacts

Temporary construction noise impacts vary markedly because the noise strength of construction equipment ranges widely as a function of the equipment used and short-term variations are strongly influenced by topographical factors that may somewhat change during the course of the project. Construction noise tends to occur in discrete phases dominated initially by earth-moving sources and later for finish construction. The heavy equipment noise typically ranges up to about 90 dB at 50 feet from the source. Figure 2 summarizes the noise generation for typical construction activities. The higher levels on the noise spectrum from each type of source tends to be the short-term maximum. The lower part of the range reflects the longer-term average.

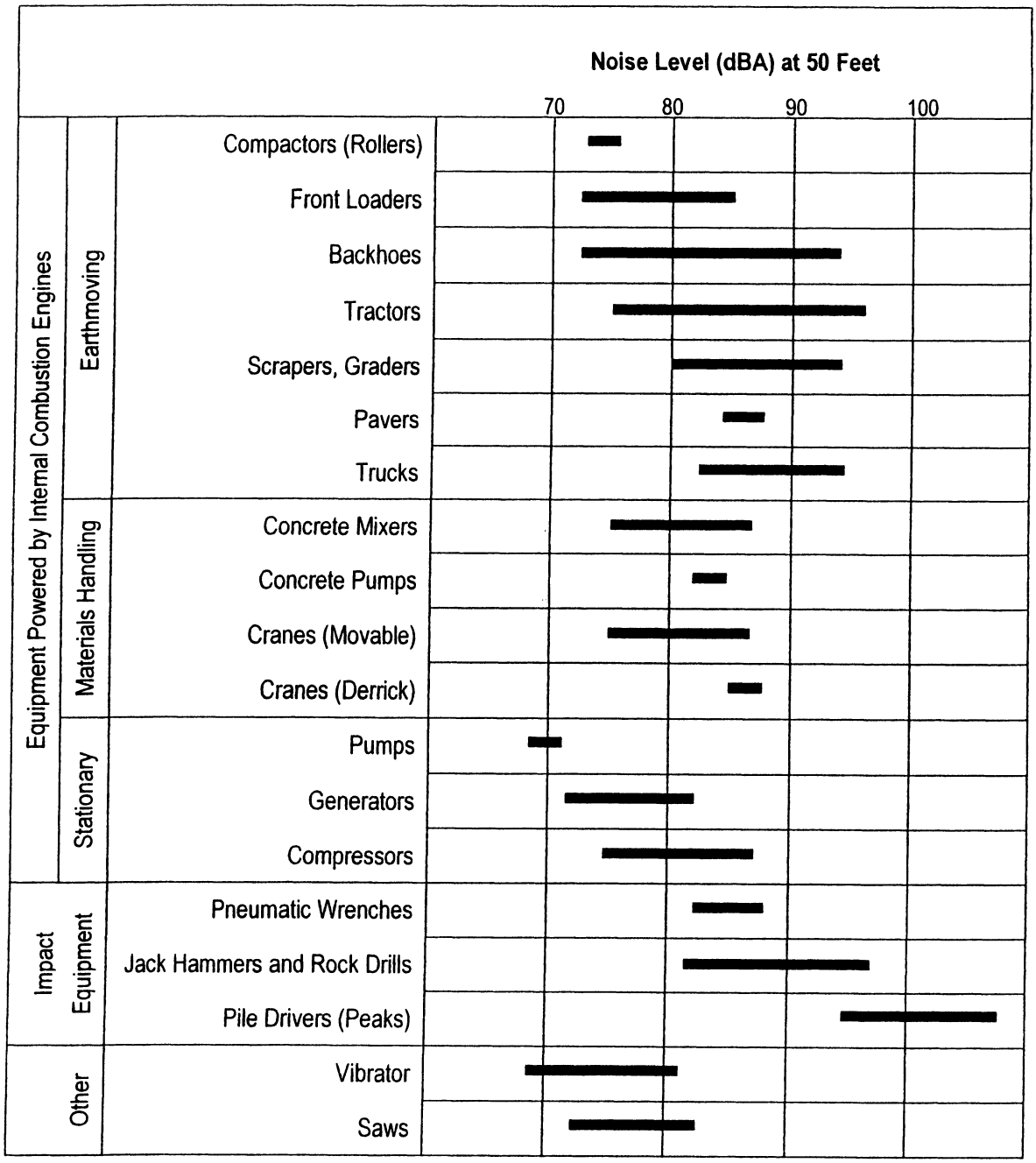
Point sources of noise emissions are atmospherically attenuated by a factor of 6 dB per doubling of distance. The loudest construction will require more than 1,000 feet of distance between the source and a nearby receiver to reduce the 90 dB source strength to a generally acceptable 65 dB exterior exposure level. Construction noise will be audible at existing residences near the proposed project site, both at residences along Cornell Road and southeast of Caleta Road. For purposes of analysis, and as a worst-case scenario, only the nearest residences were analyzed for construction noise impacts. Any mitigation required to reduce noise impacts at the nearest residential units and implemented at other residences will offer a greater benefit of noise reduction for the residences at greater distances.

The residence closest to the project site grading and construction activities is the home located on the east side of Cornell Road, adjacent to the construction area, specifically adjacent to proposed lots 59 and 60. The existing residence backs up to proposed lots 59 and 60, but is separated from the properties by an easement. Its backyard is approximately 50 feet from the grading area of the contour fill slopes associated with lots 59 and 60. The building pad of each lot is situated above the fill slopes, so the existing residence is situated below the properties of lots 59 and 60. The maximum impact will derive from construction of fill slopes east of the closest residence.

The noise performance/significance standard is based upon a peak noise level (Lmax). Several pieces of equipment may operate on a building pad or slope. However, only one piece at a time will typically be operating at full throttle at any location closest to any off-site homes, and only one piece can occupy a given small area at any point in time. One very loud piece of construction equipment operating at full throttle closes to any outdoor residential usable space was used as a prototype noise impact source.

## Figure 2

# Typical Construction Equipment Noise Generation Levels




Source: EPA PB 206717, Environmental Protection Agency, December 31, 1971, "Noise from Construction Equipment and Operations."

A bulldozer with a 90 dB noise maximum was presumed to be the peak noise generator during grading and slope construction. The peak noise impact levels for grading activity associated with the contour fill slopes and building pads are as follows:

| **Peak Equipment Noise Level @ 50 ft. (dB)** | **Distance to Residence (feet)** | **Peak Noise Level at Residence (dB)** | **Mitigation Required (dB)** |
|---|---|---|---|
| Bulldozer-90 | Backyard to Contour Slopes 50 | 90* | -15 |
| Bulldozer-90 | Backyard to Building Pad 150 | 81* | -6 |

*Exceeds L.A. County Noise Performance Standards.

As indicated above, the peak noise levels associated with grading both contour fill slopes and building pads at lots 59 and 60 will exceed the County standards at the nearest residence. The setback needed to not exceed the 75 dB performance standard at the nearest residence from heavy equipment operations under direct line-of-sight conditions is 300 feet. Grading will be required within 300 feet of some off-site residences, and the 75 dB noise ordinance standard will be exceeded. While "excess" construction noise of 6 dB for grading of building pads closest to existing home is mitigable with erection of a temporary barrier berm at the edge of the pad, the noise impacts from grading the contour/manufactured slopes as close as 50 feet of any residence under line-of-sight conditions cannot be mitigated due to nature of the terrain. This is considered a temporary, but significant, noise impact.

One unique noise issue is that blasting may be required if hard-rock formations are encountered that do not yield to normal pressure applied by dozers or graders. Construction blasting is achieved by a series of sequenced charges that are detonated sequentially such that each new small blast enhances the traveling shock wave used to crack the rocks. The purpose of blasting is to fracture rocks, and not to expel them. Such blasting does not create ejected material as might be seen in a Hollywood movie. The associated noise during a controlled blast is a loud thump similar to a large wave crashing on the shore. The rock drills used to place the charges are often considered noisier than the blast itself. Controlled blasting will not create noise or vibration impacts that would significantly affect adjacent residents.

Drilling for placement of ANFO (ammonium nitrate fertilizer and fuel oil) explosive entails placement of the rig, stabilizing the unit, drilling and blowing the cuttings out of the hole. The measured noise level during a hard-rock drilling sequence produced an average noise level of 89 dB at 50 feet from the unit. The maximum was not reported, but would presumably be in the low- to mid-90 dB range. A drill rig reference noise level was assumed to be 95 dB (Lmax).

Under direct line-of-sight conditions, geometrical spreading losses would reduce the 95 dB maximum to a 75 dB maximum (County standard) at 500 feet from the source to the receiver. If there is intervening terrain or any temporary barrier, the potential noise impact "envelope" would be much reduced. The placement of a possible drilling rig for possible blasting is not known. Placement of the rig within 500 feet with a direct line-of-sight to any outdoor residential usable space would be a potentially significant impact. Erection of a 10-foot high temporary earthen berm, or construction of a framework of suspended acoustical mats with a minimum sound transmission class (STC) of 25 at least 12 feet high shall be required for drilling within 500 feet with a direct line-of-sight of any backyard outdoor patio, pool, or similar use.

If any fractured rock from blasting is further crushed onsite to be used as base material for fill slopes, the crusher has a similar noise profile (90 dB) as a bulldozer. Rock crushing within 300 feet of any occupied home could cause the 75 dB standard to be exceeded. If the crusher operates for more than ten (10) days at a given location, it becomes a "stationary source" under the County noise ordinance. Stationary sources have a more stringent standard than temporary (mobile) sources. If a mobile rock crusher is used on the project, it may not operate within 300 feet of any residence without full screening, and it may not operate for more than the (10) days at any given location before relocation to another crushing site.

**Local Roadway Noise Modification**

The proposed development will generate 834 vehicle trips per day (Kimley-Horn & Associates, July 2003). Traffic noise changes on area-wide roadways were calculated using the FHWA Highway Traffic Noise Model (FHWA-RD-77-108) initialized with traffic input parameters (i.e., traffic volumes) supplied by the EIR traffic consultant. The impact analysis was conducted along the primary project access routes (Kanan & Cornell Roads). The 24-hour CNEL for four scenarios (2003 existing, 2006 with ambient growth, 2006 with growth and project, and 2006 cumulative) in dBA CNEL at 50 feet from the roadway centerline is shown in Table 2. The corresponding distance from the roadway centerline to the residential exposure standard (65 dB CNEL) is shown in Table 3a and 3b.

The proposed project will create a maximum traffic noise impact of 0.2 dB above the no project (ambient growth) contribution along both Cornell Road and Kanan Roads. Noise level changes of less than 3 dB are barely detectable by the human ear. The proposed project is too small to have a significant traffic noise impact given the baseline levels of traffic and associated noise already present in the area. Project traffic will contribute to an incremental degradation of noise quality along roadways in the area, but the project-related noise increment will be individually undetectable.

The maximum cumulative project noise level increase (growth plus the proposed project) is 0.7 dB above existing conditions. This increase would occur along Kanan Road, north and south of Cornell Road. This incremental project noise impact would be less than the 3.0 dB detection/significance threshold. Traffic noise impacts from the proposed project would thus be both individually, as well as cumulatively, less than significant.

## Table 2

### Traffic Noise Impact Analysis
### (CNEL in dB @ 50 Feet from Roadway Centerline)

| Segment | 2003 Existing dB | 2006 Ambient dB | 2006 with Project dB | 2006 Cumulative dB |
|---|---|---|---|---|
| **Kanan Road** | | | | |
| Agoura Road – Cornell Road | 72.2 | 72.3 | 72.5 | 72.9 |
| South of Cornell Road | 71.6 | 71.7 | 71.8 | 72.3 |
| **Cornell Road** | | | | |
| East of Kanan Road | 62.7 | 62.8 | 63.0 | 63.2 |

Note: Under line-of-sight conditions, no intervening structures or terrain.

## Table 3a

### Traffic Noise Impact Analysis
**(Distance to the 65 dB CNEL [feet] from Roadway Centerline)**
**Acoustically "soft" conditions, (downstairs yards)**

| Segment | 2003 Existing (feet) | 2006 Ambient (feet) | 2006 with Project (feet) | 2006 Cumulative (feet) |
|---|---|---|---|---|
| **Kanan Road** | | | | |
| Agoura Road – Cornell Road | 150 | 155 | 160 | 170 |
| South of Cornell Road | 140 | 140 | 140 | 155 |
| **Cornell Road** | | | | |
| East of Kanan Road | <50 | <50 | <50 | <50 |

Note: Under line-of-sight conditions, no intervening structures or terrain.

## Table 3b

### Traffic Noise Impact Analysis
**(Distance to the 65 dB CNEL [feet] from Roadway Centerline)**
**Acoustically "hard" conditions, (upstairs bedroom windows)**

| Segment | 2003 Existing (feet) | 2006 Ambient (feet) | 2006 with Project (feet) | 2006 Cumulative (feet) |
|---|---|---|---|---|
| **Kanan Road** | | | | |
| Agoura Road – Cornell Road | 265 | 270 | 280 | 310 |
| South of Cornell Road | 230 | 235 | 240 | 270 |
| **Cornell Road** | | | | |
| East of Kanan Road | <50 | <50 | <50 | <50 |

Note: Under line-of-sight conditions, no intervening structures or terrain.

## Exterior Noise Standard Compliance

### *Kanan Road*

As shown in Table 3a, downstairs usable outdoor space at any home with a rear or side yard within the 170 feet contour line of Kanan Road would experience traffic noise impacts under line-of-sight conditions. An impact analysis was conducted for any yard or patio area within the 170-foot noise impact zone for a receiver at 10 feet inside the rear lot line for each property. The following lots along Kanan Road will require mitigation in order to comply with the County exterior noise standard of 65 dB CNEL:

**Lots 29-32; Lots 39-41; Lot 43; Lots 52-54:**

The source receiver distance was measured for each potentially affected lot, the maximum noise loading was calculated, and the barrier height was determined under direct line-of-sight conditions needed to mitigate the level to 65 dB CNEL or less. The results of the exterior mitigation analysis are shown in Table 4. Barrier heights of five (5) feet (masonry block, 3/8-inch glass or 5/8-inch plexiglass) will achieve 65 dB CNEL or less at all affected yards (except Lots 43 and 54 which need a six (6) foot barrier).

The mitigation analysis does not incorporate any small enhancement of sound reduction effectiveness due to grade separation between affected lots and Kanan Road. The elevation difference may reduce the required wall height by 1 foot or less, or the 5-foot high wall may create a 1-2 dB extra margin of safety relative to the standard. The small noise effect of incorporating site-specific grade separation was therefore ignored and the more conservative barrier recommendation shown in Table 4 was retained.

### *Interior Noise Compliance*

Building facades along Kanan Road with a complete line-of-sight as far as 310 feet from the roadway centerline may have noise levels exceeding 65 dB CNEL. When exterior levels exceed 65 dB CNEL, enhanced noise attenuation features are necessary to achieve a mandatory 45 dB CNEL maximum beyond simply closing single-paned windows.

The hierarchy of structural noise mitigation possibility is as follows:

| Exterior to Interior Reduction Desired (dB) | Measure(s) Needed |
|---|---|
| 0-10 | None |
| 10-20 | Close single-paned windows facing roadway. Provide supplemental ventilation. |
| 20-25 | Close standard dual-paned windows. Provide supplemental ventilation. |
| 25-30 | Close upgraded dual-paned windows. Provide supplemental ventilation. Baffle vents and line ducts with absorbers. |
| >30 | Custom upgrades (dual layer drywall, triple-paned windows, steel doors, etc.) |

## Table 4

### Usable Exterior Space Noise Impact Analysis
**(Rear yards within 170 feet of Kanan Road C.L.)**

| Lot No. | Dist. to C.L.[a] (feet) | Noise Level (dB CNEL)[b] | Mitigation Needed (dB) | Max. Barrier Height (feet) |
|---|---|---|---|---|
| 29 | 130 | 69 | 4 | 5 |
| 30 | 135 | 69 | 4 | 5 |
| 31 | 140 | 68 | 3 | 5 |
| 32 | 150 | 68 | 3 | 5 |
| 39 | 130 | 69 | 4 | 5 |
| 40 | 130 | 69 | 4 | 5 |
| 41 | 130 | 69 | 4 | 5 |
| 43 | 80 | 71 | 6 | 6 |
| 52 | 170 | 68 | 3 | 5 |
| 53 | 90 | 70 | 5 | 5 |
| 54 | 70 | 71 | 6 | 6 |

[a]From patio at 10 feet inside property line.
[b]At top of any barrier.

The homes that may require slightly upgraded acoustical treatments having windows within 310 feet of Kanan Road under direct line-of-sight conditions, (see Table 3b) and the needed level of structural mitigation, are shown in Table 5. The structural noise mitigation requirement for this tract ranges from 21-26 dB for affected homes in this tract. As seen above, the use of "standard" dual-paned windows, in conjunction with central air conditioning to allow for window closure, will allow the interior noise standard to be met.

Final verification of the ability to meet interior standards will be provided at the building plan stage. For carpeted bedrooms, the exterior to interior noise reduction with closed windows is almost equal to the sound rating (sound transmission class, or "STC") of the windows facing the roadways. Selection of dual-paned windows with a minimum STC of 26 is therefore recommended for all lots shown in Table 5 in order to meet the 45 dB CNEL interior standard.

## Table 5

### Interior Noise Compliance Mitigation Analysis
**(Upstairs bedroom windows facing Kanan Road)**

| Lot No. | Distance (C.L. to façade) (feet) | Noise Loading (dB CNEL) | Mitigation Needed (dB) |
|---|---|---|---|
| 21 | 275 | 66 | 21 |
| 22 | 220 | 67 | 22 |
| 23 | 180 | 67 | 22 |
| 24 | 175 | 67 | 22 |
| 25 | 180 | 67 | 22 |
| 26 | 220 | 67 | 22 |
| 27 | 220 | 67 | 22 |
| 28 | 170 | 68 | 23 |
| 29 | 140 | 68 | 23 |
| 30 | 145 | 68 | 23 |
| 31 | 150 | 68 | 23 |
| 32 | 160 | 68 | 23 |
| 39 | 130 | 69 | 24 |
| 40 | 130 | 69 | 24 |
| 41 | 130 | 69 | 24 |
| 43 | 90 | 70 | 25 |
| 44 | 160 | 68 | 23 |
| 45 | 170 | 68 | 23 |
| 46 | 180 | 67 | 22 |
| 51 | 230 | 66 | 21 |
| 52 | 180 | 67 | 22 |
| 53 | 100 | 70 | 25 |
| 54 | 80 | 71 | 26 |

## MITIGATION

Temporary construction noise will impact the nearest residence and may be excessive at homes near the project site. Construction noise impacts will be minimized by compliance with County Noise Ordinance Section 12.08.440 limiting allowable hours of construction activities and prohibiting the creation of any excessively loud, unnecessary or unusual equipment noise. However, grading within 300 feet within full view of any occupied residence will cause the short-term noise standard of 75 dB to be exceeded. Mitigation in the form of temporary barriers is feasible for elevated building pads. For construction of contoured slopes, barrier mitigation is not feasible and impacts will be temporary but significant.

Drilling for the placement of explosives for rock fracture blasting may required. The location of possible drill rig placement is unknown. If drilling were required within 500 feet of any residence backyard, patio, etc., under a clear line-of-sight, a significant temporary impact may occur. Drilling within 500 feet of such a use with an unobstructed view of the activity shall require construction of a temporary 10-foot high earthen berm or a 12-foot high framework with suspended sound blankets (rated at STC=25 or higher) that interrupts such a line-of-sight.

If a temporary rock crusher is brought onsite to process oversize rock, placement of the crusher within 300 feet with a direct view of any outdoor residential space could cause a significant temporary impact. Operation of the crusher for more than 10 days at any single location within 1,500 feet of a residence could exceed the more stringent "stationary source" criterion in the noise ordinance. If on-site crushing is proposed, a noise-control plan shall be submitted and approved by County staff outlining crusher placement, noise protection and any periodic equipment relocation to stay within the less stringent "mobile source" noise limits.

No significant off-site noise impacts deriving from traffic pattern changes were identified requiring impact mitigation.

Potential on-site noise impacts are confined to the development perimeter in closest proximity to Kanan Road. Exterior levels at usable space such as patios could exceed 65 dB CNEL for any residence immediately adjacent to Kanan Road. A 5-foot high rear and side yard noise wall is required for any patio space at Lots 29-32, 39-41, and 52-53. Rear and side yards at Lots 43 and 54 require a 6-foot high barrier. Barriers may be concrete masonry block, transparent plastic or glass, or some combination thereof with a combined area density of 3.5 pounds per square foot.

Upstairs facades of any residence within 310 feet of the centerline could have noise levels that doe not allow interior standards to be met with closed single-paned windows. Interior noise mitigation measures for residence facades within 310 feet of the Kanan Road centerline under line-of-sight conditions are as follows:

1. Upstairs facades shall have dual-paned windows in all livable space with a minimum sound rating of STC=26 or higher.

2. All units in this tract shall have central air conditioning systems.

# APPENDIX G

# WATER QUALITY BACKGROUND MATERIALS

# APPENDIX G-1

**US Environmental Protection Agency, Region 9, Total Maximum Daily Loads for Nutrients, Malibu Creek Watershed, Published March 21, 2003**

# Total Maximum Daily Loads for Nutrients
# Malibu Creek Watershed

## US Environmental Protection Agency
## Region 9

**Established by:**

_____ _____

**Catherine Kuhlman** **Date**
**Acting Director**
**Water Division**
**EPA Region 9**

## Table of Contents


| | | |
|---|---|---|
| 1. | Introduction | 3 |
| 2. | Problem Statement | 9 |
| 3. | Numeric Targets | 17 |
| 4. | Source Assessment | 22 |
| 5. | Linkage Analysis | 36 |
| 6. | TMDLs and Allocations | 38 |
| 7. | Implementation Recommendations | 46 |
| 8. | Monitoring Recommendations | 48 |
| 9. | References | 50 |
| 10. | Appendix (Figures and Tables A-1--A-4) | 54 |

## 1. Introduction

This document describes the Total Maximum Daily Loads (TMDLs) for nutrient compounds for the Malibu Creek watershed, which includes Malibu Lagoon, Malibu Creek and its tributaries, and four urban lakes. The nutrient compounds addressed in these TMDLs are nitrogen and phosphorus. Malibu Creek and three of its tributaries (Las Virgenes Creek, Medea Creek, and Lindero Creek) exceed the water quality objectives (WQOs) for nuisance effects such as algae, odors, and scum (RWQCB, 1996). Additionally, Malibu Lagoon and four urban lakes (Lindero, Westlake, Sherwood, and Malibou) within the watershed exceed the WQOs for nutrient related effects (i.e., ammonia, dissolved oxygen, or eutrophication). The TMDLs identify the amounts of nitrogen and phosphorous that can be discharged to the water bodies in the Malibu Creek watershed without causing violations of applicable water quality standards, and allocate allowable nutrient loads among different discharge sources.

These TMDLs comply with 40 CFR 130.2 and 130.7, Section 303(d) of the Clean Water Act and U.S. Environmental Protection Agency (EPA) guidance for developing TMDLs in California (U.S. EPA, 2000). This document summarizes the information used by the EPA and the California Regional Water Quality Control Board, Los Angeles Region (Regional Board) to develop TMDLs for nitrogen and phosphorus compounds. The TMDLs are expressed differently for summer and winter conditions because flows, nutrient loads, and nutrient effects vary substantially in different seasons. In this document, the term "summer" is defined as the period between April 15-November 15 and "winter" is defined as the period between November 16-April 14. These two seasonal periods are distinguished in order to account for:

- the winter period in which the Tapia Water Reclamation Facility (WRF) is authorized to discharge most of its treated effluent, which results in substantial differences in flows and nutrient loads between summer and winter, and
- rainfall and runoff patterns (most rainfall and precipitation-related nutrient loading occurs during the winter period).

TMDLs are being established for the following segments within the Malibu Creek Watershed which have been included on the Section 303(d) list as impaired due to effects of nutrients: Lake Sherwood, Westlake Lake, Lake Lindero, Las Virgenes Creek, Lindero Creek, Medea Creek, Malibou Lake, Malibu Creek, Malibu Lagoon. In addition, we have determined that it is necessary to set load allocations and wasteload allocations to limit nutrient discharges to upstream, hydrologically-connected segments within the watershed in order to achieve compliance with water quality standards in the downstream impaired segments for which TMDLs are being established. Allocations are being established for sources that discharge to all of the waters that are tributary to Malibu Creek and Lagoon, including the following upstream water bodies: Hidden Valley Creek, Triunfo Creek, Potrero Canyon Creek, Palo Comado Creek, Cheesebro Creek, Stokes Creek, and Cold Creek. There is some evidence that water quality is impaired due to nutrient effects in some of these upstream tributaries and we believe the loading reductions that will occur pursuant to the load and wasteload allocations established in these TMDLs should be sufficient to address potential nutrient-related impairment in these tributaries. Figure A-1 shows all waterbodies in the Malibu watershed and impaired waters addressed in

these TMDLs. Figure A-2 shows the subwatersheds within Malibu Creek watershed as several impaired waters have been grouped together in these TMDLs. (see Appendix for figures)

### a. Regulatory Background

Section 303(d) of the Clean Water Act (CWA) requires that each State "shall identify those waters within its boundaries for which the effluent limitations are not stringent enough to implement any water quality standard applicable to such waters." The CWA also requires states to establish a priority ranking for waters on the 303(d) list of impaired waters and establish TMDLs for such waters.

The elements of a TMDL are described in 40 CFR 130.2 and 130.7 and Section 303(d) of the CWA, as well as in U.S. Environmental Protection Agency guidance (U.S. EPA, 1991 and 2000a). A TMDL is defined as the "sum of the individual waste load allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background" (40 CFR 130.2) such that the capacity of the waterbody to assimilate pollutant loading (the Loading Capacity) is not exceeded. A TMDL is also required to account for seasonal variations and include a margin of safety to address uncertainty in the analysis (USEPA, 2000a).

The Environmental Protection Agency has oversight authority for the 303(d) program and is required to review and either approve or disapprove the TMDLs submitted by states. In California, the State Water Resources Control Board (State Board) and the nine Regional Boards are responsible for preparing lists of impaired waterbodies under the 303(d) program and for preparing TMDLs, both subject to EPA approval. If EPA does not approve a TMDL submitted by a state, EPA is required to establish a TMDL for that waterbody. The Regional Boards also hold regulatory authority for many of the instruments used to implement the TMDLs, such as the National Pollutant Discharge Elimination System (NPDES) and state-specified Waste Discharge Requirements (WDRs).

The State of California identified over 700 waterbody-pollutant combinations in the Los Angeles Region where TMDLs would be required (SWRCB, 1998; RWCQB 1996, 1998). These are referred to as "listed" or "303(d) listed" waterbodies. A schedule for development of TMDLs in the Los Angeles Region was established in a consent decree (Heal the Bay Inc., et al. v. Browner C 98-4825 SBA) approved on March 22, 1999. For the purpose of scheduling TMDL development, the decree combined the more than 700 waterbody-pollutant combinations into 92 TMDL analytical units.

These TMDLs address Analytical Unit 50 specified in the Consent Decree, which consists of Malibu Lagoon, segments of the Malibu Creek and tributaries, and urban lakes impaired by nutrient compounds and effects that appear to be caused by those compounds. The nutrient impairments include ammonia and nutrients (nitrogen and phosphorus) and nuisance effects (dissolved oxygen, algae, scum, and odor). Table 1 identifies the listed waterbodies, the nutrient-related impairments for which each is listed, and the number of linear miles of waterbody in Analytical Unit 50 impaired by each. The consent decree schedule requires that these TMDLs be approved or established by EPA by March 22, 2003. EPA is establishing these

TMDLs at the request of the Regional Board and in order to meet its obligations under the consent decree, because the State was unable to establish these TMDLs in time to meet the consent decree deadlines.

This report presents the nutrient TMDLs and summarizes the analyses performed by EPA and the Regional Board to develop these TMDLs.

**Table 1. Malibu Creek Watershed 303(d) listed Waterbodies for Nutrients**
(streams = linear miles listed; lakes = acres listed)

| Waterbody | Algae | Eutrophy | Scum/ Odors | Ammonia | Organic enrichment | Dissolved Oxygen |
|---|---|---|---|---|---|---|
| Lake Sherwood | 213 | 213 | | 213 | 213 | 213 |
| Westlake Lake | 186 | 186 | | 186 | 186 | 186 |
| Lake Lindero | 14 | 14 | 14 | | 14 | |
| Las Virgenes Creek | 11.25 | | 11.25 | | | 11.25 |
| Lindero Creek | 6.56 | | 6.56 | | | |
| Medea Creek | 7.56 | | | | | |
| Malibou Lake | 69 | 69 | | | 69 | 69 |
| Malibu Creek | 8.43 | | 8.43 | | | |
| Malibu Lagoon | | 33 | | | | |

### b. Environmental Setting: The Malibu Creek Watershed

These TMDLs addresses nutrient-related impairments for waterbodies within the Malibu Creek watershed (Table 1). There are a number of waterbodies which were not listed or were not assessed during the 303(d) listing process but were included in the modeling effort since they are hydrologically connected to the impaired waterbodies. These include Hidden Valley Creek, Triunfo Creek, Potrero Canyon Creek, Palo Comado Creek, Cheesebro Creek, Stokes Creek, and Cold Creek. Three of the seven lakes in the Malibu Creek watershed (Lake Eleanor, Las Virgenes Reservoir, and Century Lake) were not addressed in this analysis because they were not listed as impaired and they were not crucial to understanding the hydrology of the watershed.

The Malibu Creek watershed, located about 35 miles west of Los Angeles, California, includes several streams, lakes, and a lagoon that are on the 303(d) list for algae/nutrient impairments. The watershed is 109 square miles and extends from the Santa Monica Mountains and adjacent Simi Hills to the Pacific coast at Santa Monica Bay. Several creeks and lakes are located in the upper portions of the watershed, and these ultimately drain into Malibu Creek at the downstream end of the watershed. Historically, there is little flow in the summer months; much of the natural flow that does occur in the summer in the upper tributaries comes from springs and seepage areas. Malibu Creek drains into Malibu Lagoon, a 13-acre tidal lagoon, which in turn drains into Santa Monica Bay when the entrance to the lagoon is open.

Lake Sherwood is a 213-acre private lake located in the 10,864-acre Hidden Valley subwatershed. Although the lake itself is surrounded by a residential community, it receives the drainage from mostly agricultural and undeveloped lands in its drainage area. The lake is hydraulically connected to a bowl-shaped groundwater aquifer, which is an additional source of summer flows. Fishing, boating and swimming are allowed at the lake and there is a golf course at the west end of the lake. Lake Sherwood was listed as impaired due to problems associated

with high algal abundances, organic enrichment, eutrophic conditions and low dissolved oxygen in the lake. Lake water quality was also listed for ammonia toxicity suggesting that excess nitrogen may be the cause of the eutrophication. The lake has a maximum depth of 30 feet. The average lake inflow rate is 2.66 cfs and the residence time is 493 days (Lund *et al.*, 1994). The lake discharges to Potrero Creek.

Westlake Lake is a 186-acre man-made lake, which was constructed in 1976 to provide a private setting for homes and to provide opportunities for boating and fishing to the residents of Westlake Lake. Like Lake Sherwood, Westlake Lake is listed for algae, eutrophic conditions and ammonia toxicity. The primary source of water to Westlake Lake is Potrero Creek that contains flow from Lake Sherwood as well as drainage from Potrero Creek watershed (NRCS, 1995). The lake also receives drainage from the surrounding mountains in the Westlake subwatershed as well as six storm drains (Lund et al., 1994). The lake has a maximum depth of 18 feet. The average lake inflow rate is 9.97 cfs. A minimum flow of 1 cfs is required to be discharged in the summer months for fish. The lake residence time is 40 days (Lund *et al.*, 1994). Flows from Westlake Lake are discharged into Triunfo Creek.

Both Lindero Creek and Lake Lindero are listed for algae and eutrophic conditions. In addition Lake Lindero is listed for organic enrichment and scum/odors. Lake Lindero is a small urban lake that was constructed in 1964. Because flows in the upper reaches of Lindero Creek are relatively small, the main sources of water are runoff from the adjacent lots, a golf course and the streets. Residential areas make up about 37% of the land use pattern in the 5,460-acre Lindero Creek subwatershed. Another 6% is commercial and industrial. The rest is undeveloped or vacant land. The 13.6 acre lake has a maximum depth of 20 feet. The average lake inflow rate is 1.51 cfs with a residence time of 30 days (Lund *et al.*, 1994). Water exits the lake spillway to the lower Lindero Creek and eventually flows to Medea Creek.

Medea Creek has a total length of 7.56 miles. Land use in the Medea Creek subwatershed contains a mix of open space area (61%), residential use (31%) and commercial use (3%). Medea Creek also receives drainage from the subwatersheds associated with Palo Comado Creek and Cheeseboro Creek.

Malibou Lake is listed for both algae and eutrophic conditions. Malibou Lake receives the drainage from most of the subwatersheds in the upper portion of the watershed. The lake has a drainage area of 64 square miles which represents almost 60% of the entire watershed. Water flows from Triunfo and Medea Creek into the lake. The lake was constructed in 1922 for swimming, boating and fishing by members and guests of the Malibou Lake Mountain Club, Ltd. The maximum depth of this 69-acre lake is about 20 feet (Lund *et al.*, 1994). Malibou Lake has mud bottom that is dredged on a continual basis because of sediment loadings from upstream sources. The outflow from the lake discharges into Malibu Creek.

Malibu Creek is listed for algae and scum/foam. The 10-mile creek runs from Malibu Lake to Malibu Lagoon and has an estimated winter mean flow of about 15 cfs and a dry weather average base flow of 2.5 cubic feet per second (cfs). The predominant land use in the Malibu Creek subwatershed is open space (94%). Residential uses make up 1% percent of the subwatershed acreage and commercial/industrial uses make up 3% of the total land use. The

Tapia Water Reclamation Facility (Tapia WRF) is located in this subwatershed and contributes significant flow in the winter months. Malibu Creek also receives flow from Las Virgenes Creek, Cold Creek and Stokes Creek.

Las Virgenes Creek is listed for algae, eutrophic conditions, and low dissolved oxygen. Eleven miles in length, the creek receives drainage from a 12,456-acre area. The land use in the Las Virgenes Creek subwatershed is predominantly open space (83%). Residential land use accounts for 6% of the land use area. Commercial/industrial land use accounts for another 3%. The proposed Ahmanson Ranch development is located in the upper watershed. This proposed project would add 1,097 acres of residential land use and 390 acres of golf course to the land use mix in the watershed. Neither Stokes Creek nor Cold Creek are listed for nutrient related impairments. Both creeks flow through relatively undeveloped areas and water quality in these creeks is presumed to be high.

Malibu Lagoon, located at the bottom of the watershed, is listed for eutrophic conditions. The lagoon is at the receiving end of the drainage from all upstream subwatersheds. Water quality problems occur especially in the summer months when the lagoon is closed. During the winter months higher flows can cause the lagoon to breach, flushing out much of the water and sediments. Land use in the 681-acre Malibu Lagoon subwatershed consists of a mix of open space (34%), residential areas (36%), and commercial uses (15%).

### c. TMDL ELEMENTS

Guidance from USEPA (2000a) identifies seven elements of a TMDL. Sections 2 through 8 of this document are organized such that each section describes one of the elements, with the analysis and findings of these TMDLs for that element. The seven elements are:

1. Problem Statement. This section reviews the evidence used to include the water body on the 303(d) list, and summarizes existing conditions using that evidence along with any new information acquired since the listing. For these TMDLs, the problem encompasses nutrients, which result in excessive algae proliferation and related effects. The problem identification reviews: those reaches that fail to support all designated beneficial uses, the beneficial uses that are not supported for each reach, the water quality objectives (WQOs) designed to protect those beneficial uses and, in summary, the data and information regarding the decision to list each reach, such as the number and severity of exceedances observed.

2. Numeric Targets. For these TMDLs, the numeric targets are based on the numeric and narrative water quality objectives in the Basin Plan. Load reductions and pollutant allocations in the TMDL are developed to ensure that these numeric targets for the impaired waterbodies are met.

3. Source Assessment. This step is a quantitative estimate of point sources and non-point sources of nutrient compounds into the Malibu Creek watershed. The source assessment considers seasonality and flow.

4. Linkage Analysis. This analysis demonstrates how the sources of nutrient compounds (nitrogen and phosphorus) in the waterbody are linked to the observed conditions in the impaired waterbody. The linkage analysis includes an assessment of critical conditions, which are periods when the changing pollutant sources and changing assimilative capacity of the waterbody combine to produce either extreme impairment conditions or conditions especially resistant to improvement. Separate TMDLs may be defined for each critical condition/season.

5. TMDLs and Pollutant Allocations. The total loading capacity for each waterbody is determined. The TMDL is set at the loading capacity. Each pollutant source is allocated an allowed quantity of nitrogen and phosphorus compounds that it may discharge. Allocations are designed such that the waterbody will not exceed numeric targets for any of the compounds or effects in any of its reaches. Point sources are given waste load allocations, and non-point sources are given load allocations. Allocations need to consider worst-case conditions, so that the pollutant loads may be expected to remove the impairment under critical conditions.

6. Implementation Recommendations. This section describes the plans, regulatory tools, or other mechanisms by which the waste load allocations and load allocations may be achieved.

7. Monitoring Recommendations. These TMDLs recommend monitoring the waterbody to ensure that the Waste Load Allocations and Load Allocations are achieved and remove the impairment so that numeric targets are no longer exceeded and that the nutrient-related effects intended to be addressed by these TMDLs also are removed.

## 2. Problem Statement

Excessive algae in the Malibu Creek watershed has resulted in several waterbodies not supporting their designated beneficial uses associated with aquatic life and recreation (RWQCB, 1996). Algal biomass can lead to impairment of swimming and wading activities. In addition, the proliferation of algae can result in loss of invertebrate taxa through habitat alteration (Biggs, 2000). Algal growth in some instances has produced algal mats in the lakes (Lund et al., 1994), creeks (Ambrose et al., 1995, Kamer et al., 2002, CH2MHill, 2000, Heal the Bay, 2002), and lagoon (Ambrose et al., 2000); these mats may result in eutrophic conditions where dissolved oxygen concentration is low (Briscoe, et al., 2002), and negatively affect aquatic life in the waterbody (Ambrose et al., 2000). The decay of these mats may also cause problems with scum and odors that affect recreational uses of the affected waterbody. In addition, the concentration of ammonia, a nitrogen compound, has been present in concentrations exceeding objectives designed to protect aquatic life (RWQCB, 1996).

This section provides a review of the data used by the Regional Board to list the waterbodies within the Malibu Creek watershed for nutrient-related impacts. Where appropriate the data has been updated with more recent information. As the Regional Board's listing decisions are based on impairments to water quality, and TMDLs are designed to attain water quality standards, it is appropriate to begin this section with a discussion of the applicable water quality standards.

### a. Applicable Water Quality Standards

California state water quality standards consist of the following elements: 1) beneficial uses, 2) narrative and/or numeric water quality objectives and 3) an antidegradation policy. In California, beneficial uses are defined by the Regional Water Quality Control Boards (Regional Boards) in the Water Quality Control Plans (Basin Plans). Numeric and narrative objectives are specified in each Region's Basin Plan, designed to be protective of the beneficial uses in each waterbody in the region. The Water Quality Control Plan for the Los Angeles Region (Basin Plan, 1994) defines 14 beneficial uses for the Malibu Creek watershed. These uses are identified as existing (E), potential (P), or intermittent (I) uses. We have identified ten of the beneficial uses that are sensitive to nutrient compounds and related effects, such that protecting these uses will serve to protect all others too. Therefore this document focuses discussion on these ten use designations: REC1, REC2, WARM, COLD, EST, MAR, WILD, RARE, MIGR, and SPWN. Table 2 contains the beneficial use designations relevant to this TMDL.

**Table 2. Malibu Creek Watershed Beneficial Uses**

| | RECREATION | | AQUATIC LIFE USE SUPPORT | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | REC1 | REC2 | WILD | WARM | RARE | COLD | MIGR | SPWN | EST | MAR |
| Malibu Lagoon | E | E | | E | E | | E | E | E | E |
| Malibu Creek | E | E | E | E | E | E | E | E | | |
| Las Virgenes Creek | E | E | E | E | E | P | P | P | | |
| Malibou Lake | E | E | E | E | E | | | | | |
| Lower Medea Creek | I | I | E | I | E | P | | | | |
| Upper Medea Creek | E | E | E | E | | | | | | |
| Lindero Creek | I | I | E | I | | | | | | |
| Lake Lindero | I | I | E | I | | | | | | |
| Westlake Lake | E | E | E | E | | | | | | |
| Lake Sherwood | E | E | E | E | | | | | | |

Recreational uses for body contact (REC1) and secondary contact (REC2) apply to all the listed waterbodies as existing, potential or intermittent. These uses apply even if access is prohibited to portions of the waterbody. Objectives designed to protect human health (e.g., bacterial objectives) and the aesthetic qualities of the resource (e.g., visual, taste and odors) are appropriate to protect recreational uses of the river.

The use designation for warm water fish (WARM) exists in most of the impaired creeks, with the exception of Medea Creek (Reach 1), and Lindero Creek. This use designation does not apply to the lakes, or the lagoon. The cold-water fisheries designated use (COLD) applies to Malibu Creek, Cold Creek, and Las Virgenes Creek. The Wildlife use designation (WILD) is for the protection of fish and wildlife. This use applies to all impaired waterbodies within the Malibu Creek watershed.

*Ammonia*. The Basin Plan establishes numeric objectives for ammonia which are protective of fish (COLD), (WARM) and wildlife (WILD) (see Plan Tables 3-1 through 3-4). The numeric objectives for ammonia in the Basin Plan were updated by the Regional Board in April 2002. The objective for chronic exposure is based on a four-day average concentration. The objective for acute toxicity is based on a one-hour average concentration. These objectives are expressed as a function of pH and temperature because un-ionized ammonia ($NH_3$) is toxic to fish and other aquatic life.

*Dissolved Oxygen*. Adequate dissolved oxygen levels are required to support aquatic life. Dissolved oxygen requirements are dependent on the beneficial uses of the waterbody for the Malibu Creek watershed. The Basin Plan states "*At a minimum (see specifics below) the mean annual dissolved oxygen concentrations of all waters shall be greater than 7 mg/l, and no single determinations shall be less than 5.0 mg/l except when natural conditions cause lesser concentrations.*"

In addition, the Basin Plan states, *"the dissolved oxygen content of all surface waters designated as WARM shall not be depressed below 5 mg/l as a result of waste discharges."* The WARM designation applies to all listed waters except Lake Lindero.

The Basin Plan also states, *"the dissolved oxygen content of all surface waters designated as both COLD and SPAWN shall not be depressed below 7 mg/l as a result of waste discharges."* The COLD and SPAWN designation applies to Malibu Lagoon, Malibu Creek, and Lake Lindero. COLD and SPAWN also apply as a potential use for Las Virgenes Creek.

*Nitrogen (Nitrate, Nitrite)*. Nitrogen requirements are dependent on the beneficial uses of the waterbody for the Malibu Creek watershed. Excess nitrogen in surface waters also leads to excessive aquatic growth and can contribute to elevated levels of nitrate in groundwater as well. The Basin Plan states, "*Waters shall not exceed 10 mg/L nitrogen as sum of nitrate-nitrogen and nitrite-nitrogen, 10 mg/L nitrate-nitrogen ($NO_3$-N), 45 mg/L nitrate or 1 mg/L as nitrite-nitrogen ($NO_2$-N).*" The Basin Plan also states *10 mg/L nitrogen [sum of nitrate-nitrogen and nitrite-nitrogen] is the water quality objective for Malibu Creek watershed* (see Plan Table 3-8)."

*Biostimulatory Substances: Nutrients.* The Basin Plan addresses excess aquatic growth in the form of a narrative objective for nutrients. Excessive nutrient (e.g. nitrogen and phosphorous) concentrations in a waterbody can lead to nuisance effects such as algae, odors, and scum. The objective specifies, *"waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses."* To implement this narrative objective, we have evaluated available data, studies, and other information to estimate the levels of nitrogen and phosphorus that can be present without causing violations of this objective.

*Floating Materials: Scum/Foam.* The Basin Plan expresses a narrative objective for floating material requiring that the waters should be free of floating material, including foams and scum *"in concentrations that cause nuisance or adversely affect beneficial uses."*

### b. Assessment of existing conditions relative to numeric and narrative standards

This section describes conditions in the Malibu Creek watershed, which resulted in the inclusion of waterbodies as impaired on the 1996 Water Quality Assessment (WQA) which formed the basis for the 1996 and 1998 303(d) listings. We also have incorporated new information that was gathered as part of the submittal process for the 2002 303(d) listing process.

*Ammonia as Nitrogen.* Lake Sherwood and Westlake Lake are the only two waterbodies within the Malibu Creek watershed identified on the 1996 303(d) list as impaired due to ammonia concentrations. The data reviewed for the assessment were collected as part of a Regional Board study entitled, "Evaluation of Water Quality for Selected Lakes in the Los Angeles Hydrological Basin." (Lund et al., 1994). The data were collected between July 1992 and March 1993.

**Table 3. Ammonia Concentrations (mg/l) for Lake Sherwood and Westlake Lake**

| Waterbody Name | Number of samples | Mean (Std Dev) | Range |
|---|---|---|---|
| Lake Sherwood | 59 | 0.99 (1.28) | 0.10 – 6.00 |
| Westlake Lake | 52 | 0.35 (0.35) | 0.10 – 1.34 |

These data were evaluated against the updated ammonia criteria in the Basin Plan. Relative to the acute criteria, two of the Lake Sherwood samples exceeded the criteria (3%), and none (0%) of the Westlake Lake samples exceeded the criteria. Relative to the chronic criteria, seven of the Lake Sherwood samples (12%) exceeded the criteria and one of the Westlake Lake samples (2%) exceeded the criteria. There is no more recent data to assess the lakes for ammonia.

We also evaluated the available ammonia data for streams in the Malibu Creek watershed collected by Tapia as part of their NPDES monitoring program from 1991 to 1999. These data represent close to 800 samples. As can be seen in Table 4 below, the ammonia concentrations in the river were generally low. The median concentrations were typically below 0.1 mg/l. Ninety percent of the samples had concentrations below 0.2 mg/l.

**Table 4. Summary of ammonia data from Tapia (1991 to 1999)**

| | Lower Las Virgenes Creek | Upper Malibu Creek | Middle Malibu Creek | Middle Malibu Creek | Lower Malibu Creek | Lower Malibu Creek | Malibu Lagoon | Malibu Lagoon |
|---|---|---|---|---|---|---|---|---|
| Station | R6 | R9 | R1 | R2 | R13 | R3 | R4 | R11 |
| Count | 84 | 98 | 96 | 100 | 108 | 108 | 100 | 102 |
| Average | 0.07 | 0.03 | 0.15 | 0.21 | 0.05 | 0.05 | 0.07 | 0.06 |
| Median | 0.04 | 0.03 | 0.06 | 0.13 | 0.04 | 0.04 | 0.04 | 0.04 |
| $90^{th}$ percentile | 0.09 | 0.06 | 0.20 | 0.21 | 0.10 | 0.08 | 0.12 | 0.12 |
| Max | 1.20 | 0.18 | 1.00 | 4.00 | 0.23 | 0.90 | 1.00 | 0.53 |

In the 2002 303(d) listing process, the Regional Board staff re-evaluated the monthly ammonia data collected between November 1988 to December 2000 from Malibu Creek, Cold Creek, Cheeseboro Creek, Medea Creek and Malibu Lagoon relative to the toxicity standard corrected for temperature and pH. When adjusted for pH there were no exceedances of the acute criteria in any of these reaches. There were also no exceedances of the chronic criteria adjusted for temperature and pH in any of the rivers. In summary there is some limited evidence of ammonia toxicity in the lakes and no data to suggest that the streams or lagoons are experiencing ammonia toxicity.

*Dissolved Oxygen*. Las Virgenes Creek was listed in the 1996 WQA as impaired due to depressed dissolved oxygen concentrations that do not meet the recommended water criteria for protection of fresh water aquatic life. This assessment was based on a total of eleven data points sampled over a two-week period in the fall of 1995. Six of the eleven data points were below 7 mg/l. To supplement this assessment, we reviewed data collected by Tapia WRF as part of their NPDES monitoring program of the data from January 1994 to June 1999. These data represent close to 2000 samples.

**Table 5. Summary of dissolved oxygen concentrations (mg/l) from Tapia stations (1994-1999)**

| | Lower Las Virgenes Creek | Upper Malibu Creek | Middle Malibu Creek | Middle Malibu Creek | Lower Malibu Creek | Lower Malibu Creek | Malibu Lagoon | Malibu Lagoon |
|---|---|---|---|---|---|---|---|---|
| Station | R6 | R9 | R1 | R2 | R13 | R3 | R4 | R11 |
| Count | 210 | 200 | 248 | 248 | 247 | 242 | 227 | 247 |
| Average | 7.12 | 7.64 | 9.57 | 8.79 | 9.27 | 11.66 | 12.38 | 10.87 |
| Median | 6.95 | 7.85 | 9.70 | 8.75 | 9.20 | 11.50 | 11.60 | 10.70 |
| Minimum | 4.3 | 3 | 5 | 5.9 | 6.8 | 5.3 | 7.1 | 0 |
| # <5 mg/l | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 1 |

Based on these data there does not appear to be a problem with dissolved oxygen concentrations in the Las Virgenes Creek, Malibu Creek or the Lagoon. One criticism of the monitoring effort is that the sampling begins in the upper watershed and ends later in the day at the lagoon. Since DO concentrations are typically higher in the afternoon, this time differential might bias the results. To assess the potential for this bias the Regional Board contracted with SCCWRP to perform a pre-dawn survey at 17 sites in the watershed on September 22-23, 2001 (Briscoe et al, 2002). DO concentrations were less than 7.0 mg/l at 6 of 17 sites. These were generally sites

with more developed land use. The average DO was greater than 5.0 mg/l at all sites except Malibu Lagoon where DO concentrations were very low (1.2 mg/l). The diel pattern for in-stream DO concentrations is a natural occurrence and there is insufficient evidence to suggest the DO concentrations in these streams are depressed as a result of waste discharges. On the other hand there is ample evidence that eutrophic conditions in the lagoon can lead to low DO values (Ambrose et al., 1995, Briscoe et al., 2002). Therefore we conclude that the data indicate that Malibu Lagoon does not meet applicable DO objectives. Available data for streams within the watershed are inconclusive as to whether DO objectives are attained in these streams.

The lakes study (Lund et al., 1994) suggested that there might be impairments in three lakes due to low DO. The waters of Sherwood Lake were generally anoxic below the hypolimnion (3 meters) from April to October. Westlake Lake was weakly stratified, but had low DO at depths below 4 meters in the summer. Malibu Lake was generally anoxic below 2.5 meters (April through October). No DO problems were observed in the relatively shallow Lake Lindero.

*Biostimulatory Substances: Algae.* For the 1996 WQA, impairment decisions were based on observations for the presence of these nuisance effects (also known as aesthetic stressors). Algae observed in "high" amounts were considered to be an exceedance of the narrative standard for floating material and biostimulatory substance. The results of observations made between 1991 and 1995 are summarized below (Table 6). Malibu Creek and three of its tributaries (Las Virgenes Creek, Lindero Creek, and Medea Creek) were listed as impaired due to observations of excessive algal growth.

**Table 6. Summary of algae data in 1996 WQA listing.**

| Stream Reach | # of Observations | High amounts of algae |
|---|---|---|
| Malibu Creek | 28 | 4 |
| Las Virgenes Creek | 15 | 5 |
| Lindero Creek R1 | 2 | 2 |
| Lindero Creek R2 | 7 | 4 |
| Medea Creek R2 | 8 | 3 |

To supplement this data we analyzed the long-term data set from Tapia on percent algal cover in various reaches of Malibu Creek and Las Virgenes Creek (summarized in Table 7). We also reviewed data that was submitted from Heal the Bay (discussed below).

**Table 7. Summary of Percent algal coverage for Tapia Data set (1983 to 1999)**

| **All Seasons** | **Number of samples** | **Median** | **#>30%** | **%>30%** |
|---|---|---|---|---|
| Las Virgenes | 426 | 12.5 | 77 | 18% |
| Upstream of Tapia (R9) | 393 | 12.5 | 140 | 36% |
| Immediately above Tapia discharge (R1) | 442 | 12.5 | 118 | 27% |
| Immediately below Tapia (R2) | 439 | 12.5 | 26 | 6% |
| County Gaging Station (R13) | 444 | 12.5 | 57 | 13% |
| Malibu Canyon area (R3) | 422 | 12.5 | 124 | 29% |
| Cross Creek Road (R4) | 407 | 12.5 | 80 | 20% |
| Lagoon (R11) | 434 | 12.5 | 39 | 9% |
| **Summer Months (May - Oct)** | **Number of samples** | **Median** | **#>30%** | **%>30%** |
| Las Virgenes | 240 | 12.5 | 65 | 27% |
| Upstream of Tapia (R9) | 210 | 31.25 | 105 | 50% |
| Immediately above Tapia discharge (R1) | 251 | 12.5 | 95 | 38% |
| Immediately below Tapia (R2) | 247 | 12.5 | 24 | 10% |
| County Gaging Station (R13) | 252 | 12.5 | 37 | 15% |
| Malibu Canyon area (R3) | 241 | 12.5 | 95 | 39% |
| Cross Creek Road (R4) | 220 | 12.5 | 74 | 34% |
| Lagoon (R11) | 248 | 12.5 | 32 | 13% |
| **Winter Months (Nov - Apr)** | **Number of samples** | **Median** | **#>30%** | **%>30%** |
| Las Virgenes | 186 | 12.5 | 12 | 6% |
| Upstream of Tapia (R9) | 183 | 12.5 | 35 | 19% |
| Immediately above Tapia discharge (R1) | 191 | 12.5 | 23 | 12% |
| Immediately below Tapia (R2) | 192 | 0 | 2 | 1% |
| County Gaging Station (R13) | 192 | 12.5 | 20 | 10% |
| Malibu Canyon area (R3) | 181 | 12.5 | 29 | 16% |
| Cross Creek Road (R4) | 187 | 12.5 | 6 | 3% |
| Lagoon (R11) | 186 | 0 | 7 | 4% |

To assist in determining where and when algae were present at levels that cause violations of applicable water quality standards, the Regional Board applied algae assessment guidelines based on a New Zealand Study in the 2002 Section 303(d) listing process (Biggs, 2000). Based on its interpretation of the Biggs report, the Regional Board recommended that waters be considered impaired by algae if algae cover exceeded 30% in more than 10% of available samples. In its comments on EPA's draft TMDLs, the Regional Board also recommended application of this assessment criterion in considering seasonal variations in algae problems as part of TMDL development.

As indicated in Table 7, high algal abundances (i.e., greater than 30% cover) can be observed at many sites on a relatively frequent basis. These data also suggest that high algal abundances are most predominant in the summer months as all eight sites had coverages greater than 30% in 10% of the samples. During the winter months four of the sites had exceedance frequencies at or greater than 10%. The percentage of observations exceeding the 30% target was substantially lower in winter than summer at all eight sites.

As part of the 2002 303 (d) assessment, Regional Board staff analyzed data from 1997 to 1999, a subset of the data summarized above. These data reflect more accurately the recent condition. The patterns are basically similar with the exception that the percent coverage values have

increased over this three year time period (CH2MHill, 2000). Although there are some instances in which the % algal cover exceeded 30% in the winter months, the problem is predominantly a dry-weather phenomenon.

We believe it was appropriate to apply the Biggs guidelines in the screening-level exercise entailed by the Section 303(d) listing process; however, it is unclear whether it is appropriate to apply Biggs' recommended guidelines in the manner suggested by the Regional Board to develop the Malibu Creek TMDLs for nutrients to address algal impacts. Based on our review of the Biggs report cited by the State, we believe it is appropriate to consider the Biggs guidelines in the TMDLs but to apply them in a manner somewhat different than applied by the State in the listing process.

We note that Biggs recommended a threshold of 30% cover for filamentous (floating) algae greater than 2 cm in length and a threshold of 60% cover for bottom algae greater than 0.3 cm thick. Biggs did not recommend application of a 10% frequency of exceedance for these cover algae guidelines as suggested by the State. Biggs recommended application of the algae cover guidelines "during summer low flows" and noted that the aesthetics/recreation guidelines are "only expected to be applied over the summer months". Biggs generally recommended evaluation of mean nutrient and biomass levels over relatively long averaging periods (monthly, seasonally, or annually).

Based on these considerations, EPA re-evaluated the Tapia algae data on a seasonal basis and evaluated both the mean values and the range of values at each sampling locations. We compared the seasonal mean values to the guidelines recommended by Biggs for filamentous algae (30%). The Tapia data set is based primarily on floating algae and indicates that mean algal cover at most stations is closer to 30% in the summer than in the winter months.

We also analyzed the data submittal from Heal the Bay that provided data from seven creek stations in the watershed (Cheeseboro Creek, 2 in Cold Creek, 2 in Malibu Creek, Las Virgenes Creek and Medea Creek) (See Appendix Figure A-3 which indicates the seasonal averages and range of values for each station). The data for floating algae was compared to the 30% threshold. The data for mat algae was compared to the 60% threshold. Based on Heal the Bay's floating algae data, average cover is generally less than 30% in both summer and winter. Assessment of the mat algae data indicates average cover near 60% at most sites in the summer. The winter values for mat algae are somewhat less than in the summer.

Our review of available, taken together, indicates that there is evidence of algal impairment in Malibu Creek throughout the year. Our review of the algae data available for Malibu Creek and Lagoon indicates algae are clearly present at levels of concern during the summer season (as defined in the TMDL) throughout the Malibu Creek watershed, and present at levels of potential concern during the winter months at several watershed locations. EPA believes these data support the decision to focus this TMDL primarily on algae impairment in the summer season and secondarily on algae problems in the winter season.

To better quantify the extent of algae coverage and the associated impact on the beneficial uses within the watershed, studies were conducted by SCCWRP and the University of California at

Santa Barbara to address existing data gaps in the knowledge of the spatial extent of algal coverage, and chlorophyll-a data, as well as, the species of algae present and which conditions limit the growth of algae in the streams.

The Chlorophyll-*a* (Chl-*a*) concentrations were generally below 50 mg/l at sites in Cold Creek, Palo Comado Creek and Triunfo. The Chl-*a* concentrations were higher (greater than 100 mg/l) at more developed sites such as Lindero Creek, Medea Creek and Malibu Creek. These sites also had higher percent cover of macroalgae and diatom films. In general the concentrations were higher in October than in August 2001. (see Appendix, Figures A-4, A-5)

The information used to list the lakes as impaired comes from observations by Lund et al. (1994) that suggested that there were problems with algae in all four lakes and macrophytes in Malibu, Sherwood and Lindero. There is no more recent data to evaluate the listing.

In conclusion, there is evidence of algal impairment in Malibu Creek throughout the year. Our review of the algae data available for Malibu Creek, Malibu Lagoon, and the tributaries indicates algae are clearly present at levels of concern during the summer at many locations in the Malibu Creek watershed, and present at levels of potential concern during the winter months at several watershed locations.

*Floating Materials: Scum.* As indicated in Table 4, Malibu Creek, Las Virgenes Creek, and Lindero Creek R2 are listed on the 1996 305(b) water quality assessment as impaired due to observations of scum and foam. These waterbodies are "Not Supporting" the Basin Plan narrative standard for floating materials. The beneficial uses that are affected by this impairment relate to recreation. The data for the observations were collected between 1991 and 1995. For the most part the observations of scum and odors correspond to areas of high algal abundance.

**Table 9. Scum/Odor Observations**

| River Reach | # of Observations | High |
|---|---|---|
| Malibu Creek | 23 | 3 |
| Las Virgenes Creek | 15 | 5 |
| Lindero Creek R2 | 7 | 2 |

*Summary of assessment.* High levels of algae in the lagoon and streams have the potential to cause problems with DO, aquatic life and aesthetics. The percent algal cover is often greater than 30% in Malibu Creek, Las Virgenes Creek and Medea Creek. Total chlorophyll concentrations can be greater than 100 mg/l in the reaches of the more developed watersheds (Malibu Creek, Medea Creek and Lindero Creek). There is no demonstration that algae in these reaches is affecting dissolved oxygen concentration. However, taken together, the data on the types of algae in the watershed, the coverage of the mats, and total chlorophyll a concentrations observed indicate that streams are near conditions where one would expect eutrophy. These conditions appear to be more predominant in the summer months. This is consistent with the lakes study (Lund et al., 1994) that suggested that nutrients from runoff contribute to algae and macrophytes result in anoxic conditions concentrations in the summer season.

## 3. Numeric Targets

The streams, lakes and lagoon in the Malibu Creek watershed are 303(d) listed for exceedance of narrative criteria associated with excessive algal and periphyton growth, and associated water quality problems. The pollutants responsible for these conditions are nitrogen and phosphorus, thus the numeric targets for nitrogen and phosphorus are defined and used to calculate the TMDL, as discussed below. Other numeric targets are also developed for in-stream parameters such as dissolved oxygen, ammonia, algal cover and biomass. These other targets serve as indicators of the desired condition for the waterbody. EPA expects these indicators will provide a useful reference in determining the effectiveness of the TMDL in attaining water quality standards, although they are not directly enforceable by EPA.

### a. Dissolved oxygen (DO)

The target for the mean annual dissolved oxygen concentration is 7 mg/l for all waters in the Malibu watershed (Table 10). A more restrictive target is required for Lake Lindero, Las Virgenes Creek and Malibu Lagoon to protect existing and potential uses associated with cold-water fisheries and spawning. The Basin Plan standard for waters designated as WARM is that no single determination be below 5.0 mg/l as a result of waste discharges. Recognizing that diel fluctuations in DO are a natural occurrence, we propose that 7.0 mg/l minimum for waters with uses associated with cold water fisheries and spawning be interpreted as an average daily value.

**Table 10. Summary of numeric targets for dissolved oxygen**

| Waterbody | Annual average | Minimum conc. (mg/l) |
|---|---|---|
| Malibu Lagoon | 7 | 7 |
| Malibu Creek | 7 | 7 |
| Las Virgenes Creek | 7 | 7 |
| Lindero Creek Reach 1and 2 | 7 | 5 |
| Medea Creek Reach 1 and 2 | 7 | 5 |
| Malibou Lake | 7 | 5 |
| Lake Lindero | 7 | 7 |
| Westlake Lake | 7 | 5 |
| Lake Sherwood | 7 | 5 |

### b. Ammonia toxicity

Numeric targets for ammonia are based on the water quality standards in the Basin Plan and are set for the two lakes listed on the Section 303(d) list as well as for Malibu Creek itself in order to provide an additional indicator of whether future nutrient reductions result in attainment of ammonia objectives in the Creek. The acute criteria are dependent on pH and the chronic criteria are dependent on pH and temperature. Data on pH and temperature for the creeks and lagoon are based on long-term temperature and pH data collected by Tapia between 1998 and 1995. Targets for lakes are based on data from July 1992 to March 1993 (Lund et al., 1994). The target values for the acute criteria were calculated using the $90^{th}$ percentile of pH and the $50^{th}$ percentile of temperature and pH for the chronic criteria.

**Table 11. Targets for ammonia toxicity for listed waterbodies**

| Waterbody | Target NH4 Acute criteria | Target NH4 Chronic criteria |
|---|---|---|
| Malibu Creek | 2.59 mg/l | 1.75 mg/l |
| Lake Sherwood | 6.7 mg/l | 2.1 mg/l |
| Westlake Lake | 8.5 mg/l | 1.5 mg/l |

### c. Algae/Chlorophyll *a*

The Regional Board has not established numeric values for nuisance levels of aquatic growth such as algae. These TMDLs establish numeric targets for percent algal cover and algal biomass for the entire Malibu Creek watershed.

*Percent cover (Algae).* The Regional Board has used 30% cover (with greater than 10 frequency) as an indicator for evaluating excessive nuisance algae for listing purposes based on recommendations from Biggs (2000). We will use 30% algal cover for floating algae (filamentous algae greater than 2 cm in length) and 60% algal cover for bottom algae (diatoms and blue green algae mats greater than 0.3 cm in thickness) expressed seasonal mean as targets in this TMDL for the creeks and lagoon. EPA believes these targets are more consistent with the recommendations found in the Biggs report.

*Algal biomass- Chlorophyll a (Chl-a).* There is relatively little information on targets for algal biomass in streams or lagoons. Studies by Dodds et al., 1988 suggested that a mean of 70 mg/m$^2$ Chl-*a* and a maximum of 200 mg/m$^2$ Chl-*a* might be used as a dividing point between mesotrophic and eutrophic conditions. Others have suggested values between 50 and 100 mg/m$^2$ Chl-*a* as targets for the mean and values between 100 and 200 mg/m$^2$ as targets maximum Chl-*a*. In these TMDLs, we use 50 mg/m$^2$ for the mean and 150 mg/m$^2$ for the maximum as numeric targets for in-stream chlorophyll-a concentration. This is based on our review of the data for Malibu Creek watershed which indicates that streams in undeveloped areas are generally below 50 mg/m$^2$ Chl-*a* and that values in developed areas are frequently above 150 mg/m$^2$ Chl-*a* (Kamer et al., 2002). The value of 150 mg Chl-*a*/m$^2$ is within biomass range of "critical level[s] for an aesthetic nuisance" as provided by EPA (1999a). The target for lakes of 10 ug/l Chl-*a* is based on EPA guidance (EPA, 1999a).

**Table 12. Summary of numeric targets for algae**

| Waterbody Type | Chlorophyll-*a* | Algae (% coverage) |
|---|---|---|
| Lakes | 10 ug/l | 30 |
| Streams | 150 mg/m$^2$ | 30 for floating algae, 60 for bottom algae |
| Lagoon | 150 mg/m$^2$ | 30 for floating algae, 60 for bottom algae |

### d. Nitrogen and Phosphorus

EPA is applying numeric targets for nutrients during two seasons. During the summer (April 15-November 15), total N (nitrate-nitrite) and total P targets are 1.0 and 0.1 mg/l respectively for all water bodies.

In the winter months (November 16-April 14), the total N target is 8 mg/l (nitrate-nitrite) for all water bodies. No total P target is applied during the winter months. Table 13 summarizes these targets for each season and each waterbody type. The basis for these targets is discussed below.

EPA stresses that these numeric target values are proposed only for waters in the Malibu Creek watershed. The inclusion of these numeric target values for Malibu watershed is not intended to reflect any judgements about the numeric targets needed for other nutrient TMDLs needed in California.

**Table 13. Summary of numeric targets for nitrogen and phosphorus as monthly averages**

| Waterbody Type | Summer (April 15 to Nov. 15) | | Winter (Nov. 16 to April 14) |
|---|---|---|---|
| | Total Nitrogen (mg/l) | Total Phosphorous (mg/l) | Total Nitrogen (mg/l) |
| Lakes | 1.0 | 0.1 | 8.0 |
| Streams | 1.0 | 0.1 | 8.0 |
| Lagoon | 1.0 | 0.1 | 8.0 |

### e. Basis for Summer Nitrogen and Phosphorus Numeric Targets

*Streams* At the present time there are no numeric nutrient criteria for general waters of California. States are being asked to develop nutrient criteria and Regional Board 4 staff is participating in the EPA and State work groups to development eco-regional specific nutrient criteria. Although studies are underway in a number of watersheds, the deadline for development and implementation of nutrient criteria is several years away.

EPA concluded that it is necessary to set numeric targets more stringent than the existing numeric objectives for total nitrogen in order to ensure attainment of the narrative objective that addresses Biostimulatory Substances. Our review of available data, studies, and information indicate that the numeric objectives are not sufficiently protective during the summer months when algae problems are most pronounced.

In the 1970s there was a recommendation of the use of 0.1 mg/l as a standard for total phosphorous, and many States and some Regional Boards have adopted this as a nutrient standard. Others (including San Diego Regional Board) have also used this number to develop a nitrogen value of 1 mg/l assuming a 10:1 nitrogen to phosphorous (N:P) ratio. EPA and NOAA have recommended values of 0.1 to 1.0 mg/l for nitrogen and 0.01 to 0.1 mg/l for phosphorous as guidelines for evaluating eutrophic conditions in coastal estuaries (NOAA/EPA 1988). Dodds et al. (1998) suggested thresholds of 1.5 mg/l nitrogen and 0.075 mg/l for distinguishing between mesotrophic and eutrophic conditions in streams based on a review of stream data from various locations around the world. However based on the work of Kamer et al. (2002) these values have little predictive power in explaining the patterns in algal abundance or biomass within the Malibu Creek watershed.

There is uncertainty as to what factors control algal abundances in the Malibu Creek watershed (Ambrose et al., 1995, CH2MHill, 2000, Ambrose et al., 2000, Kamer et al., 2002). Working in a number of creeks within the Malibu Creek watershed, Kamer et al. (2002) found that total phosphorus could explain 70% of the variability in benthic Chlorophyll a, and the combination

of total phosphorus plus light could explain 68% of the variability in total chlorophyll a concentration. However their data on nitrogen to phosphorus (N:P) ratios were inconclusive suggesting that both N and P may be limiting or alternately that neither N nor P were limiting. Their experiments in the field were also inconclusive, some tests suggesting nitrogen limitation at undeveloped sites and P limitation at the more developed sites. They indicated that there might be other factors such as light and flow that may help to better explain the patterns in algal abundances. The nutrient limitation studies that have been done in the streams are equivocal for setting numeric targets.

Studies were inconclusive in large part due to the destruction of a large number of nutrient diffusers within the field. A follow-up nutrient diffuser study was conducted in the fall of 2002 and the final results are expected to be available by mid-2003. This study is expected to provide more definitive data regarding the relationship between nutrients and algal impairment. The Regional Board should carefully consider the results of this study, which may provide a basis for determining whether the TMDLs need to be revised.

Some efforts have been made to use N:P ratios to identify limiting nutrients in the lagoon. The N:P ratios reported by Ambrose et al. (1995) varied widely with time. The results suggested that averaged over the course of the year the upstream area near the Malibu Creek inlet tended to be more phosphorus limited (general norm for streams) while the central and downstream areas tended to be more nitrogen limited (the general norm of coastal waters). Ambrose et al. (2000) suggested that N was probably more limiting than P based on N:P ratios . However, others (CH2MHill, 2000) have pointed out that although the N:P ratios are suggestive of nitrogen limitation there is very little positive relationship between chemical concentrations and algal abundances in the lagoon. Indeed, in the summer time there is a negative relationship as algae take up nutrients. In addition, a review of the Tapia data indicates that reductions in Tapia loadings in the summer have not had any measurable effect on reducing algal abundances in the Lagoon.

Therefore, when establishing a numeric target to control algal biomass and chlorophyll a concentrations, it is important to consider the factors limiting algal growth. No single study element was identified as the factor most likely limiting algal growth (Ambrose et al., 2000; Kamer et al, 2002). In the absence of conclusive information on limiting factors, the EPA will target both nitrogen and phosphorus for the summer period. The target values (Table 13) and the rationale used to develop these targets are presented below. However, it is anticipated that the limiting condition will be determined prior to full implementation of these TMDLs. Studies are underway to: 1) assess the dissolved oxygen levels within the watershed, 2) assess the level of impairment due to excessive algae, and 3) evaluate the relationship between nutrient water quality and aquatic life impacts. After these determinations, the Regional Board may need to revise these TMDLs.

EPA has utilized the reference waterbody approach to develop numeric targets for impaired streams and lakes within the Malibu watershed. This approach is described in EPA guidance (EPA 2000a, 2000b). For streams, the reference approach involves using relatively undisturbed stream segments to serve as examples of background nutrient concentrations (EPA 2000). Data were reviewed from three locations upstream of the Tapia treatment plant where we have long-

term data sets (see Figure A-1 and Table 14). The stations are located in Upper Malibu Creek (R9), Middle Malibu Creek (R1) and Lower Las Virgenes Creek (R6).

**Table 14. Median Concentration Values (mg/l) from Tapia Monitoring stations (1991 to 1999)**

| NUTRIENT COMPOUND | Upper Malibu Creek (R9) | Middle Malibu Creek (R1) | Lower Las Virgenes Creek (R6) | Proposed Target |
|---|---|---|---|---|
| NO3-N | 0.1 | 0.8 | 2.61 | |
| TN | 0.71 | 1.51 | 3.41 | 1.0 |
| PO4-P | 0.08 | 0.11 | 0.23 | |
| TP | | | | 0.1 |

The concentrations for both nitrogen and phosphorus at the Upper Malibu Creek and Middle Malibu Creek stations were much lower than at the Las Virgenes Creek station. Data from stations R9 and R1 are believed to be more appropriate for setting target values using the reference approach. Based on data from these stations, the proposed targets are 1.0 mg/l for total nitrogen and 0.1 mg/l as a target for total phosphorus for the summer period. These values are consistent with EPA coastal values (NOAA/EPA 1998) and similar to the values for the eutrophic/mesotrophy proposed by Dodds et al. (2000) (1.5 mg/l TN and 0.075 mg/l TP).

*Lakes.* Lund et al. (1994) was the primary data source for establishing reference conditions for the lakes. This study evaluated trophic status, including nutrients and effects, for twenty-three lakes within the Los Angeles Region and was the same study used to list the four lakes in the Malibu Creek watershed as impaired. Ideally, reference conditions (nitrogen and phosphorus) are concentrations representative of lake conditions in the absence of anthropogenic pollution sources. However, since most lakes have been impacted by human activity to some measure, reference conditions represent the least impacted or most attainable lake conditions for a specific region (EPA, 2000b). Based on the evaluation, Crystal Lake, an alpine lake in the Los Angeles National Forest, was the least impaired. Nutrient concentrations at Crystal Lake were low, and these concentrations are felt to represent the most attainable nutrient and effects target.

**Table 15. Summary of nutrient concentrations (mg/l) for five lakes (adapted from Lund et al., 1994)**

| Nutrient | Lake Sherwood | Westlake Lake | Malibu Lake | Lake Lindero | Crystal Lake | Proposed Lake Targets |
|---|---|---|---|---|---|---|
| NO3 | 0.5 | 0.3 | 0.5 | 0.4 | <0.1 | |
| NH4 | 0.8 | 0.4 | 0.1 | 0.1 | 0.2 | |
| TKN | 1.7 | 1.3 | 1.2 | 1.1 | 0.2 | |
| TN | 2.23 | 1.69 | 1.78 | 1.58 | <0.3 | 1.0 |
| TP | 0.25 | 0.16 | 0.14 | 0.13 | <0.1 | 0.1 |
| PO4 | 0.25 | 0.16 | 0.13 | 0.09 | <0.1 | |
| Chl-*a* | 16 | 14 | 44 | 23 | 4 | |

The proposed targets for these TMDLs are 1.0 mg/l for total N and 0.1 mg/l for total P for the summer period. The TP value of 0.1 mg/l is based on concentration at Crystal Lake. The TN value of 1.0 mg/l is derived from the Crystal Lake TP value assuming an N:P ratio of 10 to 1 ratio. The lake report (Lund et al., 1994) indicated that there were excessively high nitrogen values at Lake Sherwood, Westlake, Malibu Lake and Lake Lindero and high phosphorus values

at Sherwood Lake and Lake Lindero. They suggested that Lake Sherwood and Westlake Lake were both N and P limited and that Malibou Lake and Lake Lindero might be P limited. Compliance with these targets will result in significant improvements in nitrogen concentrations in all four lakes, significant improvement in phosphorus concentrations in Sherwood Lake and Westlake Lake and minor improvements in phosphorus concentrations in Malibou Lake and Lake Lindero.

*Lagoon*. Targets for the Lagoon were derived from the EPA/NOAA guidance for estuaries (NOAA/EPA 1988). The targets are 1.0 mg/l for nitrogen and 0.1 mg/l phosphorus for the summer period. We used the high-end range for these values because of the uncertainty regarding which factors are limiting algal abundances. For comparison, average lagoon values during the summer were 1.39 mg/l for nitrogen and 0.49 mg/l (Ambrose et al., 2000). The average winter concentrations measured by Ambrose et al were 4.0 mg/l for nitrogen and 0.63 mg/l for phosphorus.

### f. Basis for Winter Season Nitrogen Numeric Targets

The Regional Board's Basin Plan includes a numeric objective for Malibu Creek of 10 mg/l of nitrogen (sum of nitrate-nitrogen and nitrite-nitrogen). As discussed in the problem statement, Section 2, there is clear evidence of algae problems in the summer months and some evidence of algae problems in the winter months. In EPA's judgment, it would be unwarranted to apply the summer season numeric target values for nitrogen and phosphorus at this time given the significant uncertainty concerning the existence and degree of algae problems as well as the uncertainty concerning the relationship between algae growth and nutrient levels in the winter months. However, EPA has concluded that it is necessary and appropriate to set numeric targets for total nitrogen because the Basin Plan specifies numeric objectives for total nitrogen that apply throughout the year and because there is some evidence of algae problems in the winter. To account for these uncertainties, EPA is setting numeric targets for the winter months that are less stringent than the nitrogen targets selected for the summer season but more stringent than the Basin Plan numeric objective for total nitrogen. EPA is incorporating a 20% explicit margin of safety in the winter season numeric targets for total nitrogen in order to help address uncertainty concerning algal growth problems in winter and to ensure that the 10 mg/l numeric objective is met in all waterbodies during the winter months. Therefore, the numeric targets for the winter season are 8 mg/l for the streams, lakes, and lagoon.

## 4. Source Assessment

An inventory of possible sources of nutrients to the waterbody was compiled, and both simple methods and computer modeling were used to estimate nutrient loads for those sources. Provided below is a description of the sources and a summary of the load estimates. For more detailed information on the source assessment, please refer to the modeling report (Tetra Tech, 2002). The Tetra Tech analysis provided both annual and summer loading estimates for nitrogen and phosphorus. The summer analysis covered May 1 to October 31 and included storm events during that period.

For purposes of allocations among nutrient sources, federal regulations distinguish between allocations for point sources regulated under NPDES permits (for which wasteload allocations are established) and nonpoint sources not regulated through NPDES permits (for which load allocations are established) (see 40 CFR 130.2).

Sources of nutrient discharges to waters in the Malibu Creek watershed that are regulated in whole or in part through NPDES permits include direct discharges from the Tapia WRF and urban stormwater discharges regulated under municipal stormwater permits. As discussed further in the allocation section below, for some source categories, it is difficult to distinguish between discharges regulated under stormwater permits and discharges that are not subject to permit requirements. In the source assessment section, source categories are discussed based on the physical characteristics of the discharge rather than their regulatory status.

Nutrient loads for storm water runoff were estimated by using the Hydrodynamic Simulation Program Fortran, a computer model (Tetra Tech, 2002). Loads from nonpoint sources discussed in this section were estimated using simple mass balance calculations.

The major categories of nutrient sources in the Malibu Creek watershed are:

- direct and indirect discharges from Tapia WRF
- septic systems
- runoff from residential and commercial areas
- runoff and erosion from undeveloped areas
- runoff associated with agricultural/livestock
- golf course irrigation and fertilization
- groundwater
- atmospheric deposition

### a. Tapia Water Reclamation Facility (WRF)

There are two types of discharges from the Tapia WRF operated by the Las Virgenes Municipal Water District (LVMWD). Direct discharges include discharges of treated effluent directly to Malibu Creek and effluent discharges to percolation beds and then to Malibu Creek. Indirect discharges include loads associated with effluent irrigation and sludge disposal, which may reach water bodies through surface runoff or subsurface flows.

*Direct discharges*. The discharges from Tapia WRF and the percolation beds were calculated from TWRF monitoring data and represented in the linkage analysis as a direct discharge into middle Malibu Creek.

The Tapia WRF was built in 1965 (RWQCB, 1997). The facility has been expanded several times over the years as increasing urbanization and population growth in the watershed has increased wastewater flows. The plant capacity was expanded from 10 mgd to 16.1 mgd in 1994 (RWQCB, 1997). In 1984, the plant was converted from secondary to tertiary treatment. Currently, discharge to Malibu Creek is not allowed during the summer season when the sand

berm forms and closes off the entrance to Malibu Lagoon from the ocean. Regional Board Order No. 97-135 was adopted on November 3, 1997, and requires a discharge prohibition to the creek from April 15 through November 15 (RWQCB, 2000). Previously, discharges to Malibu Creek were fairly low during the season, when there is demand for the reclaimed wastewater. The mean summer effluent discharge rates during April to September ranged from <0.1 to 0.6 mgd. In comparison, the mean discharge rates during the winter months (October to February) were approximately 8 to 10 mgd (LVMWD, 1996-2000).

The treated effluent from Tapia has one of two end destinations. The effluent is either reclaimed for irrigation and industrial uses, or is discharged to streams. Effluent is discharged to Malibu Creek or Las Virgenes Creek through discharge points 001 and 002 (Table 16). No discharge is currently routed to the percolation ponds. The 004 discharge point was eliminated in 1999.

**Table 16. Tapia Effluent Discharge Points**

| Discharge No. | Description | Subwatershed | Receiving Water |
|---|---|---|---|
| 1 | Primary outfall pipe | Middle Malibu Creek | Malibu Creek |
| 2 | Reservoir No. 2 outfall | Lower Las Virgenes Creek | Las Virgenes Creek |

The primary discharge outfall into Malibu Creek is Discharge No. 001, which is located about 0.3 mile upstream of the confluence with Cold Creek (about 5 miles upstream of the lagoon). Discharge No. 002 flows into lower Las Virgenes Creek, and is used to release surplus effluent from Las Virgenes Reservoir No. 2, which is used for distribution of the reclaimed water system.

The effluent concentrations of nutrients discharged to Malibu Creek from 1992 to 2000 for phosphate-P concentrations ranged from 1.9 to 2.9 mg/l, and averaged 2.6 mg/l. Nitrate-N was the dominant nitrogen species, with concentrations ranging from 8 mg/l to 19 mg/l, and averaging 14 mg/l. Nitrite-N was negligible and was generally below the detection limit of 0.01 mg/l. Ammonia-N was generally below the detection limit of 0.2 mg/l. Organic-N concentrations ranged from 0.4 mg/l to 0.8 mg/l, and averaged 0.6 mg/l. The total nitrogen concentration averaged 14.6 mg/l, and the N/P ratio of the effluent was 5.6. (LVMWD, 1993-2000).

The nutrient loads discharged to Malibu Creek from Tapia were estimated from the monthly flow and concentration measurements collected by the Las Virgenes Municipal Water District for their NPDES monitoring reports (LVMWD, 1993-2000). The discharge prohibition was initiated in water year 1998.

**Table 17. Annual nitrogen and phosphorus loadings from Tapia (1992-1999)**

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|---|
| Total Nitrogen | 155,058 | 128,284 | 114,527 | 137,788 | 92,365 | 79,208 | 185,407 | 95,788 |
| Total Phosphorus ($PO_4$) | 46,728 | 39,032 | 18,295 | 19,623 | 15,833 | 9,092 | 29,620 | 16,104 |

The facility represents 30% of the nitrogen and 48% of the phosphorus loadings to the Malibu Creek watershed on an annual basis. Prior to the discharge prohibition, Tapia loadings represented 4.6% of the summer season loadings for nitrogen and 8% of the summer season loadings for phosphorus.

*Indirect Discharges of Reclaimed Wastewater and Sludge Disposal.* The Las Virgenes Municipal Water District (LVMWD) sells approximately 4,000 acre-feet per year of reclaimed wastewater from its Tapia WRF that is used for irrigating open space and landscaping (Abramson et al., 1998). In addition, Tapia composts the solid wastes from its treatment facility into fertilizer at their Rancho Las Virgenes Compost Facility (LVMWD, 1994; RWQCB, 1997; Abramson et al., 1998). Another portion of the sludge from Tapia is digested and pumped to their Rancho Las Virgenes Farm for subsurface injection. The sludge is used to fertilize the oat, barley, Sudan grass, silage corn, and Sudan hybrid crops that are grown during the various seasons at the 91-acre site (RWQCB, 1997). While these practices make good use of the reclaimed wastewater, they are essentially the same as fertilization and will add nonpoint sources of nutrients if the nutrient application rates are higher than the plant uptake rates. The excess nutrients will migrate to waterways through shallow groundwater flows, or increase the nutrient loads in surface runoff during storms (Tetra Tech, 2002).

Tables 18 and 19 present total loads of nitrogen and phosphorus, respectively, produced by effluent irrigation in the Malibu Creek Watershed. During model calibration, net loading of nitrogen was reduced to 25% of total produced loads due to plant uptake and soil retention, except for Tapia percolation beds that have no adjustments since they flow into Malibu Creek. During calibration, net phosphorus loads were reduced to 10% of total produced loads due to plant uptake and soil retention, except for the Tapia percolation beds that have no adjustments since they flow into Malibu Creek. In contrast to the common assumption that phosphorus is relatively immobile in soils, phosphorus loads from effluent irrigation were necessary to explain the observed concentrations in the waterways.

**Table 18. Annual Nitrogen Loads associated with effluent irrigation in the Malibu Creek Watershed**

| Source | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|---|
| Triunfo Sanitation District | 21,109 | 9,120 | 17,762 | 21,588 | 50,743 | 53,342 | 38,652 | 63,649 |
| Western Las Virgenes Municipal Water District | 117,522 | 75,110 | 80,883 | 98,653 | 80,737 | 94,253 | 81,021 | 100,741 |
| Calabasas | 46,673 | 38,975 | 56,946 | 60,743 | 60,080 | 50,754 | 46,498 | 60,749 |
| Las Virgenes Valley | 4,865 | 8,294 | 11,854 | 10,947 | 10,988 | 6,534 | 5,613 | 9,795 |
| Rancho Las Virgenes | 4,018 | 2,632 | 2,324 | 925 | 2,591 | 2,375 | 1,820 | 3,487 |
| Rancho Las Virgenes Composting | 0 | 0 | 0 | 0 | 0 | 0 | 148 | 150 |
| Tapia Percolation Beds | 46,585 | 20,185 | 69,882 | 91,645 | 69,745 | 72,300 | 0 | 0 |
| Malibu Creek Park | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 40 |
| Tapia Spray Fields and Wastewater Reclamation Facility | 2,320 | 825 | 2,742 | 1,165 | 719 | 27,796 | 148 | 150 |
| Tapia Yard | 27,576 | 19,854 | 21,177 | 21,113 | 24,131 | 0 | 0 | 0 |
| TOTAL | 272,660 | 176,988 | 265,564 | 308,774 | 301,730 | 309,351 | 175,898 | 240,760 |

**Table 19. Annual Phosphorus Loads associated with effluent irrigation in the Malibu Creek Watershed**

| Source | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|---|
| Triunfo Sanitation District | 6,568 | 2,504 | 2,768 | 2,456 | 8,569 | 10,137 | 5,987 | 10,667 |
| Western Las Virgenes Municipal Water District | 36,704 | 21,302 | 12,374 | 11,721 | 13,637 | 14,793 | 14,563 | 17,221 |
| Calabasas | 14,554 | 10,981 | 8,978 | 7,204 | 10,241 | 8,063 | 8,395 | 10,747 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Las Virgenes Valley** | 1,535 | 2,688 | 2,003 | 1,023 | 1,880 | 868 | 1,028 | 1,703 |
| **Rancho Las Virgenes** | 1,218 | 1,248 | 338 | 52 | 439 | 390 | 351 | 580 |
| **Rancho Las Virgenes Composting** | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 25 |
| **Tapia Percolation Beds** | 14,348 | 5,902 | 10,741 | 12,372 | 11,972 | 8,741 | 0 | 0 |
| **Malibu Creek Park** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| **Tapia Spray Fields and Wastewater Reclamation Facility** | 722 | 293 | 511 | 106 | 145 | 4,086 | 25 | 25 |
| **Tapia Yard** | 8,356 | 6,115 | 3,898 | 2,774 | 3,678 | 0 | 0 | 0 |
| **TOTAL** | 85,997 | 53,026 | 43,605 | 39,703 | 52,557 | 49,075 | 32,372 | 42,977 |

**Table 20. Sludge injection loads at Rancho Las Virgenes Farm**

| Year | Sludge biosolids loading (ton/yr) | Total Nitrogen load (lb/yr) | Total Phosphorus Load (lb/yr) | Net Nitrogen Load to waters (lb/yr) |
|---|---|---|---|---|
| 1997 | 307 | 49,120 | 6,140 | 24,560 |
| 1998 | 90 | 14,400 | 1,800 | 7,200 |
| 1999 | 1 | 160 | 20 | 80 |

Effluent irrigation and sludge injection are estimated to contribute 9% of the annual nitrogen load and 6% of the annual phosphorus load (Tetra Tech, 2002). These sources are estimated to contribute 15% of the nitrogen and 13% of the phosphorus loadings (Tetra Tech, 2002) during the summer season.

### b. Septic Systems

Septic systems can be significant sources of nutrients, even when they are well sited and functioning properly, since they introduce nutrients to shallow groundwater that may eventually enter surface waters. Nitrogen is particularly mobile in groundwater, while phosphorus has a tendency to be adsorbed by the soils.

Except for the city of Malibu, most of the medium to high-density residential developments in the watershed are on sewer systems. However, septic systems are still used in lower density rural residential areas and in a few communities. The total number of septic systems in the watershed was estimated at 2,300 in the mid-1990s (NRCS, 1995).

The City of Malibu has about 6,000 septic systems, of which about 200 are estimated to be within the watershed boundaries based on information compiled by the Regional Board (RWQCB, 2000a). An estimated 70,000 to 80,000 gallons of septic effluent per day are discharged from about 20 commercial septic systems in shopping centers and commercial areas in the vicinity of Malibu Lagoon. Several hundred thousands of gallons per day are estimated to be discharged from private residences in the Malibu area of the lower watershed. Septic system discharges within the Malibu city limits (including areas outside of the watershed) are estimated to range from 840,000 to 1,200,000 gallons per day.

Although anecdotal reports indicate that illicit "greywater" discharges are a source of nutrient loads in areas where septic systems are utilized (LACDHS, 2001), the extent of the loading could not be quantified from available data.

Table 21 presents the total annual nutrient loads generated from septic systems in the Malibu Creek watershed. It was assumed that normal operating septic systems would remove 50 percent of the nitrogen and 90 percent of the phosphorous, that short-circuited systems would remove none of the nitrogen and 30% of the phosphorous, and that failing systems would not remove any of the nitrogen or phosphorous. The septic system nutrient loads were then adjusted to account for grass uptake, which resulted in about 13 percent removal for both nitrogen and phosphorus.

**Table 21. Total Annual Nutrient Loads (lbs/yr) Generated from Septic Systems**

| Subwatershed | Total number of septics | Normal Septics | Failed Septics | Short-Circuited Septics | Commercial Septics | Total effluent flow (gal/day) | Nitrogen Load (lbs/yr) | Phosphorus Load (lbs/yr) |
|---|---|---|---|---|---|---|---|---|
| Hidden Valley Creek | 625 | 500 | 125 | | | 171,250 | 30,879 | 5,147 |
| Potrero Cyn Creek | | | | | | | | |
| Westlake Lake | 60 | 48 | 12 | | | 16,440 | 2,957 | 493 |
| Upper Lindero Creek | | | | | | | | |
| Lower Lindero Creek | | | | | | | | |
| Upper Medea Creek | | | | | | | | |
| Palo Comado Creek | | | | | | | | |
| Cheeseboro Creek | | | | | | | | |
| Lower Medea Creek | 110 | 88 | 22 | | | 30,140 | 5,439 | 905 |
| Triunfo Creek | 820 | 656 | 164 | | | 224,680 | 40,515 | 6,753 |
| Upper Malibu Creek | 95 | 76 | 19 | | | 26,030 | 4,709 | 781 |
| Upr L.Virgenes Crk | | | | | | | | |
| Lwr L.Virgenes Crk | 50 | 40 | 10 | | | 13,700 | 2,482 | 412 |
| Stokes Creek | 85 | 68 | 17 | | | 23,290 | 4,198 | 701 |
| Middle Malibu Creek | 50 | 40 | 10 | | | 13,700 | 2,482 | 412 |
| Cold Creek | 300 | 240 | 60 | | | 82,200 | 14,819 | 2,471 |
| Lower Malibu Creek | 5 | 4 | 1 | | | 1,370 | 256 | 40 |
| Malibu Lagoon | | | | | | | | |
| Above Lagoon | 170 | 136 | 34 | | | 46,580 | 8,395 | 1,398 |
| Adjacent to Lagoon | 30 | | | 30 | | 8,220 | 1,497 | 248 |
| Commercial near lagoon | 20 | | | | 20 | 75,000 | 13,542 | 2,256 |
| **Total** | **2420** | **1896** | **474** | **30** | **20** | **732,600** | **132,094** | **22,017** |

Note: The Regional Board report (2000a) provided descriptions of various septic categories. Normal systems represent the majority of the septic systems that are properly sited and are functioning according to normal design standards. Failing systems represent septic systems that are not operating properly due to a variety of reasons. Failing systems include systems that have backed up or that have surfacing effluent, as well as systems that routinely have poorly functioning leach fields. Estimates of septic system failure rates ranged from 20 to 30 percent in the Malibu Creek watershed. A 20 percent maximum failure rate was assumed for the modeling, and was applied to each subwatershed that has septic systems. Short-circuited systems represent septic systems that are sited close to waterways and that have very shallow groundwater tables so that little nutrient or pathogen removal takes place. This category was used for the residential septic systems in Malibu Colony and the commercial septic systems in the Cross Creek shopping center that have been shown to influence Malibu Lagoon.

We estimate that on an annual basis septic systems contribute about 10% of the nitrogen loadings and 10% of the phosphorus loadings. During the summer season septic systems contribute about 22% of the nitrogen and 21% of phosphorus loadings. We understand that the City of Malibu is conducting a risk assessment to accurately characterize the impact of septic systems on groundwater in the Lower Malibu Creek and Malibu Lagoon watershed (City of Malibou, 2001). Data from this study will provide greater certainty on the estimates of actual loadings from septic systems to the creek and lagoon.

### c. Runoff from Residential and Commercial Areas

Runoff from residential and commercial areas can be important sources of nutrients and bacteria. Most of the major residential and commercial areas are in the cities of Westlake Village,

Thousand Oaks, Agoura Hills, Calabasas, and Malibu. Lower density residential areas are scattered in many areas of the watershed, and include the communities around Lake Sherwood and Malibou Lake, the Hidden Valley area, the Palo Comado Creek area east of Agoura Hills, and the community of Monte Nido. The potential nutrient sources include fertilizer used for lawns and landscaping; organic debris from gardens, landscaping, and parks; phosphorus in detergents used to wash cars or driveways; trash such as food wastes; domestic animal waste; and human waste from areas inhabited by homeless. Human and domestic animal waste are also sources of bacteria. These pollutants build up, particularly on impervious surfaces, and are washed into the waterways through storm drains when it rains. These loads are typically highest during the first major storms after extended dry periods, when the pollutants have accumulated.

Activities such as watering lawns and landscaping, washing cars, and washing parking lots and driveways can contribute pollutants between storms. A portion of the nutrients from all of the above sources will also infiltrate into the soils of pervious areas, and may enter the waterways through shallow groundwater flows (Tetra Tech, 2002).

On an annual basis runoff from developed land areas contributes 13% of the total nitrogen load and 10% of the total phosphorus loads. During the summer season these land uses contribute 19% of the nitrogen loadings and 17% of the phosphorus loadings.

**d. Runoff from Undeveloped Areas**

More than 75% of the Malibu Creek watershed is undeveloped land (open space) consisting primarily of chaparral, scrub, and woodlands, with smaller areas of grasslands and forests. Runoff from these areas contributes nutrients to the waterways in both particulate and soluble forms. Particulate forms generally predominate and are introduced through the erosion of soils that contain organic litter from the overlying vegetation. Soluble nutrients are released during litter decomposition and may enter the waterways as a component of surface runoff or through shallow groundwater transport.

In addition, wildlife wastes may contribute to the nutrient loads from the large undeveloped portions of the watershed. The abundance of wildlife varies among the different habitat and vegetation types. Approximately 50 species of mammals and 380 species of birds occur in the watershed (NRCS, 1995). The important mammals include mule deer, hares, rabbits, squirrels, foxes, bobcats, badgers, ring-tailed cats, weasels, coyotes, raccoons, skunks, mountain lions, and a variety of small rodents (rats, mice, gophers, voles).

Waterfowl are important components of the Malibu Lagoon ecosystem, and may also contribute nutrients and bacteria to the various lakes in the watershed. Waterfowl were considered as a separate loading source only for Malibu Lagoon, since birds may be an important source of nutrients in the lagoon (Warshall et al., 1992). Waterfowl loads were not evaluated for the lakes since bird counts were not available. Table 22 presents the annual nutrient loads produced by waterfowl near Malibu Lagoon.

**Table 22. Nutrient loadings (lbs) produced by waterfowl in Malibu Lagoon (Reference: Topanga-Las Virgenes Resource Conservation District)**

| Month | Bird Population | Nitrogen (lbs/mo) | Phosphorus (lbs/mo) |
|---|---|---|---|
| January | 1000 | 237 | 85 |
| February | 1500 | 290 | 104 |
| March | 1630 | 293 | 105 |
| April | 400 | 54 | 19 |
| May | 300 | 42 | 15 |
| June | 320 | 43 | 16 |
| July | 230 | 105 | 38 |
| August | 200 | 42 | 15 |
| September | 400 | 54 | 19 |
| October | 750 | 105 | 38 |
| November | 780 | 297 | 107 |
| December | 1100 | 209 | 75 |
| **Annual Total (lbs/yr)** | | **1771** | **637** |

Runoff from undeveloped land contributes 20% of the nitrogen and 17% of the phosphorus on an annual basis. The percent contribution during the summer is 9% for nitrogen and 11% for phosphorus. Birds contribute a relatively small fraction of the annual nitrogen load (0.3%) and phosphorus load (0.7%). The summer contribution is also a small percentage (0.5%) about 2% of phosphorus. The effects of birds and may be more significant on a local scale.

### e. Agriculture/Livestock

Most of the agricultural activity in the Malibu Creek watershed is concentrated in the Hidden Valley area and consists primarily of pastures and grazing. Smaller agricultural areas are found in parts of the Stokes Creek, Lower Las Virgenes Creek, and Triunfo Creek subwatersheds. Orchards or vineyards occur in a few areas of the Triunfo Creek, Hidden Valley, Lower Malibu Creek, and Malibu Lagoon subwatersheds. Agricultural lands introduce nutrients to waterways through both surface runoff and erosion during storms and through shallow groundwater flows. The nutrient sources include fertilizers applied during cultivation; organic litter from the plants, grasses, or trees; erosion of the surface soils; waste accumulation from grazing animals; and soluble nutrients released during the decomposition and mineralization of plant litter and animal waste.

Manure produced by horses, cattle, sheep, goats, birds, and other wildlife in the Malibu Creek watershed are sources of both nutrients and bacteria. These loads can be introduced directly to the receiving waters in the case of waterfowl or cattle wading in streams, or they may occur as nonpoint sources during storm runoff. Horses are the most prevalent livestock in the watershed. Although horses are scattered throughout much of the watershed, most of the horses are concentrated in a few areas. These are Hidden Valley, the Palo Comado Creek area east of Agoura Hills, the Triunfo Creek and Lower Medea Creek areas in the vicinity and upstream of Malibou Lake, and the Cold Creek area around the community of Monte Nido. Cattle grazing is confined primarily to the Hidden Valley area in the upper western portion of the watershed. Approximately 250 cattle are estimated to reside in this area. Approximately 200 sheep and goats reside in the Ahmanson Ranch and pasture area north and east from the Rancho Las Virgenes. In the past years, cattle grazing also has occurred on the Rancho Las Virgenes

property of the upper Las Virgenes Creek subwatershed. The Natural Resources Conservation Service study provided the above estimates (NRCS, 1995).

Tables 23 and 24 present gross nutrient loads from horse and livestock manure, respectively, in the Malibu Creek watershed. The horse loads are reduced by forty percent for input into the model, due to collection of horse manure from stables, except for Hidden Valley subwatershed where there are many open pastures. Additionally, loads were reduced by twenty percent for horses and thirty percent for cows and sheep because these percentages were assumed to occur as urine and instead contribute nutrients to shallow groundwater (ASAE, 1998). Because horse and livestock loads occur as non-point sources in the model, there is a buildup of the nutrients during the dry periods and thus reduced contribution of the nutrients to the stream reaches during these periods.

**Table 23- Gross Annual Horse Nutrient Loads**

| Subwatershed | Number of Horses | Total N (lbs/yr) | Total P (lbs/yr) |
|---|---|---|---|
| Hidden Valley Creek | 920 | 100,740 | 23,842 |
| Portereo Canyon Creek | 40 | 4,380 | 1,037 |
| Westlake Lake | | | |
| Upper Lindero Creek | | | |
| Lower Lindero Creek | 5 | 548 | 131 |
| Upper Medea Creek | 20 | 2,190 | 518 |
| Palo Comado Creek | 100 | 10,950 | 2,592 |
| Cheeseboro Creek | | | |
| Lower Medea Creek | 140 | 15,330 | 3,628 |
| Triunfo Creek | 160 | 17,520 | 4,146 |
| Upper Malibu Creek | | | |
| Upper Las Virgenes Creek | 15 | 1,643 | 391 |
| Lower Las Virgenes Creek | 5 | 548 | 131 |
| Stokes Creek | 45 | 4,928 | 1,168 |
| Middle Malibu Creek | 30 | 3,285 | 777 |
| Cold Creek | 115 | 12,593 | 2,982 |
| Lower Malibu Creek | | | |
| Malibu Lagoon | 100 | 10,950 | 2,592 |
| **Total** | **1695** | **185,603** | **43,928** |

**Table 24. Gross Annual Other Livestock Nutrient Loads**

| Subwatershed | Cattle | Sheep/Goats | Total N (lbs/yr) | Total P (lbs/yr) |
|---|---|---|---|---|
| Hidden Valley Creek | 250 | | 24,820 | 6,716 |
| Upper Las Virgenes Creek | 15 | | 1,489 | 402 |
| Upper Las Virgenes Creek | | 200 | 1,840 | 380 |
| **Total** | **265** | **200** | **28,149** | **7,501** |

On an annual basis, agriculture/livestock contribute about 5% of nitrogen and about 2% of annual phosphorus. During the summer season the percent contribution increases to about 8% for nitrogen and about 4% for phosphorus.

## f. Golf Courses

Golf courses can be major sources of nutrients since the typical fertilization and watering rates are generally much greater than the amounts utilized by the golf course grasses. The excess nutrients accumulate in the soils and can be transported to waterways in shallow groundwater flows and stormwater runoff. Most of the golf courses are adjacent to waterways. Both Lake Sherwood and Lake Lindero have golf courses just upstream of the lakes, and Westlake Lake has a golf course about 0.6 miles northeast of the lake. In addition, two golf courses are located in the upper portions of the Westlake and Upper Lindero Creek watersheds near perennial or intermittent streams. There is also a small private golf course on the west side of Malibu Lagoon in the Malibu Colony area.

Table 25 presents golf course total nutrient loads and those remaining after grass uptake. During model calibration, it was assumed that fifty percent of the net nitrogen loads and ten percent of the net phosphorus loads reached the waterways because of reductions from processes such as plant uptake and soil retention (Reed et al., 1988). For the Hidden Valley golf course, it was assumed that 100% of the net nitrogen load and twenty percent of the net phosphorus load reached Lake Sherwood because the golf course is adjacent to the lake. In contrast to the common assumption that phosphorus is relatively immobile in soils, phosphorus loads from golf courses were necessary to explain the observed concentrations in the waterways.

**Table 25. Golf Course Total and Net Nutrient Loads (lbs/yr) after Grass Uptake**

| **Subwatershed** | **Adjacent Tributary** | **Total acres** | **Gross N Loading (lbs/yr)** | **Gross P Loading (lbs/yr)** | *Net N Loading* (lbs/yr) | *Net P Loading* (lbs/yr) |
|---|---|---|---|---|---|---|
| Hidden Valley Creek | Lake Sherwood | 150.6 | 47,172 | 20,604 | 15,552 | 14,568 |
| Westlake (2 courses) | Westlake Tributary<br>Triunfo Creek Trib | 199.2 | 66,708 | 27,996 | 24,876 | 20,016 |
| Upper Lindero Creek (2 courses) | Lake Lindero<br>Upper Lindero Creek | 103.6 | 32,556 | 14,196 | 10,800 | 10,044 |
| Malibu Lagoon | Malibu Lagoon | 10.5 | 3,288 | 1,440 | 1,080 | 1,020 |
| Total | | | 149,724 | 64,236 | 52,308 | 45,648 |

On an annual basis, golf course contributes 5% of the total nitrogen and 7% of the total phosphorus loadings. During the summer the percentages increase to 9% for nitrogen and 16% for phosphorus.

## g. Groundwater

Shallow groundwater provides the base flows to the streams and is a major source of water during the summer season. Therefore, dissolved nutrients in groundwater can be important sources during dry periods. The nutrient concentrations in groundwater depend on the nature of the soils, geology, vegetation type and coverage, and nutrient sources such as septic systems and fertilization (Flowers, 1972).

Information on nitrate concentrations in groundwater is available from detection monitoring programs at the Rancho Las Virgenes Farm and the Calabasas Landfill. Background nitrate concentrations can be estimated from the monitoring locations that are either upgradient of the

sites, or that have been determined to be unimpacted by the site operations. The average nitrate nitrogen concentration at the upgradient wells was 1.58 mg/l during 1997 to 2000 (CSDLC, 2000). The range at these wells was 0.05 to 12.3 mg/l. In the impacted area downgradient of Rancho Las Virgenes Farm, the average nitrate nitrogen concentration in monitoring wells was 153 mg/l, and the range was 0.3 to 370 mg/l (Tetra Tech, 2002). See Table 26 for groundwater summary data.

**Table 26. Nitrate Concentrations in Groundwater**

| Well location - Watershed | Sample Period | No. of wells with data | No. of analyses | Average $NO_3$-N (mg/l) |
|---|---|---|---|---|
| Malibu Creek | Pre-1973 | 40 | 46 | 1.9 |
| Malibu Creek | Pre-1973 | 20 | 53 | 1.6 |
| Las Virgenes | Pre-1973 | 6 | 7 | 1.6 |
| Lindero Canyon | Pre-1973 | 14 | 17 | 3.4 |
| Triunfo Canyon | Pre-1973 | 6 | 7 | 0.9 |
| Russell Valley | Pre-1973 | 4 | 16 | 3.25 |
| Sherwood | Pre-1973 | 21 | 40 | 1.3 |
| Up gradient RLV Farm | 1997-2000 | 3 | 58 | 1.58 |
| Down gradient RLV Farm | 1997-2000 | 5 | 49 | 153.4 |

Background nutrient loads from the shallow groundwater were estimated using flow rates simulated by HSPF and the average nitrate concentration (1.0 mg/l) from the upgradient well datasets from Rancho Las Virgenes Farm and the Calabasas landfill. The concentration of phosphorus was estimated at 0.13 mg/l. The concentration was based on the measurements in some upstream tributaries during base flow periods (Tetra Tech, 2002). It is not known whether these "background" groundwater nutrient levels are naturally occurring or are also influenced by anthropogenic inputs. We estimate that on an annual basis, groundwater loadings represent about 6% of the nitrogen and phosphorus to the watershed. During the summer season groundwater loadings represent about 9% of the nitrogen and about 12% of the phosphorus.

### g. Atmospheric Deposition

Atmospheric deposition rates for nitrogen in the Malibu Creek watershed were estimated from recent measurements and modeling conducted by Ambrose et al., 2000 and the Southern California Coastal Water Research Project (SCCWRP).

The total nutrient loads from atmospheric deposition can be substantial since they are applied to the whole watershed. However, much of these nutrients are taken up and cycled by plants in the large vegetated areas of the watershed, so only a small portion of the deposited nutrients actually enters the waterways. In urbanized or agricultural areas, other activities such as fertilization or detergent use provide larger loads on a per unit area basis. Therefore, atmospheric deposition of nutrients was considered as a separate nonpoint source loading category only to the surfaces of receiving waters. Atmospheric deposition to land was included in the total nutrient build-up and washoff parameters that were defined for each land use and vegetation type that was modeled with HSPF (Tetra Tech, 2002). Table 27 summarizes the atmospheric deposition loads to Malibu Lagoon and the four study lakes.

**Table 27. Nutrient loads from atmospheric deposition**

| Waterbody | Surface area (acres) | Nitrogen Load (lb/yr) | Phosphorus Load (lb/yr) |
|---|---|---|---|
| Lake Sherwood | 163 | 3602 | 43.7 |
| Westlake Lake | 95 | 2100 | 25.5 |
| Lake Lindero | 12 | 265 | 3.2 |
| Malibou Lake | 55 | 1216 | 14.7 |
| Malibu Lagoon | 13 | 287 | 3.5 |

In summary, direct atmospheric deposition accounts for about 1% of the total nitrogen and a much smaller fraction (0.1%) of the total phosphorus on an annual basis. Atmospheric deposition contributes a larger percentage of the summer period loadings representing about 5% of the nitrogen and 0.5% of the phosphorus.

### h. Sediments

Nutrient loads from sediment release and aquatic plant decomposition were considered for the four lakes and Malibu lagoon. Nitrogen and phosphorus loadings from Malibu Lagoon sediments were based on measurements and estimates performed by UCLA (Ambrose et al., 1995 and 2000). Nitrogen and phosphorus release rates from the sediments of the four lakes were estimated using typical release rates measured in other lakes (Tetra Tech, 2002 and references therein).

Estimates of nutrient loads associated with sediments are relatively minor on a watershed basis (about 3% of the annual nitrogen and about 4% of the total phosphorus). In places like Malibu Lagoon and perhaps Malibou Lake, the release from the sediments may have a major effect on nitrogen and phosphorus concentrations. We estimate that in the summer, when the algae problem is the worst, sediments account for about 16% of the nitrogen and phosphorus loaded to the lagoon. Although there is ample evidence that sediments are scoured out of the lagoon during heavy winter storms (Ambrose et al., 2000), little is known about how much of the annual nitrogen and phosphorus loads to Malibu Lagoon are deposited and retained in the sediments.

### i. Tidal Inflow

Tidal inflow loads of nutrients were calculated from estimated tidal inflow rates from the UCLA study (Ambrose et al., 2000) and nutrient concentrations in coastal waters measured during the Malibu Technical investigation (RWQCB, 2000). The concentrations were averaged from measurements at all beach surf zone stations. The average concentration for phosphorus was 0.03 mg/l. and 0.47 mg/l for nitrogen.

Tidal inflow accounts for 4% of the annual nitrogen and 2% of the annual phosphorus loadings for the entire watershed. During the summer season, tidal inflow accounts for 5% of the nitrogen loads and about 3% of the phosphorus loads. These loadings affect the lagoon only.

### j. Dry Weather Storm Drain Loads to Malibu Lagoon

Three major storm drains discharge to Malibu Lagoon. The Civic Center drain collects runoff from much of the floodplain, nearby hillsides, and the Civic Center area northwest of the lagoon

(Warshall et al., 1992; Ambrose et al., 2000) and discharges to Malibu Creek near the entrance to Malibu Lagoon. The Cross Creek Road drains the Cross Creek Plaza shopping center and surrounding commercial areas, and discharges to Malibu Lagoon next to the highway. The Malibu Colony drain collects runoff from the areas around Malibu Colony Plaza and Malibu Road and discharges into the western edge of the lagoon.

Dry weather nutrient loads from the two drains were calculated in the UCLA study using measured nutrient concentrations in washwater from the commercial parking lots (16 mg/l N and 0.36 mg/l P), estimates of the amount of wash water used, and the acreages of the washed commercial areas determined from field observations (Ambrose et al., 2000). From a watershed basis, the loadings from these sources were almost negligible. They represent less than 0.1% of the total annual nitrogen and 0.01% of the total annual phosphorus. Even on a local scale the contribution is small representing less than half a percent of the summer nitrogen load and 0.1% of the summer phosphorus load from the Malibu Lagoon subwatershed.

**k. Summary of source assessment**

Based on watershed modeling study (Tetra Tech, 2002) the following conclusions are provided. On an annual basis, Tapia WRF contributes a large percentage of the nitrogen and phosphorus loadings. High nitrogen and phosphorus loadings are also associated with wet-weather runoff associated with commercial and residential land uses and also with wet-weather runoff from undeveloped areas (see Appendix, Figure A-6). The loadings during the summer (defined by Tetra Tech as May to October) are at least an order of magnitude lower, partly due to the Tapia discharge prohibition, but primarily due to the decrease in runoff associated with large storms. During the summer, sources like septic systems, golf course irrigation and fertilization, and urban runoff provide a greater percentage of the load (see Appendix, Figure A-7). Sources and associated loadings are not distributed evenly throughout the watershed, so that reductions made at local scales (subwatersheds) are likely to have immediate effects on water quality even though they may represent a small fraction of the overall loadings to the watershed. Distribution of estimated loads for each nutrient by watershed are shown in Tables A-1 through A-4 (see Appendix).

## 5. Linkage Analysis: Linking Sources with Water Quality Targets

Information on sources of pollutants provides one part of the TMDL analysis. To determine whether those pollutants impair a waterbody, it is also necessary to determine the assimilative capacity of the receiving water under critical conditions. This section describes the methods used to determine the nutrient loadings that can be assimilated by the receiving waters and ensure attainment of the numeric targets (described in Section 2). In this section, we also describe the approaches for defining the critical conditions and developing an appropriate Margin of Safety (MOS) to ensure that water quality standards will be met. (Reminder these nutrient TMDLs define summer as April 15 to November 15 and winter as November 16 to April 14.)

To assist in analyzing these TMDLs, EPA and its contractors used receiving water quality models to estimate pollutant loads and predict the nutrient concentrations in the various streams, lakes, and lagoon in the watershed. The models assisted in the analysis of linkages between sources of pollutants to in-stream water quality concentrations and impacts in receiving waters (rivers, lakes and lagoon). The models also assisted in evaluating the relationship between pollutant loads and the in-stream water quality targets for the listed reaches (Tetra Tech, 2002).

The Hydrodynamic Simulation Program FORTRAN (HSPF) model selected for the watershed loading analyses includes a receiving water model applicable to both streams and well-mixed lakes. The HSPF model includes different forms of the limiting nutrients for algal growth (phosphorus and nitrogen), nutrient cycles, phytoplankton, and other water quality variables such as dissolved oxygen and biochemical oxygen demand (BOD). HSPF was selected since it could be linked directly with the watershed and stream modeling framework and would apply to both rivers and the lagoon system.

The BATHTUB model was used to develop the linkage between loadings to the lakes, nutrient concentrations and algal biomass. BATHTUB also uses mass balance models to predict phosphorus and nitrogen concentrations in the water column as functions of loading rates, outflow (flushing) loss rates, and internal loss rates. Phytoplankton concentrations were estimated based on steady-state relationships that include processes such as photosynthesis, settling, respiration, grazing mortality, and flushing (Tetra Tech, 2002).

### a. Critical conditions and seasonality

EPA has reviewed available monitoring data and has concluded the most critical time period for impairment is during the summer months when the potential for eutrophication and hypoxia are the greatest. Based on comparison of impairments in surface waters and local rainfall data, the "summer" time period corresponds to April 15 to November 15. For the lakes, this is the period when the percent algal coverage and biomass appear to be the greatest (see Problem Statement section). The summer also reflects the critical period for exceedance of the ammonia toxicity standard because of higher lake temperatures. For Malibu Lagoon, the algae problem appears greatest during the summer months since the lagoon is impounded and the streams have areas of little flow which allows algal growth to proliferate due to minimal flushing combined with

longer daylight levels and warmer waters. Therefore, TMDLs are being established for both nutrients—total Nitrogen and total Phosphorus during the summer in all water bodies.

Some evidence of excessive algae also exists in streams and lakes during the winter months (November 16 to April 14). However the percent algae coverage is much less in the winter than during the summer months and given the fairly high degree of subjectivity for making these algae assessments, there is uncertainty regarding the degree of impairment. As previously discussed several studies within the watershed have not clarified the issue of nutrient limitation nor direct effect of nutrients on algae growth. EPA is establishing only nitrogen TMDLs for the winter months because the Basin Plan contains a numeric objective for total nitrogen which the TMDLs must meet, and because the need for phosphorus TMDLs during the winter has not been firmly established.

The best information currently available to EPA indicates that exceedances of standards during the summer period are not exacerbated by nutrient discharges during the winter period that might remain in the system during summer (CH2MHill, 2000). Therefore, EPA has concluded that it is not necessary to reduce the loading capacity estimates (particularly during the wetter winter period) to account for potentially delayed effects during summer associated with winter nutrient discharges.

*Summer*. For the summer season, the loading capacity was calculated by determining the median flow value at the Malibu Creek gaging station (below Cold Creek, LACPWD site #F130-R) during the summer season and multiplying that median flow by the concentration-based numeric targets for total nitrogen and total phosphorous and a units correction factor to yield daily loading capacities. The loading capacity estimate is based on median flow values for the 1998-2001 period, which is the period following the imposition of new permit requirements for the direct Tapia WRF discharge that essentially prohibit discharge from Tapia between April 15-November 15. EPA concluded that it is appropriate to base the loading capacity estimate on median flow because summer season nutrient effects in the Malibu Creek watershed are principally associated with algae growth which occurs over relatively long time periods (more than a week) that are best represented by the median flow values rather than mean flows. EPA also rejected the $90^{th}$ percentile flow level (2.5 cfs) because that flow level does not account for periodic wet weather-related loads in the summer season which could cause substantial nutrient loads. Applying the $90^{th}$ percentile flow would result in TMDLs that are more stringent than necessary to implement the applicable water quality standards and that may not be attainable. The selection of summer median flows as the appropriate critical flows is also based on the consideration that the TMDL addresses algae growth in several lakes and the Malibu Lagoon, which are less sensitive to short term variations in flows and nutrient loads than are most streams.

The long-term median summer flow value was approximately 5.2 cfs. This value was multiplied by the numeric target values of 1.0 mg/l total nitrogen and 0.1 mg/l total phosphorus and an appropriate correction factor to yield loading capacity estimates of 77.1 lbs/day of total nitrogen and 7.7 lbs/day of total phosphorus for the summer season. These loading capacities are expressed as average daily values yet can be easily converted to monthly or summer values by multiplying by the appropriate number of days.

*Winter.* For the winter season, EPA considered applying a similar mass load based approach to calculating loading capacities for nitrogen. However, because flows and loads vary much more in Malibu Creek during the winter season in response to much more frequent wet weather events, EPA concluded that it would be more appropriate to identify concentration-based loading capacities (which are more sensitive to variations in flow levels) than to estimate mass based loading capacities based on simplified critical flow estimates. Based on these considerations, the winter season loading capacity for nitrogen is 8 mg/l of nitrate-N plus nitrite-N for all water bodies in the watershed, which is equivalent to the numeric target for total nitrogen in the winter season.

## 6. TMDLs and Pollutant Allocations

### a. TMDLs

These TMDLs are set equivalent to the loading capacities (i.e., the assimilative capacities) for the water bodies addressed in these TMDLs. The loading capacity calculations were discussed in the preceding section. Table 28 summarizes the TMDLs.

**Table 28: TMDLs for Nitrogen and Phosphorus**

| Season | Total Nitrogen | Total Phosphorus |
|---|---|---|
| Summer (April 15- November 15) | 27 lbs/day | 2.7 lbs/day |
| Winter (November 16- April 14) | 8 mg/l* | n/a |

* nitrate-N+nitrite-N

### b. Allocations

Consistent with the TMDLs defined above, EPA has defined allocations for each pollutant source for the winter and summer seasons. Each pollutant source is allocated a quantitative load of nitrogen and phosphorus compounds for summer and nitrogen for winter. Allocations are designed such that each waterbody will not exceed the seasonal TMDLs, and not exceed numeric targets for any of the nutrient compounds or effects in any of the listed reaches. Consequently each waterbody will attain water quality standards. As required by EPA regulations, the TMDL is the sum of the wasteload allocations and load allocations, including natural background.

Point sources are given wasteload allocations, and non-point sources are given load allocations. The direct discharges from the Tapia WRF are regulated through an NPDES permit; therefore, this source is assigned wasteload allocations in this TMDL. In addition, EPA recognizes that discharges of stormwater and other runoff from some urbanized areas in the watershed are regulated pursuant to the Los Angeles and Ventura County municipal stormwater permits. Discharges in the following allocation categories likely include some discharges regulated through these stormwater permits:

- Runoff from developed lands,
- Golf courses,
- Dry weather urban runoff, and
- other source categories.

EPA was unable to specifically distinguish the amounts of pollutant loads from each of these allocation categories associated with areas regulated by the stormwater permits. Therefore, allocations for the source categories other than the direct Tapia WRF discharge are termed load allocations in these TMDLs. If it is later determined that nutrient loads associated with any of these load allocation categories are actually subject to regulation through NPDES permits, these allocations are to be considered wasteload allocations for purposes of implementing the permitting provisions of 40 CFR 122.44(d).

Tables 29, 30, 31 identify the specific wasteload and load allocations proposed for total nitrogen and total phosphorus during the summer and winter periods. Details concerning the calculation of these allocations are discussed below.

**Table 29. Summer nitrogen allocations by source category**

| Source Category | Existing Loads (lbs/day) | % of existing load | Target Reduction (%) | Load Allocation (lbs/day, except Tapia) |
|---|---|---|---|---|
| Wasteload Allocations | | | | |
| Tapia Direct Discharge | 19 | 5% | 100% | 0* |
| Load Allocations | | | | |
| Septic Systems | 91 | 22% | 93 | 6 |
| Effluent Irrigation/Sludge | 61 | 15% | 100 | 0 |
| Runoff from developed areas | 26 | 6% | 90 | 3 |
| Golf Course Fertilization | 37 | 9% | 100 | 0 |
| Agriculture/Livestock | 32 | 8% | 90 | 3 |
| Dry Weather Urban Runoff | 52 | 13% | 90 | 5 |
| Runoff from undeveloped land | 37 | 9% | 90 | 4 |
| Other | 56 | 14% | 85 | 8 |
| **Total** | **411** | **100%** | **93%** | **27** |

Existing Loads determined from Tetra Tech, 2002
Developed areas = sum of commercial/industrial, high/medium density residential, low density residential, and rural residential.
Undeveloped areas = sum of vacant, chaparral/sage scrub, grasslands, and woodlands.
Other = sum of atmospheric deposition, lagoon drains, birds, tidal inflow, groundwater, and sediment release.
*See text for discussion of Tapia allocation.

**Table 30. Summer phosphorus allocations by source category**

| Source Category | Existing Loads (lbs/day) | % of existing load | Target Reduction (%) | Load Allocation (lbs/day, except Tapia) |
|---|---|---|---|---|
| Wasteload Allocations | | | | |
| Tapia Discharge | 3.5 | 8 | 100 | 0* |
| Load Allocations | | | | |
| Septic Systems | 8.9 | 21 | 90 | 0.9 |
| Effluent Irrigation/Sludge | 5.3 | 13 | 100 | 0 |
| Runoff from developed lands | 2.6 | 6 | 90 | 0.3 |
| Golf Course Fertilization | 6.6 | 16 | 100 | 0 |
| Agriculture/Livestock | 1.7 | 4 | 90 | 0.2 |
| Dry Weather Urban Runoff | 4.6 | 11 | 90 | 0.5 |
| Runoff from undeveloped lands | 4.8 | 11 | 90 | 0.5 |
| Other | 4.1 | 10 | 90 | 0.6 |
| **Total** | **42.3** | **100%** | **94%** | **2.7** |

Existing Loads determined from Tetra Tech, 2002
Other footnotes see Table 29
*See text for discussion of Tapia allocation

**Table 31. Winter concentration-based nitrogen allocations by source category**

| Source Category | Existing Loads (lbs/6 mo) | % of Existing Load | Daily Load Allocation (mg/l)* |
|---|---|---|---|
| Wasteload Allocations | | | |
| Tapia Discharge | 187,508 | 34% | 8 |
| Load Allocations | | | |
| Septic Systems | 47,285 | 9% | 8 |
| Effluent Irrigation/Sludge | 44,298 | 8% | 0 |
| Runoff from Developed Areas | 59,030 | 11% | 8 |
| Golf Course Fertilization | 27,141 | 5% | 8 |
| Agriculture/Livestock | 27,343 | 5% | 8 |
| Dry Weather Urban Runoff | 8,500 | 2% | 8 |
| Runoff from undeveloped land | 123,933 | 22% | 8 |
| Other | 27,637 | 5% | 8 |
| **Total** | **552,675** | **100%** | **8** |

*nitrate-N+nitrite-N
Existing Loads determined from Tetra Tech, 2002
Other footnotes see Table 29

## Waste Load Allocations

Tapia's Direct Discharge. Seasonal wasteload allocations are proposed for Tapia. Order No. 99-142 prohibits discharge from Tapia to Malibu Creek from April 15 to November 15, with minor exceptions during storm flow events and minimal (<2.5 cfs) stream flow conditions. The summer Tapia WLA is set at zero; however, this WLA is not intended to negate these exceptions. We understand that to date, Tapia has not had to discharge in the summer, and we expect that such discharges would be very sporadic in the future. We believe these discharges will have an insignificant effect on average summer loads and that it is therefore unnecessary to account for them in the cumulative loading allowed under the TMDL. The State should ensure that these discharges do not result in exceedances of any applicable water quality standards.

During the winter period, Tapia's wasteload allocation is 8 mg/l total nitrogen, equal to the numeric target established in the TMDL It will be necessary for Tapia to reduce nitrogen loads from their historical levels of about 14 mg/l by approximately 43% to meet the new winter wasteload allocation.

These wasteload allocations apply during wet and dry weather conditions during the respective summer and winter periods. EPA proposes these allocations be set as average daily values, to be averaged over no more than a one-month period.

## Load Allocations

Load allocations (LAs) are set based on source categories evaluated in the source analysis. This approach of setting LAs for different source categories is consistent with the requirements of 40 CFR 130.2(g), which authorizes establishment of LAs as "gross allotments". The LAs apply to all discharges from these source categories to listed segments and to upstream, hydrologically

connected segments within the Malibu Creek watershed. This means that LAs apply both to discharges to segments for which TMDLs are being established, as well as to discharges to segments that are tributary to the segments for which TMDLs are established. It is necessary and appropriate to set LAs for discharges to the upstream tributaries in order to meet water quality standards in the downstream impaired segments in the Malibu Creek watershed. These upstream tributaries flow into and contribute to impairment of Section 303(d)-listed segments. TMDLs and associated LAs and WLAs must be set at levels that will implement applicable water quality standards for the listed water bodies (40 CFR 130.7(c)(1)).

*Effluent irrigation and sludge disposal.* The waste discharge requirements issued by the Regional Board that regulate effluent irrigation and sludge disposal prohibit application of effluent or sludge at levels that would result in pollutant discharges to receiving waters (RWQCB Order No. 87-86, 94-055). The effluent irrigation waste discharge requirements require application of reclaimed water at agronomic rates that do not result in percolation of nutrients to groundwater. Based on these requirements, the load allocations for discharges to surface waters associated with effluent irrigation and sludge disposal during both the winter and summer periods are zero. We understand that sludge is no longer being applied and the only on-going nutrient applications in this category are associated with effluent irrigation. If reclaimed water is used for irrigation consistent with the requirements of the existing waste discharge requirements, there should be no nutrient loading to surface waters associated with this activity.

*Septic Systems.* The load allocations for this source category are set at levels that will require large reductions in nutrient loading from septic tanks throughout the watershed. Implementation of the load allocation will probably necessitate aggressive actions to identify and repair all septic systems that do not function properly. The highest priority for implementation is to ensure that discharges from commercial septic systems do not cause nutrient discharges to surface waters, particularly in the Malibu Lagoon area. We expect that actions taken to address septic systems will provide improvements in discharge quality throughout the year; therefore, the winter LAs should be met if the summer LAs are met.

*Urban runoff.* Although runoff from commercial and residential areas can contribute large loads of nitrogen and phosphorus to the system on an annual basis, the critical time period is the summer period. In addition, work by Kamer et al. (2002) indicates there are higher algal problems in developed urban areas. The summer load allocations would necessitate large reductions in nutrient loads from this source category. We expect that measures implemented to reduce urban runoff will provide improvements in discharge quality during dry periods throughout the year. Because total nitrogen levels in wet weather stormwater runoff are usually below the proposed WLA, we do not expect that extensive work will be needed to address wet weather nutrient loads from this source category.

*Golf Course.* The load allocation for golf course irrigation in the summer is zero. The goal is to allow effluent irrigation only for fertilization in amounts that plants can utilize. In practice we would assume that once implemented these practices would be applied year round, so that substantial nutrient reductions may also be obtained during the winter period. It is unknown whether additional controls will be needed to implement the winter LA for this source category. Reduction in the excess nutrients from golf course fertilization in the Hidden Valley, Westlake,

and Lindero Creek subwatersheds will particularly improve water quality in Lake Sherwood, Westlake Lake and Lake Lindero.

*Agriculture/Livestock*. Load reductions of approximately 90% of excess nutrients from agriculture and livestock discharges during the summer are established for the Malibu Creek watershed. The goal is to effectively eliminate runoff of manure from stables and to minimize nutrient contaminated runoff both from stables and manure piles. In practice we would assume that once implemented these practices would be applied year round, so that substantial nutrient reductions may also be obtained during the winter period. It is unknown whether additional controls will be needed to implement the winter LA for this source category.

*Runoff from undeveloped land*. The load allocations provide for reductions of 90% in nutrient loading from undeveloped land areas. These reductions are needed in order to set TMDLs that will meet applicable water quality standards. It is reasonable to provide for some nutrient loading reductions from undeveloped land because nutrient loadings from these lands are likely affected by some controllable factors including atmospheric deposition of nutrients onto land surfaces as well illicit dumping of trash and other material that could yield nutrient loads. Moreover, runoff from some undeveloped areas is channeled to developed areas that are expected to benefit from runoff management practices that should reduce nutrient concentrations. Therefore, actions to control nutrient loads from developed areas should result in some reduction in runoff from undeveloped land areas.

*Other sources*. This source category includes direct atmospheric deposition to water surfaces, discharges from stormdrains to Malibu Lagoon, fecal material from birds, tidal inflow, groundwater releases, and sediment releases. EPA acknowledges that the proposed load reductions are aggressive (90% in summer). However, we believe these reductions should be feasible because:

- actions to reduce nutrient inputs from other anthropogenic sources should eventually bring about substantial reductions in loadings from groundwater and sediment, and
- direct stormdrain discharges to Malibu Lagoon can be effectively eliminated during the summer season.

**c. Margin of safety**

The Clean Water Act and federal regulations require that TMDLs provide a margin of safety to account for uncertainty concerning the relationship between pollution controls and water quality responses (see 40 CFR 130.7(c)(1)). The Malibu Creek watershed nutrient TMDLs provide both implicit and explicit margins of safety to account for several types of uncertainty in the analysis. This section discusses analytical factors that are uncertain and describes how the TMDL provides the requisite margin of safety.

*Relationship between algae growth and nutrient loading*. Although there is strong evidence of excessive algal growth in summer and some evidence of excessive algal growth in winter, the degree of algae-related impairment in winter and the degree to which nitrogen, phosphorus, or both are limiting factors in algae production throughout the year are uncertain.

The summer season TMDLs and allocations account for this uncertainty by setting conservative numeric target values for total nitrogen and total phosphorus. Our review of the available data suggests that there is a closer relationship between nutrient levels and algae production in summer than was observed in the winter. Attainment of these conservative summer target values should ensure that nitrogen and phosphorus are not critical limiting factors in algae production and should result in reductions in algae growth.

The winter season numeric targets, associated TMDLs and allocation are less stringent than the summer because available data and research studies do not clearly demonstrate that nutrient levels are likely to cause excessive algae growth. The TMDLs are designed to ensure implementation of the Basin Plan numeric objective for total nitrogen while acknowledging uncertainty concerning winter algae problems and associated attainment of the narrative objective for biostimulatory effects. The TMDLs account for this winter period uncertainty by incorporating a 20% margin of safety (setting the nitrogen numeric target at 8 mg/l instead of 10 mg/l, which is the applicable numeric objective).

Nutrient loading during the winter period, stream flows, and nutrient loading capacity vary more during the winter period than the summer period because most precipitation related changes in runoff, loads, and flows occurs during the winter period. Winter period loads and flows change quickly in response to unpredictable precipitation events. High velocity stream flows are likely to scour filamentous algae and carry it out of the watershed; these high flows also flush nutrient compounds through the watershed and into the ocean. We are accounting for the uncertainty associated with winter season variability in loads, flows, and loading capacity by setting the winter season TMDLs and allocations on a concentration basis instead of a mass-loading basis.

Studies are currently underway to improve our understanding of the relationship between nutrient levels in the watershed and algal growth. EPA strongly recommends that these studies be completed and additional studies carried out if necessary to characterize the limiting factors that control algae growth in the Malibu Creek watershed. These studies need to focus both on the winter and summer periods. Additional study is needed to reconcile conflicting data and research concerning the degree to which algae growth in the winter period is causing impairment and violation of narrative water quality objectives. Based on results from these studies, the State should consider reviewing and, if necessary, revising the TMDLs, allocations, and/or implementation provisions.

*Uncertainty in nutrient loading estimates*. Although we used established methods for estimating nutrient loads from different sources including relatively sophisticated modeling tools, it is not certain that these estimates are accurate. To help account for this uncertainty, the watershed loadings were based on a four-year period (1992 -1995) that included a wide range of hydrologic variability, and was coincidentally weighted more toward wet years. This approach yields conservatively high runoff estimates from different land uses.

We also made conservative assumptions in the estimation of loadings from septic systems, effluent irrigation, and golf course runoff. All of the excess nitrogen loads (87%) not utilized by plants from septic systems near Malibu Lagoon were assumed to enter the lagoon. Similarly

conservative estimates were made in estimating phosphorus delivery from septic systems. Approximately 10 percent of the phosphorus loads from effluent irrigation and golf course fertilization were assumed to enter waterways, an assumption that is conservative because it is usually assumed that phosphorus compounds are highly sorbed to particles and therefore relatively immobile in soils.

These conservative loading estimates were used to estimate the percentage reductions needed to attain the individual allocations during the summer period. Use of conservatively high runoff estimates results in conservative percent reduction estimates for each source category (i.e., implementation of these percentage reductions is highly likely to result in attainment of the individual allocations and the TMDLs).

Additional studies of loadings from nonpoint source categories would be warranted in the future to better characterize loadings during wet weather periods from polluted runoff as well as loads associated with septic system operation.

**d. Summary of pollutant allocations**

These TMDLs establish seasonal waste load allocations for the Tapia WRP. Seasonal load allocations are established for several source categories including effluent irrigation, commercial/multi-family septic systems in Malibu Lagoon, urban runoff, golf course runoff, livestock/agricultural runoff, and other land uses. During the summer period, large reductions in loads from all anthropogenic sources are needed. During the winter, substantial reductions in Tapia's discharge and modest reductions from other source categories are needed in nitrogen loading to ensure attainment of the concentration-based allocations. Actual reductions attained in winter should be greater since in practice a number of the load reduction efforts proposed in the implementation recommendations (below) are likely to result in year round reductions rather than just summer season reductions.

There is uncertainty in *some* aspects of the TMDL analysis. Implicit and explicit margins of safety are provided to account for these uncertainties. Additional monitoring and studies currently underway and recommended below should help address these areas of uncertainty and provide a basis for considering whether TMDL revisions are warranted.

## 7. Implementation Recommendations

This section describes the plans, regulatory tools, or other mechanisms by which the waste load allocations and load allocations may be achieved. The main responsibility for water quality management and monitoring resides with the State. EPA fully expects the State to develop implementation and monitoring measures for these TMDLs. Following are EPA's recommendations for implementing these TMDLs.

### a. Implementing waste load allocations to permitted point source dischargers

*Tapia Water Reclamation Facility.* EPA anticipates that the WLAs established in these TMDLs will be implemented through the NPDES permit for the Tapia Water Reclamation Facility. It appears that Tapia needs to substantially decrease nutrient loads in order to meet both its existing winter period effluent limitations and its WLA. The Regional Board will need to determine whether the permit needs to be modified to be consistent with the WLAs and when the modifications would occur. When the permit is next revised, we recommend inclusion of re-opener language that provides to review of the permit if necessary following completion of monitoring and research studies designed to further characterize nutrient and algae issues in the watershed and determine the need for further reductions in nutrient loading from Tapia.

### b. Implementing Load Allocations to nonpoint sources.

*Effluent Irrigation.* The usage of reclaimed water is regulated under water reclamation requirements contained in Regional Board Resolutions 87-86 and 94-055. This should be modified if necessary to be consistent with these TMDLs.

*Septic Systems.* The highest priority for implementation actions in this source category is commercial septic systems. In particular, actions are needed to ensure that commercial septic systems located in the Malibu Lagoon subwatershed, specifically in the areas of the Malibu Colony Plaza, Cross Creek Plaza, and Malibu Civic Center do not contribute to nutrient loading to the Lagoon. These systems may have been improperly sited and appear to be located adjacent to the lagoon, in a groundwater table with historic levels that do not allow as least 10 feet between the groundwater and septic system.

These commercial septic systems were the focus of Regional Board Resolution 98-023. This resolution provided direction to the Executive Officer to require the submittal of Reports of Waste Discharge for all discharges from multi-family and commercial septic systems located in the Malibu Creek watershed. Therefore, EPA's understanding is that a mechanism for implementation for the septic system Waste Load Allocations (WLAs) derived from these TMDLs has already been established. EPA anticipates that the WLAs developed for these TMDLs will be established as WDR permit limits for the individual septic systems. In addition, the WDRs have specific prohibitions on septic systems within 10 feet of the highest historical groundwater levels. The actual implementation date on the WLAs will depend on implementation schedules established by the Regional Board.

Septic systems that are poorly sited will have options available for meeting the LAs under these TMDLs. One possible method of compliance is pretreatment via Nitrogen Reduction Systems (NRS) of effluent to remove nutrients prior to leachfield discharge (USEPA, 1999b). The principal treatment mechanism for these systems would be biological nitrification-denitrification.

*Golf Course Irrigation.* Golf courses and users of recycled water can implement management practices to minimize the potential for nutrients entering surface water. Potential management practices may include:

- Applications of fertilizers and recycled water at agronomic rates to ensure that the total nitrogen and phosphorus loads do not exceed the daily vegetative requirements of the turf.

- Use of irrigation systems that will minimize the potential for application of excess recycled water that would result in surface runoff.

- The design of recycled water irrigation systems to cease operation under anticipated storm events.

Some of the management strategies outlined above have been proposed by the Ahmanson Ranch Specific Area Plan for implementation in the master planed community for Ahmanson Ranch (VCRMA, 2002). The BMPs outlined above are administrative BMPs, which will involve changes in operational practices, but not necessarily result in capital expenditure.

*Horses and Livestock.* Load reductions are proposed for horse stables and livestock pastures. It is estimated that 40% of the manure is already removed from stables. Additional manure management measures will be needed to implement the allocations. Additional BMPs may also be necessary to mitigate the impacts from this source category. For examples, measures could be taken to keep animals away from the streams in Hidden Valley and other tributaries, and manure could be removed more frequently from stables. It is important to ensure that manure from stables is managed properly throughout the year and that animal waste is not allowed to runoff into streams at any time.

## 8. Monitoring Recommendations

Follow-up monitoring and evaluation is recommended to validate the TMDL, and to assess whether the implementation measures are adequate to attain water quality standards.

### a. Water quality monitoring

A watershed-scale monitoring program should be established at key compliance points along the river. Samples should also be collected at the upstream and downstream ends of the listed tributaries. Sample results should be compared to the numeric in-stream targets identified in Section 2c for dissolved oxygen, ammonia, nitrate, total nitrogen, percent algal cover and Chlorophyll *a*.

Much of this data is already being collected as part of the Tapia WRP monitoring program. However there is only limited data available for the upper portion of the watershed and selected tributaries of Malibu Creek. EPA recommends that these watersheds be surveyed in order to more fully understand the natural conditions, and how the impaired waterbodies compare to natural conditions. Heal the Bay has a network of monitoring stations throughout the watershed including a number of potential reference sites. These sites should be considered in future monitoring and assessment plans for the watershed.

The Malibu Creek Advisory Committee, Modeling and Monitoring Subcommittee has developed a Watershed-Wide Monitoring Program (1999). The program addresses the watershed-scale monitoring needed to evaluate the effectiveness of the TMDLs. The data could be used to provide further verification of the model and refine the TMDLs as appropriate.

### b. Pollutant source monitoring

Monitoring of pollutant sources is needed to ensure that required reductions are being achieved and if necessary, to refine the allocations presented in these TMDLs.

*Treated and reclaimed wastewater*. Tapia WRP should continue to monitor effluent concentrations of nitrogen and phosphorus for the purpose of verifying loads to the watershed. Tapia WRP should also continue to monitor the quality and quantity of reclaimed water used in the system. Special monitoring should be conducted to evaluate the quantity and quality of reclaimed water that re-enters the system via surface runoff or through groundwater.

*Septic systems*. According to the Regional Board, the WDRs will have a monitoring program component to estimate concentrations from the septic systems. In addition, we recommend special studies be conducted for better certainty in the number of septic systems and the distribution of the systems within the Malibu Creek watershed.

*Horses and livestock*. Monitoring is needed to ensure that recommended load reductions are being achieved. This could be established through random inspections of horse and livestock facilities.

*Monitoring of urban sources.* A special monitoring program should be established to evaluate effectiveness of actions to reduce both dry and wet weather urban runoff.

**c. Special studies—Recommendations**

There are uncertainties in the numeric target and winter wet season impact of source loading from the treatment plant to Malibu Lagoon. The following studies are recommended to address these uncertainties.

*Extent of algal impairment*. EPA recommends studies to investigate the current extent of impairment due to excessive algal growth in the creek by surveying algal biomass and species composition at multiple sites within the creek. This data will provide information regarding the present degree of excessive algal biomass in the stream as well as determining any relationships between land uses, water column nutrient concentrations, and resulting impacts on stream periphyton biomass and communities.

*Limiting factor analysis.* EPA recommends further study to assess whether total nitrogen or total phosphorus or other parameters such as flow and light limit algal growth in the Malibu Creek watershed. This information will assist Regional Board staff in determining watershed specific nutrient targets which are linked to algal nutrient requirements.

*Fate of nutrients in Malibu Lagoon*. These TMDLs are based on the assumption that the summer nutrient concentrations control algal abundances. Another critical assumption is that summer period nutrient concentrations are related to summer period loadings. This may not be the case in the Lagoon where some fraction of the total nitrogen and phosphorus loadings may be retained in the sediments and ultimately serve as a source of nutrients during summer periods when algae is more abundant. Thus, EPA recommends a study to determine if the expected upstream reductions in nutrient loadings do not result in desired improvements in water quality in the lagoon.

**d. Summary of TMDL Monitoring**

The TMDL monitoring program should be designed to provide information that will assure that water quality objectives are being met throughout the watershed and to refine the source loading estimates. These efforts will provide information on the success of the TMDLs to address the nutrient related problems in the creek, lagoon and listed tributaries. Information generated by this program may be used by the Regional Board to revise the TMDLs, NPDES permits, WDRs, and other control actions if necessary.

## 9. References


Abramson, M.,. Padick. E.T. Schueman, G.O. Taylor, J. Olson, J. Safford, K. Starman, and J. Woodward. 1998. The Malibu Creek Watershed: A Framework for Monitoring, Enhancement and Action. Prepared for Heal the Bay and The California State Coastal Conservancy. The 606 Studio Graduate Department of Landscape Architecture, California State Polytechnic University, Pomona

Ambrose, R.F. and A. R. Orme. 2000. Lower Malibu Creek and Lagoon resource enhancement and management. Final report to the California State Coastal Conservancy. University of California, Los Angeles May 2000.

Ambrose, R.F.., I.H. Suffet, and S.S Que Hee. 1995. Enhanced environmental monitoring program at Malibu Lagoon and Malibu Creek. Prepared for the Las Virgenes Municipal Water District by the Environmental Science and Engineering Program at the University of California, Los Angeles.

American Society of Agricultural Engineers (ASAE). 1998. ASAE Standards. Manure Production Characteristics. ASAE D384.1 DEC93

Batiuk, R.A., R.J. Orth, K.A. Moore, W.C. Dennison, J. C. Stevenson, L.W. Staver, V. Carter, N.B. Rybicki, R.E. Hickman, S. Kollar, S. Bieber, P. Heasly. 1992. Chesapeake Bay Submerged Aquatic Vegetation Habitat Requirements and Restoration Target s: A Technical Synthesis. EPA: Annapolis, MD.

Biggs, B.J.F. 2000. Eutrophication of streams and rivers: dissolved nutrient-chlorophyll relationships for benthic algae. J. N. Am. Benthol. Soc. 19(1):17-31.

Biggs, B.J.F. 2000. New Zealand Periphyton Guidelines: Detecting, Monitoring and Managing Enrichment of Streams.

Briscoe, E., K. Kamer, S. Lice, M. Abramson and K. Schiff. 2002. Pre-dawn dissolved oxygen levels in the Malibu Creek watershed. Prepared for the Los Angeles Regional Water Quality Control Board by the Southern California Coastal Water Research Project and Heal the Bay.

Busse, L., J. Simpson, K. Kamer and S. Cooper. 2002. A survey of algae and nutrients in the Malibu Creek watershed. Prepared for the Los Angeles Regional Water Quality Control Board by the California Coastal Water Research Project and University of California Santa Barbara.

CH2MHill. 2000. Evaluation of nutrient standards for Malibu Creek and Lagoon. Prepared for Las Virgenes Municipal Water District and Triunfo Sanitation District.

County Sanitation Districts of Los Angeles County. 2000. Calabasas Landfill Water Quality Monitoring Report, Third Quarter 2000.

Dodds, W.K. and E.G. Welch. 2000. Establishing nutrient criteria in streams. J. N. Am. Benthol. Soc. 19(1): 186-196.

Dodds, W.K., V. H. Smith, and B. Zander, 1997. Developing nutrient targets to control benthic chlorphyll levels in streams: A case study of the Clark Fork River. Wat. Res. 31(7): 1738-1750.

Flowers 1972. Measurement and management Aspects of Water Toxicology: The Malibu Creek Watershed, A mixed residential and Wilderness Areas

Haith, D.A., R. Mandel, and R.S. Wu. 1992. GWLF, Generalized loading functions, Version 2.0 Users Manual. Department of Agricultural and Biological Engineering, Cornell University, Ithaca, New York.

Heal the Bay. 2002. Monitoring data for Malibu Creek waterbodies, 1998 to Dec. 2000.

Kamer, K., K. Schiff, L. Busse, J. Simpson, and S. Cooper. 2002. Algae, nutrients and physical conditions of streams in the Malibu Creek watershed: Interim Report. Southern Prepared for the Los Angeles Regional Water Quality Control Board by the California Coastal Water Research Project and University of California Santa Barbara.

Kennish, M.J. 1992. Ecology of Estuaries: Anthropogenic Effects. CRC Press, Inc., Boca Raton, FL.

Malibu Creek Watershed Advisory Council. 1999. Draft Malibu Creek Watershed Monitoring Program, report by Monitoring and Modeling Subcommittee, March 8, 1999. www.lvmwd.dst.ca.us.

Lund, L.J., M.A. Anderson, and C. Amrhein. 1994. Evaluation of Water Quality for Selected Lakes in the Los Angeles Hydrological Basin. Prepared for the Los Angeles Regional Water Quality Control Board by the Department of Soil Science, University of California, Riverside, CA.

LACDHS. 2001. personal communication with Jack Petralia , Los Angeles County Dept. Health Services on March 30, 2001.

Las Virgenes Municipal Water District (LVMWD). 1994. Las Virgenes Composting Facility, Putting Wastewater by-products to Good Use.

NOAA/EPA. National Oceanic and Atmospheric Administration and Environmental Protection Agency. 1988. Strategic Assessment of Near Coastal Waters, Chapter 3, Susceptibility and Concentration Status of Northeast Estuaries to Nutrient Discharges. NOA A: Washington, D.C.

NRCS. 1995. Malibu Creek Watershed Technical Documentation Nitrogen and Phosphorus Analysis

Reed, S.C., E.J. Middlebrooks, and R.W. Crites. 1988. Natural systems for waste management and treatment. McGraw-Hill. New York.

Regional Water Quality Control Board, Los Angeles (RWQCB). 2002. Waste Discharge Requirements for Malibu Country Mart III, Order No. R4-2002-xxxx. Adopted Dec. 12, 2002.

RWQCB. 2002. Draft 303(d) list.

RWQCB. 2000a. Regional Board Report on Wastewater Disposal Issues and Malibu Technical Investigation in the City of Malibu.

RWQCB. 2000b. Analysis of Nutrient Data for the Malibu Creek Watershed. ("Birosik" report)

RWQCB. 1998. 1998 Water Quality Assessment

RWQCB, 1997. Fact Sheet: Order No. 97-135, Waste Discharge Requirements for Las Virgenes Municipal Water District (Tapia Water Reclamation Facility).

RWQCB. 1996. Water Quality Assessment and Documentation

RWQCB. 1994. Water Quality Control Plan for the Los Angeles Region

Tetra Tech 2002. Nutrient and Coliform Modeling for the Malibu Creek Watershed TMDL Studies. Prepared for US Environmental Protection Agency Region 9 and the Los Angeles Regional Water Quality Control Board by Tetra Tech, Inc. Lafayette CA.

Tapia—Las Virgenes Reclamation/ Conservation District (TLVRCD). 1989. Malibu Lagoon" A Baseline Ecological Survey

University of Rhode Island (URI). 2002.

United States Environmental Protection Agency (USEPA). 2000a. Guidance for Developing TMDLs in California

USEPA 2000b. Nutrient Criteria Technical Guidance Manual: Lakes and Reservoirs, April 2000

USEPA 2000c. Nutrient Criteria Technical Guidance Manual: Estuarine and Coastal marine Waters, October 2001

USEPA. 1999a. Protocol for Developing Nutrient TMDLs. *1st ed.* EPA 841-B-99-007. Office of Water, United States Environmental Protection Agency, Washington D.C. 135 pp.

USEPA. 1999b. The Class V Underground injection Well Control Study, Volume 5, large capacity Septic Systems

VCRMA, 2002 Ahmanson Ranch Specific Plan

Warshall, P. and P. Williams. 1992. Malibu Wastewater Management Study: A Human Ecology of the New City. Prepared for the City of Malibu. Peter Warshall & Associates and Philip Williams & Associates, Ltd.

## 10. Appendix

**Figures A-1 to A-12**

**Tables A-1 to A-4**

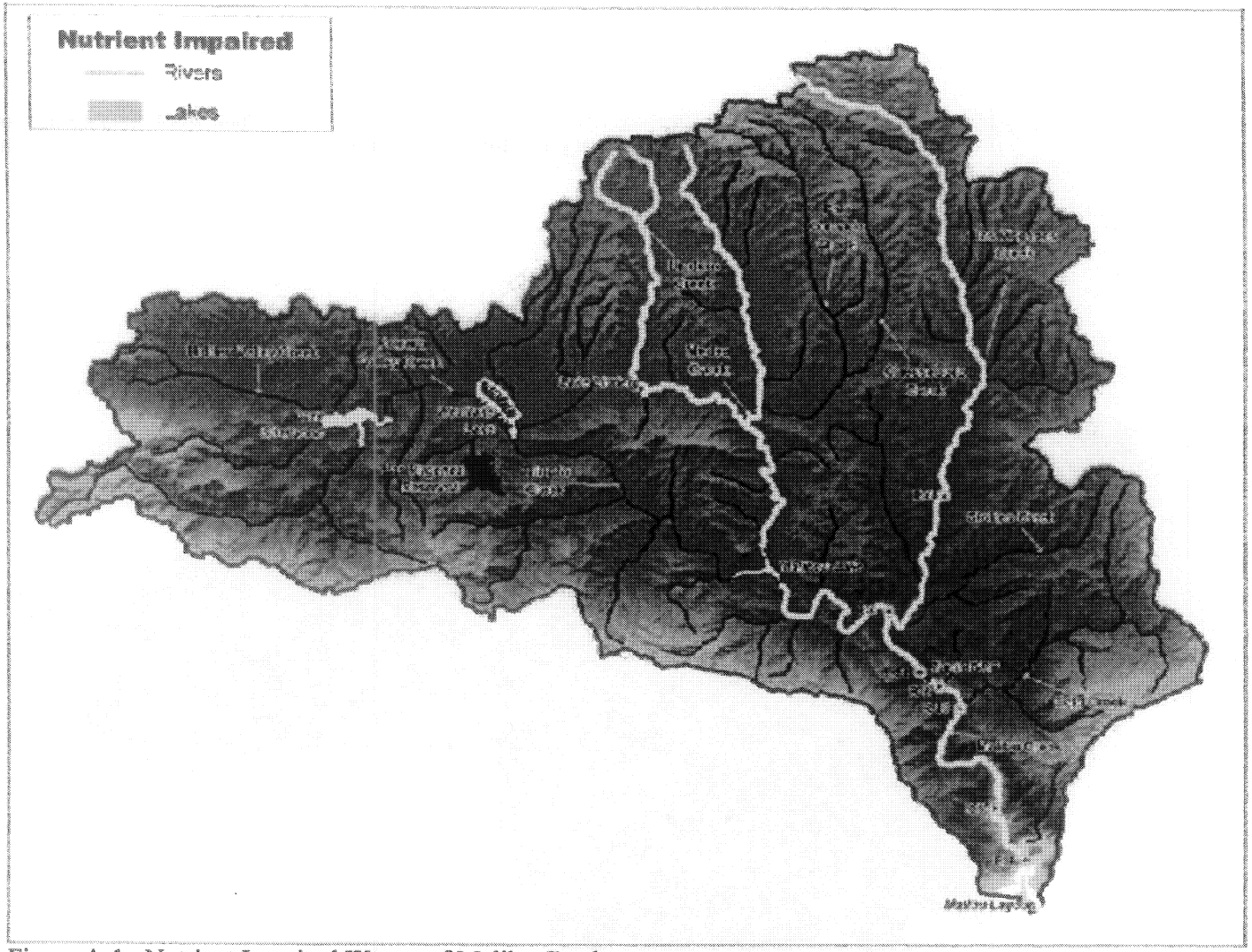



Figure A-1. Nutrient Impaired Waters of Malibu Creek
Also shown: Tapia WRF (square) and 6 monitoring sites along Malibu Creek (open circles with squares).

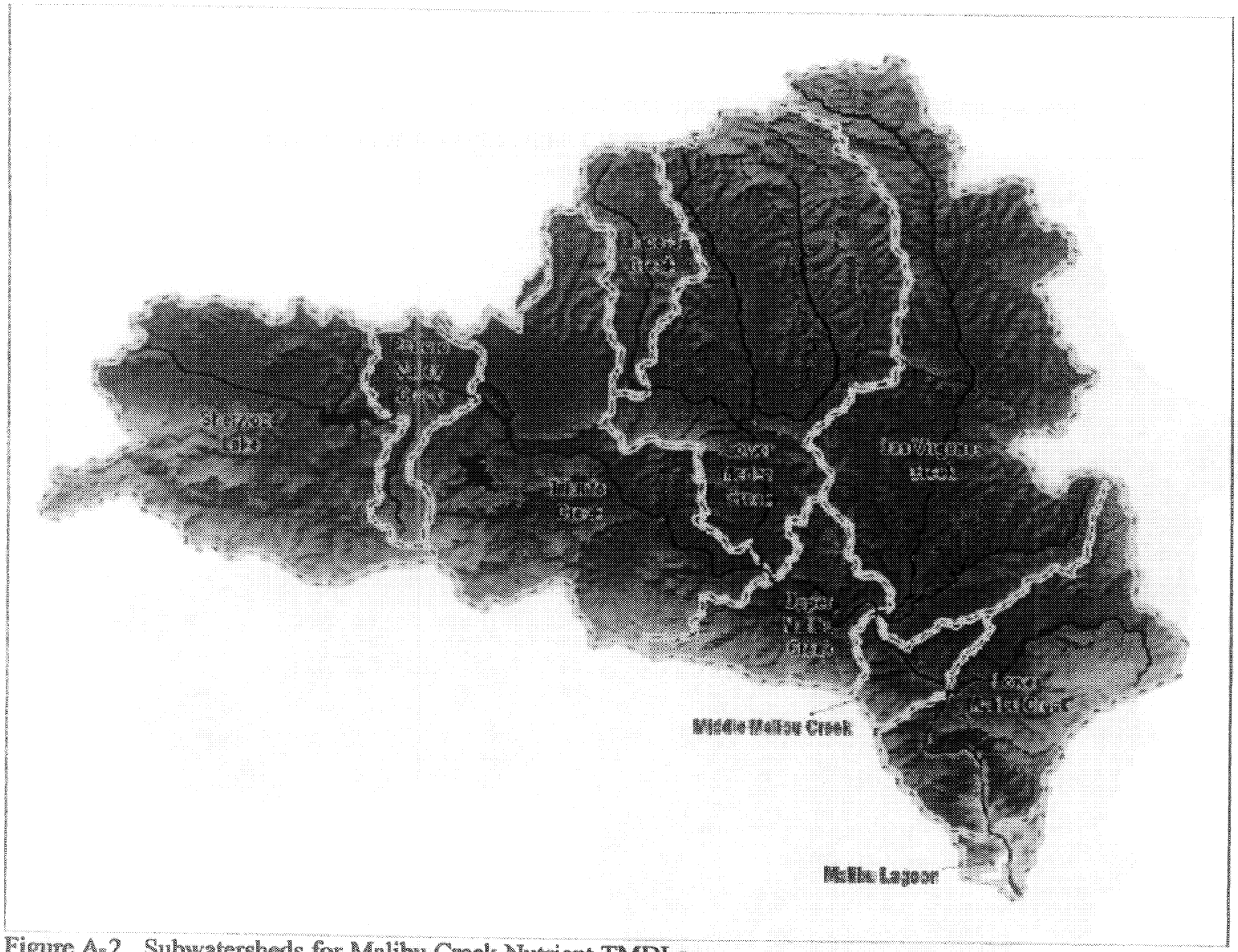



Figure A-2. Subwatersheds for Malibu Creek Nutrient TMDLs
(source: Tetra Tech report, 2002)

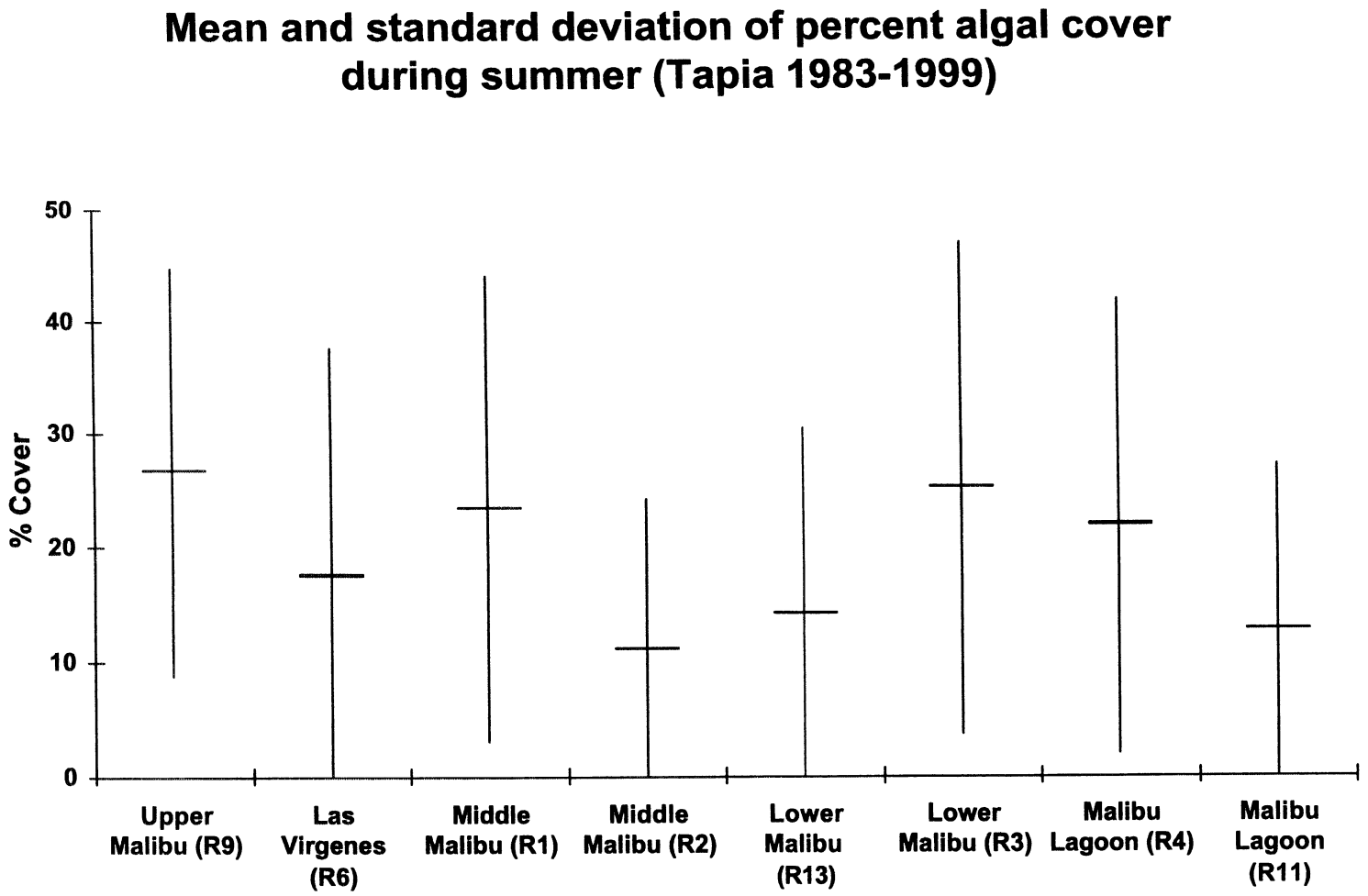



Figure A-3. Percent coverage of floating algae in Malibu Creek watershed and tributaries during the summer months. (source: Tapia, 1983 to 1999)

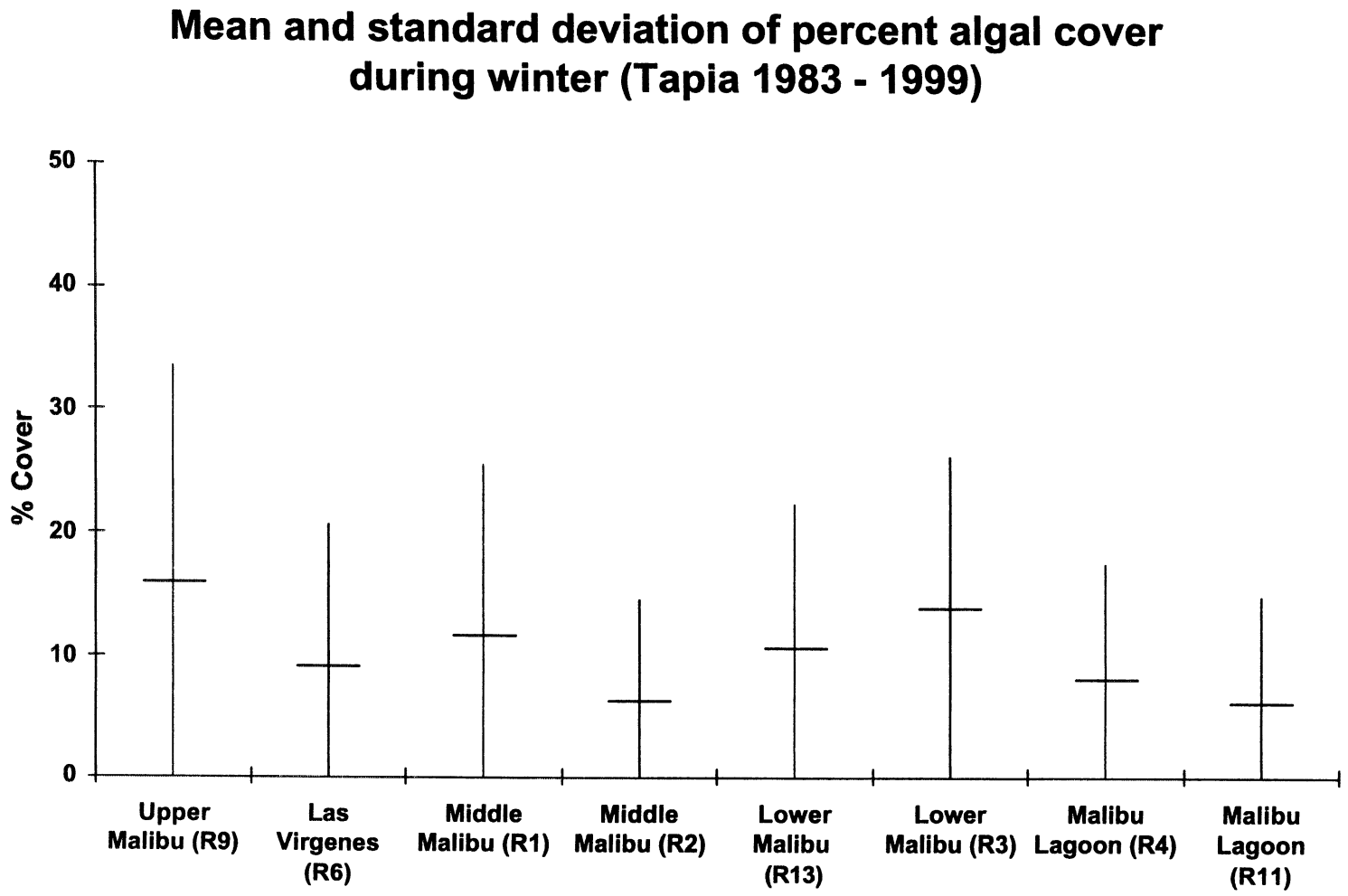



Figure A-4. Percent coverage of floating algae in Malibu Creek watershed and tributaries during the winter months. (source: Tapia, 1983 to 1999)

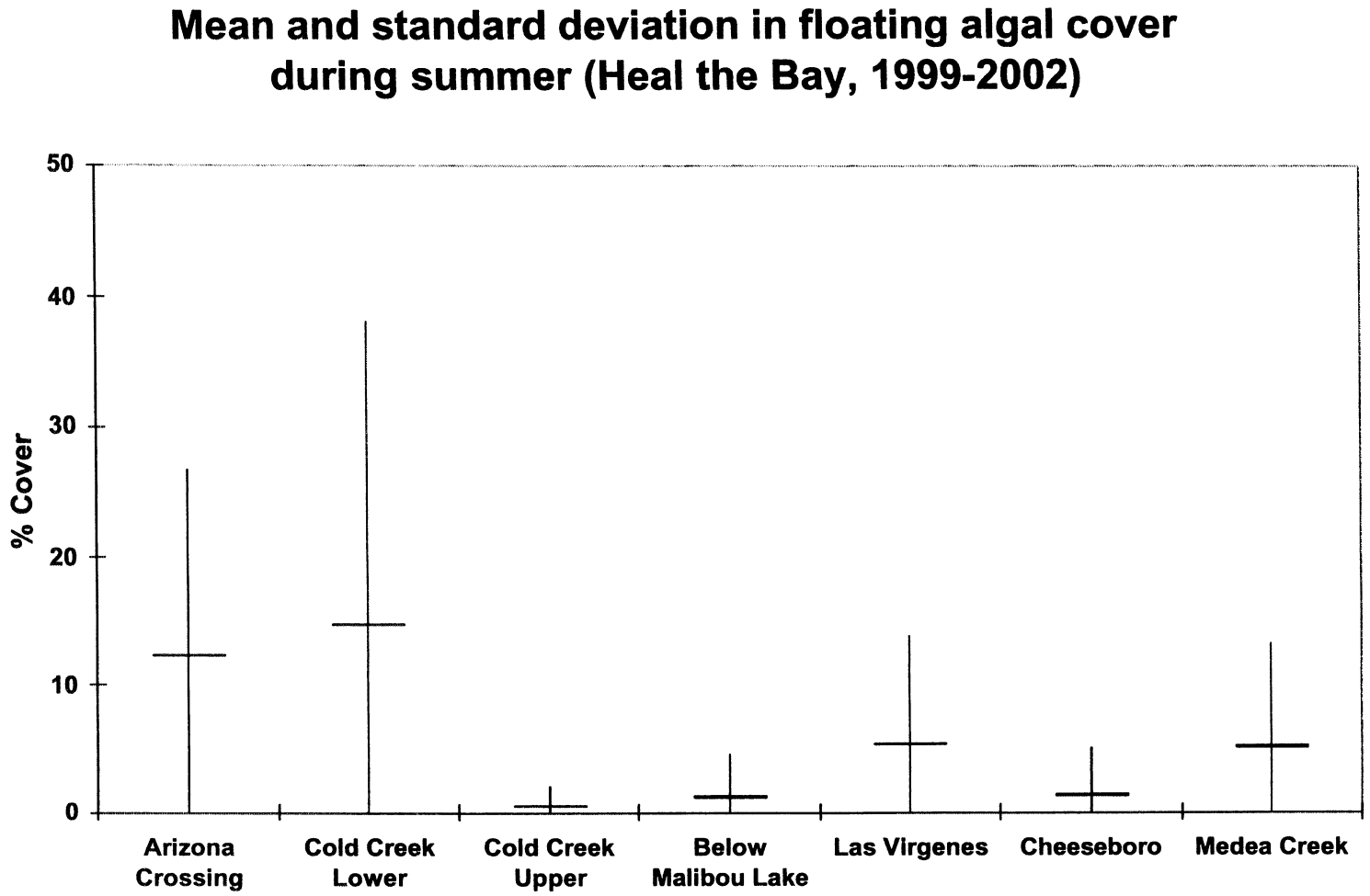



Figure A-5. Percent coverage of floating algae in Malibu Creek watershed and tributaries during the summer months. (source: Heal the Bay data, 1999 to 2002)

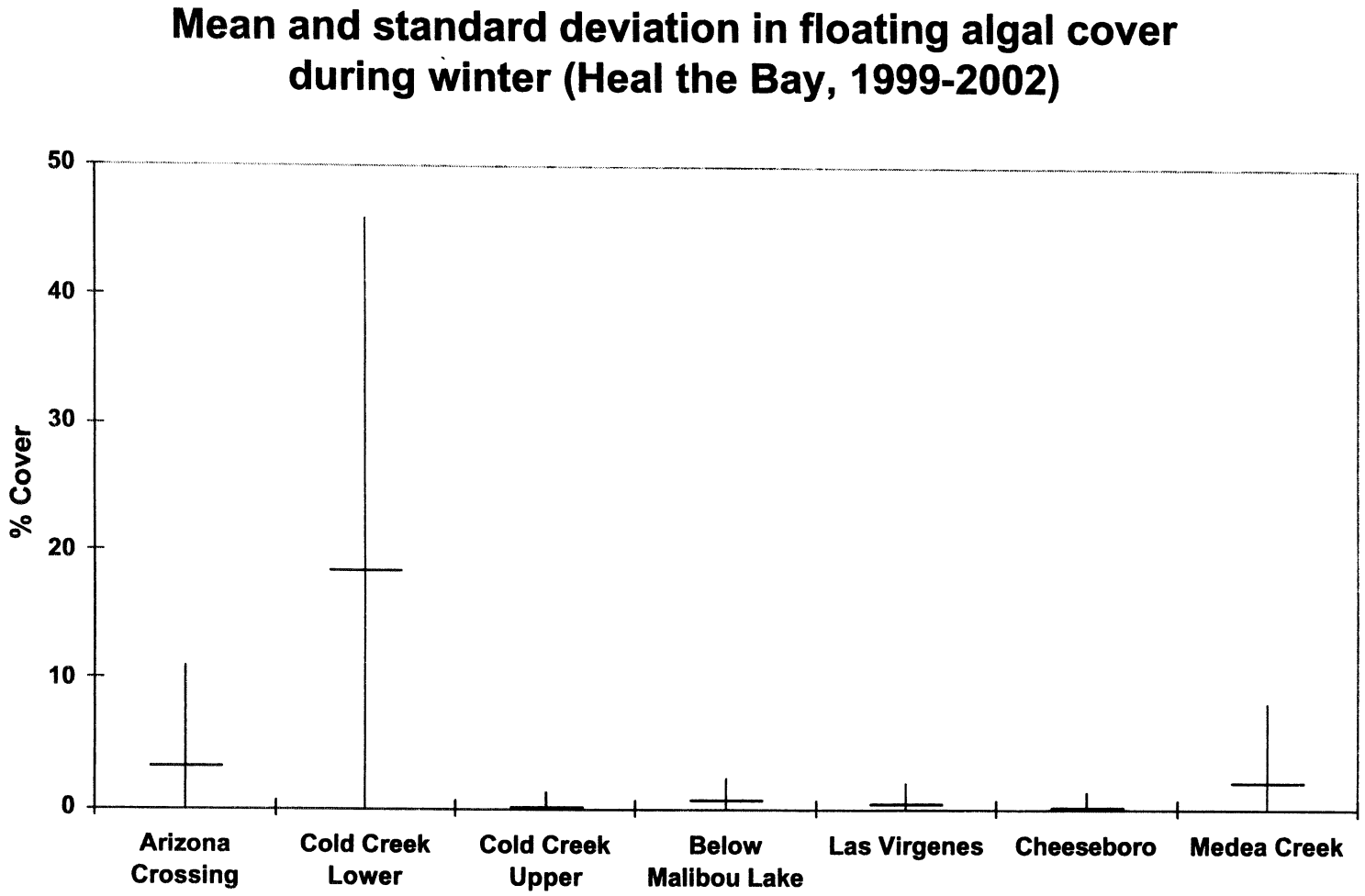



Figure A-6. Percent coverage of floating algae in Malibu Creek watershed and tributaries during winter months. (source: Heal the Bay data, 1999 to 2002)

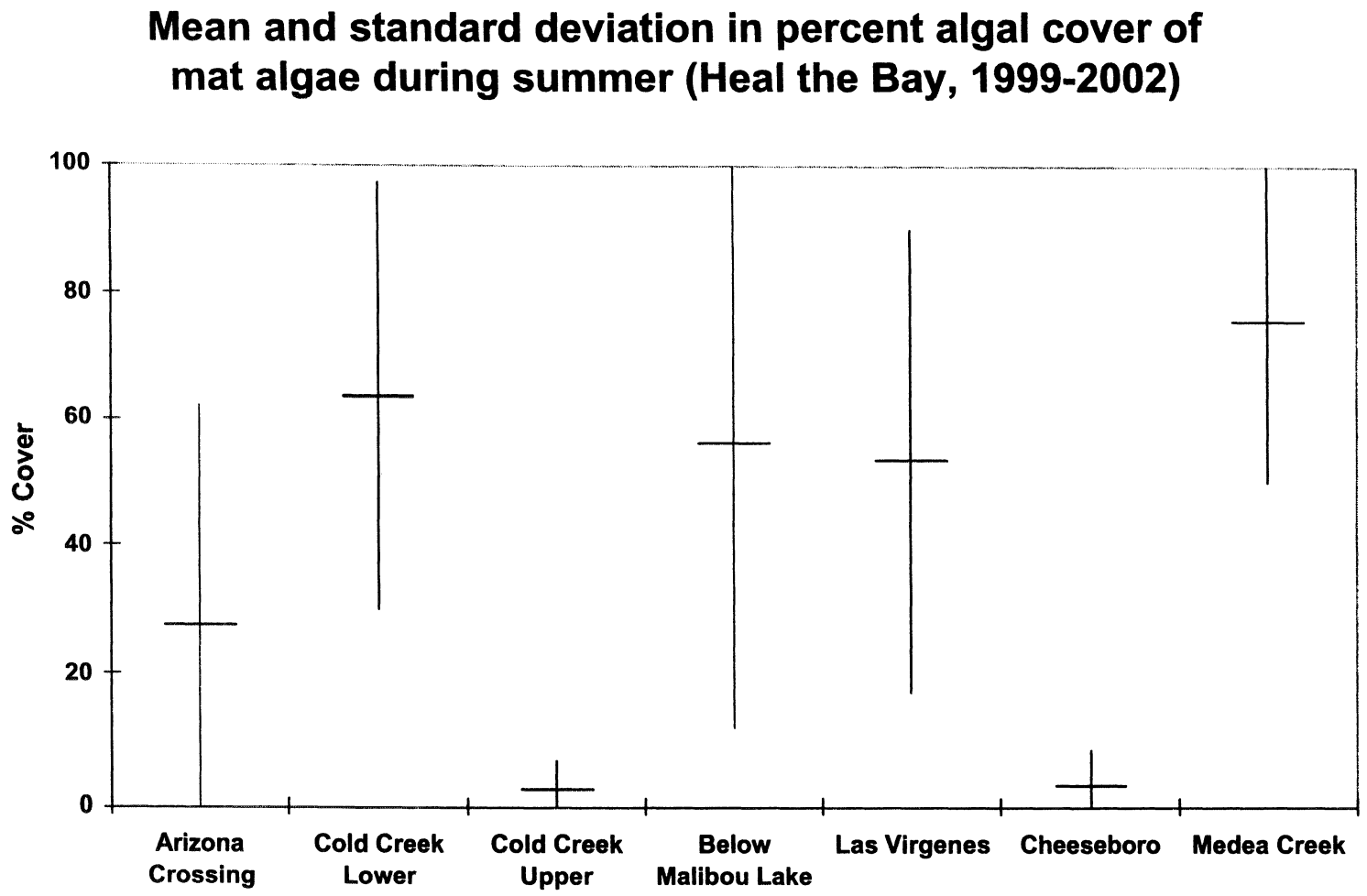



Figure A-7. Percent coverage of mat algae in Malibu Creek watershed and tributaries during summer months. (source: Heal the Bay data, 1998 to 2000)

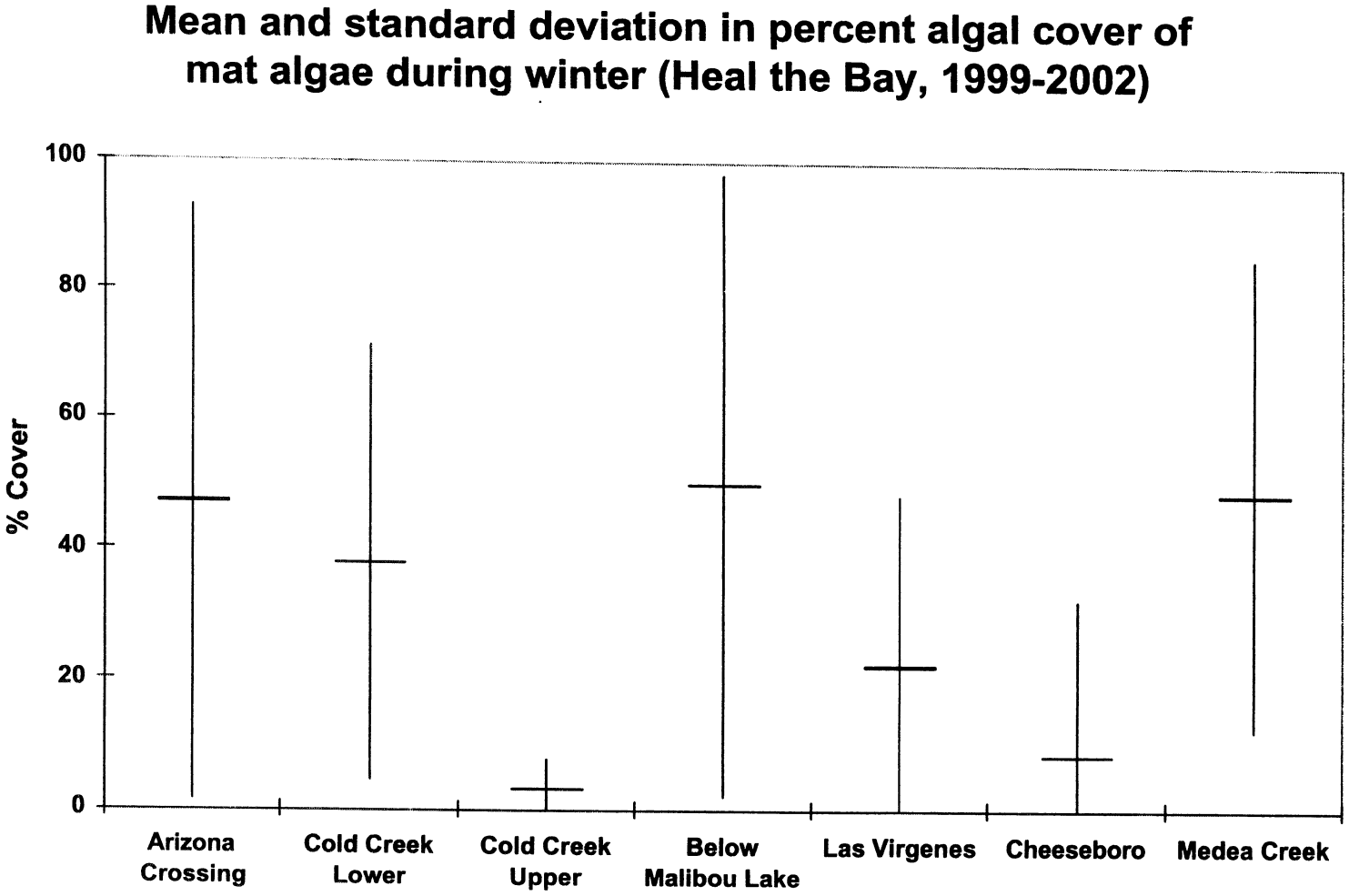



Figure A-8. Percent coverage of mat algae in Malibu Creek watershed and tributaries during winter. (source: Heal the Bay data, 1998 to 2000)

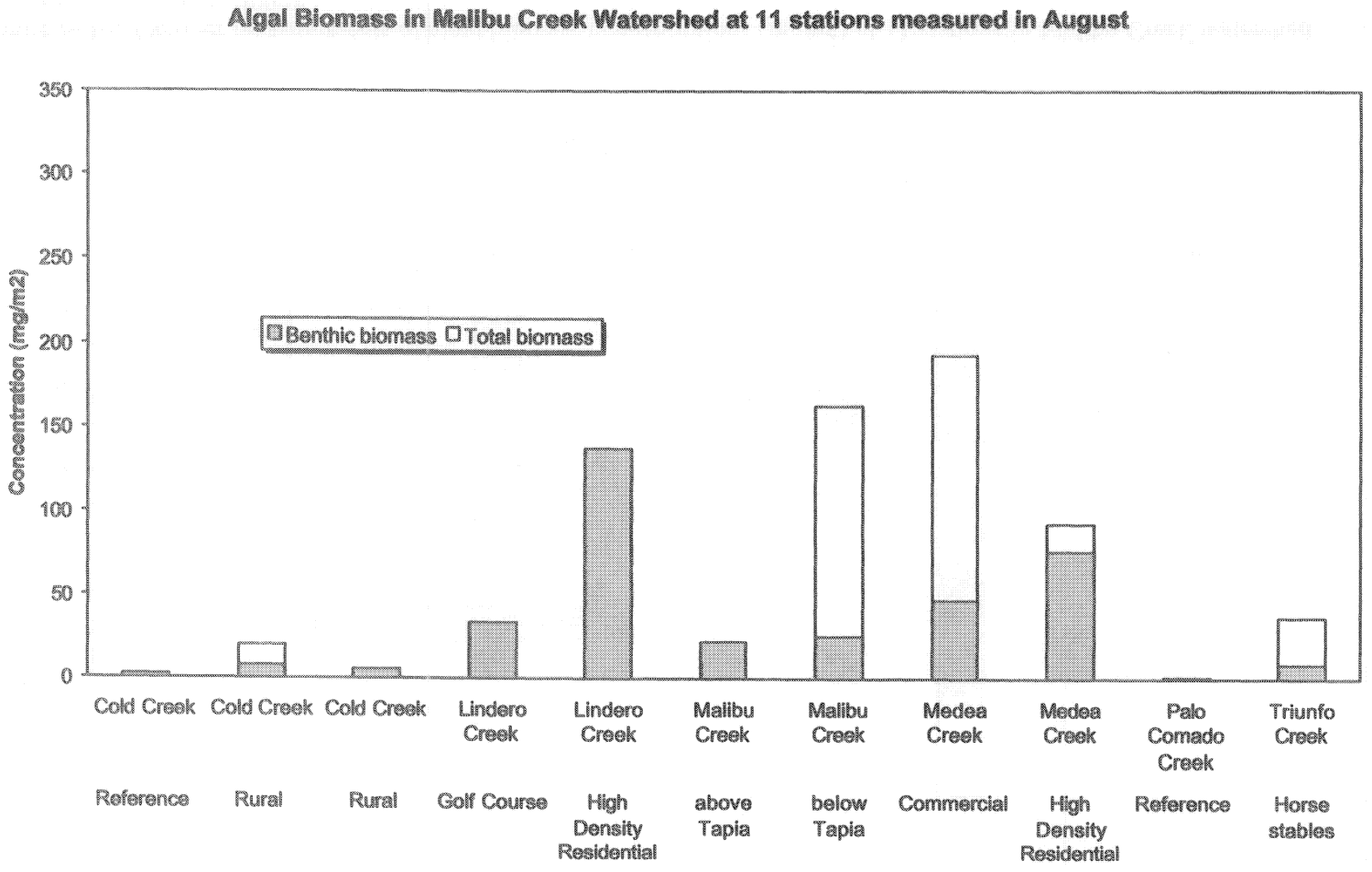



Figure A-9. August 2001 measurements of Algal biomass concentrations (mg/m$^2$) at 11 stations in Malibu Creek watershed. (Source: Kamer et al., 2002)

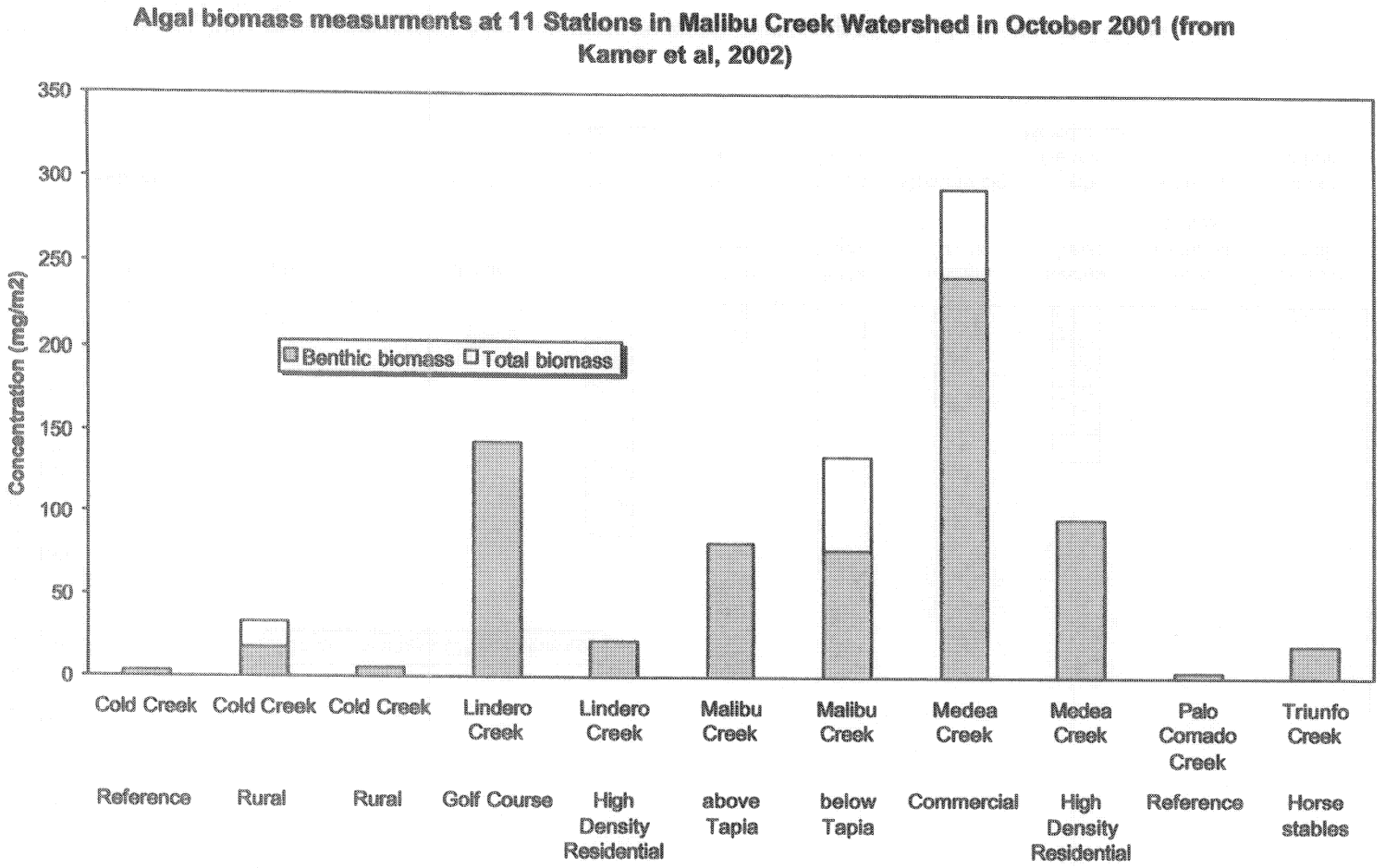



Figure A-10. October measurements of algal biomass concentrations ($mg/m^2$) at 11 stations in Malibu Creek watershed. (Source: Kamer et al., 2002)

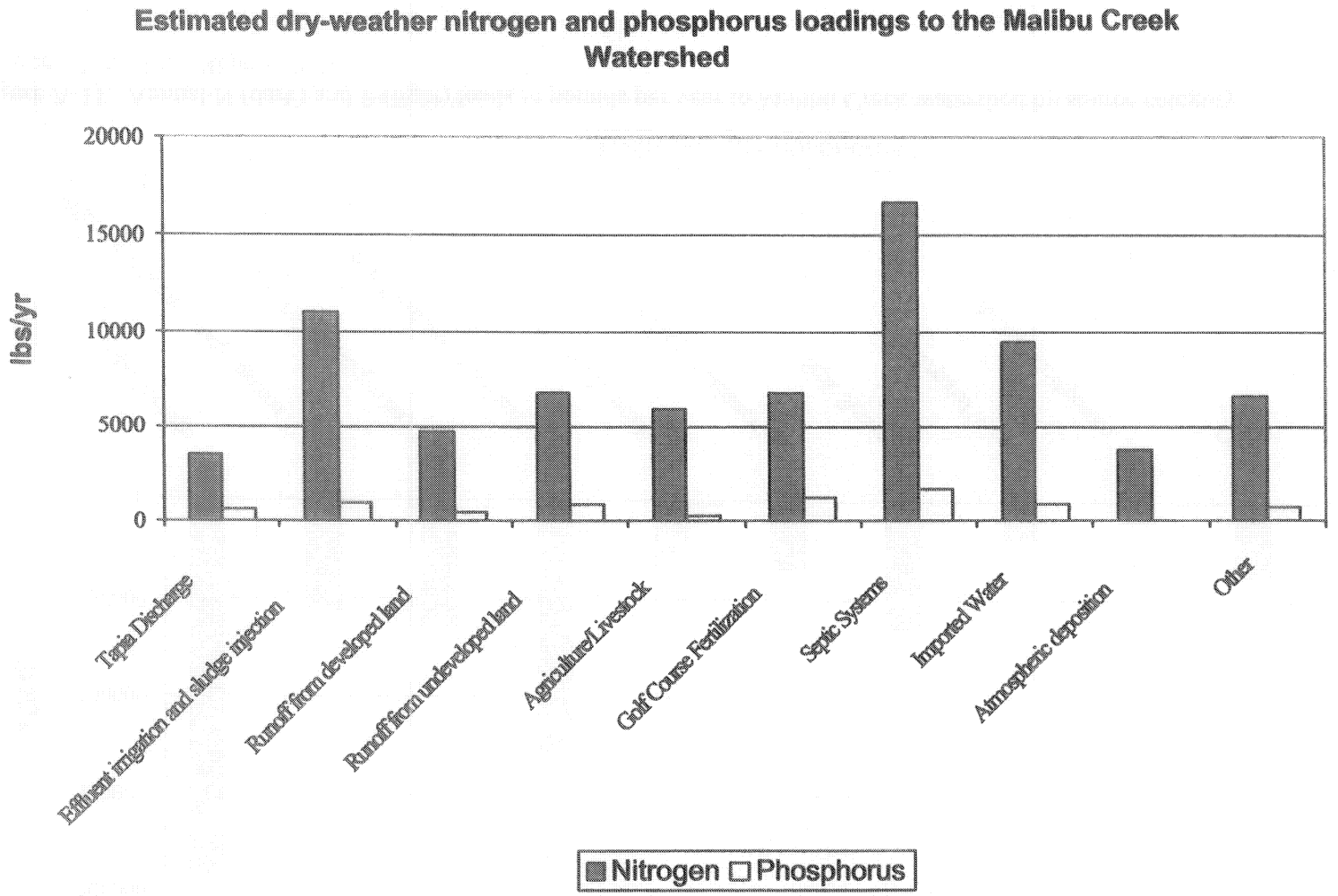



Figure A-12. Summer N (dark) and P (light) loads in pounds per year to Malibu Creek watershed by source category. (source: Tetra Tech Report, 2002)

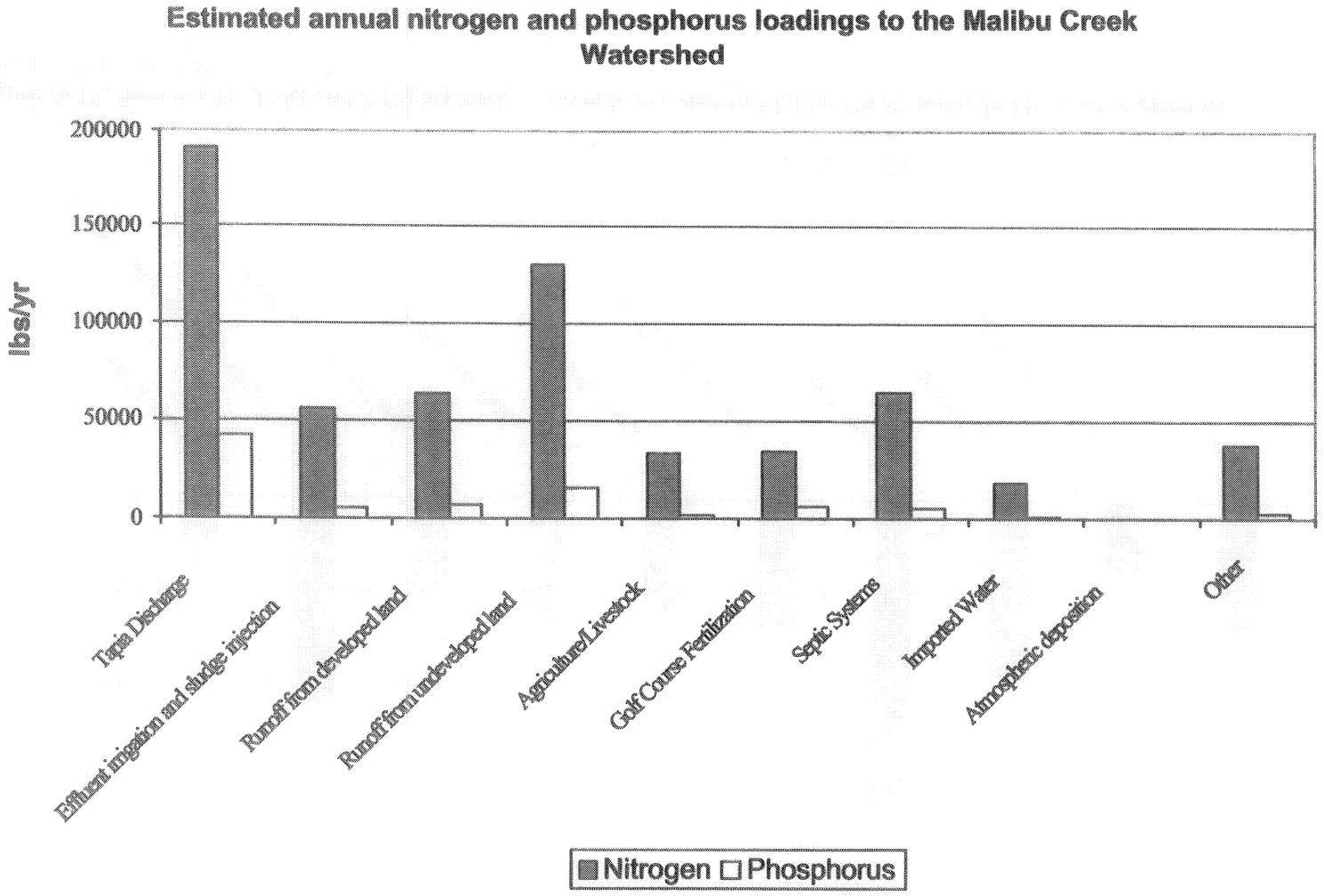



Figure A-11. Annual N (dark) and P (light) loads in pounds per year to Malibu Creek watershed by source category. (source: Tetra Tech Report, 2002)

## Table A-4. Distribution of Average Annual Total Phosphorus Loads by Watershed and Source 1993 – 1995

| | Commercial/Industrial | High/Medium Density Res. | Low Density Residential | Rural Residential | Agriculture/Livestock | Vacant | Chaparral/Sage | Grasslands | Woodlands | Golf Courses | Septic | Sludge | Effluent Irrigation | Tapia | Imported Water | Lagoon drains | Birds | Tidal Inflow | Atmospheric Deposition | Sediment Release | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hidden Valley | 0.0% | 0.0% | 0.1% | 0.1% | 1.7% | 0.2% | 2.4% | 0.1% | 0.1% | 3.4% | 0.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 9.1% |
| Potrero Canyon Creek | 0.0% | 0.5% | 0.0% | 0.0% | 0.0% | 0.2% | 0.5% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1.5% |
| Westlake | 0.9% | 1.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.5% | 0.2% | 0.0% | 2.3% | 0.1% | 0.0% | 0.0% | 0.0% | 0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 5.5% |
| Upper Lindero Creek | 0.1% | 0.5% | 0.0% | 0.0% | 0.0% | 0.1% | 0.2% | 0.1% | 0.0% | 1.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 2.3% |
| Lower Lindero Creek | 0.2% | 0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.9% |
| Upper Medea Creek | 0.2% | 1.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.4% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 2.2% |
| Palo Comado Creek | 0.2% | 0.0% | 0.2% | 0.0% | 0.1% | 0.0% | 0.4% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1.1% |
| Cheeseboro Creek | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.3% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.4% |
| Lower Medea Creek | 0.0% | 0.0% | 0.2% | 0.0% | 0.1% | 0.0% | 0.5% | 0.1% | 0.0% | 0.0% | 0.1% | 0.0% | 2.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 3.5% |
| Triunfo Creek | 0.0% | 0.1% | 0.2% | 0.2% | 0.2% | 0.0% | 2.0% | 0.0% | 0.1% | 0.0% | 1.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 3.9% |
| Upper Malibu Creek | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1.3% | 0.0% | 0.1% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1.6% |
| Upper Las Virgenes Creek | 0.1% | 0.2% | 0.0% | 0.0% | 0.0% | 0.1% | 0.9% | 0.3% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1.8% |
| Lower Las Virgenes Creek | 0.4% | 0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.9% | 0.3% | 0.0% | 0.0% | 0.1% | 0.7% | 1.5% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 4.5% |
| Stokes Creek | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 1.0% | 0.1% | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1.5% |
| Middle Malibu Creek | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.5% | 0.0% | 0.1% | 0.0% | 48.3% | 0.0% | 0.7% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 49.7% |
| Cold Creek | 0.0% | 0.0% | 0.3% | 0.3% | 0.1% | 0.0% | 2.0% | 0.0% | 0.0% | 0.0% | 0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 3.1% |
| Lower Malibu Creek | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.9% |
| Malibu Lagoon | 0.1% | 0.0% | 0.1% | 0.0% | 0.1% | 0.0% | 0.1% | 0.0% | 0.0% | 0.1% | 2.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.7% | 1.8% | 0.0% | 0.7% | 6.5% |
| Total | 2.3% | 4.0% | 1.3% | 0.7% | 2.5% | 0.7% | 14.8% | 1.5% | 0.7% | 7.0% | 53.9% | 0.7% | 4.9% | 0.1% | 1.5% | 0.0% | 0.7% | 1.8% | 0.1% | 0.7% | 100.0% |

(source: Tetra Tech report, 2002)

## Table A-3. Distribution of Average Annual Total Nitrogen Loads by Watershed and Source 1993 – 1995

| | Commercial/Industrial | High/Medium Density Res. | Low Density Residential | Rural Residential | Agriculture/Livestock | Vacant | Chaparral/Sage | Grasslands | Woodlands | Golf Courses | Septic | Sludge | Effluent Irrigation | Tapia | Imported Water | Lagoon drains | Birds | Tidal Inflow | Atmospheric Deposition | Sediment Release | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hidden Valley | 0.0% | 0.0% | 0.2% | 0.1% | 3.6% | 0.2% | 2.9% | 0.1% | 0.1% | 2.5% | 2.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.6% | 0.0% | 12.3% |
| Potrero Canyon Creek | 0.0% | 0.5% | 0.0% | 0.0% | 0.1% | 0.2% | 0.6% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1.9% |
| Westlake | 1.2% | 1.2% | 0.0% | 0.0% | 0.0% | 0.2% | 0.6% | 0.2% | 0.0% | 2.0% | 0.2% | 0.0% | 0.0% | 0.0% | 0.8% | 0.0% | 0.0% | 0.0% | 0.3% | 0.0% | 6.6% |
| Upper Lindero Creek | 0.1% | 0.6% | 0.0% | 0.0% | 0.0% | 0.1% | 0.2% | 0.1% | 0.0% | 0.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 2.4% |
| Lower Lindero Creek | 0.3% | 0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1.2% |
| Upper Medea Creek | 0.3% | 1.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.7% | 0.0% | 0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 3.1% |
| Palo Comado Creek | 0.3% | 0.0% | 0.2% | 0.0% | 0.2% | 0.0% | 0.5% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1.4% |
| Cheeseboro Creek | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.3% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.5% |
| Lower Medea Creek | 0.0% | 0.0% | 0.2% | 0.0% | 0.3% | 0.0% | 0.6% | 0.1% | 0.0% | 0.0% | 0.4% | 0.0% | 3.7% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 5.4% |
| Triunfo Creek | 0.0% | 0.1% | 0.2% | 0.3% | 0.3% | 0.0% | 2.4% | 0.0% | 0.1% | 0.0% | 2.8% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.2% | 0.0% | 6.5% |
| Upper Malibu Creek | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1.5% | 0.1% | 0.1% | 0.0% | 0.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 2.0% |
| Upper Las Virgenes Creek | 0.1% | 0.2% | 0.0% | 0.0% | 0.1% | 0.1% | 1.0% | 0.4% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 2.3% |
| Lower Las Virgenes Creek | 0.6% | 0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 1.1% | 0.4% | 0.0% | 0.0% | 0.2% | 1.0% | 2.5% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 6.4% |
| Stokes Creek | 0.1% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 1.2% | 0.1% | 0.0% | 0.0% | 0.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1.9% |
| Middle Malibu Creek | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 0.6% | 0.0% | 0.1% | 0.0% | 30.4% | 0.0% | 1.0% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 32.4% |
| Cold Creek | 0.0% | 0.0% | 0.3% | 0.3% | 0.2% | 0.0% | 2.3% | 0.0% | 0.0% | 0.0% | 1.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 4.3% |
| Lower Malibu Creek | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1.1% |
| Malibu Lagoon | 0.1% | 0.0% | 0.1% | 0.0% | 0.2% | 0.0% | 0.1% | 0.0% | 0.0% | 0.1% | 2.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.3% | 3.8% | 0.0% | 0.7% | 8.1% |
| Total | 3.2% | 4.7% | 1.4% | 0.9% | 5.3% | 0.9% | 17.5% | 1.7% | 0.8% | 5.4% | 40.4% | 1.0% | 7.8% | 0.2% | 2.9% | 0.0% | 0.3% | 3.8% | 1.2% | 0.7% | 100.0% |

(source: Tetra Tech report, 2002)

## Table A-1. Distribution of Summer Total Nitrogen Loads by Watershed and Source 1993 – 1995

| | Commercial/Industrial | High/Medium Density Res. | Low Density Residential | Rural Residential | Agriculture/Livestock | Vacant | Chaparral/Sage | Grasslands | Woodlands | Golf Courses | Septic | Sludge | Effluent Irrigation | Tapia | Imported Water | Lagoon drains | Birds | Tidal Inflow | Atmospheric Deposition | Sediment Release | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hidden Valley | 0.0% | 0.0% | 0.1% | 0.1% | 5.6% | 0.1% | 1.0% | 0.1% | 0.4% | 4.3% | 3.7% | | | | | | | | 3% | | 18% |
| Potrero Canyon Creek | 0.0% | 0.3% | 0.0% | 0.0% | 0.1% | 0.1% | 0.2% | 0.0% | 0.0% | | | | | | 2% | | | | | | 3% |
| Westlake | 1.1% | 0.7% | 0.0% | 0.1% | | | 0.2% | 0.1% | 0.0% | 3.5% | 0.4% | | | | 4% | | | | 1% | | 11% |
| Upper Lindero Creek | 0.1% | 0.4% | 0.0% | | | 0.0% | 0.1% | 0.0% | 0.0% | 1.5% | | | | | 1% | | | | 0% | | 4% |
| Lower Lindero Creek | 0.3% | 0.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | | | | | | 1% | | | | | | 1% |
| Upper Medea Creek | 0.2% | 0.7% | 0.0% | | 0.1% | 0.0% | 0.2% | 0.0% | 0.1% | | | | 1% | | 2% | | | | | | 4% |
| Palo Comado Creek | 0.2% | 0.0% | 0.1% | | 0.3% | | 0.2% | 0.0% | 0.1% | | | | | | 1% | | | | | | 2% |
| Cheeseboro Creek | 0.1% | | | | 0.0% | | 0.1% | 0.0% | 0.1% | | | | | | | | | | | | 0% |
| Lower Medea Creek | 0.0% | | 0.1% | 0.0% | 0.4% | 0.0% | 0.2% | 0.0% | 0.0% | | 0.7% | | 6% | | 0% | | | | | | 8% |
| Triunfo Creek | 0.0% | 0.0% | 0.1% | 0.1% | 0.5% | 0.0% | 0.8% | 0.0% | 0.3% | | 4.9% | | | | 0% | | | | 1% | | 8% |
| Upper Malibu Creek | | | 0.0% | 0.0% | | | 0.5% | 0.0% | 0.3% | | 0.6% | | | | | | | | | | 1% |
| Upper Las Virgenes Creek | 0.1% | 0.1% | 0.0% | | 0.2% | 0.0% | 0.5% | 0.2% | 0.3% | | | | | | 1% | | | | | | 2% |
| Lower Las Virgenes Creek | 0.5% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.4% | 0.2% | 0.1% | | 0.3% | 1.7% | 4% | | 1% | | | | | | 9% |
| Stokes Creek | 0.0% | | 0.0% | 0.0% | 0.2% | 0.0% | 0.4% | 0.0% | 0.1% | | 0.5% | | | | | | | | | | 1% |
| Middle Malibu Creek | 0.0% | | 0.0% | 0.0% | 0.1% | 0.2% | 0.0% | 0.2% | | | | | 2% | 0% | | | | | | | 3% |
| Cold Creek | 0.0% | | 0.1% | 0.1% | 0.4% | 0.0% | 0.7% | 0.0% | 0.1% | | 1.8% | | | | 0% | | | | | | 4% |
| Lower Malibu Creek | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.3% | 0.0% | 0.1% | | 0.0% | | | | | | | | | | 0% |
| Malibu Lagoon | 0.1% | 0.0% | 0.1% | | 0.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.2% | 10.1% | | | | | 0% | 1% | 5% | 0% | 3% | 20% |
| Total | 2.9% | 2.8% | 0.6% | 0.4% | 8.2% | 0.4% | 6.0% | 1.1% | 1.9% | 9.5% | 23.0% | 1.7% | 14% | 0% | 13% | 0% | 1% | 5% | 5% | 3% | 100% |

(source: Tetra Tech report, 2002)

## Table A-2. Distribution of Summer Total Phosphorus Loads by Watershed and Source 1993 – 1995

| | Commercial/Industrial | High/Medium Density Res. | Low Density Residential | Rural Residential | Agriculture/Livestock | Vacant | Chaparral/Sage | Grasslands | Woodlands | Golf Courses | Septic | Sludge | Effluent Irrigation | Tapia | Imported Water | Lagoon drains | Birds | Tidal Inflow | Atmospheric Deposition | Sediment Release | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hidden Valley | 0.0% | 0.0% | 0.1% | 0.1% | 3.0% | 0.1% | 1.3% | 0.1% | 0.5% | 8.2% | 2.0% | | | | | | | | 0.3% | | 15.7% |
| Potrero Canyon Creek | 0.0% | | 0.3% | 0.0% | 0.0% | 0.1% | 0.1% | 0.3% | 0.0% | | 0.4% | | | | 1.6% | | | | | | 2.8% |
| Westlake | 1.1% | 0.7% | 0.0% | | | 0.1% | 0.3% | 0.1% | 0.0% | 5.6% | 0.2% | | | | 3.3% | | | | 0.2% | | 11.6% |
| Upper Lindero Creek | 0.1% | 0.4% | 0.0% | | | 0.0% | 0.1% | 0.1% | 0.0% | 2.8% | | | | | 1.3% | | | | 0.0% | | 4.9% |
| Lower Lindero Creek | 0.3% | 0.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | | | | | | 0.6% | | | | | | 1.4% |
| Upper Medea Creek | 0.3% | 0.7% | 0.0% | | 0.0% | 0.0% | 0.2% | 0.0% | 0.1% | | | | 1.0% | | 1.7% | | | | | | 4.1% |
| Palo Comado Creek | 0.2% | 0.0% | 0.1% | | 0.2% | | 0.3% | 0.1% | 0.1% | | | | | | 0.5% | | | | | | 1.5% |
| Cheeseboro Creek | 0.1% | | | | 0.0% | | 0.2% | 0.1% | 0.1% | | | | | | | | | | | | 0.5% |
| Lower Medea Creek | 0.0% | | 0.1% | 0.0% | 0.2% | 0.0% | 0.3% | 0.0% | 0.0% | | 0.4% | | 5.8% | | 0.4% | | | | | | 7.2% |
| Triunfo Creek | 0.0% | 0.0% | 0.1% | 0.1% | 0.3% | 0.0% | 1.1% | 0.0% | 0.3% | | 2.7% | | | | 0.4% | | | | 0.1% | | 5.1% |
| Upper Malibu Creek | | | 0.0% | 0.0% | | | 0.6% | 0.0% | 0.3% | | 0.3% | | | | | | | | | | 1.3% |
| Upper Las Virgenes Creek | 0.1% | 0.2% | 0.0% | | 0.1% | 0.0% | 0.6% | 0.3% | 0.3% | | | | | | 0.8% | | | | | | 2.4% |
| Lower Las Virgenes Creek | 0.5% | 0.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.5% | 0.2% | 0.2% | | 0.2% | 1.7% | 3.6% | | 0.9% | | | | | | 8.2% |
| Stokes Creek | 0.1% | | 0.0% | 0.0% | 0.1% | 0.0% | 0.5% | 0.1% | 0.1% | | 0.3% | | | | | | | | | | 1.2% |
| Middle Malibu Creek | 0.0% | | 0.0% | 0.0% | 0.0% | 0.0% | 0.2% | 0.0% | 0.3% | | | | 1.6% | 0.2% | | | | | | | 2.4% |
| Cold Creek | 0.0% | | 0.1% | 0.1% | 0.2% | 0.0% | 0.9% | 0.0% | 0.1% | | 1.0% | | | | 0.4% | | | | | | 2.8% |
| Lower Malibu Creek | 0.0% | | 0.0% | 0.0% | 0.0% | | 0.4% | 0.0% | 0.1% | | 0.0% | | | | | | | | | | 0.6% |
| Malibu Lagoon | 0.1% | 0.0% | 0.1% | | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.3% | 15.8% | | | | | 0.0% | 2.0% | 3.5% | 0.0% | 4.4% | 26.5% |
| Total | 2.9% | 2.6% | 1.0% | 0.4% | 4.3% | 0.4% | 7.9% | 1.3% | 2.8% | 16.9% | 23.2% | 1.7% | 12.0% | 0.2% | 11.9% | 0.0% | 2.0% | 3.5% | 0.6% | 4.4% | 100.0% |

(source: Tetra Tech report, 2002)

# APPENDIX G-2

**California Regional Water Quality Control Board, Los Angeles, Total Maximum Daily Loads for Bacteria, Malibu Creek Watershed, January 29, 2004**

# Total Maximum Daily Loads for Bacteria
# Malibu Creek Watershed

**California Regional Water Quality Control Board**
**Los Angeles**

**January 29, 2004**

## ES. EXECUTIVE SUMMARY

This TMDL[1] addresses bacteria water quality impairments in the Malibu Creek Watershed. The TMDL is consistent with the Santa Monica Bay Beaches Bacteria TMDL, which was approved by the United States Environmental Protection Agency (EPA) in June 2003. The Santa Monica Bay Beaches TMDL expressed the Waste Load Allocation for bacteria at Santa Moncia Bay Beaches in terms of the number of days that the single sample bacteria water quality objectives in the Basin Plan may be exceeded.The Santa Monica Bay Beaches TMDL applies to Surfrider Beach, which is located at the mouth of the Malibu Creek Watershed. In terms of the number of days that the single sample bacteria limits are exceeded, Surfrider ranks among the most impaired beaches in the Bay. This TMDL addresses the bacteria sources from Malibu Creek and Lagoon, but does not address other coastal sources that may impact the impairment at Surfrider Beach.

The Malibu Creek Watershed Bacteria TMDL was developed using available monitoring data and surface water quality models. The data available for the Creek and Lagoon were not as robust as the data for the Santa Monica Bay Beaches. The county and city health departments monitor the beaches on weekly, or in some cases, daily basis. However, Malibu Creek and Lagoon are monitored only monthly by volunteer monitoring groups and the Las Virgenes Municipal Water District during dry weather. The Los Angeles County Department of Public Works monitors stormwater bacteria counts during wet weather. Due to the lack of monitoring data, this TMDL relied heavily on modeled output data. The models were calibrated against actual in-stream monitoring data, but data were not sufficient to validate the models. In other words, the multiple variables in the models were adjusted to reasonably match historical creek water quality data, however data were not sufficient to confirm that the models would be able to predict the bacteria concentrations in the creek if one or more of the assumed inputs of bacteria are changed. Although, available monitoring data for the Malibu Lagoon were sparse, the model predicted a substantially higher number of exceedances in the Lagoon than for Malibu Creek or it tributaries during dry weather.

The responsible jurisdictions and responsible agencies, primarily the incorporated cities, Los Angeles County and Ventura County, are responsible for meeting the final pollutant allocations. Consistent with the Santa Monica Bay Beaches TMDLs, Waste Load Allocations and Load Allocations are expressed in terms of allowable days of exceedance of the single sample bacteria limits and no exceedance of the 30-day geometric mean limits. In addition, this TMDL provides an estimated reduction in bacteria loading necessary to meet the allocations. Based upon the model output, stormwater from commercial/industrial and high density development generate the highest annual bacteria loading. However, these loads are a result of episodic storm events. Bacteria loads from on-site wastewater treatment systems, especially in the Malibu Civic Center area, are believe to contribute bacteria loading year round and may have a greater impact on impairments during dry weather. Another significant finding is that based on the model output, loading reductions designed to meet the allowable days of exceedance of the single sample limits were not sufficient to meet the 30-day geometric mean. In addition, the model indicates that it may not be possible to achieve the 30-day geometric mean in the Lagoon due to fecal contamination from birds.

This TMDL, provides an implementation schedule allowing the responsible jurisdictions and responsible agencies time to gather additional monitoring data to validate the model and to better quantify the loading from birds in the Lagoon. The Regional Board may reconsider the TMDL in three years from the effective date to consider the impact of birds in the Lagoon and to refine the days of allowable exceedance based on additional studies. At that time, the Regional Board may revise the TMDL to allow for a Natural Source Exclusion, as provided for in the Basin Plan. The Natural Source Exclusion can only be applied after all anthropogenic sources of bacteria have been controlled. The schedule would allow six years from the effective date to meet both summer and winter dry-weather Waste Load and Load allocations. This is a longer schedule than generally provided for in the Santa Monica Bay TMDL for summer dry weather. However, it is warranted due to the disperse nature of the sources and the foreseeable implementation measures. In Santa Monica Bay, the City of Los Angeles and the County of Los Angeles already had

[1] A Total Maximum Daily Load (TMDL) is the sum of pollutant loadings from point sources (Waste Load Allocation) and nonpoint sources (Load Allocation), and natural background that can be assimilated by a water body, without exceeding water quality standards.

started construction of the implementation measure, which is dry-weather diversion of major storm drains. Therefore a three year schedule for summer dry weather was feasible. In Malibu, the likely primary implementation for dry weather compliance will be to evaluate and upgrade individual on-site wastewater treatment systems if necessary, or the construction of a centralized wastewater treatment plant in the Civic Center area of the City of Malibu. In addition, strategies for dealing with on-site wastewater treatment systems will be impacted by the upcoming Malibu Creek nutrient TMDL, scheduled for release in 2004. While properly sited and maintained systems are an effective method for treating bacteria, advanced treatment may be required to reduce total nitrogen. Therefore, the responsible jurisdictions and responsible agencies may wish to consider the implications of the nutrient TMDL before finalizing plans to address on-site systems.

It is anticipated that wet-weather allocations will be met primarily through on-site stormwater collection and treatment devices rather than widespread reliance on diversion of major storm drains. This is due to the rural nature of the watershed, which is not served by a major stormwater network. In addition, the diversion of natural creeks and drainages could have adverse impact on aquatic life and wildlife, and should be avoided. This TMDL allows 10 years for compliance with the wet-weather allocations.

**TABLE OF CONTENTS**


ES. EXECUTIVE SUMMARY ..... ii

LIST OF FIGURES ..... v

1. INTRODUCTION ..... 1

*1.1 Regulatory Background.* ..... *1*

2. PROBLEM IDENTIFICATION ..... 3

*3.1 Applicable Water Quality Standards* ..... *5*

*3.2 Numeric target* ..... *8*

*3.3 Assessment of existing conditions relative to bacteria standards and numeric targets* ..... *8*

*3.4 Fecal to E. Coli Coliform Relationship* ..... *13*

4. SOURCE ASSESSMENT ..... 15

*4.1 Summary of source assessment.* ..... *23*

5. LINKAGE ANALYSIS ..... 23

*5.1 Model description* ..... *24*

*5.2 Critical Conditions and Seasonality* ..... *25*

*5.3 Application of the model to link loadings to water quality* ..... *25*

6. POLLUTANT ALLOCATIONS AND TMDLs ..... 30

*6.1 Estimated Load Reductions for Point Sources* ..... *31*

*6.2 Overview of Estimated Load Reductions for Nonpoint Sources* ..... *32*

*6.3 Margin of Safety* ..... *32*

*6.4 Summary of pollutant reductions* ..... *33*

7. IMPLEMENTATION PLAN ..... 33

*7.1 Responsible Jurisdictions, Agencies and Entities* ..... *33*

*7.2 Implementing Strategies for Achieving Allocations* ..... *34*

*7.3 Implementation Cost Estimates* ..... *40*

*7.4 Implementation Schedule* ..... *41*

8. AMBIENT BACTERIA WATER QUALITY AND COMPLIANCE MONITORING PLAN ..... 45

*8.1 Malibu Creek Watershed Monitoring Plan* ..... *45*

9. REFERENCES ..... 47

## LIST OF FIGURES

Figure 1 - Malibu Creek Watershed Impaired Creeks 1
Figure 2 - City of Calabasas Las Virgenes Creek Monitoring Stations 10
Figure 3- LVMWD and LACDPW Malibu Creek and Lagoon Monitoring Stations 11
Figure 4 - Malibu Creek Watershed Compliance Points and Tapia Discharge Points 16
Figure 6 - Jurisdictions within the Malibu Creek Watershed 34
Figure 7 - Commercial Onsite Wastewater Treatment System in Malibu Lagoon subwatershed 37

## LIST OF TABLES

Table 1 - Water bodies within the Malibu Creek Watershed that are listed as impaired ..... 5
Table 2 - Malibu Creek Watershed Beneficial Uses - Not Supported ..... 5
Table 3 - Summary of bacteria standard revisions ..... 6
Table 4 - Sources of updated water quality monitoring data ..... 9
Table 5 - Summary of fecal coliform data (counts/100 ml) used in the 1998 listing process ..... 9
Table 6 - Las Virgenes Creek Comparison with Dry-Weather Target ..... 11
Table 7 - Malibu Creek Comparison with Dry-Weather Numeric Target ..... 12
Table 8 - Malibu Lagoon (R4) Data Comparison with Dry Weather Target ..... 13
Table 9 - Malibu Lagoon (R-11) Data Comparison with Dry-Weather Numeric Target ..... 13
Table 10 - Fecal Coliform Relationship ..... 14
Table 11 - Annual gross fecal loadings (billion counts/year) in Tapia effluent ..... 16
Table 12 - Annual gross fecal loads (billion counts/year) associated with effluent irrigation ..... 17
Table 13 - Annual gross fecal coliform loadings associated with sludge Injection Loads ..... 17
Table 14 - Estimated gross and net annual fecal coliform loads generated from onsite wastewater treatment systems ..... 18
Table 15 - Gross annual fecal loads associated with horse manure ..... 21
Table 16 - Gross annual fecal coliform loads associated with livestock manure ..... 21
Table 17 - Estimated gross annual bacterial loads (billion counts) produced by waterfowl near Malibu ..... 22
Table 18 - Summary of Calibrated Source Loading ..... 24
Table 19 - Compliance Points and Major Load Contributions ..... 25
Table 20 - Subwatershed Estimated Source Reductions to Meet TMDL Allocation ..... 29
Table 21 - Estimated Watershed Anthropogenic Source Allocation ..... 30
Table 22 - Waste Load and Load Allocations for the Malibu Creek Watershed Bacteria TMDL ..... 30
Table 23 - Example Watershed Reduction Strategy by Source Category ..... 31
Table 24 - Cost of Recently Permitted Systems ..... 40
Table 25 - Summary of Implementation Schedule ..... 42

## LIST OF APPENDICES

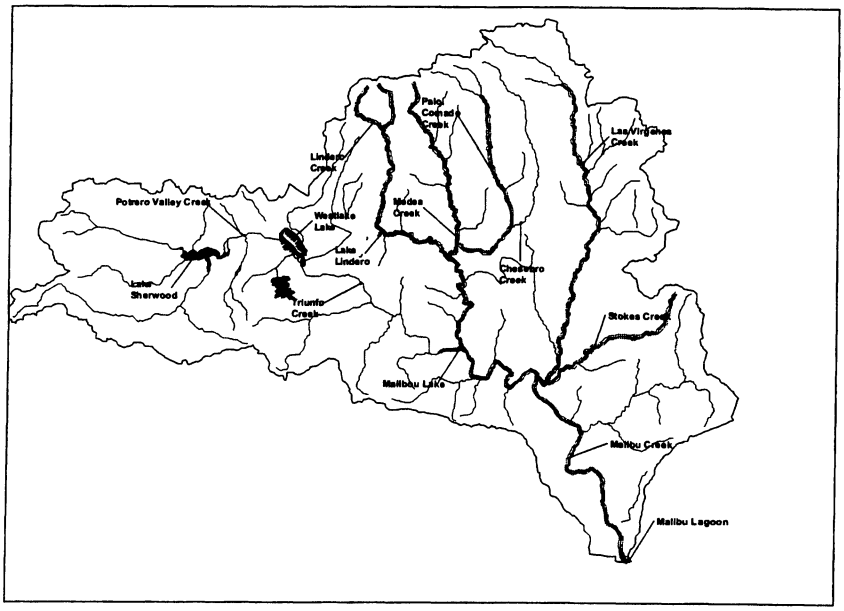
**Appendix 1- Baseline Single Sample Model Output ..... 49**
**Appendix 2 - Baseline 30-Day Running Geometric Mean Model Output ..... 54**
**Appendix 3 - Allocations and Predicted Single Ssmple Compliance ..... 59**
**Appendix 4 - Allocations and Predicted 30-Day Running Geometric Mean Compliance ..... 68**
**Appendix 5 - Allocation Loads by Subwatershed ..... 77**
**Appendix 6 - Modular Treatment Systems Cost ..... 86**
**Appendix 7 - Heal the Bay's Water Quality Monitoring Data ..... 88**

## 1. INTRODUCTION

This document describes the Total Maximum Daily Load (TMDLs) for bacteria indicators for the Malibu Creek Watershed, which includes Malibu Lagoon, Malibu Creek and its tributaries. The target bacteria indicators addressed in this TMDL are fecal coliform, total coliform, E. coli, and enterococcus. Malibu Creek, five of its tributaries (Stokes Creek, Las Virgenes Creek, Palo Comado Creek, Medea Creek, and Lindero Creek) exceed the water quality objectives (WQOs) for bacterial indicators (RWQCB, 1996 and 1998).

This TMDL complies with 40 CFR 130.2 and 130.7, Section 303(d) of the Clean Water Act and U.S. Environmental Protection Agency (EPA) guidance for developing TMDLs in California (U.S. EPA, 2000). This document summarizes the information used by the EPA and the California Regional Water Quality Control Board, Los Angeles Region (Regional Board) to develop waste load and load allocations for bacterial indicators. The TMDL also includes an Implementation Plan and cost estimates for complying with the TMDL. The water bodies in this TMDL are highlighted in Figure 1 and described in Table 1.

**Figure 1 - Malibu Creek Watershed Impaired Creeks**




### 1.1 Regulatory Background.

Section 303(d) of the Clean Water Act (CWA) requires that each State "shall identify those waters within its boundaries for which the effluent limitations are not stringent enough to implement any water quality objective applicable to such waters." The CWA also requires states to establish a priority ranking for waters on the 303(d) list of impaired waters and establish TMDLs for such waters. For the purpose of this document, 303(d) listed water bodies and impaired water bodies are synonymous.

The elements of a TMDL are described in 40 CFR 130.2 and 130.7 and Section 303(d) of the CWA, as well as in the U.S. Environmental Protection Agency guidance (U.S. EPA, 2000). A TMDL is defined as the "sum of the individual waste load allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background" (40 CFR 130.2) such that the capacity of the water body to assimilate pollutant loading (the Loading Capacity) is not exceeded. A TMDL is also required to account for seasonal variations and include a margin of safety to address uncertainty in the analysis (USEPA, 2000).

The Environmental Protection Agency has oversight authority for the 303(d) program and is required to review and either approve or disapprove the TMDLs submitted by states. In California, the State Water Resources Control Board (State Board) and the nine Regional Boards are responsible for preparing lists of impaired water bodies under the 303(d) program and for preparing TMDLs, both subject to EPA approval. If EPA does not approve a TMDL submitted by a state, it is required to establish a TMDL for that water body. The Regional Boards hold regulatory authority for many of the instruments used to implement the TMDLs, such as the National Pollutant Discharge Elimination System (NPDES) and state-specified Waste Discharge Requirements (WDRs).

The Regional Board identified over 700 water body-pollutant combinations in the Los Angeles Region where TMDLs would be required (LARWCQB, 1996, 1998). These are referred to as "listed" or "303(d) listed" water bodies . A schedule for development of TMDLs in the Los Angeles Region was established in a consent decree (Heal the Bay Inc., et al. v. Browner C 98-4825 SBA) approved on March 22, 1999. For the purpose of scheduling TMDL development, the consent decree combined the more than 700 water body-pollutant combinations into 92 TMDL analytical units.

This TMDL addresses Analytical Unit 47 of the consent decree which consists of Malibu Lagoon, segments of the Malibu Creek and tributaries. These listings were included on the 1996 and 1998 303(d) lists and were retained on the 2002 303(d) list. The listed water bodies are identified in Table 1. Malibu Beach and Surfrider Beach are covered under the Santa Monica Bay Beaches (Analytical unit #48). The consent decree schedule requires that this TMDL and the Malibu Creek nutrient TMDL be completed by March 22, 2003. EPA established bacteria and nutrient TMDLs in fulfillment of the consent decree requirement in March 2003.

This TMDL represents an independent analysis of the EPA TMDL and includes an implementation schedule for meeting the allocations. If adopted by the Regional Board and the State Board, and subject to EPA's approval, this TMDL will supercede the EPA TMDL. Regional Board staff are scheduled to release a revised nutrient TMDLs in late 2004, based on additional studies.

Both this TMDL and EPA's TMDL are consistent with the Santa Monica Bay Beaches Bacteria TMDLs, which were adopted by the Regional Board in 2002, and approved by EPA in June 2003. The Santa Monica Bay Beaches Bacteria TMDLs were developed by Regional Board staff in cooperation with a Technical Advisory Committee (TAC), composed of key stakeholders. This was a precedent-setting TMDL which grappled with two difficult aspects of bacteria exceedances:

- The difficulty of controlling high bacteria counts during wet weather and
- The need to balance the needs of human recreational use and wildlife, which can be a significant source of bacteria loading.

The TAC recognized that even relatively undeveloped watersheds exceed bacteria standards on occasion due to natural sources such as birds and other wildlife. The Water Quality Control Plan for the Los Angeles Region (the Basin Plan) contains bacteria limits for single samples and the 30-day geometric mean values. The Santa Monica Bay Beaches Bacteria TMDL limits the number of allowable days that the single sample bacteria standards may be exceeded, but requires compliance with the 30-day geometric mean at all times. The number of days that the single sample limits may be exceeded were based on the historical days of exceedance at Leo Carillo Beach, the beach at the base of the Arroyo Sequit reference watershed.

### 1.2 TMDL Elements

Guidance from USEPA (2000) identifies seven elements of a TMDL. These elements of the Malibu Creek Bacteria TMDL are described in Sections 2 through 8 of this document. The elements are:

1. Problem Identification. This section reviews the evidence used to add the water body to the 303(d) list, and summarizes existing conditions using that evidence along with any new information acquired since the listing. The problem identification reviews those reaches that fail to support all designated beneficial uses; the beneficial uses that are not supported for each reach; the water quality objectives (WQOs) designed to protect those beneficial uses; and the data and information regarding the decision to list each reach, such as the number and severity of exceedences observed.

2. Numeric Targets. For this TMDL, the numeric targets are based on the numeric water quality objectives for coliform bacteria that apply to the watershed and the allowable number of exceedance days established in the Santa Monica Bay Beaches TMDL.

3. Source Assessment. This is a quantitative estimate of point sources and nonpoint sources of bacteria into the Malibu Creek Watershed. The source assessment considers factors such as seasonality and flow which may influence the relative magnitude of contributions from various sources.

4. Linkage Analysis. This analysis demonstrates how the sources of coliform bacteria in the water body are linked to the observed conditions in the impaired water body. The linkage analysis includes an assessment of critical conditions, which are periods when the changing pollutant sources and changing assimilative capacity of the water body combine to produce either critical conditions or conditions especially resistant to improvement.

5. Pollutant Allocation and TMDL. The allocations are expressed in terms of allowable days of exceedance of the single sample limit and the rolling 30-day geometric limits. However, for informational purposes, the TMDL estimates the loading that will achieve the allocations. Allocations are designed such that the water body will meet the applicable numeric targets in all reaches. Point sources are given waste load allocations and nonpoint sources are given load allocations. Allocations need to consider the worst-case conditions that are expected to re-occur with some recognized return frequency (e.g., $90^{th}$ percentile event), so that the pollutant loads may be expected to remove the impairment under critical conditions.

6. Implementation Recommendations. This section describes the plans, regulatory tools, or other mechanisms by which the waste load allocations and load allocations may be achieved and recommends several implementation options

7. Monitoring Recommendations. This TMDL provides for the monitoring plan that will be used to determine compliance with the TMDL and to provide additional assessment of the current impairment.

## 2. PROBLEM IDENTIFICATION

In this section, we identify the 303(d) listed impairments and describe the environmental setting of the Malibu Creek Watershed. Table 1 includes a listing of the impaired segments of the Creek system and the area or stream miles affected.

The Malibu Creek Watershed is located about 35 miles west of Los Angeles. The 109-square mile watershed extends from the Santa Monica Mountains and adjacent Simi Hills to the Pacific Coast at Santa Monica Bay. Several creeks and lakes are located in the upper portions of the watershed, and these

ultimately drain into Malibu Creek at the downstream end of the watershed. Historically, there is little flow in the summer months; much of the natural flow that does occur in the summer in the upper tributaries comes from springs and seepage areas. During rain storms the runoff from the watershed may increase flows in the creeks dramatically. The natural hydrology of the watershed has been modified by the creation of several dams and man-made lakes, the importation of water to the system for human use which provides most of the base flow to the system, and the presence of the Tapia Wastewater Reclamation Facility (WRF), which provides significant dry-weather flow to the system in the winter months. Flows from watershed drain into Malibu Lagoon and ultimately into Santa Monica Bay when the Lagoon is breached.

In terms of land use patterns, about 80% of the land in Malibu Creek Watershed is undeveloped. The developed land is a mixture of residential (13%), commercial/industrial (4%) and agricultural (3%) land uses.

A number of water bodies in the Malibu Creek Watershed are hydrologically connected to the water bodies listed in the 1998 and 2002 Water Quality Assessment (See Table 1). These unimpaired or unassessed water bodies include Hidden Valley Creek, Potrero Canyon Creek, Triunfo Creek, Cheeseboro Creek, and Cold Creek and four lakes (Lake Sherwood, Westlake, Lake Lindero and Malibou Lake). These water bodies have been considered within the analytical framework of this TMDL because they have the potential to contribute significant bacterial indicator loadings to the downstream impaired water bodies.

The western part of the watershed drains the areas around Hidden Valley, Portero Creek, Westlake and Triunfo Creek (total area about 25,210 acres). These areas are largely undeveloped. There is some limited agricultural land use, located mostly in the Hidden Valley subwatershed. Most of the residential and commercial/industrial land use is in the area around Westlake Village. Nearly all the runoff from this large watershed area is funneled to Triunfo Creek and ultimately to Malibou Lake. None of the creek reaches in this western-most portion of the watershed have been listed for fecal coliform bacterial impairments. However, it is important to note that the water bodies in these areas were largely unassessed by the Regional Board due to a lack of data. It is highly probable that the runoff from these areas contributes fecal coliform loadings to the listed segments downstream of Malibou Lake and need to be considered in TMDL development.

Malibou Lake also receives flows from a number of water bodies that are listed for bacterial impariments, specifically Lindero Creek, Medea Creek and Palo Camodo Creek. This 15,900-acre area drains watersheds associated with these three creeks and the watersheds associated with Cheeseboro Creek which is not listed. The land use in these areas while still largely undeveloped has a higher percentage of residential and commercial land uses especially in the areas around Lindero Creek and Medea Creek watersheds.

Malibou Lake discharges to Malibu Creek which is listed as impaired for its entire 10-mile length from the Lake to the Lagoon. Malibu Creek also receives flow from Las Virgenes Creek and Stokes Creek, both of which are listed as impaired. Land use at the bottom of the watershed near the lagoon is much more developed with significant residential and commercial development.

**Table 1 - Water bodies within the Malibu Creek Watershed that are listed as impaired due to high fecal coliform counts (LARWQCB, 2002a)**

| Water body | Extent impaired |
|---|---|
| Lindero Creek Reach 2 (above Lake Lindero) | 4.8 miles |
| Lindero Creek Reach 1 (Medea Creek to Lake Lindero) | 2.2 miles |
| Medea Creek Reach 2 (above confluence with Lindero Creek) | 5.4 miles |
| Medea Creek Reach 1 (from Malibou Lake to confluence with Lindero Creek | 3.0 miles |
| Palo Comado Creek | 7.8 miles |
| Las Virgenes Creek | 11.5 miles |
| Stokes Creek | 5.3 miles |
| Malibu Creek | 9.5 miles |
| Malibu Lagoon | 13 acres |

# 3. NUMERIC TARGETS AND CONFIRMATION OF 303(d) LISTINGS

This section provides a review of the data used by the Regional Board to list the water bodies within the Malibu Creek Watershed for fecal coliforms. Where appropriate the data have been updated with more recent information. As the Regional Board's listing decisions are based on impairments to water quality, it is appropriate to begin this section with a discussion of the applicable water quality standards. In addition, the numeric targets for this TMDL are defined and the data are compared with those targets.

## 3.1 Applicable Water Quality Standards

Water quality standards consist of the following elements: 1) beneficial uses, 2) narrative and/or numeric water quality objectives and 3) an antidegradation policy. In California, beneficial uses are defined by the Regional Water Quality Control Boards (Regional Boards) in the Water Quality Control Plans (Basin Plans). Numeric and narrative water quality objectives are specified in each of the Regional Board's Basin Plans. The water quality objectives are designed to be protective of the beneficial uses in each water body in the region. The Basin Plan for the Los Angeles Regional Board (1994) defines 14 beneficial uses for the Malibu Creek Watershed. All the designated beneficial uses must be protected. However, the two beneficial uses most pertinent to coliform bacteria are REC-1 and REC-2. Table 2 identifies for each of the listed water bodies the uses (existing or intermittent) that are affected by high bacterial indicator levels.

**Table 2 - Malibu Creek Watershed Beneficial Uses - Not Supported**

| Watershed | REC-1 | REC-2 |
|---|---|---|
| Malibu Lagoon | E | E |
| Malibu Creek | E | E |
| Las Virgenes Creek | E | E |
| Stokes Creek | E | E |
| Upper Medea Creek | I | I |
| Lower Medea Creek | E | E |
| Lindero Creek | I | I |
| Palo Comado Creek | E | E |

Recreational uses for body contact (REC-1) and secondary contact (REC-2) apply to all the listed water bodies as either existing, potential or intermittent. These uses apply even if access is prohibited to portions of the water body. Objectives designed to protect human health (e.g., bacterial objectives) are appropriate to protect recreational uses of the creek. The REC-1 standard protects uses where ingestion of water is reasonably possible. The REC-2 standard protects uses which occur in proximity to water (such as picnicking, sunbathing, hiking, or boating) where ingestion of water is reasonably possible.

The Wildlife use designation (WILD) is for the protection of wildlife. This use applies to all impaired water bodies within the Malibu Creek Watershed. This is pertinent to the coliform TMDL because wildlife can contribute bacterial loadings to the watershed. Issues related to the effect of wildlife population on water quality and the potential for competing beneficial uses (REC-1 vs. WILD) are discussed in more detail in Section 3 (Numeric Targets).

Specified reaches of Malibu Creek were determined to be impaired for recreational beneficial uses due to exceedance of bacterial water quality objectives during the 1996, 1998, and 2002 water quality assessment. The applicable bacterial objectives at that time were specified in the Basin Plan as follows:

*In waters designated for water contact recreation (REC-1), the fecal coliform concentration shall not exceed a log mean of 200/100 ml (based on a minimum of no less than four samples for any 30-day period), nor shall more than 10 percent of total samples during any 30-day period exceed 400/100 ml.*

The Regional Board recently updated the bacteria objectives for waters designated as REC-1 to be consistent with EPA criteria guidance which recommends the use of E. coli criteria for freshwater and the enterococcus criteria for marine waters (See Regional Board Resolution R01-018 and State Board Resolution 2002-0142). The updated revisions have subsequently been approved by the Office of Administrative Law and EPA, and became effective on August 19, 2002. The revisions create objectives for these two new indicators and revise the way in which the objectives for fecal and total coliform bacteria are implemented in freshwater and marine waters, respectively. The revised objectives are summarized in Table 3.

**Table 3 - Summary of bacteria standard revisions**

| | Parameter | 30-Day Geometric Mean | Single Sample |
|---|---|---|---|
| Streams (freshwater) | Fecal | 200 | 400 |
| | E.coli | 126 | 235 |
| Lagoon (marine water) | Total | 1,000 | 10,000 or 1,000 if FC/TC > 0.1 |
| | Fecal | 200 | 400 |
| | Enterococcus | 35 | 104 |

The implementation provisions for the water contact recreation bacteria objectives defined in these resolutions are as follows:

*The geometric mean values should be calculated based on a statistically sufficient number of samples (generally not less than 5 samples equally spaced over a 30-day period).*

*If any of the single sample limits are exceeded, the Regional Board may require repeat sampling on a daily basis until the sample falls below the single sample limit or for five days, which ever is less, in order to determine the persistence of the exceedance.*

*When repeat sampling is required because of an exceedance of any one single sample limit, values from all samples collected during that 30-day period will be used to calculate the geometric mean.*

In this TMDL we recognize that there are natural sources of coliform bacteria (e.g., birds in lagoon) and that in some instances these sources may contribute bacterial loadings sufficient to cause exceedance of the single sample and /or 30-day geometric mean water quality objective. Therefore, a reference system/antidegradation approach is used to establish the acceptable frequency of exceedance of the single sample objectives for the Malibu Creek TMDL.

The reference system/anti-degradation approach ensures that bacteriological water quality is at least as good as that of a reference system and that no degradation of existing bacteriological water quality is permitted where existing bacteriological water quality is better than that of the selected reference system.

The reference watershed approach is used to set a numeric target expressed in terms of allowable exceedance days for the single sample standard. This is consistent with the intent of the Regional Board's prior actions on the Santa Monica Bay TMDLs. The Basin Plan was recently amended to incorporate the following language:

*The single sample bacteriological objectives shall be strictly applied except when provided for in a Total Maximum Daily Load (TMDL). In all circumstances, including in the context of a TMDL, the geometric mean objectives shall be strictly applied. In the context of a TMDL, and at the discretion of the Regional Board, implementation of the single sample objectives in fresh and marine waters may be accomplished by using a 'reference system/antidegradation approach' or 'natural sources exclusion approach.' A reference system is defined as an area and associated monitoring point that is not impacted by human activities that potentially affect bacteria densities in the receiving water body.*

*These approaches recognize that there are natural sources of bacteria, which may cause or contribute to exceedances of the single sample objectives for bacterial indicators. They also acknowledge that it is not the intent of the Regional Board to require treatment or diversion of natural water bodies or to require treatment of natural sources of bacteria from undeveloped areas. Such requirements, if imposed by the Regional Board, could adversely affect valuable aquatic life and wildlife beneficial uses supported by natural water bodies in the Region.*

*Under the reference system/antidegradation implementation procedure, a certain frequency of exceedance of the single sample objectives above shall be permitted on the basis of the observed exceedance frequency in the selected reference system or the targeted water body, whichever is less. The reference system/anti-degradation approach ensures that bacteriological water quality is at least as good as that of a reference system and that no degradation of existing bacteriological water quality is permitted where existing bacteriological water quality is better than that of the selected reference system.*

*Under the natural sources exclusion implementation procedure, after all anthropogenic sources of bacteria have been controlled such that they do not cause an exceedance of the single sample objectives, a certain frequency of exceedance of the single sample objectives shall be permitted based on the residual exceedance frequency in the specific water body. The residual exceedance frequency shall define the background level of exceedance due to natural sources. The 'natural sources exclusion' approach may be used if an appropriate reference system cannot be identified due unique characteristics of the target water body. These approaches are consistent with the State Antidegradation Policy (State Board Resolution No. 68-16) and with federal antidegradation requirements (40 CFR 131.12).*

*The appropriateness of these approaches and the specific exceedance frequencies to be permitted under each will be evaluated within the context of TMDL development for a specific water body, at which time the Regional Board may select one of these approaches, if appropriate.*

Arroyo Sequit, located about 10 miles north of Malibu, was chosen as the reference watershed for this TMDL in part for its proximity and similarity to the Malibu Creek Watershed. Arroyo Sequit is the least developed watershed in the area (98% open space), like Malibu Creek it has a freshwater outlet to the beach (Leo Carillo Beach), and there is an existing shoreline monitoring station at the beach. Equally important, Arroyo Sequit is also the reference watershed being used in the Regional Board's Santa Monica Bay Beaches Bacteria TMDLs (LARWQCB, 2002b, 2002c) and the Regional Board has established a procedure for setting the acceptable allowable days of exceedances based on the historic exceedance rate at the mouth of this watershed.[2]

[2] While Arroyo Sequit is similar in many ways to Malibu Creek, it does not have a terminus lagoon and the bird population associated with such a lagoon. Therefore, this TMDL makes provision for further evaluation of the contribution from birds and consideration of a Natural Source Exclusion.

### 3.2 Numeric target

The Santa Monica Bay TMDLs allow for 17 exceedance days per year during wet weather, three exceedance days during winter dry weather, and zero exceedance days during summer dry weather.[3] An exceedance day is any day when any of the applicable bacteria single sample limits are exceeded. No exceedances of the 30-day geometric mean are allowed. Wet days are defined as days 0.1 inch or more of rainfall and the following 3 days to account for residual rainfall effects. This applies to all the beaches within Santa Monica Bay including Surfrider Beach, except where historical data indicates better water quality. Pursuant to the antidegradation policy (State Board Resolution 68-16), where existing water quality is better than the allowable exceedances, then the historical exceedance rate will apply. We propose the same allowances for the Malibu Lagoon, Malibu Creek and all the tributaries within the Malibu Creek Watershed.

### 3.3 Assessment of existing conditions relative to bacteria standards and numeric targets

This section describes conditions in the Malibu Creek Watershed which resulted in the inclusion of water bodies as impaired on the 1998 and 2002 Section 303(d) Lists. In performing the assessment of inland waters, the Regional Board compared the data to the fecal coliform standard in effect at the time of the assessment and the allowable exceedance days as established under the Santa Monica Bay Beaches TMDL. Because the data were too limited to directly assess compliance with 30-day geometric mean standard of 200/100 ml, the evaluation was based on greater than 10% of the samples exceeding the single sample standard of 400 /100 ml and the median using the entire data set. The Malibu Lagoon listing was based on data from Las Virgenes Municipal Water District (Ambrose *et al.*, 1995). Although the Regional Board did not include Triunfo Creek and Cold Creek on the 303(d) list, they are included in Table 4 since they were part of the Regional Board's assessment of conditions in the Malibu Creek Watershed. It is also likely that sources discharging in these water bodies contribute fecal coliform loadings to the listed segments downstream and therefore need to be considered as part of our source analysis.

Bacterial water quality data from four organizations (see Table 4) were reviewed during the development of this TMDL..Enterococcus dataset were not used during this assessment because the Basin Plan does not specify objectives for enterococcus in fresh waters. Furthermore, Regional Board staff were unable to define a statistically significant correlation between enterococcus and fecal or E.coli counts. Heal the Bay has been collecting monthly E. coli samples from seven locations within the watershed since December, 2001 (Table 5). Analysis of this monthly monitoring data is included in Appendix A. Analysis of this data show few exceedances of the E. coli health standards occur during dry weather at these locations.

[3] The allowable exceedance days are based on a daily sampling schedule. If weekly sampling is performed the allowable exceedance days are reduced accordingly.

The Basin Plan does not include enterococcus standards for non-marine water bodies . A summary of the fecal coliform data used in the 1998 listing process is include in Table 5.

**Table 4 - Sources of updated water quality monitoring data**

| Agency | Water bodies | Time Period | Parameters | Comment |
|---|---|---|---|---|
| Los Angeles County Department of Public Works | Malibu Creek | January 1995 to January 2002 | total coliform, fecal coliform | Wet-weather only |
| City of Calabasas | Las Virgenes Creek, Malibu Creek | November 1999 to September 2002 | total coliform, fecal coliform | dry-weather |
| Las Virgenes Municipal Water District | Malibu Creek, Malibu Lagoon | January 1998 to October 2002 | total coliform, fecal coliform, enterococcus | dry-weather |
| Heal the Bay | Malibu Creek<br><br>Palo Comado, Malibu, West Carlysle Chesebro Las Virgenes, and Cold Creeks | November 1998 to March 2003<br>December 2001 to December 2002 | enterococcus<br><br>E. coli | dry-weather<br><br>dry-weather |

**Table 5 - Summary of fecal coliform data (counts/100 ml) used in the 1998 listing process (LARWQCB, 1996, 1998, 2002a).**

| Water Body Name | Number of Samples | Range* |
|---|---|---|
| Triunfo Creek | 4 | ND-2,300 |
| Lindero Creek Reach 1 | 9 | 1,700-90,000 |
| Palo Comado | 4 | 220-30,000 |
| Medea Creek Reach 1 | 8 | 23-50,000 |
| Medea Creek Reach 2 | 4 | 300-90,000 |
| Las Virgenes | 10 | 40-17,000 |
| Stokes Creek | 4 | 80-14,000 |
| Cold Creek | 7 | ND-90,000 |
| Malibu Creek | 83 | ND-14,000 |

* Basin Plan single sample standard is 400 counts/100 ml.

**Discussion**

Recent (post-1998) bacterial water quality monitoring data were available for the streams listed in Table 4 only. Therefore, the following discussion of results will not include water bodies other than Malibu Creek, Las Virgenes Creek, and Malibu Lagoon. In addition, data were not assessed against the Basin Plan geometric mean standards because the standard requires at least five samples during a 30-day period. To give an indication of whether the dataset might have exceeded the Basin Plan geometric mean, the median of the dataset was assessed against the geometric mean standard[4]. Finally, existing data were compared

[4] For positively skewed data the median is usually quite close to the geometric mean (Hesel and Hirsh, 1999)

with the allowable exceedance days for single sample limits, recognizing that this analysis likely underestimates the actual number of exceedances, since none of the datasets include daily sampling.

Las Virgenes Creek - Dry -Weather Sampling

The City of Calabasas submitted updated bacterial indicator data collected for this watershed. These data were collected as part of their volunteer monitoring program. Monitoring locations are shown in Figure 2. As indicated in Table 5, the data were reviewed for the period of November 1999 to September 2002. The database consisted of dry-weather monitoring data only. The indicators tested were total coliform and fecal coliform. The total coliform data were not assessed because the Basin Plan standard for total coliform is applicable for marine waters only.

A total of 198 fecal samples were assessed for compliance with Basin Plan single sample limit of 400 MPN/100 ml. Approximately 28% of the 198 samples exceeded the Basin Plans standard. The median concentration of the samples was 500 MPN/100 ml, and the range of fecal coliform counts was 0 to 160,000 MPN/100 ml. The data did not appear to indicate a trend when the data were analyzed over time. Based on the review of the most recent data for this watershed, the impairment of the REC-1 and REC-2 beneficial uses for fecal coliform based on the single sample standard is confirmed. Also, the review of the data indicates that the 30-day geometric mean standard (200 MPN/100 ml) may have been exceeded based on the median of the database. A comparison of the data with the allowable exceedance days proposed for this TMDL shows that both summer and winter dry-weather as proposed in this TMDL targets were exceeded (see Table 6).

**Figure 2 - City of Calabasas Las Virgenes Creek Monitoring Stations**

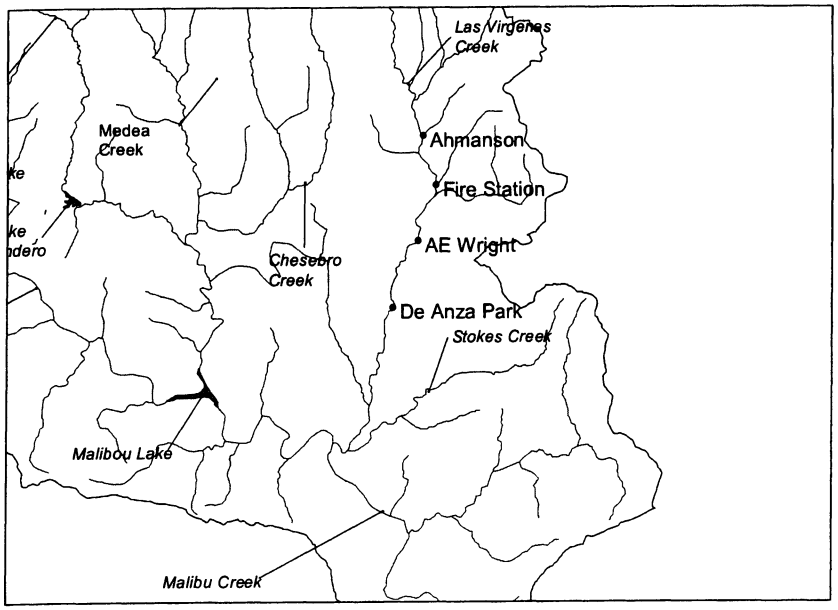


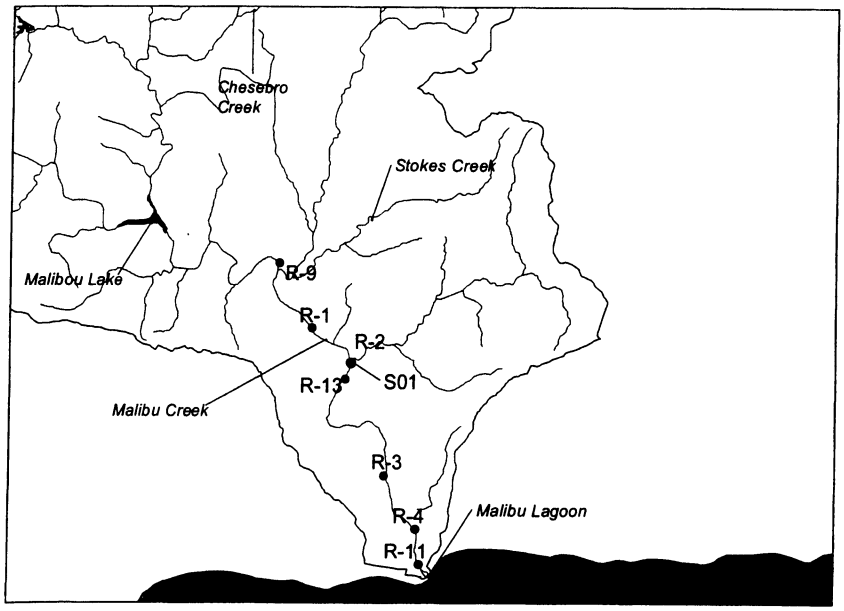
**Table 6 - Las Virgenes Creek Comparison with Dry-Weather Target**

| Season | Dry Season Target | Exceedance Days | | | |
|---|---|---|---|---|---|
| | | 1999 | 2000 | 2001 | 2002 |
| Summer | 0 | 2 | 26 | 16 | 15 |
| Winter | 3 | 1 | 14 | 25 | 3 |

Malibu Creek - Dry Weather

The Las Virgenes Municipal Water District submits in-stream water quality data as required by their NPDES discharge monitoring reports. The data for Malibu Creek was collected at stations R-1, R-2, R-3, R-9, and R-13 (see Figure 3). The data were reviewed for the period of January 1998 to October 2002. The database consists of dry-weather monitoring data only for following bacterial indicators: fecal coliform, total coliform, and enterococcus. The total coliform and enterococcus data were not assessed, since there are no applicable fresh water objectives for these parameters.

**Figure 3- LVMWD and LACDPW Malibu Creek and Lagoon Monitoring Stations**




A total of 340 fecal coliform samples were assessed for compliance with Basin Plan standard of 400 MPN/100 ml, and reference/antidegradation approach. Approximately 8.5% of the 340 samples exceeded the Basin Plan standard. The median concentration of the samples was 70, and the range of the fecal coliform counts was 17 to 5,000 MPN/100 ml. The data demonstrated a decreasing trend when the data were analyzed over time. Review of the data indicates that the 30-day geometric mean standard (200 MPN/100 ml) does not exceed the Basin Plan standard based on the median of the database. A comparison of the data with the proposed allowable exceedance days shows that both summer and winter dry-weather targets were exceeded (see Table 7). Actual exceedance days may have been higher.

**Table 7 - Malibu Creek Comparison with Dry-Weather Numeric Target**

| Season | Dry Season Target | Exceedance Days | | | | |
|---|---|---|---|---|---|---|
| | | 1998 | 1999 | 2000 | 2001 | 2002 |
| Summer | 0 | 1 | 1 | 2 | 2 | 4 |
| Winter | 3 | 3 | 0 | 3 | 12 | 1 |

Malibu Creek - Wet Weather

The Los Angeles Department of Public Works submits stormwater monitoring data as required by their NPDES discharge monitoring reports. The data for Malibu Creek was collected at station S01(see Figure 3) located below the confluence of Cold Creek and Middle Malibu Creek. The data were reviewed for the period of January 1995 to January 2002. The database consists of wet-weather monitoring data only for following bacterial indicators: fecal coliform and total coliform. The total coliform data were not assessed.

A total of 52 fecal coliform samples were assessed for compliance with Basin Plan standard of 400 MPN/100 ml. Approximately 86.5% of the 52 samples exceeded the Basin Plan standard. This database was not assessed against the reference/antidegradation target. The median concentration of the samples was 50,000 and the range of the fecal coliform counts was 0 to 1,600,000 MPN/100 ml. The data demonstrated a decreasing trend when the data were analyzed over time. Based on the review of the most recent data for this watershed, the impairment of the REC-1 and REC-2 beneficial uses for fecal coliform based on the single sample standard is confirmed. In addition, review of the data indicates that the 30-day geometric mean standard (200 MPN/100 ml) may have been exceeded based on the median of the database.

Cold Creek - Dry Weather

Heal the Bay collects E.coli data in Cold Creek as part of the Stream Team monitoring program. The data for Cold Creek was collected at station HTB3 (at Stunt Road) and HTB11(at Piuma Road).The data were reviewed for the period of December 2001 to December 2002. The database consists of dry-weather monitoring data for the following bacterial indicators: E. coli and total coliform. The total coliform data were not assessed.

A total of 33 E. coli samples from HTB3 and HTB11were assessed for compliance with Basin Plan standard of 235 MPN/100 ml. Approximately 3% (1of 33) samples exceeded the Basin Plan standard. The geomean concentration of the samples at HTB3 and HTB11 were 9 and 15 cfu/100, respectively. The range of the E. coli counts at the sites was 5 to 272 cfu/100ml for HTB3, and 5 to 86 cfu/100mL at HTB11. Review of this data indicates that E. coli standard in upper and middle Cold Creek is in compliance with Basin Plan objectives for the single sample and geomean standard during dry weather.

Malibu Lagoon

The Las Virgenes Municipal Water District collected data for the Malibu Lagoon at stations R-4 and R-11 (see Figure 3). The data were reviewed for the period of January 1998 to October 2002. These data were assessed based on the bacterial water quality objectives for marine waters. The database consists of dry-weather monitoring data only for fecal coliform and total coliform.

*Above Pacific Coast Highway – Dry Weather*

A total of 57 fecal coliform and 63 total coliform samples from monitoring station R-4 were assessed for compliance with Basin Plan fecal coliform standard of 400 MPN/100 ml and total coliform standard of 1,000 MPN/100ml or 10,000 MPN/100ml, which ever applied. Approximately 8.7% of the 57 fecal coliform samples and 30% (20 of 57) of the total coliform samples exceeded the Basin Plan standard. The median concentration of the samples was 80 MPN/100 ml for fecal coliform and 800 MPN/100 ml for total coliform. The range of the fecal coliform counts was 20 to 1,700 MPN/100 ml, while the total coliform range was 70 to 9,000 MPN/100 ml. The data demonstrated an increasing fecal coliform trend and gradual

decreasing total coliform trend, when the data were analyzed over time. Based on the review of the most recent data for this watershed, an impairment is confirmed of the REC-1 and REC-2 beneficial uses for total coliform based on the single sample standard. On the other hand, review of the data indicates that the 30-day geometric mean standard (200 MPN/100 ml) does not exceed the Basin Plan standard for fecal or total coliforms based on the median of the database.

A comparison of the data with the allowable exceedance days shows that the summer dry-weather target was exceeded, but winter dry-weather target was not (see Table 8.) However, this analysis likely underestimates the actual exceedances since it is based on a very small number of samples.

**Table 8 - Malibu Lagoon (R4) Data Comparison with Dry Weather Target**

| Season | Dry Season Target | Exceedance Days | | |
|---|---|---|---|---|
| | | 2000 | 2001 | 2002 |
| summer | 0 | 0 | 0 | 2 |
| winter | 3 | 1 | 2 | 0 |

*Below Pacific Coast Highway – Dry Weather*

A total of 71 fecal coliform and 77 total coliform samples from monitoring station R-11 were assessed for compliance with Basin Plan fecal coliform standard of 400 MPN/100 ml and total coliform standard of 1,000 MPN or 10,000 MPN, whichever applied. Approximately 28.5% of the 71 fecal coliform samples and 7% (6 of 77) of the total coliform samples exceeded the Basin Plan standards. The median concentration of the samples was 220 MPN/100 ml for fecal coliform and 1,100 MPN/100 ml for total coliform. The range of the fecal coliform counts was 20 to 5,000 MPN/100 ml, while the total coliform range was 20 to 16,000 MPN/100 ml. The data demonstrated a decreasing trend for fecal and total coliform, when the data were analyzed over time. Based on the review of the most recent data for this watershed, the impairment of the REC-1 and REC-2 beneficial uses is confirmed for fecal coliform based on the single sample standard. In addition, review of the data indicates that the 30-day geometric mean standard (200 MPN/100 ml) exceeds the Basin Plan standard for fecal or total coliforms based on the median of the database.

A comparison of the data with the proposed allowable exceedance days shows that the summer and winter dry-weather target were exceeded (see Table 9.) However, this analysis likely underestimates the actual exceedances since it is based on a very small number of samples.

**Table 9 - Malibu Lagoon (R-11) Data Comparison with Dry-Weather Numeric Target**

| Season | Dry Season Target | Exceedance Days | | |
|---|---|---|---|---|
| | | 2000 | 2001 | 2002 |
| summer | 0 | 2 | 6 | 3 |
| winter | 3 | 8 | 3 | 1 |

In summary, the most recent monitoring data were reassessed against the newly revised bacteria water quality objectives and the numeric targets proposed for this TMDL and the 303(d) listed impairments were confirmed.

### 3.4 Fecal to E. Coli Coliform Relationship

The freshwater standards for E. coli and fecal coliform apply to all the creeks in the watershed. The marine standards for total coliform, fecal coliform and enterococcus apply to the lagoon. Recognizing that these multiple standards apply, the modeling for the linkage analysis in this TMDL was based solely on fecal coliform objectives which are the same for fresh and marine waters. This decision was made in part because the 303(d) listings were based solely on the exceedances on the fecal coliform standard. There is almost no data on E. coli data to assess compliance with the E. coli freshwater standard and very little

enterococcus data to assess conditions in the lagoon. While there is a substantial dataset for total coliform, the total coliform standard only applies to the lagoon. We anticipate that actions targeted toward the reduction of fecal coliform in the watershed will also reduce concentrations of total coliform in the lagoon.

Given the limited data for bacteria indicators in the watershed, the TMDL developed and established by USEPA in March 2003 was based solely on fecal coliform as an indicator target. Fecal coliform waste load and load allocations were developed for bacteria sources to ensure attainment with water quality standards. During the public comment period USEPA received comments that questioned whether water quality could be attained in the streams, since allocations were not developed for E. coli. In order to address these comments, the Regional Board staff conducted a data analysis to determine whether a statistical relationship between E. coli and fecal coliform existed based on a linear regression analysis of historical data from the Malibu Creek Watershed. The results of this analysis indicated that the E. coli and fecal coliform concentrations were highly correlated (r-value = 0.994). Linear regression analysis demonstrated that the concentration of E. coli could be predicted from fecal coliform concentrations (coefficients of determination [$R^2$] =98.7%). Therefore compliance with the fecal coliform geometric mean concentrations of 200 org/100 ml, should ensure compliance with the E. coli single sample standard numeric target of 235 org/ 100 ml, based on the relationship demonstrated in Table 10.

Equation (1) $E.\ coli = (1.00409\ fecal\ coliform) - 10.6$

**Table 10 - Fecal Coliform Relationship**

| Fecal Coliform | Fecal/E. coli Relationship | Predicted E. coli |
|---|---|---|
| 200 org/100 ml | 1.00409 (200)-10.6 | 190.28 |

Equation 1 was not used to predict the geometric mean concentrations for E. coli, since the fecal coliform data set evaluated did not have a minimum number of samples (5 samples over a 30-day period) to assess a geometric mean relationship.

## 4. SOURCE ASSESSMENT

Fecal coliform bacteria may be introduced from a variety of sources including onsite wastewater treatment systems, animal wastes, and runoff from both developed and undeveloped areas. An inventory of possible point and nonpoint sources of fecal coliform bacteria to the water body was compiled, and both simple methods and computer modeling were used to estimate bacteria loads for those sources. Source inventories were used in the analysis to identify all potential sources within the Malibu Creek Watershed, modeling was used to identify the potential delivery of pathogens into the creeks and the lagoon.

Fecal coliform loads from the watershed were estimated by using a computer model (Hydrologic Simulation Program – FORTRAN) and supplemental estimates of selected sources (Tetra Tech, 2002). Fecal coliform loadings deposited on land surfaces or in the soil, may be attenuated through sunlight, heat, and decay over time. Transport of coliform bacteria is a result of periodic rainfall and groundwater seepage into the creek system. This source assessment chapter discusses the gross loading potential of various identified sources. While gross loadings are applicable to direct discharges, adjustments were made for indirect discharges resulting from surface runoff or groundwater discharge. Gross loadings were adjusted for indirect discharges and are referred to herein as "net" loadings. The gross and adjusted net loadings were further refined based upon calibration of the model with actual in-stream monitoring data (calibrated loadings). In most cases, the calibrated loadings were less than the gross and net loadings. It is important to note that multivariate models were used. The multiple sources of bacteria loadings (quantity of each variable) in the models were adjusted to reasonably match historical creek water quality data. Since the inputs were indirectly estimated, the data was not sufficient to confirm that the models would be able to predict the bacteria concentrations in the creek or lagoon if one or more assumed inputs of bacteria are changed. For more detailed information on the source assessment, please refer to the modeling report (Tetra Tech, 2002).

**Tapia Waste Water Reclamation Facility**. The Tapia WWRF has the capacity to treat and discharge up to 16.1 mgd of tertiary- treated sewage. The treated effluent from Tapia has one of two end destinations. The effluent is either reclaimed for irrigation and industrial uses, or is discharged to streams. Effluent is discharged to Malibu Creek or Las Virgenes Creek through discharge points 001, 002, and 004 (Figure 4). The primary outfall into Malibu Creek is Discharge No. 001, which is located about 0.3 mile upstream of the confluence with Cold Creek. Discharge No. 002 flows into lower Las Virgenes Creek, and is used to release surplus effluent from Las Virgenes Reservoir No. 2, which is used for distribution of the reclaimed water system. Discharge No. 004 is the discharge from the percolation ponds. Currently, discharge to Malibu Creek is not allowed from April 15 to November 15 (Regional Board Order No. 97-135). On average during the winter months the plant dischargers between 8 to 10 mgd (LVMWD, 1996-2000).

Tapia's permit requires that all the wastewater be chlorinated to at least 2.2 MPN/100 ml for fecal coliform. Although fecal coliforms have not been detected in the effluent, an upper bound on the estimated loadings can be made by multiplying the reported detection limits for fecal coliforms by the average flows. The fecal coliform loads discharged to Malibu Creek from Tapia were estimated from the monthly flow and concentration measurements collected by the Las Virgenes Municipal Water District for their NPDES monitoring reports (LVMWD, 1993-2000). Based on this analysis the annual fecal coliform loadings from the Tapia plant are on the order of 30 to 60 billion counts per year (Table 11).,

**Figure 4 - Malibu Creek Watershed Compliance Points and Tapia Discharge Points**

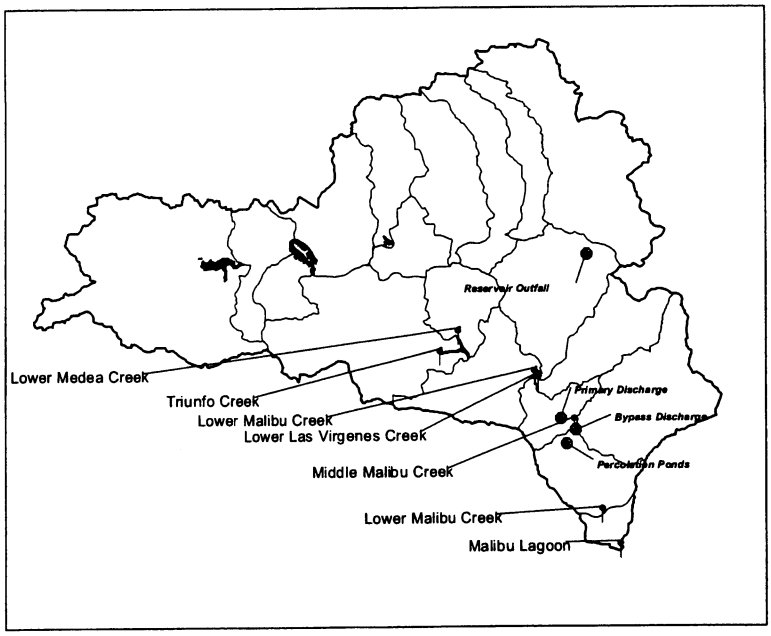



**Table 11 - Annual gross fecal loadings (billion counts/year) in Tapia effluent (Tetra Tech, 2002)***

| | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|---|
| **Max** | <1 | <1 | <1 | <1 | <1.1 | <1.1 | <1.1 | <1.1 |
| **Average Flow (cfs)** | 4.76 | 5.35 | 4.02 | 4.80 | 3.13 | 3.00 | 6.44 | 3.18 |
| **Load** | 42.2 | 47.3 | 35.7 | 42.8 | 30.5 | 29.3 | 62.9 | 30.8 |

* Fecal loads were assumed to the equal to total coliform loads. This is a conservative assumption, and it is expected that the actual fecal loads may be lower.

The Las Virgenes Municipal Water District (LVMWD) sells approximately 4,000 acre-feet per year of reclaimed wastewater from its Tapia facility that is used for irrigating open space and landscaping (Abramson et al., 1998). The use of reclaimed water is regulated under water reclamation requirements contained in Order No. 87-86 and 94-055. Table 12 summarizes the annual loadings of total coliform from each effluent irrigation operation, estimated by multiplying flows times the concentration/detection limit. These are gross numbers, and do not reflect loadings to receiving water. Indeed, Order No. 87-86 requires that irrigation water shall be retained on the areas of application and not be permitted to escape as surface flows, that reclaimed water shall not be applied at a rate which exceeds vegetative demand, and that special precautions shall be taken to prevent overwatering and to exclude the production of runoff.

**Table 12 - Annual gross fecal loads (billion counts/year) associated with effluent irrigation in the Malibu Creek Watershed** (Tetra Tech, 2002)*

| Source | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|---|
| Triunfo Sanitation District | 5.3 | 3.4 | 5.3 | 6.0 | 18.0 | 20.8 | 13.4 | 19.9 |
| Western Las Virgenes Municipal Water District | 30.0 | 28.1 | 24.2 | 27.2 | 29.1 | 37.0 | 27.2 | 34.0 |
| Calabasas | 11.7 | 14.7 | 17.1 | 16.7 | 21.3 | 20.0 | 15.6 | 20.7 |
| Las Virgenes Valley | 1.2 | 3.3 | 3.9 | 2.9 | 3.8 | 2.6 | 1.9 | 3.4 |
| Rancho Las Virgenes | 0.9 | 1.1 | 0.7 | 0.2 | 0.9 | 0.9 | 0.6 | 1.2 |
| Rancho Las Virgenes Composting | 0 | 0 | 0 | 0 | 0 | 0 | 0.05 | 0.05 |
| Tapia Percolation Beds | 11.8 | 8.3 | 21.1 | 27.5 | 23.2 | 26.4 | 0 | 0 |
| Malibu Creek Park | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.02 |
| Tapia Spray Fields and Wastewater Reclamation Facility | 0.6 | 0.3 | 0.9 | 0.3 | 0.3 | 10.6 | 0.05 | 0.05 |
| Tapia Yard | 7.0 | 7.1 | 7.0 | 6.2 | 8.2 | 0 | 0 | 0 |
| **TOTAL** | **68.5** | **66.3** | **80.2** | **87.0** | **104** | **118.3** | **58.8** | **79.3** |

* Fecal loads were assumed to the equal to total coliform loads. This is a conservative assumption, and it is expected that the actual fecal loads may be lower.

Tapia is permitted to compost the solid wastes from its treatment facility into fertilizer at their Rancho Las Virgenes Compost Facility (LVMWD, 1994; LA RWQCB, 1997; Abramson et al., 1998). Another portion of the sludge from Tapia may be digested and pumped to their Rancho Las Virgenes Farm for subsurface injection. This activity is regulated under Waste Discharge Requirements contained in Order No. 79-107. Table 13 summarizes the annual loadings from sludge disposal. These have decreased in recent years as composting at Rancho Las Virgenes has come on line, but injection still occurs (approx. 1 dry ton/year) according to a Las Virgenes Municipal Water District official (Colbough, 2003).

**Table 13 - Annual gross fecal coliform loadings associated with sludge Injection Loads at Rancho Las Virgenes Farm (Tetra Tech, 2002)**

| Year | Sludge Biosolids Loadings (dry ton/yr.) | Fecal Coliform Loading (billion counts/year) |
|---|---|---|
| 1997 | 307 | 53,800 |
| 1998 | 90 | 16,300 |
| 1999 | 1 | NA |

The loads from Tapia either from direct discharge or indirectly from use of reclaimed water for effluent irrigation or sludge injection are insignificant (<0.1%) of the total estimated annual loading. Both the direct discharge and reclaimed water are chlorinated so that the effective concentrations of fecal coliforms are less than 1 MPN. Given that concentrations from Tapia are less than 0.5% of the water quality objective for fecal coliform bacteria, flows from Tapia actually provide additional assimilative capacity to the system.

**Onsite Wastewater Treatment Systems.** Except for the City of Malibu, most of the medium to high-density residential developments in the watershed are on sewer systems. However, onsite wastewater treatment systems are still used in rural residential areas and in the City of Malibu. The term onsite wastewater treatment system is being used in this document instead of the traditional term: septic systems. Onsite wastewater treatment system describes the location and purpose of these systems. The total number of systems in the watershed was estimated at 2,300 in the mid-1990s (NRCS, 1995) and 2,420 in 2001 (Tetra Tech, 2002).

The USEPA (2003) assumed that there were about 20 commercial onsite wastewater treatment systems in shopping centers and commercial areas in the vicinity of Malibu Lagoon which discharge an estimated

70,000 to 80,000 gallons of septic effluent per day (LARWQCB, 2000). Furthermore, this refined number of commercial and multifamily systems is based on the watershed defined by surface topography and drainage along the land surface of the Malibu Lagoon Subwatershed. Since onsite wastewater treatment systems are below grade: the groundwater flow regime controls whether groundwater passing beneath a system ultimately flows into Malibu Creek, Malibu Lagoon or the surfzone. Therefore, at this time we cannot positively identify systems that contribute groundwater flow to the Creek and the Lagoon. Several hundred thousands of gallons per day are estimated to be discharged from private residences in the Malibu area of the lower watershed (LARWQCB, 2000). It is presumed that most of these systems are providing adequate treatment of bacteria. Warshall (1992) estimated that 30 single family residences with onsite systems were "short circuited" and therefore contributing elevated levels of bacteria to the Lagoon. The locations, designs, and depths to groundwater of these systems have not been inventoried to confirm this claim ..Table 14 presents the total annual fecal coliform loads generated from onsite wastewater treatment systems in the Malibu Creek Watershed as used in the Tetra Tech modeling (2002).

**Table 14 - Estimated gross and net annual fecal coliform loads generated from Onsite Wastewater Treatment systems**

| Subwatershed | Onsite WastewaterTreatment Systems | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Normal | Failed | Short-Circuited | Commercial | Effluent flow (gal/day) | Gross Fecal Coliform Load (billion /year) | Net Fecal Coliform Load (billion /year) |
| Hidden Valley Creek | 625 | 500 | 125 | | | 171,250 | 1,551,250 | 124,100 |
| Portereo Canyon Creek | | | | | | | | |
| Westlake | 60 | 48 | 12 | | | 16,440 | 148,920 | 11,914 |
| Upper Lindero Creek | | | | | | | | |
| Lower Lindero Creek | | | | | | | | |
| Upper Medea Creek | | | | | | | | |
| Palo Comado Creek | | | | | | | | |
| Cheeseboro Creek | | | | | | | | |
| Lower Medea Creek | 110 | 88 | 22 | | | 30,140 | 273,020 | 21,842 |
| Triunfo Creek | 820 | 656 | 164 | | | 224,680 | 2,036,700 | 162,819 |
| Upper Malibu Creek | 95 | 76 | 19 | | | 26,030 | 235,790 | 18,863 |
| Upper Las Virgenes Creek | | | | | | | | |
| Lower Las Virgenes Creek | 50 | 40 | 10 | | | 13,700 | 124,100 | 9,928 |
| Stokes Creek | 85 | 68 | 17 | | | 23,290 | 210,970 | 16,878 |
| Middle Malibu Creek | 50 | 40 | 10 | | | 13,700 | 124,100 | 9,928 |
| Cold Creek | 300 | 240 | 60 | | | 82,200 | 744,600 | 59,568 |
| Lower Malibu Creek | 5 | 4 | 1 | | | 1,370 | 12,410 | 993 |
| Malibu Lagoon | | | | | | | | |
| Above Lagoon | 170 | 136 | 34 | | | 46,580 | 423,400 | 33,775 |
| Adjacent to Lagoon | 30 | | | 30 | | 8,220 | 74,460 | 74,460 |
| Commercial near lagoon | 20 | | | | 20 | 75,000 | 678,900 | 678,900 |
| Total | 2,420 | 1896 | 474 | 30 | 20 | 732,600 | 6,638,620 | 1,223,968 |

Source: LARWQCB, 2000; NRCS, 1995; Finney,

When properly sited and operated, it is assumed that onsite wastewater treatment systems remove nearly 100% of the fecal coliform bacteria. However, onsite wastewater treatment systems can be significant sources of bacteria when the systems provide inadequate treatment and discharge directly to groundwater in close proximity to surface waters or discharge directly to surface water via overland flow. Inadequate treatment may be due to insufficient vertical separation to the groundwater, insufficient horizontal separation or surface discharge from a failed disposal field. Onsite wastewater treatment system failure

rates have been estimated to be 20 to 30% in the unincorporated parts of Los Angeles County and within the Malibu Creek Watershed. It is presumed that this estimate of system failure apparently includes a wide range of types of failures, many of which may not impact surface water quality. For example, failing systems include systems that have backed up, have surfacing effluent that does not reach a creek, or have poorly functioning leach fields. LARWQCB has historically been concerned about the bacterial loading from the residential onsite wastewater treatment systems in the Malibu Colony and Cross Creek shopping areas adjacent to the Malibu due to their close proximity to the lagoon . This concern is based on limited evidence of high pollutant concentrations measured in the shallow groundwater in this area and the potential for insufficient vertical separation between the bottom of the soil absorption systems and the high ground water table (LARWQCB, 2000).

In estimating loads from the failing systems, a maximum failure rate of 20 percent was assumed. However to calibrate the model the failure rate was adjusted. This resulted in an average failure rate of about 8 percent for onsite wastewater treatment systems above Malibu Lagoon. Forty percent of the bacteria from these failed systems were assumed to reach surface waters (Tetra Tech 2001). For the short-circuited and commercial onsite wastewater treatment systems adjacent to the lagoon, the calibrated fecal coliform failure rate was assumed to be 20 percent throughout the year, and assuming that 100% of the bacteria from the failed systems reached the lagoon. In order to account for both lower assumed to be failure rates and bacteria die off in route to the receiving water, 20 percent of the gross bacteria loads were assumed to enter the receiving water (Tetra Tech, 2002).

The City of Malibu has undertaken a study of the impact of onsite wastewater treatment systems on groundwater quality in this area. This project, entitled *Risk Assessment of Decentralized Wastewater Management in High Priority Area, Malibu, California*, is being conducted by the City of Malibu, with a California Coastal Conservancy Grant, and is administered by the Santa Monica Bay Restoration Commission. This study is collecting groundwater quality samples in this watershed on a monthly basis for one year. This ongoing study will provide a area-wide characterization of the potential contribution of onsite systems to the Malibu Lagoon Watershed. The results of this study will be incorporated into a three dimensional computer model of groundwater flow and solute transport, and will be available to refine the assumptions of the models used to more accurately allocate the source loading from onsite systems in this subwatershed. For example, the model will enable the determination of travel times for bacteria in groundwater to determine whether adequate die-off of bacteria is likely to occur prior to reaching the lagoon. Unfortunately, data from the study have not yet been released and therefore could not be considered in the development of this TMDL. However, the study results should assist the city in implementing the TMDL.

Both estimated gross and net bacteria loads are provided in Table 14. Calibrated loads for onsite wastewater treatmentsystems, based on the calibration of the models, are provided in Table 18. Based on these assumptions, we estimated that onsite wastewater treatment systems may account for about 18% of the total annual fecal coliform loadings to the Malibu Creek Watershed. Similarly, the onsite wastewater treatment systems in the Malibu Lagoon subwatershed may account for 12% of the total annual loadings to the entire Malibu Creek Watershed.

**Runoff from Residential and Commercial Areas**. Runoff from residential and commercial areas can be important sources of bacteria. Most of the major residential and commercial areas are in the cities of Westlake Village, Thousand Oaks, Agoura Hills, Calabasas, and Malibu. Lower density residential areas are scattered in many areas of the watershed, and include the communities around Lake Sherwood and Malibou Lake, the Hidden Valley area, the Palo Comado Creek area east of Agoura Hills, and the community of Monte Nido. The potential sources include fertilizer used for lawns and landscaping; organic debris from gardens, landscaping, and parks; trash such as food wastes; domestic animal waste; and human waste from areas inhabited by the homeless. These pollutants build up, particularly on impervious surfaces, and are washed into the waterways through storm drains when it rains. These loads are typically highest during the first major storms after extended dry periods, when the pollutants have accumulated. Activities such as the watering of lawns and the washing down of parking lots and driveways can contribute pollutants between storms. The bacterial loadings from residential runoff were estimated to be 3,150,000 billion counts per year. The estimated bacterial loadings associated with commercial and

industrial were on the order of 2,550,000 billion counts per year. During wet weather, urban runoff appears to be the predominate source of bacterial loading.

**Horse and Livestock**. Manure produced by horses, cattle, sheep, goats, birds and other wildlife in the Malibu Creek Watershed are sources of both nutrients and coliforms. These loads can be introduced directly to the receiving waters in the case of waterfowl or cattle wading in streams, or they may occur as nonpoint sources during storm runoff.

Most of the horses are concentrated in a few areas. These are Hidden Valley, the Palo Comado Creek area east of Agoura Hills, the Triunfo Creek and Lower Medea Creek areas in the vicinity and upstream of Malibou Lake, and the Cold Creek area around the community of Monte Nido. Cattle grazing is confined primarily to the Hidden Valley area in the upper western portion of the watershed. Approximately 250 cattle are estimated to reside in this area (NRCS, 1995). Approximately 200 sheep and goats reside in the pasture area north and east from the Rancho Las Virgenes. In past years, cattle grazing have also occurred on the Rancho Las Virgenes property of the upper Las Virgenes Creek subwatershed (Orton, 2001).

Estimates of fecal loads produced by horse and livestock can be estimated by multiplying the number of animals in the watersheds by a per unit fecal production load (Tables 15 and 16).

**Table 15 - Gross annual fecal loads associated with horse manure**

| Subwatershed | Number of Horses | Estimated Fecal coliform loads (billion counts/year) |
|---|---|---|
| Hidden Valley Creek | 920 | 140,890 |
| Portereo Canyon Creek | 40 | 6,132 |
| Westlake | | |
| Upper Lindero Creek | | |
| Lower Lindero Creek | 5 | 767 |
| Upper Medea Creek | 20 | 3,066 |
| Palo Comado Creek | 100 | 15,330 |
| Cheeseboro Creek | | |
| Lower Medea Creek | 140 | 21,462 |
| Triunfo Creek | 160 | 24,528 |
| Upper Malibu Creek | | |
| Upper Las Virgenes Creek | 15 | 2,300 |
| Lower Las Virgenes Creek | 5 | 767 |
| Stokes Creek | 45 | 6,899 |
| Middle Malibu Creek | 30 | 4,599 |
| Cold Creek | 115 | 17,630 |
| Lower Malibu Creek | | |
| Malibu Lagoon | 100 | 15,330 |
| **Total** | **1695** | **259,700** |

**Table 16 - Gross annual fecal coliform loads associated with livestock manure**

| Subwatershed | Cattle | Sheep/Goats | Estimated Fecal coliform (billion counts/year) |
|---|---|---|---|
| Hidden Valley Creek | 250 | | 26,000 |
| Upper Las Virgenes Creek | 15 | | 1,560 |
| Upper Las Virgenes Creek | | 200 | 2,400 |
| **Total** | **265** | **200** | **29,960** |

The values in Tables 15 and 16 present estimated gross fecal coliform loads from horse and other livestock manure, respectively, in the Malibu Creek Watershed. They do not reflect the estimated net loadings to the creeks. In our model, the gross loads from horses were reduced by forty percent for input into the model, due to collection of horse manure from stables, except for the Hidden Valley subwatershed where there are many open pastures. Additionally, loads were reduced by twenty percent for horses and thirty percent for cows and sheep because these percentages were assumed to occur as urine (ASAE, 1998). Since urine is not expected to contain fecal bacteria, the reductions were necessary. Because horse and livestock loads occur as nonpoint sources in the model, there is a buildup of the bacteria during the dry periods and thus reduced contribution of the bacteria to the stream reaches during these periods. Based on these assumptions, our best estimate of net loadings to the creeks is 32,100 billion counts per year. This represents about 0.5% of the total loadings to the Malibu Creek Watershed.

**Wildlife.** Wildlife wastes contribute to the bacterial loads from the large undeveloped portions of the watershed, and may be the only source of bacteria from these areas. Over 75 percent of the entire Malibu Creek Watershed is undeveloped wildland consisting primarily of chaparral, scrub, and woodlands, with smaller areas of grasslands and forests. The abundance of wildlife varies among the different habitat and vegetation types. Approximately 50 species of mammals and 380 species of birds occur in the watershed

(NRCS, 1995). The important mammals include mule deer, hares, rabbits, squirrels, foxes, bobcats, badgers, ring-tailed cats, weasels, coyotes, raccoons, skunks, mountain lions, and a variety of small rodents (rats, mice, gophers, voles) (NRCS, 1995). We have no direct estimates of populations or the loading rates associated with these animals. However, the values for bacterial loadings associated with runoff from undeveloped land provide an indirect estimate of wildlife contribution. It is estimated that runoff from chaparral/sage scrublands contributes 37,700 billion per year, runoff from grasslands contributes 2,690 billion per year, and runoff from woodlands contributes 809 billion per year. Estimates for each type of vegetation were based on literature and event mean concentrations measured by the Los Angeles County Department of Public Works (Tetra Tech, 2002)

Waterfowl are important components of the Malibu Lagoon ecosystem, and may also contribute nutrients and bacteria to the various lakes in the watershed. Waterfowl were considered as a separate loading source only for Malibu Lagoon, since birds have previously been suggested to be an important source of the elevated coliform levels in the lagoon (Warshall et al., 1992). Table 17 presents the estimated annual bacteria loads produced by waterfowl near Malibu Lagoon. The loads were reduced to 35% of the total load for use after model calibration (see Table 18). This reduction in bird loads can be explained by the fact that the birds do not spend all their time in the lagoon. It should be pointed out that waterfowl loads were not evaluated for the lakes, since bird counts were not available.

**Table 17 - Estimated gross annual bacterial loads (billion counts) produced by waterfowl near Malibu**

| Month | Bird Population | Estimated Fecal coliform (billion counts/year) |
|---|---|---|
| January | 1000 | 75,330 |
| February | 1500 | 102,060 |
| March | 1630 | 122,788 |
| April | 400 | 29,160 |
| May | 300 | 22,599 |
| June | 320 | 23,328 |
| July | 230 | 17,326 |
| August | 200 | 15,066 |
| September | 400 | 29,160 |
| October | 750 | 56,498 |
| November | 780 | 56,862 |
| December | 1100 | 82,863 |
| **Annual Total** | 8610 | **633,040** |

Source: Topanga-Las Virgenes Resource Conservation District; ASAE, 1998.

**Golf Courses.** Golf courses are a potential source of bacteria since the typical fertilization and watering rates are generally high. Golf courses also attract large numbers of water fowl. The bacteria may be transported to waterways in storm runoff. Most of the golf courses are adjacent to waterways. Both Lake Sherwood and Lake Lindero have golf courses just upstream of the lakes, and Westlake Lake has a golf course about 0.6 mile northeast of the lake. In addition, two golf courses are located in the upper portions of the Westlake and Upper Lindero Creek watersheds near perennial or intermittent streams. There is also a small private golf course on the west side of Malibu Lagoon in the Malibu Colony area (Tetra Tech, 2002). Based on our analysis, the runoff of fecal coliform bacteria associated with golf courses appears to be negligible (less than 1%).

**Tidal Inflow to Lagoon.** Tidal inflow loads of bacteria were calculated from estimated tidal inflow rates from the UCLA study (Ambrose et al., 2000) and fecal coliform concentrations in coastal waters measured during the Malibu Technical investigation (LARWQCB, 2000). The average concentration for fecal

coliform at beach surf zone stations was 69 counts per 100 ml. From this number, annual loading associated with tidal inflow was estimated to be 16,100 billion counts per year. This is a relatively small percentage (0.2%) of the annual loadings to the lagoon.

**Dry weather storm drain loads to Malibu Lagoon.** Three storm drains discharge to the Malibu Lagoon. These are the Civic Center drain, the Cross Creek Road drain, and the Malibu Colony. It is estimated that the fecal loading from the Malibu Colony storm drain was 48 million per day. These high concentrations from these storm drains may result in localized exceedances of water quality standards. However in terms of annual loadings, these drains appears to contribute a very small fraction (<1%) of the loads to the lagoon.

**Sanitary Sewer Overflows, Leaking Sewer Pipes**
Sanitary Sewer Overflows (SSOs) and exfiltration from sewer systems has been indentified by EPA as a potential cause of pathogens in surface water (USEPA 2000a and 2001). SSOs are primarily addressed through enforcement actions such as Administrative Civil Liabilities (ACL) fines, Cease and Desists Orders (CDOs), and litigation. In addition, USEPA documents indicate that although exfiltration may be possible given certain conditions, "no data or narrative information in the literature demonstrate, or even suggest, that sewer exfiltration has directly contaminated surface waters."(USEPA2000a). Thus, these potential sources were not included in the sources assessment.

**Illicit Connections**

Sources of elevated bacteria to marine and fresh waters may also include direct illegal discharges from malfunctioning onsite water treatment systems and illicit discharges from private drains. Data were not available at the time of TMDL development to assess the bacterial contribution from illicit connections. Based on local code and/or ordinances, illicit connections are prohibited in the following areas: unincorporated county areas of Ventura and Los Angeles and the cities of Calabasas, Westlake Village, Thousand Oaks, Simi Valley, and Malibu.

### 4.1 Summary of source assessment.

The values in Tables 11-17 do not by themselves provide enough information to allocate load reductions among the various sources. A model has been developed to relate loadings to concentrations in the creek and lagoon system. The model integrates this information on potential loadings with assumptions about the timing and delivery of these loadings relative to instream flows and instream processes to predict water quality. The calibrated modeled loads to the system are summarized in Table 18.

These values represent our best estimates of potential sources from the watershed to the creeks and lagoon. Surface runoff loads from residential and commercial areas appear most likely to bethe largest sources. Most of these loadings are associated with storms. However dry-weather urban runoff also contributes anthropogenic loading. Based on preliminary data, inadequate onsite wastewater treatment systems may result in significant fecal contribution, especially to the lagoon. Birds are another significant potential source of fecal coliforms to the lagoon. These are the apparent major contributors to the total watershed on an annual basis. During the dry season, urban runoff appears to be the largest source of fecal coliforms, but the loads associated with birds and failing onsite wastewater treatment systems may be comparable in magnitude.

## 5. LINKAGE ANALYSIS

Information on sources of pollutants provides one part of the TMDL analysis. To determine whether those pollutants impair a water body, it is also necessary to determine the assimilative capacity of the receiving water under critical conditions. This section describes the use of a hydrodynamic and water quality model to determine the loadings of bacteria that are expected to achieve the compliance with the TMDL. In this section, we also describe the approaches for defining the critical conditions and developing an appropriate Margin of Safety (MOS) to ensure that water quality standards will be met.

## 5.1 Model description

Receiving water quality models were used to predict fecal coliform concentrations in the 303(d) listed creeks and lagoon under various loading scenarios. The models were used to establish potential relationships between pollutant loads from the identified sources within Malibu Creek Watershed and the in-stream water quality targets for the listed reaches (Tetra Tech, 2002).

HSPF was selected since it could be linked directly with the watershed and stream modeling framework. For the purpose of analysis, the Malibu Creek Watershed was divided into 18 subwatersheds. The source loadings data from each these subwatersheds were treated as inputs at the appropriate location within the network of tributaries and creeks that were modeled as part of Malibu Creek Watershed (Figure 4). The following stream reaches within the Malibu Creek Watershed were included in the model: Hidden Valley Creek, Portrero Canyon Creek, Upper Lindero Creek, Lower Lindero Creek, Upper Medea Creek, Palo Comado Creek, Cheeseboro Creek, Lower Medea Creek, Triunfo Creek, Upper Malibu Creek, Upper Las Virgenes Creek, Lower Las Virgenes Creek, Stokes Creek, Middle Malibu Creek, Cold Creek, Lower Malibu Creek and Malibu Lagoon. The following lakes were also considered as part of the stream network: Westlake Lake, Lake Sherwood, Lake Lindero and Malibou Lake.

Calibration of the model involved a comparison of historical receiving water data (baseline conditions) with predicted receiving water concentrations (simulated conditions) from the model. The model predictions were compared to actual in-stream concentrations at five locations within the watershed where there were existing data: Upper Malibu Creek (R9), Middle Malibu Creek (R2), Lower Malibu Creek (R3), Malibu Creek at the Lagoon (R4) and Malibu Lagoon (R11). As result of calibration, some pollutant source inputs were adjusted. The final calibrated sources loads are summarized in Table 18. Although the model was calibrated, the model was not validated due to insufficient instream monitoring data at the time of model development. Therefore, we cannot be sure that the model reflects all of the existing and potential bacteria sources. Furthermore, since this model has multiple variables and has not been validated, we cannot be sure that the loads are appropriately allocated among the sources. These source load should be considered to be estimates. The nature of the calibration process and the parameters adjusted to achieve calibration are detailed in the modeling document (Tetra Tech, 2002).

**Table 18 - Summary of Calibrated Source Loading**

| Potential Sources | Total Annual Loading (billion counts/year) |
|---|---|
| Tapia Discharge | 59 |
| Storm Water Runoff | |
| Commercial/Industrial | 2,550,000 |
| High/Med. Density Residential | 2,700,000 |
| Low Density Residential | 344,000 |
| Rural Residential | 97,500 |
| Agriculture/Livestock | 32,100 |
| Onsite Wastewater Treatment Systems | 247,000 |
| Effluent Irrigation | 12 |
| Dry Weather Runoff | |
| Entire Watershed (except lagoon) | 5,210 |
| Malibu Lagoon | 18 |
| Birds | 450,000 |
| Tidal Inflow | 16,100 |
| Natural Sources Other than Birds | |
| Vacant | 1,950 |
| Chaparral/Sage Scrub | 37,700 |
| Grasslands | 2,690 |
| Woodlands | 809 |

The model results were evaluated for the critical condition (See Section 5.2) and then used to evaluate the bacterial load reductions that would be required to ensure that water quality standards are met at each of the listed reaches (See Section 5.3).

### 5.2 Critical Conditions and Seasonality

The linkage analysis revealed the conditions to which the impaired water bodies were most likely to exceed water quality standards: storms and summer dry weather. During summer dry weather when Tapia WWRF is prohibited from discharging to the creek and base flows in the creek system and to the lagoon are fairly low, dilution of bacterial loads is minimal. Under these conditions, small and localized loading (e.g. onsite wastewater treatment systems) can result in exceedances of water quality standards. On the other hand the largest bacterial loads are delivered during winter storm events. The effect of storm runoff is to dramatically increase the in-stream instantaneous concentration and the 30-day geometric mean.

To establish the critical condition for the wet days, we used rain data from 1993. Based on data from the Regional Board's Santa Monica Bay TMDL, this represents the 90th percentile wet-weather year based on rain data from 1947 to 2000. Use of this year provides a conservative estimate of loading from runoff. For the critical year (1993) we identified 69 wet days and 296 dry days.[5] To further evaluate the critical conditions, we modeled a representative dry year. The model was calibrated using meteorological data from 1992 to 1995. Of these years, 1994 had the greatest number of dry-weather days (310). The dry-year scenario was based on 1994, which was the 50$^{th}$ percentile year in terms of dry-weather days for the period of 1947-2000.

Based on the linkage analysis of in-stream response to source loading, we have determined the bacterial concentrations are most likely to exceed the single sample standard of 400 org/100mL and the geometric mean standard of 200 org/100mL during storm events. In addition, the single sample standard is likely to be exceeded during the summer dry weather in a representative dry year. Therefore, this TMDL will be based on two critical periods to ensure compliance of water quality standards.

### 5.3 Application of the model to link loadings to water quality

The model was used to examine the relationship between loading and the numeric targets. Seven critical compliance points were identified at major tributaries and the Malibu Creek mainstem (see Table 19). These compliance points (see Figure 2) were consistent with the listed reaches, modeling output points and/or available monitoring data. Although Triunfo Creek is not listed, a compliance point was identified to address the contributions of fecal coliform loading from the western section of the watershed.

**Table 19 - Compliance Points and Major Load Contributions**

| Compliance Point | Description | Local Watershed Loads | Upstream Creek Loads |
|---|---|---|---|
| Lower Medea Creek | upstream of confluence with Malibou Lake | Storm water<br>Residential Onsite Wastewater Treatment Systems | Upper Lindero Creek<br>Lake Lindero<br>Lake Lindero Creek<br>Lower Lindero Creek<br>Chesebro Creek<br>Palo Comado Creek<br>Upper Medea Creek |
| Triunfo Creek | upstream of confluence with Malibou Lake | Storm water<br>Residential Onsite Wastewater Treatment Systems | Hidden Valley Creek<br>Lake Sherwood<br>Potrero Creek<br>Westlake Lake |

[5] The 1993 calendar year is used solely in the modeling scenarios which will lead to the recommended load reductions percentages. For purposes of calculating the allowable days of exceedances, the storm year was used, which is consistent with the Santa Monica Bay Wet-Weather Bacteria TMDL. .

| | | | |
|---|---|---|---|
| Lower Las Virgenes Creek | upstream of confluence with Malibu Creek | Storm water | Upper Las Virgenes Creek |
| Upper Malibu Creek | upstream of confluence with Las Virgenes Creek | Storm water<br>Residential Onsite Wastewater Treatment Systems | Malibou Lake |
| Middle Malibu Creek | downstream Tapia discharge serial 001 | Storm water<br>Residential Onsite Wastewater Treatment Systems | Lower Las Virgenes Creek<br>Stokes Creek |
| Lower Malibu | downstream of Cold Creek confluence | Storm water<br>Residential Onsite Wastewater Treatment Systems | Cold Canyon |
| Malibu Lagoon | Cross Creek Road and below Pacific Coast Highway | Storm water<br>Commercial Onsite Wastewater Treatment Systems<br>Birds | Lower Malibu Creek |

*Baseline Conditions – Comparison with Allowable Exceedance Days*

For each of the seven compliance points the relationship between loads and water quality was determined based on examination of the model output results. The daily fecal coliform counts for the critical wet year (1993) predicted by the model were evaluated against the single sample standard of 400 org/100mL.

The model results indicated a significant number of days of exceedance during the critical years (see Appendix 1). Most of the exceedance days are associated with rain days. Indeed, the model suggests that every storm of 0.1 inch or greater has the potential to cause exceedance of the single sample standard. The predicted number of wet-day exceedances far exceeds the 17 days dry weather allowance for wet days. In comparison, there were relatively few dry-day exceedances in the creeks. The dry-day exceedance predicted by the model vary by watershed but range from 3 to 12 days. The higher numbers were associated with the Triunfo Creek and Lower Las Virgenes Creek watersheds. In contrast to the creeks, the number of exceedances dry-days predicted for the lagoon (42 days) far exceeds the 3 day allowance for dry weather days.

*Baseline Conditions –Comparison with the 30 day Running Geometric Mean Standard*

The 30-day geometric mean fecal coliform counts for the critical wet-year (1993) generated by the model were evaluated against the geometric standard of 200 org/100mL. The model hindcast that the 30-day geometric mean was exceeded at each compliance point more than 100 days during 1993. According to the model output the geometric mean for the estuary was exceeded 365 days for 1993. As noted in Section 2, review of dry weather data for lagoon monitoring station R-11 indicates that the median concentration from 1998-2002 was above 200 MPN/100 ml suggesting that the 30 day-geometric mean will exceeded in dry weather as well. Based on the modeling scenarios, this maybe a result of the year round fecal coliform loading from birds or onsite wastewater treatment systems (see Appendix 2).

*Load Reductions*

The compliance points were used during the linkage analysis to assess the relationship between water quality and source load reduction. The goal of the assessment was to reduce source loads to achieve the fecal coliform water quality standards at each compliance point. (See Appendix 3 and 4 for linkage graphs).

Various load reduction scenarios were modeled. The initial scenario was designed to meet the allowable exceedance days during the critical wet year (1993) during storm events. However, exceedance of the single sample standards were still occurring according to model output during the dry period (April 1 to October 31) of the critical wet-weather year (1993). This pattern is apparently related to the temporal influence of major loading sources: storm water (during storms) and onsite wastewater treatment systems (low-flow conditions). Compliance was finally achieved with the single sample standard by reducing a combination of dry season and wet season loads. Further reductions were required to meet the numeric targets for the critical dry year (1994).

Additional reductions were required to achieve compliance with the 30-day geometric mean standard (200-org/100 mL). In order to achieve the geometric mean standard, further reductions were required from watersheds upstream of these affected compliance points. As a result, reductions were required in watersheds, which were not listed on the 303(d) list and but were upstream of listed reaches. In the case of Triunfo, reductions were required from Hidden Valley and Westlake subwatersheds, although these watersheds are not listed as impaired. The Medea Creek geometric mean compliance was achieved by further reducing loads in Chesebro, Palo Comado, Upper Lindero, and Lower Lindero until water quality in Medea Creek meet the 30-day geometric mean. The Malibu Lagoon estuary 30-day geometric mean could not be achieved, even after anthropogenic loads within the water body were reduced by 99%. The final overall load reductions for each compliance point is included in Table 20. A map delineating the subwatershed is provided in Figure 5.

**Figure 5 - Subwatershed Delineation**

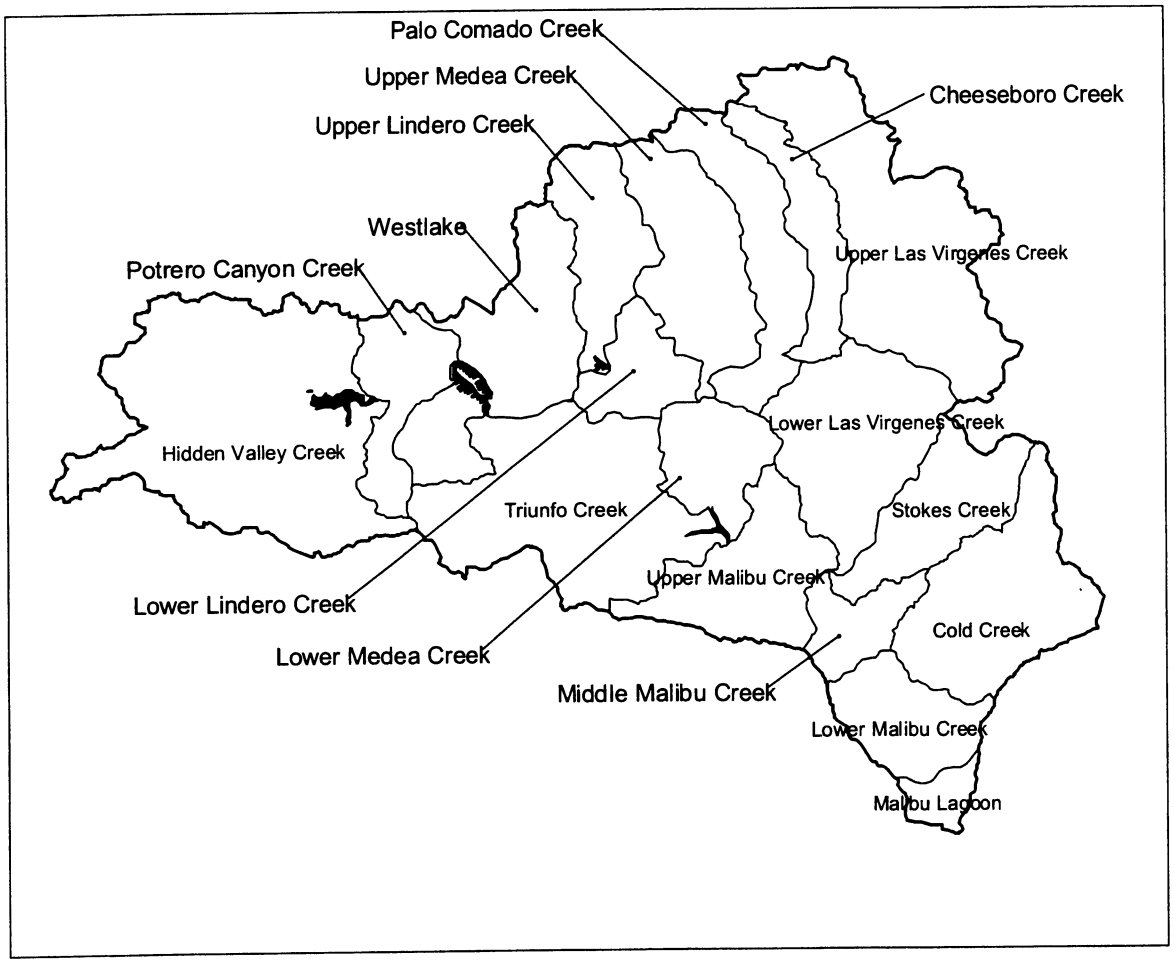


**Table 20 - Subwatershed Estimated Source Reductions to Meet TMDL Allocation**

| Watershed | Estimated Load | Allocation | Estimated Percent Reduction |
|---|---|---|---|
| Triunfo | $1.70 \times 10^{14}$ | $3.85 \times 10^{13}$ | 77 |
| Hidden Valley | $1.36 \times 10^{14}$ | $5.14 \times 10^{13}$ | 62 |
| Potrero | $3.22 \times 10^{14}$ | $2.07 \times 10^{13}$ | 94 |
| Westlake | $1.60 \times 10^{15}$ | $9.53 \times 10^{13}$ | 94 |
| Lower Medea | $6.47 \times 10^{13}$ | $4.93 \times 10^{12}$ | 92 |
| Upper Medea | $9.46 \times 10^{14}$ | $1.32 \times 10^{13}$ | 99 |
| Chesebro | $6.40 \times 10^{13}$ | $1.56 \times 10^{12}$ | 98 |
| Palo Comado | $2.85 \times 10^{14}$ | $4.86 \times 10^{12}$ | 98 |
| Upper Lindero | $4.66 \times 10^{14}$ | $6.99 \times 10^{12}$ | 99 |
| Lower Lindero | $5.10 \times 10^{14}$ | $6.97 \times 10^{12}$ | 99 |
| Lower Las Virgenes | $7.14 \times 10^{14}$ | $9.07 \times 10^{13}$ | 87 |
| Upper Las Virgenes | $2.34 \times 10^{14}$ | $4.74 \times 10^{12}$ | 98 |
| Upper Malibu | $1.36 \times 10^{13}$ | $1.14 \times 10^{13}$ | 16 |
| Middle Malibu | $2.24 \times 10^{13}$ | $6.14 \times 10^{12}$ | 73 |
| Stokes Creek | $6.17 \times 10^{13}$ | $1.25 \times 10^{13}$ | 80 |
| Lower Malibu Creek | $4.27 \times 10^{12}$ | $2.60 \times 10^{12}$ | 39 |
| Cold | $1.24 \times 10^{14}$ | $2.51 \times 10^{13}$ | 80 |
| Malibu Lagoon (subwatershed) | $1.36 \times 10^{14}$ | $9.32 \times 10^{11}$ | 99 |
| Estuary | $6.70 \times 10^{14}$ | $4.95 \times 10^{14}$ | 26 |
| **Total** | **$6.54 \times 10^{15}$** | **$8.94 \times 10^{14}$** | **86** |

The seven compliance points each receive load contributions from within its watershed, from upstream water bodies and/or a tributary. The lakes were not included in Table 20, because the lakes were not identified as a fecal coliform source during the source assessment (Section 4). The existing loads (or baseline) presented in Table 21 are the same loads presented in Table 20. The allocation is the load that meets the in-stream targets, and corresponds to attainment of the numeric targets. Included in the allocation load category are the natural sources of bacteria, such as wildlife. The percent reduction category is the load reduction required from the estimated existing baseline conditions to meet the instream numeric targets.

Prior to allocations of the bacteria loads, natural sources of bacteria must be subtracted from the gross loads. In this TMDL, natural sources of bacteria include birds, as well, as the following land uses: chaparral/sagebrush, grassland, woodlands. The estimated anthropogenic loads primarily from runoff and onsite wastewater treatment systems available for allocations are presented by watershed in Table 21.

**Table 21 - Estimated Watershed Anthropogenic Source Allocation**

| Watershed | Existing Loads | Natural Source Loads | Existing Anthropogenic Sources | Allocation Anthropogenic Sources | % Reduction Anthropogenic Sources |
|---|---|---|---|---|---|
| Triunfo | $1.70 \times 10^{14}$ | $5.30 \times 10^{12}$ | $1.65 \times 10^{14}$ | $3.32 \times 10^{13}$ | 80 |
| Hidden Valley | $1.36 \times 10^{14}$ | $7.06 \times 10^{12}$ | $1.29 \times 10^{14}$ | $4.44 \times 10^{13}$ | 67 |
| Potrero | $3.22 \times 10^{14}$ | $1.84 \times 10^{12}$ | $3.20 \times 10^{14}$ | $1.89 \times 10^{13}$ | 94 |
| Westlake | $1.60 \times 10^{15}$ | $1.95 \times 10^{12}$ | $1.60 \times 10^{15}$ | $9.33 \times 10^{13}$ | 94 |
| Lower Medea | $6.47 \times 10^{13}$ | $1.51 \times 10^{12}$ | $6.32 \times 10^{13}$ | $3.42 \times 10^{12}$ | 94 |
| Upper Medea | $9.46 \times 10^{14}$ | $9.06 \times 10^{11}$ | $9.45 \times 10^{14}$ | $1.23 \times 10^{13}$ | 98 |
| Chesebro | $6.40 \times 10^{13}$ | $7.97 \times 10^{11}$ | $6.32 \times 10^{13}$ | $7.66 \times 10^{11}$ | 98 |
| Palo Comado | $2.85 \times 10^{14}$ | $1.07 \times 10^{12}$ | $2.84 \times 10^{14}$ | $3.08 \times 10^{12}$ | 98 |
| Upper Lindero | $4.66 \times 10^{14}$ | $7.24 \times 10^{11}$ | $4.65 \times 10^{14}$ | $6.72 \times 10^{12}$ | 98 |
| Lower Lindero | $5.10 \times 10^{14}$ | $4.90 \times 10^{11}$ | $5.10 \times 10^{14}$ | $6.48 \times 10^{12}$ | 98 |
| Lower Las Virgenes | $7.14 \times 10^{14}$ | $2.93 \times 10^{12}$ | $7.11 \times 10^{14}$ | $8.77 \times 10^{13}$ | 87 |
| Upper Las Virgenes | $2.34 \times 10^{14}$ | $2.84 \times 10^{12}$ | $2.31 \times 10^{14}$ | $1.90 \times 10^{12}$ | 99 |
| Upper Malibu | $1.36 \times 10^{13}$ | $3.45 \times 10^{12}$ | $9.45 \times 10^{12}$ | $7.95 \times 10^{12}$ | 16 |
| Middle Malibu | $2.24 \times 10^{13}$ | $1.34 \times 10^{12}$ | $2.11 \times 10^{13}$ | $4.78 \times 10^{12}$ | 77 |
| Stokes | $6.17 \times 10^{13}$ | $2.85 \times 10^{12}$ | $5.89 \times 10^{13}$ | $9.65 \times 10^{12}$ | 83 |
| Lower Malibu | $4.27 \times 10^{12}$ | $2.28 \times 10^{12}$ | $1.99 \times 10^{12}$ | $3.21 \times 10^{11}$ | 84 |
| Cold | $1.24 \times 10^{14}$ | $5.12 \times 10^{12}$ | $1.19 \times 10^{14}$ | $2.00 \times 10^{13}$ | 83 |
| Malibu Lagoon | $1.36 \times 10^{14}$ | $1.53 \times 10^{11}$ | $1.34 \times 10^{14}$ | $7.78 \times 10^{11}$ | 99 |
| Estuary | $6.70 \times 10^{14}$ | $4.95 \times 10^{14}$ | $1.75 \times 10^{14}$ | $4.07 \times 10^{11}$ | 100 |
| **Total** | **$6.54 \times 10^{15}$** | **$5.38 \times 10^{14}$** | **$6.00 \times 10^{14}$** | **$3.56 \times 10^{14}$** | **94** |

## 6. POLLUTANT ALLOCATIONS AND TMDLs

The Waste Load Allocations and Load Allocations for this TMDL are the same as for the Santa Monica Bay Beaches Bacteria TMDL (See Table 22).

**Table 22 - Waste Load and Load Allocations for the Malibu Creek Watershed Bacteria TMDL***

| | |
|---|---|
| Summer (April 1 to October 31) Dry-Weather Days | Zero (0) exceedance days based on the Single Sample Bacteria Water Quality Objectives<br><br>Zero (0) exceedance days based on the Rolling 30-Day Geometric Mean Bacteria Water Quality Objectives |
| Winter (November 1-March 31) Dry-Weather Days | Three (3) exceedance days based on the Single Sample Bacteria Water Quality Objectives<br><br>Zero (0) exceedance days based on the Rolling 30-Day Geometric Mean Bacteria Water Quality Objectives |
| Wet-Weather Days (days with 0.1 inch of rain or greater and three days following the rain event) | 17 exceedance days based on the Single Sample Bacteria Water Quality Objectives<br><br>Zero (0) exceedance days based on the Rolling 30-Day Geometric Mean Bacteria Water Quality Objectives |

*The allowable exceedance days are based on daily sampling. If weekly sampling is performed, the allowable exceedance days are scaled accordingly.

Responsible jurisdictions, responsible agencies, and responsible entities may employ any reduction strategy they choose to meet these allocations. However, a sample strategy, based on model output is depicted in Table 23. This table is for information purposes only. However, it appears that any successful strategy must achieve major reductions in loadings from runoff from urban and suburban areas in the upper watershed and in Malibu, and commercial and multi-family onsite wastewater treatment systems in the Malibu Lagoon subwatershed and estuary. The following subsections describes staff's analysis of suggested loading reductions.

**Table 23 - Example Watershed Reduction Strategy by Source Category**

| Source | Estimated Existing Loading | % of Total Existing | TMDL Allocation | %Reduction |
|---|---|---|---|---|
| Tapia Discharge | $5.92 \times 10^{10}$ | 0.00% | $5.92 \times 10^{10}$ | 0% |
| Effluent Irrigation | $1.16 \times 10^{10}$ | 0.00% | $1.16 \times 10^{10}$ | 0% |
| Commercial/ Industrial Stormwater Runoff | $2.55 \times 10^{15}$ | 39.03% | $7.65 \times 10^{13}$ | 97% |
| High/Med. Density Res. Stormwater Runoff | $2.71 \times 10^{15}$ | 41.33% | $8.13 \times 10^{13}$ | 97% |
| Low Density Residential Stormwater Runoff | $3.44 \times 10^{14}$ | 5.27% | $6.88 \times 10^{13}$ | 80% |
| Rural Residential Stormwater Runoff | $9.75 \times 10^{13}$ | 1.49% | $4.88 \times 10^{13}$ | 50% |
| Agriculture/ Livestock | $3.21 \times 10^{13}$ | 0.49% | $1.65 \times 10^{13}$ | 50% |
| Onsite wastewater treatment Systems | $2.47 \times 10^{14}$ | 3.78% | $3.71 \times 10^{13}$ | 85% |
| Dry Weather Urban Runoff | $5.21 \times 10^{12}$ | 0.00% | $2.84 \times 10^{9}$ | 99%* |
| Lagoon Drains | $1.75 \times 10^{10}$ | 0.00% | $1.75 \times 10^{8}$ | 99% |
| Tidal Inflow | $2.44 \times 10^{13}$ | 0.37% | $1.83 \times 10^{13}$ | 25% |
| **Total** | **$6.00 \times 10^{15}$** | | **$3.47 \times 10^{14}$** | |

* It is assumed that measures used to control urban stormwater runoff also will effectively control urban dry-weather runoff. Suggested source load reductions by subwatershed are included in Appendix 5.

### 6.1 Estimated Load Reductions for Point Sources

Tapia Water Reclamation Facility and Effluent Irrigation

The Tapia WRP effectively disinfects the tertiary treated wastewater, which is either discharged to Malibu Creek or reclaimed and used for irrigation. The fecal loading is small and is not likely to increase fecal

coliform concentrations. Indeed the effluent from Tapia actually provides additional dilutive capacity to the creek system. Therefore, no load reduction is warranted for this source.

Stormwater Water Discharges

Most of fecal coliform loads are discharged during storm events. Runoff from developed areas is the major source of contamination, increasing the coliform concentrations in streams by several order of magnitude (Tetra Tech, 2001). The water quality model was run repeatedly with different combinations of load scenarios in order to establish the load reductions that would be needed to meet the TMDL targets. The model analyses demonstrated that coliform loads from storm runoff would have to be reduced by more than 90 percent to meet the geometric mean criterion of 200 MPN/100 mL. These load reductions would also meet the single sample criterion of 400 MPN/100 mL.

## 6.2 Overview of Estimated Load Reductions for Nonpoint Sources

Septic Systems (Onsite Wastewater Treatment Systems)

Properly sited and functioning onsite wastewater treatment systems are expected to meet the load allocations without further modification. The waste being discharged from the onsite systems is being required to meet the REC-1 water quality standard of 200 CFU per 100 ml. It is anticipated that in the leach field the fecal coliform concentrations will be further reduced by more than 99%; this can be confirmed by groundwater monitoring. It has been estimated that these actions will decrease the annual loading to the watershed from $2.47 \times 10^{14}$ counts per year to $1.04 \times 10^{13}$ counts per year.

There is a potential for significant loading impacts from the commercial and multi-family onsite wastewater systems in the Malibu Lagoon subwatershed, and these should be a high priority. In addition, residential onsite wastewater systems upstream of the Malibu Creek Watershed have been given a load allocation..

Dry Weather Urban Runoff, Lagoon Drains and Tidal Inflow

These pollutant sources appear to contribute a relatively small percentage of the annual fecal coliform load when compared to onsite wastewater systems and stormwater. However, because creek flows are lower during dry weather discharges assimilative capacity is also low. Reduction was necessary for the loads to ensure that fecal coliform criteria are not exceeded during the low flow periods in the streams and estuary.

Natural Sources

No load reduction was given to birds since they are a natural part of the system. At the present time, we believe that the allocations described above are sufficient to meet the objectives. However, it may prove that the birds in Malibu Lagoon are sufficient alone to cause an exceedance. If this proves to be the case, the Regional Board staff will recommend that the Regional Board consider re-evaluating the TMDL, or to incorporate a natural source exclusion.

## 6.3 Margin of Safety

The Margin of Safety was derived from the use of several conservative assumptions during model analysis. These include:

- The watershed loadings were based on the 90$^{th}$ percentile year for rain (1993) based on the number of wet weather days. This should provide conservatively high runoff from different land uses for sources of storm water loads

- The watershed loadings were also based on a very dry rain year (1994). This ensures compliance with the numeric target during low flows when onsite wastewater treatment systems and dry urban runoff loads are the major bacterial sources.

- The TMDL was based on meeting the fecal 30-day geometric mean target of 200 MPN/ 100 ml, which for these watersheds was estimated to be more stringent level than the allowable exceedance of the single sample standard. This approach also provides assurance that the E. coli single sample standard will not be exceed.

- The load reductions established in this TMDL were based on reduction required during the two different critical year conditions. A wet year when storm loads are high, and a more typical dry year when base flows and assimilative capacity is low. This adds a margin of safety for more typical years.

### 6.4 Summary of pollutant reductions

The percent reduction is calculated based on estimated existing loads as determined by the model output and is provided for informational purposes only. Although localized load reductions may vary based on subwatershed, these allocations provide a watershed-wide summary of the expected load reduction needs by source type. The loads presented herein were derived from the 4-year average (1992-1995) of the simulation period, for all loads entering the Malibu Creek Watershed system. Future monitoring and assessment may result in refining these estimates.

## 7. IMPLEMENTATION PLAN

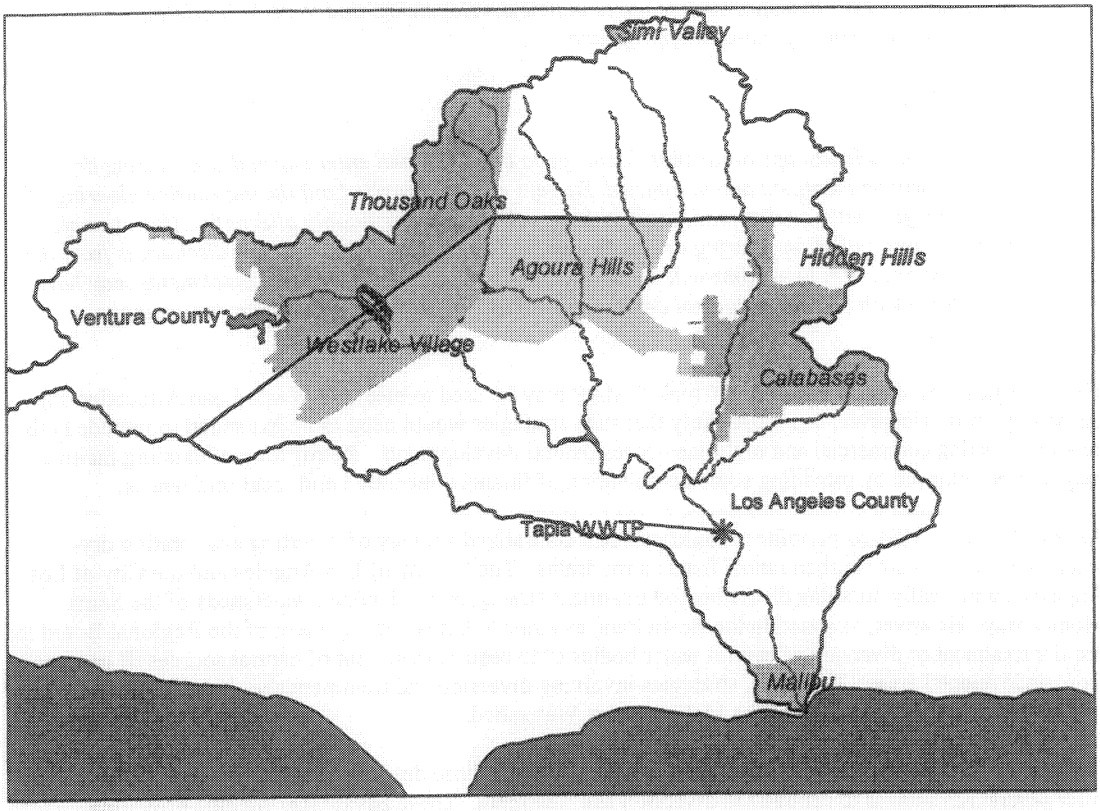
The objective of this section is to develop an implementation plan that will demonstrate a manner to which the waste load and load allocations developed for the Malibu Creek Coliform TMDL can be met. Where possible Regional Board staff considered implementation measure that have been proposed or discussed in publicly available stakeholder developed watershed management plans or Regional Board policies.

The Porter Cologne Water Quality Control Act prohibits the Regional Board from prescribing the method of achieving compliance with water quality standards, and likewise TMDLs. Below staff have identified some potential implementation strategies; however, there is no requirement to follow the particular strategies proposed herein as long as the maximum allowable exceedance days for each time period are not exceeded.

### 7.1 Responsible Jurisdictions, Agencies and Entities

The cities of Calabasas, Malibu, Westlake Village, Agoura Hills, Hidden Hills, Simi Valley, Thousand Oaks, the Counties of Los Angeles and Ventura, California Department of Parks and Recreation, National Park Service, and Santa Monica Mountains Conservancy, and Caltrans are jointly responsible for meeting the TMDL requirements for urban runoff in the for the Malibu Creek Watershed. On-site, commercial and multi-family facilities served by on-site wastewater treatment systems are subject to Waste Discharge Requirements are individually responsible for their discharges and are responsible entities. To the extent that single-family on-site wastewater treatment systems continue to be regulated by local agencies, the local agency will be the responsible agency. Should the regulation of single family residential on-site wastewater treatment systems revert to the Regional Board, the owners of those systems will become the responsible entity (see following subsection on single-family systems). The cities and the counties may jointly decide how to achieve the necessary reductions in exceedance days at each compliance point by employing one or more of the implementation strategies discussed below or any other viable strategy. Since, the majority of the Malibu Creek Watershed is located in an unincorporated area of the County of Los Angeles, the County of Los Angeles is the primary jurisdiction. Staff expects that the additional monitoring and source characterization outlined in the monitoring plan in Section 8 will assist municipalities in focusing their implementation efforts on key land uses, critical sources and storm periods.

**Figure 6 - Jurisdictions within the Malibu Creek Watershed**




## 7.2 Implementing Strategies for Achieving Allocations

Municipal Stormwater Permits

As required by the federal Clean Water Act, discharges of pollutants to the Malibu Creek Watershed from municipal storm water conveyances are prohibited, unless the discharges are in compliance with a NPDES permit. The Los Angeles County Municipal NPDES Storm Water Permit (Board Order No. 01-182; NPDES No. CAS004001) and the Ventura County Municipal Storm Water Permit (Board Order No. 00-108; NPDES No. CAS004002) will be key implementation tools for this TMDL. Future storm water permits will be modified in order to address implementation and monitoring of this TMDL and to be consistent with the waste load allocations of this TMDL.

A requirement of the Los Angeles County Municipal Storm Water Permit is that a Watershed Management Area Plan (WMAP) must be developed that include actions that address water quality problems and concerns that are unique to the six watershed areas of Los Angeles County. The WMAP for the Malibu Creek Watershed was developed in 2001. A brief description of some proposed implementation measures applicable to this TMDL are cited from the WMAP are presented below:

> *Permeable Urban Landscapes*
>
> *Using the soils data on GIS, the Council of Governments will identify opportunities to increase permeability on new urban landscapes, parking lots and street parking lanes. Cities and the County will take the responsibility of implementing the identified opportunities. Technologies have been developed to safely allow storm water infiltration in parking lots and along street corridors,*

*which provide functions of flow attenuation and water quality improvement. Extensive opportunities exist to install such features in new developments, and to retrofit existing development when upgrading is appropriate.*

*Storm Drains*

*Over-irrigated landscape areas that discharge to the street and enter storm drains during dry weather will be identified and minimized. Surveys could be carried out during routine clearing of catch-pits for water quality maintenance. Where there is a practicable alternative (for example using porous, pollution-filtering drainage galleries to encourage infiltration) discharges from the storm water system to streams will be blocked. To enable this, the outfall's catchments may have to be fitted with discharge control devices as well as replacing pipes with porous drainage galleries.*

The strategies described in the Malibu Creek WMAP may be used to meet the Waste Load Allocation for the MS4 permit. However, it is most likely that such strategies would need to be expanded to include both new and existing commercial and high-density residential developments. Retrofitting of existing facilities may best be achieved by providing some combination of financial incentive and local ordinances.

Alternatively, the MS4 co-permittees could pursue a centralized strategy of diverting and treating dry-weather and wet-weather urban runoff from storm drains. The County of Los Angeles and the City of Los Angeles are presently pursuing diversion and treatment strategies in urbanized watersheds of the Santa Monica Bay. However, as stated in the Basin Plan, as amended, it is not the intent of the Regional Board to require treatment or diversion of natural water bodies or to require treatment of natural sources of bacteria from undeveloped areas. Therefore, strategies involving diversion and treatment should be limited to the higher-density developed areas of the Malibu Creek Watershed.

Distributed on-site retention and treatment strategies, such as those described in the Malibu Creek WMAP, offer several advantages to centralized diversion and treatment. These advantages include providing incentives to the individual property owners to reduce dry-weather runoff from irrigation overspray and to encourage architectural designs to maximize non-permeable surfaces. On-site retention systems also reduce wet-weather flows, and the potential for downstream flooding. A distributed onsite structural control strategy is based on the premise that specific land uses, critical sources, or specific periods of a storm event can be targeted to achieve the TMDL waste load allocations. For the Malibu Creek Watershed the target land uses identified are commercial/industrial and high density residential.

Structural controls may include placement of storm water treatment devices specifically designed to reduce bacteria densities or storage and infiltration facilities at critical upstream points in the storm water conveyance system. A treatment system may be further targeted to a specific storm period such as the first 0.5-inch or 1 inch if the bacteria wash-off pattern mimics a 'first-flush' effect. The results from effluent sampling indicate removal rates of 97 percent for fecal coliform bacteria (90 percent for dissolved nitrogen and 90 percent phosphorus). A description of a potential control strategy taken from USEPA Factsheet (USEPA, 1999) on modular treatment system is provided below:

*A modular treatment system consists of a series of sedimentation chambers and small constructed wetlands. The wetlands are contained within a modular tank. A storm water treatment system currently on the market can be applied in residential areas, as well as, industrial/commercial developments. A diagram of the such a system in located in Appendix 6. Also, a USEPA fact sheet is located in Appendix 6. The systems are suitable for the diverse settings that exist in the Malibu Creek Watershed: coastal and inland areas. These systems are protective of groundwater by removing pollutants prior to infiltration. Soil types and high water tables surrounding the modular unit will not limit the effectiveness of the system.*

*Influent is conveyed from a catch basin through piping to sedimentation chambers and subsequently to the soil wetlands portion of the treatment system. The system has a static holding volume of 5,270 liters (1,390 gallons). The basis for the system sizing is the static holding volume*

*plus associated detention structures. Generally, 1-2 units are required for each acre of impervious surface. The first flush volume is stored in the preliminary storage structures (tanks or underground pipes). The system captures and treats the first half-inch of all the smaller (routine) storms and treats the first flush of the large (less common) storms. A 0.5-inch storm requires 1 tank per acres, and a 1-inch storm requires 2 tanks per acres.*

Dry -Weather Urban Runoff Reduction

In order to achieve the reductions required to meet the load allocation for dry weather urban runoff, a runoff reductions program must be implemented. The Malibu Creek Watershed Urban Runoff Reduction Project is a runoff reduction program developed by the Las Virgenes Municipal Water District and cities of Westlake Village, Calabasas, and Agoura Hills. This program will identify sources of commercial and residential urban runoff by a combination of curbside observations and computer analysis of water use (LVMWD, 2003). The sources of dry weather runoff identified will be offered technical assistance by the LVMWD staff to reduce runoff. An example of a mitigation measure offered LVMWD staff is tuning of irrigation systems to address inefficient irrigation practices. Water use and runoff will be monitored to measure the effectiveness of the program at reducing urban runoff (LVMWD, 2003). Although elimination of dry-weather urban runoff is the preferred strategy, it is likely that measures employed to control wet-weather urban runoff, also will control dry-weather urban runoff.

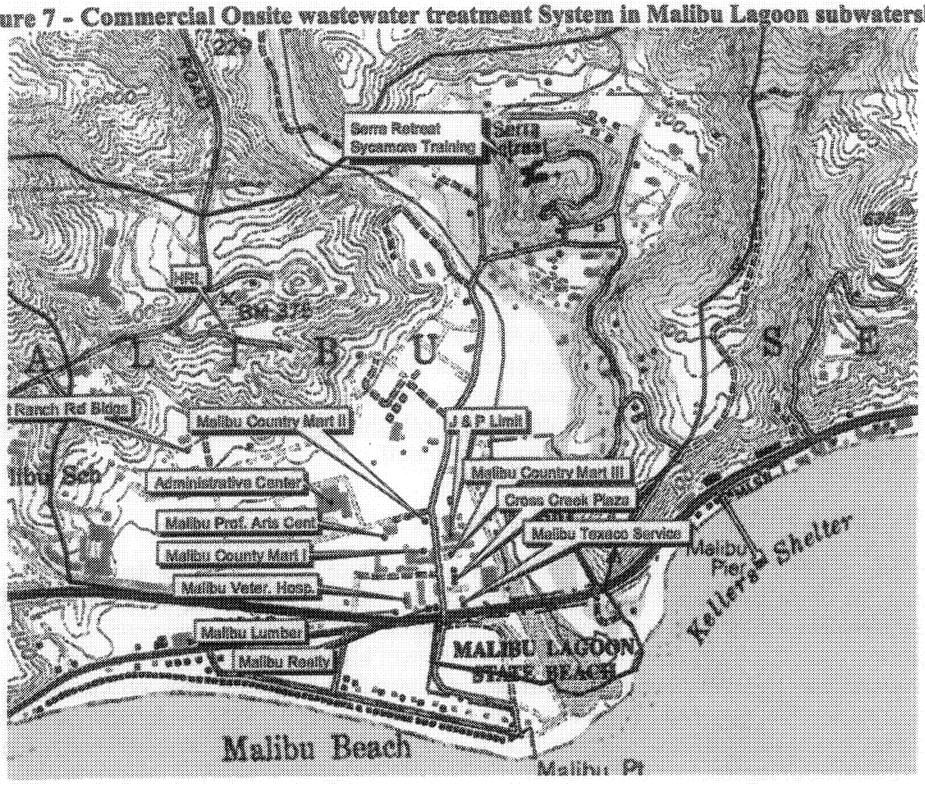
On-Site Wastewater Treatment Systems

On-site treatment systems were identified as a potential major anthropogenic source of dry-weather exceedances of the single sample and 30 day geometric limits. These systems are located within the City of Malibu and the unincorporated rural residential areas. Based on staff's analyses, commercial and multi-family systems represent the highest bacteria loadings and are of highest priority. However, private residential systems may also cause exceedances of bacteria standards, especially when systems are not properly sited, designed, or operated. These situations are more likely to result in bacterial contamination of surface waters when inadequate systems, are located in areas of high groundwater tables and in close proximity to the creek or lagoon.

Commercial and Multi-Family Systems

Commercial and multi-family systems are regulated by the Regional Board (Order No. 01-031). These systems are confined to the City of Malibu, and within the Malibu Creek Watershed, are located in the Civic Center area. The commercial/multi-family systems targeted for reduction are located in the Malibu Civic Center area (see Figure 6). Some of these onsite wastewater treatment systems may be located adjacent to the lagoon, in a groundwater table with historic levels that do not allow as least 10 feet between the groundwater and the wastewater distribution system. The specific vertical separation of these systems to groundwater has not yet been determined. Commercial multi-family onsite wastewater treatment systems located within the aforementioned commercial centers were the focus of Los Angeles Regional Board Resolution 98-023. This resolution provided direction to the Executive Officer to require the submittal of Reports of Waste Discharge for all discharges from multi-family and commercial onsite wastewater treatment systems located in the Malibu Creek Watershed.

**Figure 7 - Commercial Onsite wastewater treatment System in Malibu Lagoon subwatershed**




*Waste Discharge Requirements*

WDRs will be the mechanism for implementation of the onsite wastewater treatment system Load Allocations (LAs) derived from this TMDL for commercial and multifamily occupancies. The LAs developed for this TMDL will be established as WDR permit limits for the individual onsite wastewater treatment systems. The WDRs have specific prohibitions on onsite wastewater treatment systems within 10 feet of the highest historical groundwater levels.

The *Onsite Wastewater Treatment Systems Manual* (USEPA, 2002) has been released since the General WDR requirements were released in early 2001. This manual states: "Normal operation of septic tank/infiltration systems results in retention and die-off of most, if not all, observed pathogenic bacterial indicators with 2 to 3 feet (60 to 90 centimeters) of the infiltrative surface (USEPA, 2002; page 3-33)." However, the USEPA Manual may not have considered commercial and multi-family systems with higher flow rates that have a greater potential of saturating underlying soils. Also, the study must presume 2 to 3 feet of suitable soil types for infiltration and treatment. Systems overlying fractured bedrock, which occurs within the Malibu Creek watershed, may contaminate groundwater even with 10 feet or more of separation. In short, site specific variables must be taken into account to positively identify systems that are contributing to groundwater or surface water contamination.

Within the Malibu Creek Watershed, the recently renewed WDRs require disinfection for commercial and multifamily occupancies. Three types disinfection technology are available to commercial and multifamily WTS: chlorination, ozonation, and ultraviolet (UV) disinfection. The USEPA onsite manual (USEPA, 2002, page 3-33) also lists the typical pathogen survival time as less than 70 days. Therefore, systems

located with greater than a specific residence time (using an appropriate safety factor) in groundwater away from surface waters, should not require disinfection. Although each technology is capable of achieving the reductions required by this TMDL, chlorination is more cost effective, and thus more widely used (USEPA, 1999). The owners of the on-site commercial and multi-family systems are individually responsible for complying the WDRs, which will be written to comply with the load allocations for this TMDL.

*Centralized Waste Water Treatment Facility*

The City of Malibu has developed a conceptual plan to centralize wastewater treatment, disposal, and reuse in the Civic Center area (City of Malibu, 2003). The plan proposes connecting existing and proposed commercial properties of the Civic Center to wastewater reclamation facility (Questa, 2003). Wastewater will be treated to tertiary standards for wastewater reclamation. The facility will include disinfection and nitrogen removal. The system would provide redistribution of the reclaimed wastewater back to the commercial properties where it was generated, for use as non-potable water and irrigation. Questa Engineering Corporation provided a preliminary assessment of the feasibility of installing a community wastewater reclamation facility.

Single-Family Systems

The Regional Board issued waivers for residential systems in the early 1950's as resolutions Nos. 52-4 and 53-6. The resolutions waived reporting and permitting requirements to the Regional Board for wastewater treatment systems from single-family dwellings. The waivers allowed local agencies to approve and permit this specific group of wastewater treatment systems in accordance with local ordinances. These waivers are conditional and maybe terminated at any time by the Regional Board. Recent legislation amending sections 13269 of the CWC (senate Bill 390) requires that the Regional Board review its wastewater treatment system waivers and either renew or terminate them by June 30, 2004. In addition the legislature adopted Assembly Bill 885 in September 2000, which amended sections 13290 and 13291 of the CWC. The newly amended sections require that the State Board adopt statewide regulations or standards for permitting and operation of wastewater treatment systems by January 1, 2004. Key requirements of Section 13290 and 13291 are presented below:

- minimum operating requirements that may include siting, construction, and performance requirements
- requirements for systems adjacent to impaired waters identified pursuant to subdivision (d) of section 303 of the Clean Water Act (33 U.S.C. Sec 1313(d));
- requirements authorizing a qualified local agency to implement systems/standards/regulations within its jurisdiction, if the local agency request such authorizations;
- requirements for corrective actions when systems fail to meet requirements or standards;
- minimum requirements for monitoring to determine system performance, if applicable;
- exemption criteria to be established by regional boards; and,
- requirements for determining systems are subject to a major repair.

Pursuant to SB 390, the Board must make a finding that the waiver for residential systems does not harm water quality or public health. In order to make such a finding, staff presently are negotiating Memoranda of Understanding (MOUs) with local agencies to ensure adequate regulation of on-site systems. At a minimum, it was thought that the MOU would incorporate the AB 885 regulations. However, it now appears that the AB 885 regulations may not be finalized in time to meet the SB390 deadline. Furthermore, regardless of the status of AB 885 regulations, the Board may consider whether the MOU will ensure compliance with the TMDLs, when granting a waiver. Without an MOU, the Board may not be able to make the requisite findings to continue the waiver. In which case, the regulation of single family systems would revert to the Regional Board.

Regulation of the single family onsite systems will be regulated by local agencies subject to an MOU or in lieu of an MOU, by the Regional Board directly, via a Waste Discharge Requirement. Owners of single family systems subject to Waste Discharge Requirements will become responsible entities under this TMDL. WDRs will be written to comply with the load allocations specified in this TMDL.

Regardless of the oversight mechanism, the requirements for on-site systems should include a demonstration that the systems are meeting the load allocations under the TMDL. Such a demonstration may include a site assessment evaluating depth to groundwater during times when the groundwater table is high, presence of fractured bedrock, and proximity to surface water bodies and/or groundwater monitoring. Absent such a demonstration, or upon finding that the systems are not meeting the TMDL allocations, system upgrades may be required. These may include disinfection or alternative onsite systems. Operation of disinfection systems may be problematic for individual homeowners, who may not have the time or the knowledge to ensure proper operation. In some cases, where systems will require more active maintenance and operation, an operating permit program, such as adopted by the City of Malibu in Ordinance 242, or a benefit assessment district may be required.

Technologies, and design criteria, are currently available for single family residential systems, which could provide the necessary level of bacterial reduction required to meet load allocations. For example, systems that have disposal fields, which do not meet the minimum vertical, and/or horizontal setback requirements from surface/groundwater, may need to incorporate advanced treatment with disinfection, alternative soil absorption fields. For example, a sewage treatment mound is a potential alternative for problem locations. A mound is disposal fields elevated by sand fill to provide adequate separation between the disposal field and saturated soil conditions. Elevation of the disposal field eliminates the "short circuiting" of effluent with groundwater, and allows for bacterial degradation within the mound disposal field. Mounds treatment systems are a standard technology for single-family residences (Solomon et al., 1998). However, mounds have specific land area requirements and may not be appropriate on many existing parcels in Malibu. A mound system is a specific example of an intermittent sand/media filter (USEPA, 2002). Other types of intermittent sand/media filters can provide similar attenuation of pathogenic bacteria (USEPA, 2002).

Lagoon Drains

The City of Malibu is in the process of installing an advanced disinfection system to collect storm water "first flush" and dry weather urban runoff from the three drains (Civic Center, Malibu Colony, and Cross Creek Road) which discharge into Malibu Lagoon estuary. The system is known as the Malibu Storm Drain Treatment Facility. Preliminary testing of the effluent from the system has demonstrated the ability to meet or the REC-1 standards for bacteria indicators.

Tidal Inflow

The sources of fecal bacteria in the surfzone were not assessed during this TMDL. Potential sources of tidal inflow loads maybe foreshore washing of bird feces, subsurface exchange of contaminated lagoon or groundwater, and ebb flow from the lagoon (Grant, 2002). It is anticipated that the upstream implementation measures (e.g., OSWTS and urban runoff) as well as implementation of the Santa Monica Bay TMDL will contribute to the reduction of surfzone fecal bacteria load.

## 7.3 Implementation Cost Estimates

Stormwater Structural Control Strategy

This cost estimate is based on the modular treatment system described in Section 7.2. Modular treatment systems are prefabricated. The cost for one unit is $4,900 and the installation cost is approximately $1,400. The estimated total cost for purchase and installation is $6,300. Per tank cost decrease as the number of units per site increase. The estimated maintenance cost for one tank is $80 to $120 every three to five years. The impervious area requiring treatment in the Malibu Creek Watershed is approximately 5,440 acres of commercial and residential landuse (Tetra Tech, 2002). Assuming a lot size of 1-acre per discharger, the preliminary cost estimate based on 5,440 units to treat 5,440 acres of impervious surface from the watershed is approximately $34,272,000. The cost were based on the StormTreat Systems Sizing Worksheet.xls located in Appendix 6.

Commercial and Multi-family Onsite WastewaterTreatment Systems

Disinfection systems will likely be required for many commercial and multi-family systems. The cost of disinfection systems is dependent on the manufacturer, the site, the capacity of the plant, and the characteristics of the wastewater to be disinfected. In addition, the annual operation and maintenance costs for disinfection include power consumption, chemicals and supplies, miscellaneous equipment repairs, and personnel costs. The approximate capital cost of systems recently permitted within the Santa Monica Bay watershed are presented in Table 24.

**Table 24 - Cost of Recently Permitted Systems**

| Discharger | Volume | Treatment | Cost |
|---|---|---|---|
| Malibu RV Park | 18,000 gpd | FAST (biological) | 0.5 million |
| Malibu Bay Club | 59,000 gpd | Zenon (membrane) | 1.4 million |
| Trancas WWTP | 288,000 gpd | Secondary (biological) BMR | 1.6 million |
| POTW (other area) | 1.5 MGD | tertiary, with UV | 4.5 million |

Note: With the exception of the Malibu RV Park, the systems in Table 24 are designed to treat nutrients as well.

The conceptual plan estimates for the cost of collection, treatment, and redistribution for the core commercial facilities in the Civic Center area (see Figure 6) is approximately 12 million dollars. The estimated annual operation and maintenance cost are approximately $700,000. (Questa, 2003).

Upgrade of Residential Onsite Wastewater Treatment Systems

Single family onsite wastewater treatment systems that do not meet the requisite vertical or horizontal separation distance from groundwater and/or surface water may be upgraded to a mound type system. Design and installation of a mound system in rural parts of the country is approximately $10,000 (Solomon et al, 1998). On a national basis, the annual operation cost is approximately $150 – 200 (USEPA, 2002) An estimate of 440 failing systems was used for this TMDL (Tetra Tech, 2002). Assuming all failing system installed the mound system, and an average cost of $10, 000 per mound system, the total capital cost for the entire watershed is approximately $4,400,200.

Dry Weather Urban Runoff Reduction

The Malibu Creek Dry Urban Runoff Reduction Project is partly funded by the Proposition 13 Nonpoint Source Pollution Grant Program. The total cost to fund the program through May 2005 is $304,428 (LVMWD, 2003)

Lagoon Drains

Construction cost of the Civic Center Drain Treatment Facility is estimated at $850,000, with annual operating and maintenance cost estimated at $31,000 (City of Malibu, 2002). The cost for the three drains discharging to Malibu Lagoon is $2,500,000.

### 7.4 Implementation Schedule

The proposed implementation schedule shall consist of a phased approach as discussed below and outlined in Table 24. This TMDL, provides an implementation schedule allowing the responsible jurisdictions and responsible agencies time to gather additional monitoring data to validate the model and to better quantify the loading from birds in the Lagoon. The Regional Board may reconsider the TMDL in three years from the effective date to consider the impact of birds in the Lagoon and to revise the allowable days of exceedance based on additional studies. At that time, the Regional Board may revise the TMDL to allow for the Natural Source Exclusion, as provided for in the Basin Plan. The Natural Source Exclusion can only be applied after all anthropogenic sources of bacteria have been controlled. The schedule would allow six years from the effective date to meet both summer and winter dry-weather load and waste load allocations. This is a longer schedule than generally provided for in the Santa Monica Bay TMDL for summer dry weather. However, it is warranted due to the disperse nature of the sources and the foreseeable implementation measures. In Santa Monica Bay, the City of Los Angeles and the County of Los Angeles already had started construction of the implementation measure, which is dry-weather diversion of major storm drains. Therefore a three year schedule for summer dry weather was feasible.

To be consistent with the SMB Beaches TMDLs, the Regional Board intends to revise this TMDL, in conjunction with the revision of the SMB Beaches TMDLs. The SMB Beaches TMDLs are scheduled to be revised in four years: to re-evaluate the allowable winter dry-weather and wet-weather exceedance days based on additional data on bacterial indicator densities in the wave wash; to re-evaluate the reference system selected to set allowable exceedance levels; and to re-evaluate the reference year used in the calculation of allowable exceedance days. This TMDL is scheduled to be re-considered in three years from the effective date which will approximately coincide with the Santa Monica Bay TMDL revision. Until the TMDL is revised, the allowable number of winter dry-weather and wet-weather exceedance days will remain as presented in Table 23. Revising the TMDL will not create a conflict in the interim, since the TMDL does not require compliance during winter dry-weather or wet-weather until six and ten years, respectively, from the effective date of the TMDL. Therefore, the allowable exceedance days for winter dry-weather and wet-weather will be revised as necessary before the compliance deadlines.

**Table 25 - Summary of Implementation Schedule**

| | |
|---|---|
| 120 days after the effective date of this TMDL | Responsible jurisdictions and responsible agencies must submit a comprehensive bacteria water quality monitoring plan for the Malibu Creek Watershed to the Executive Officer of the Regional Board. The plan must be approved by the Executive Officer before the monitoring data can be considered during the implementation of the TMDL. The Executive Officer will consider cost in relation to the need for data. Monitoring cost will be considered with the benefits of protecting human health for persons swimming and wading in Malibu Creek and its tributaries, and for swimmers and surfers using downstream beaches that are impacted by the creek and lagoon. The purpose of the plan is to better characterize existing water quality as compared to water quality at the reference watershed,-and ultimately, to serve as a compliance monitoring plan. The plan must provide for analyses of all applicable bacteria indicators for which the Basin Plan has established objectives including E. coli. For fresh water and enterococcus for marine water. The plan must also include sampling locations that arespecified in Table 7-10.2, at least one location in each subwatershed, and areas where frequent REC-1 use is known to occur. However, this is not to imply that a mixing zone has been applied; water quality objectives apply throughout the watershed—not just at the sampling locations. |
| 1 year after effective date of this TMDL | 1. Responsible jurisdictions and responsible agencies shall provide a written report to the Regional Board outlining how each intends to cooperatively achieve compliance with the TMDL. The report shall include implementation methods, an implementation schedule, and proposed milestones. Specifically, the plan must include a comprehensive description of all steps to be taken to meet the 3-year summer dry weather compliance schedule, including but not limited to a detailed timeline for all category of bacteria sources under their jurisdictions including but not limited to nuisance flows, urban stormwater, on-site wastewater treatment systems, runoff from homeless encampments, horse facilities, and agricultural runoff.<br><br>2. If the responsible jurisdiction or agency is requesting an extension of the summer dry-weather compliance schedule, the plan must include a description of all local ordinances necessary to implement the detailed workplan and assurances that such ordinances have been adopted before the request for an extension is granted.<br><br>3. 3. Local agencies regulating on-site wastewater treatment systems shall provide a written report to the Regional Board detailing the rationale and criteria used to identify high-risk areas where on-site systems have a potential to impact surface waters in the Malibu Creek watershed. On-site wastewater treatment systems located in areas where there is (1) less than 10-ft separation between the bottom of the disposal field and historical groundwater , or (2) located |

| | |
|---|---|
| | less-than-250 foot setback from a 303(d) listed waterbody, or (3) located in areas of a documented nitrate or human bacterial problem in the surface or groundwater are considered high risk and are subject to disinfection requirements unless further assessment demonstrates that the systems are not impacting surface waters in the Malibu Creek watershed. Such demonstrations may include regional or site-specific groundwater monitoring or weekly upstream/downstream surface water monitoring,<br>4. If a responsible jurisdiction or agency is requesting an extension to the wet-weather compliance schedule, the plan must include a description of the integrated water resources (IRP) approach to be implemented, identification of potential markets for water re-use, an estimate of the percentage of collected stormwater that can be re-used, identification of new local ordinances that will be required, a description of new infrastructure required, a list of potential adverse environmental impacts that may result from the IRP, and a workplan and schedule with significant milestones identified. Compliance with the wet-weather allocations shall be as soon as possible but under no circumstances shall it exceed 10 years for non-integrated approaches or extend beyond July 15, 2021 for an integrated approach. The Regional Board staff will bring to the Regional Board the aforementioned plans for consideration of extension of the wet-weather compliance date as soon as possible. |
| 2 years after the effective date of this TMDL | The California Department of Parks and Recreation shall provide the Regional Board Executive Officer, a report quantifying the bacteria loading from birds to the Malibu Lagoon.<br><br>The Regional Board's Executive Officer shall require the responsible jurisdictions and responsible agencies to provide the Regional Board with a reference watershed study. The study shall be designed to collect sufficient information to establish a defensible reference condition for the Malibu Creek and Lagoon watershed. |

| | |
|---|---|
| 3 years after effective date of this TMDL**<br><br>** May be extended to up to 6 years from the effective date of this TMDL | Achieve compliance with the applicable Load Allocations and Waste Load Allocations, as expressed in terms of allowable days of exceedances of the single sample bacteria limits and the 30-day geometric mean limit during summer dry-weather (April 1 to October 31). In response to a written request from a responsible jurisdiction or responsible agency, the Executive Officer of the Regional Board may extend the compliance date for the summer dry-weather allocations from 3 years to up to 6 years from the effective date of this TMDL. The Executive Officer's decision to extend the summer dry-weather compliance date must be based on supporting documentation to justify the extension, including a detailed work plan, budget and contractual or other commitments by the responsible jurisdiction or responsible agency. |
| 3 years after effective date of this TMDL | The Regional Board shall reconsider this TMDL to:<br><br>(1) Consider a natural source exclusion for bacteria loadings from birds in the Malibu Lagoon if all anthropogenic sources to the Lagoon have been controlled.<br>(2) Reassess the allowable winter dry-weather and wet-weather exceedances days based on additional data on bacterial indicator densities, and an evaluation of site-specific variability in exceedance levels to determine whether existing water quality is better than water quality at the reference watershed,<br>(3) Reassess the allowable winter dry-weather and wet-weather exceedance days based on a re-evaluation of the selected reference watershed and consideration of other reference watersheds that may better represent reaches of the Malibu Creek and Lagoon.<br>(4) Consider whether the allowable winter dry-weather and wet-weather exceedance days should be adjusted annually dependent on the rainfall conditions and an evaluation of natural variability in exceedance levels in the reference system(s),<br>(5) Re-evaluate the reference year used in the calculation of allowable exceedance days, and<br>(6) Re-evaluate whether there is a need for further clarification or revision of the geometric mean implementation provision. |
| 6 years after the effective date of this TMDL | Achieve compliance with the applicable Load Allocations and Waste Load Allocations, expressed as allowable exceedance days during winter dry weather (November 1-March 31) single sample limits and the rolling 30-day geometric mean limit. |
| 10 years after the effective date of this TMDL<br><br>** May be extended up to July 15, 2021. | Achieve compliance with the wet-weather Load Allocations and Waste Load Allocations (expressed as allowable exceedance days for wet weather and compliance with the rolling 30-day geometric mean limit.)<br><br>The Regional Board may extend the wet-weather compliance date up to July 15, 2021 at the Regional Board's discretion, by adopting a subsequent Basin Plan amendment that complies with applicable law. |

## 8. AMBIENT BACTERIA WATER QUALITY AND COMPLIANCE MONITORING PLAN

Responsible jurisdictions and responsible agencies are jointly responsible for developing and implementing a comprehensive monitoring plan to better characterize existing water quality based on applicable bacteria water quality objectives and to assess compliance with the waste load allocations and load allocations in the TMDL. The monitoring plan must include all applicable bacteria water quality objectives and sampling frequency must be adequate to assess compliance with the 30 day geometric mean limits (i.e., at least 5 samples per 30 days). Ongoing monitoring programs developed by the Malibu Creek Watershed Management Committee as described below may fulfill the need for ambient monitoring data. However, the responsible jurisdictions and responsible agencies are ultimately accountable for ensuring that the monitoring requirements specified in this TMDL are met.

### 8.1 Malibu Creek Watershed Monitoring Plan

The Watershed Management Committee (composed of the cities of Calabasas, Agoura Hills, Westlake Village, and Malibu, and the County of Los Angeles) and the Las Virgenes Municipal Water District has been awarded a Coastal Nonpoint Source Control Program grant for $500,000 to implement the Malibu Creek Watershed Monitoring Program. The monitoring program was developed by members from the LARWQCB, State Department of Parks and Recreation, City of Calabasas, Las Virgenes Municipal Water District, Heal the Bay, City of Malibu, and UCS California Sea Grant staff. Monitoring data from this program may be used to fulfill a portion of the monitoring requirements under this TMDL. This may include fecal coliform and E. coli in the creeks, and total coliform, fecal coliform and enterococcus in the lagoon. The program is currently funded through March 2006.

### 8.2 Compliance Monitoring

For purposes of compliance monitoring, responsible jurisdictions and agencies shall jointly submit a compliance monitoring plan that specifies agreed upon sampling stations that will serve as compliance points. At a minimum, at least one sampling station will be located in each subwatershed. The sampling plan must also list the sampling parameters, methods of measuring flow, and sampling frequency. Responsible jurisdictions and/or agencies shall conduct daily or systematic weekly sampling at each compliance point. If weekly sampling is performed, then the days of allowable exceedance for single sample limits will be scaled accordingly.[6] Also if weekly sampling is conducted, the weekly sampling results will be assigned to the remaining days of the week in order to calculate the daily rolling 30-day geometric mean.

---

[6] The number of allowable exceedance days was scaled for weekly sampling by calculating the number of exceedances that would have been identified under a weekly sampling program at the reference beach during the critical year. The number of winter dry weather days that would have been sampled in 1993 under a weekly sampling regime was determined by solving for X in the following equation, where 80 days equals the number of winter dry-weather days during the critical year 1993.

$$\frac{\textbf{80 days}}{\textbf{365 days}} = \frac{\textbf{X}}{\textbf{52 weeks}}$$

Solving for the variable X yields 11.4, which was multiplied by 0.03, the historical exceedance frequency for winter dry-weather at the Leo Carrillo Beach, the reference beach in the Arroyo Sequit watershed (LARWQCB,2003). The adjusted allowable days of winter dry-weather exceedance days under a weekly sampling scenario is 1 day. Likewise, the adjusted allowable exceedance days during wet weather is 3 days when compliance points are sampled weekly. This is based on 75 wet-weather days in 1993, and a historical exceedance rate at the reference beach during wet-weather days of 0.22.

If the number of exceedance days is greater than the allowable number of exceedance days or the 30-day geometric mean is exceeded, then the responsible jurisdictions and agencies within the contributing subwatershed shall be considered out-of-compliance with the TMDL. Responsible jurisdictions or agencies shall not be deemed out of compliance with the TMDL if the investigation described in the paragraph below demonstrates that bacterial sources originating within the jurisdiction of the responsible agency have not caused or contributed to the exceedance.

If a single sample shows the discharge or contributing area to be out of compliance, the Regional Board may require, through permit requirements or the authority contained in Water Code section 13267, daily sampling at the downstream compliance point or at the existing downstream monitoring location (if it is not already) until all single sample events meet bacteria water quality objectives. Furthermore, if a creek location is out-of-compliance as determined in the previous paragraph, the Regional Board shall require responsible agencies to initiate an investigation, which at a minimum shall include daily sampling in the target receiving water body reach or at the existing monitoring location until all single sample events meet bacteria water quality objectives.

The estimated annual cost for the monitoring plan is $200,000. This is based on the cost of monitoring 24 sites on a weekly basis (one site in each of the 18 subwatersheds plus six additional sites where frequent REC-1 use is known to occur) for total coliform, fecal coliform, enterococcus, and E. coli bacteria. Monitoring cost will be considered with the benefits of protecting human health for persons swimming downstream and wading in Malibu Creek and its tributaries, and for swimmers and surfers using downstream beaches that are impacted by the Creek.

## 9. REFERENCES


Abramson, M.,. Padick. E.T. Schueman, G.O. Taylor, J. Olson, J. Safford, K. Starman, and J. Woodward. 1998. The Malibu Creek Watershed: A Framework for Monitoring, Enhancement and Action. Prepared for Heal the Bay and The California State Coastal Conservancy. The 606 Studio Graduate Department of Landscape Architecture, California State Polytechnic University, Pomona

Ambrose, R.F.., I.H. Suffet, and S.S. Que Hee. 1995. Enhanced environmental monitoring program at Malibu Lagoon and Malibu Creek. Prepared for the Las Virgenes Municipal Water District by the Environmental Science and Engineering Program at the University of California, Los Angeles.

Ambrose, R.F. and A. R. Orme. 2000. Lower Malibu Creek and Lagoon resource enhancement and management. Final report to the California State Coastal Conservancy. University of California, Los Angeles May 2000.

ASAE, 1998. ASAE Standards. Manure Production Characteristics. ASAE D384.1 DEC93

City of Malibu.2000. Proposition 13 Grant Application--Civic Center Stormdrain Treatment Facility

Colbough, Jim. 2003. Personal communication.

Consent Decree (Heal the Bay Inc., et al. v. Browner) C 98-4825 SBA

Entrix, 1999. Minimum Flow Recommendations for Malibu Creek. Prepared for the Las Virgenes Municipal Water District by ENTRIX, Inc, Walnut CA.

Flowers 1972. Measurement and management Aspects of Water Toxicology: The Malibu Creek Watershed, A mixed residential and Wilderness Areas

Haith, D.A., R. Mandel, and R.S. Wu. 1992. GWLF, Generalized loading functions, Version 2.0 Users Manual. Department of Agricultural and Biological Engineering, Cornell University, Ithaca, New York.

LARWQCB. 1994. Water Quality Control Plan for the Los Angeles Region. California Regional Water Quality Control Board, Los Angeles Region.

LARWQCB. 1996. 1996 Water Quality Assessment and Documentation. California Regional Water Quality Control Board, Los Angeles Region.

Los Angeles Regional Water Quality Control Board.1997. Fact Sheet: Order No. 97-135, Waste Discharge Requirements for Las Virgenes Municipal Water District (Tapia Water Reclamation Facility).

LARWQCB. 1998. Proposed 1998 list of impaired surface waters (the 303(d) List). March 24, 1998. California Regional Water Quality Control Board, Los Angeles Region.

LARWQCB, 2000. Malibu Technical Investigation. California Regional Water Quality Control Board, Los Angeles Region.

LARWQCB. 2002a. Draft 303(d) list. California Regional Water Quality Control Board, Los Angeles Region.

LARWQCB. 2002b. Total maximum daily load to reduce bacterial indicator densities at Santa Monica Bay Beaches during dry weather. California Regional Water Quality Control Board, Los Angeles Region. January 14, 2002.

LARWQCB. 2002c. Draft. Total maximum daily load to reduce bacterial indicator densities at Santa Monica Bay Beaches during wet weather. California Regional Water Quality Control Board, Los Angeles Region. November 7, 2002.

LARWQCB, 2003. Total maximum daily load to reduce bacterial indicator densities at Marina del Rey Harbor Mothers' Beach and Back Basins. California Regional Water Quality Control Board, Los Angeles Region. September 4, 2003.

LVMWD. 2002. Proposition 13 Grant Application--Nonpoint Pollution Program.

Lund, L.J., M.A. Anderson, and C. Amrhein. 1994. Evaluation of Water Quality for Selected Lakes in the Los Angeles Hydrological Basin. Prepared for the Los Angeles Regional Water Quality Control Board by the Department of Soil Science, University of California, Riverside, CA.

Manion, B.S. and J.H. Dillingham.1989. Malibu Lagoon: A Baseline Ecological Survey. Prepared for Los Angeles County Department of Beaches and Harbors and California State Department of Parks and Recreation. Topanga-Las Virgenes Resources Conservation District.

Orton, Randall. 2001. Personal Communications.

Reed, S.C., E.J. Middlebrooks, and R.W. Crites. 1988. Natural systems for waste management and treatment. McGraw-Hill. New York.

Tetra Tech. 2002. Nutrient and Coliform Modeling for the Malibu Creek Watershed TMDL Studies. Prepared for US Environmental Protection Agency Region 9 and the Los Angeles Regional Water Quality Control Board by Tetra Tech, Inc. Lafayette CA.

USEPA 2000. Guidance for Developing TMDLs in California

USEPA 2000a. Exfiltration in Sewer Systems, December, 2000. EPA 600-R-01-034

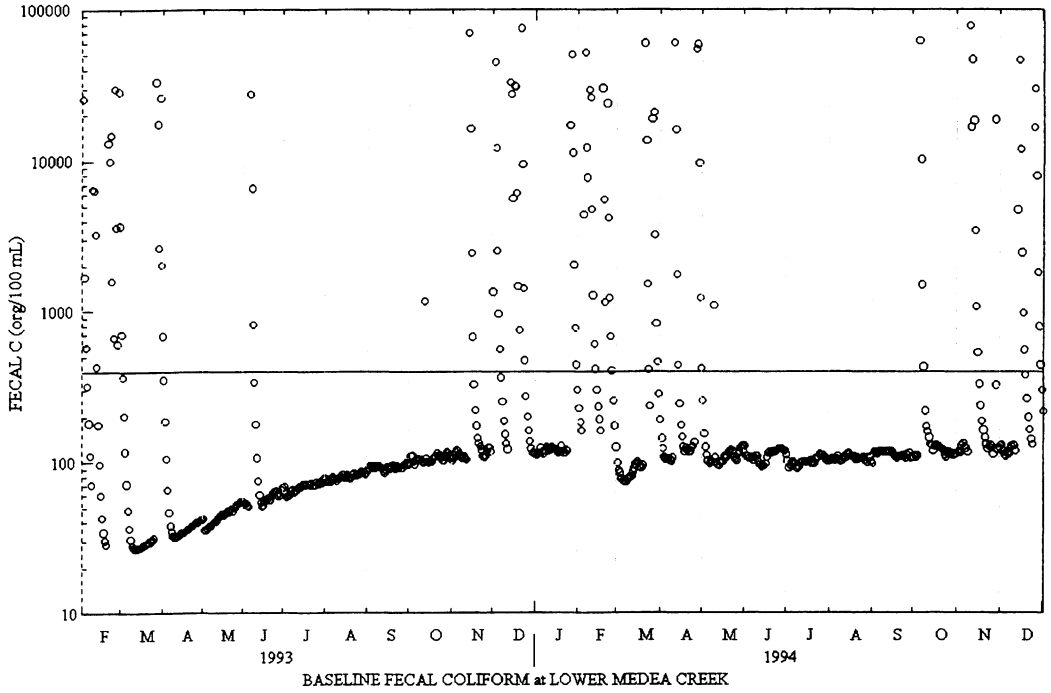
USEPA 2001. Protocol for Developing Pathogen TMDLs: First Edition Jan. 2001, EPA 841-R-00-0002

USEPA 2002. Onsite Wastewater treatment Systems Manual. February, 2002, EPA 625-R-00-0002

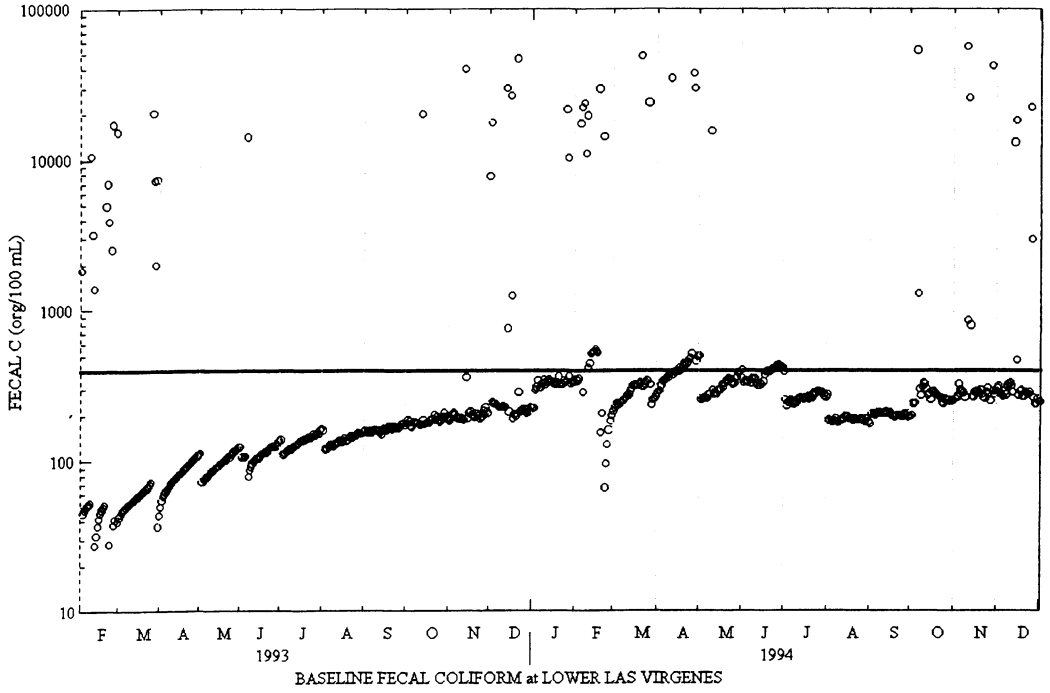
USEPA 2003. Consideration of Malibu Creek Enteric Virus Listing in TMDL Development. March 19, 2003

Warshall, P. and P. Williams. 1992. Malibu Wastewater Management Study: A Human Ecology of the New City. Prepared for the City of Malibu. Peter Warshall & Associates and Philip Williams & Associates, Ltd.

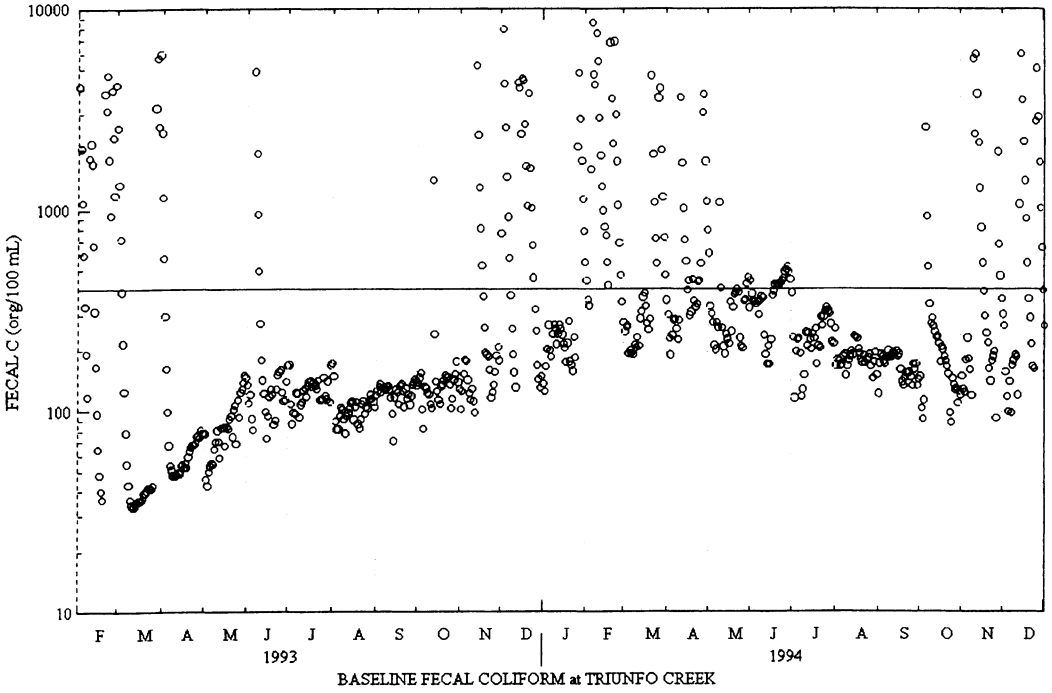
**Appendix 1- Baseline Single Sample Model Output**



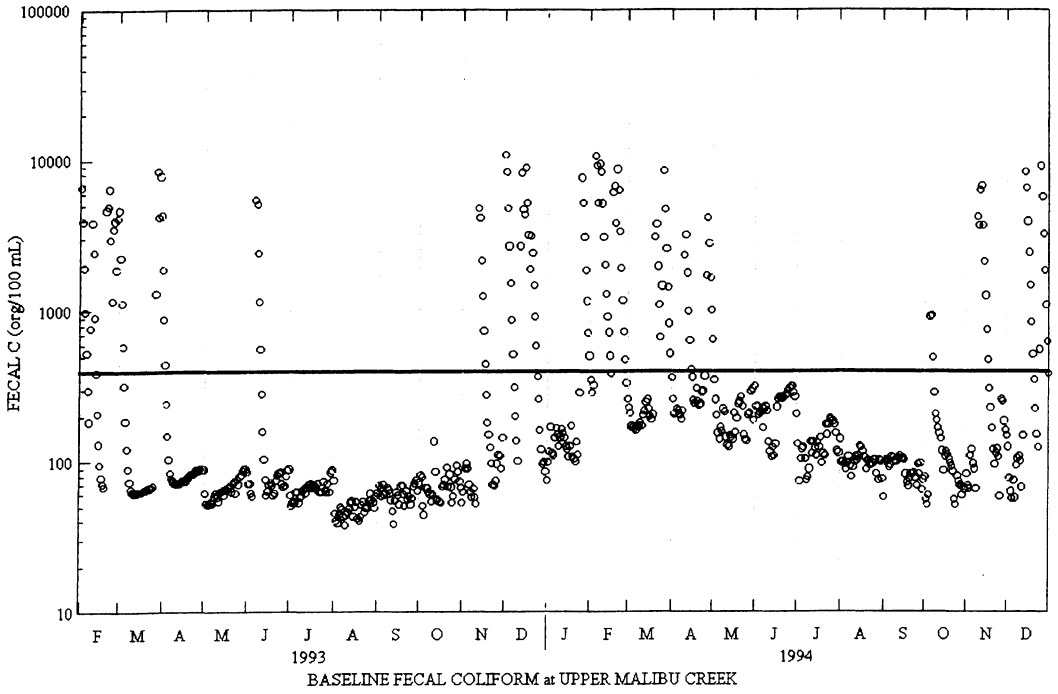

BASELINE FECAL COLIFORM at LOWER MEDEA CREEK



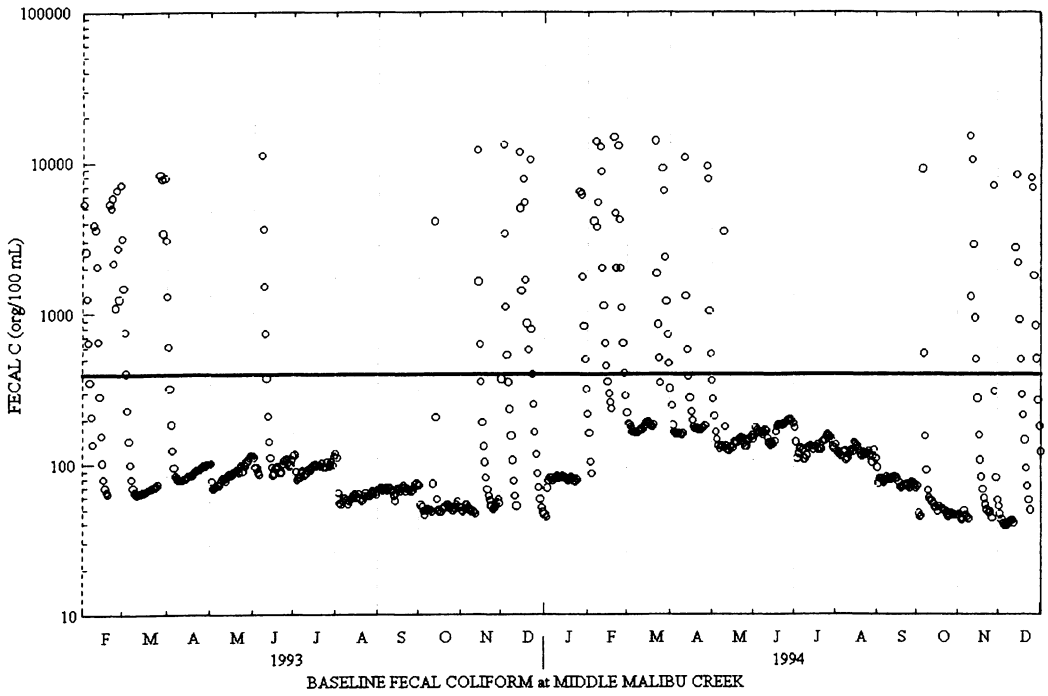

BASELINE FECAL COLIFORM at LOWER LAS VIRGENES



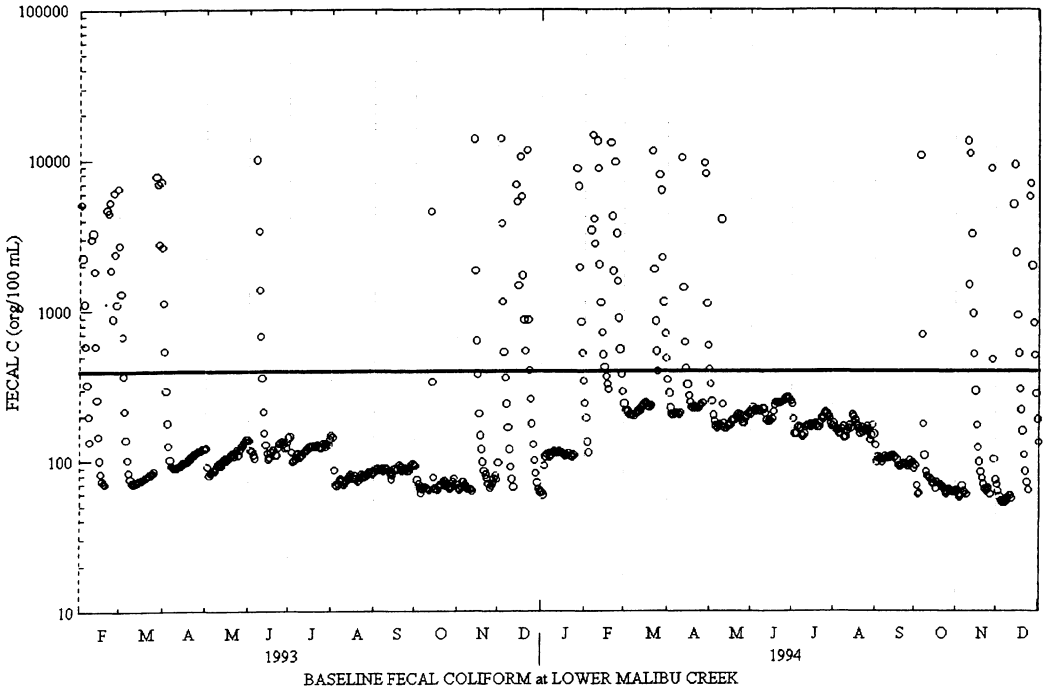
BASELINE FECAL COLIFORM at TRIUNFO CREEK



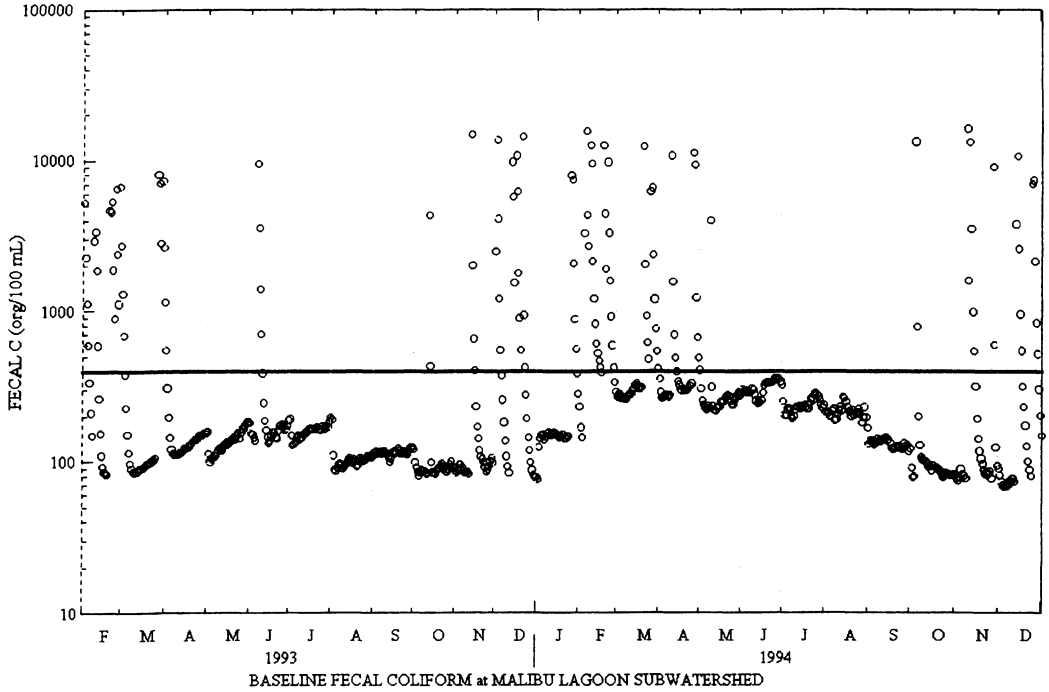
BASELINE FECAL COLIFORM at UPPER MALIBU CREEK



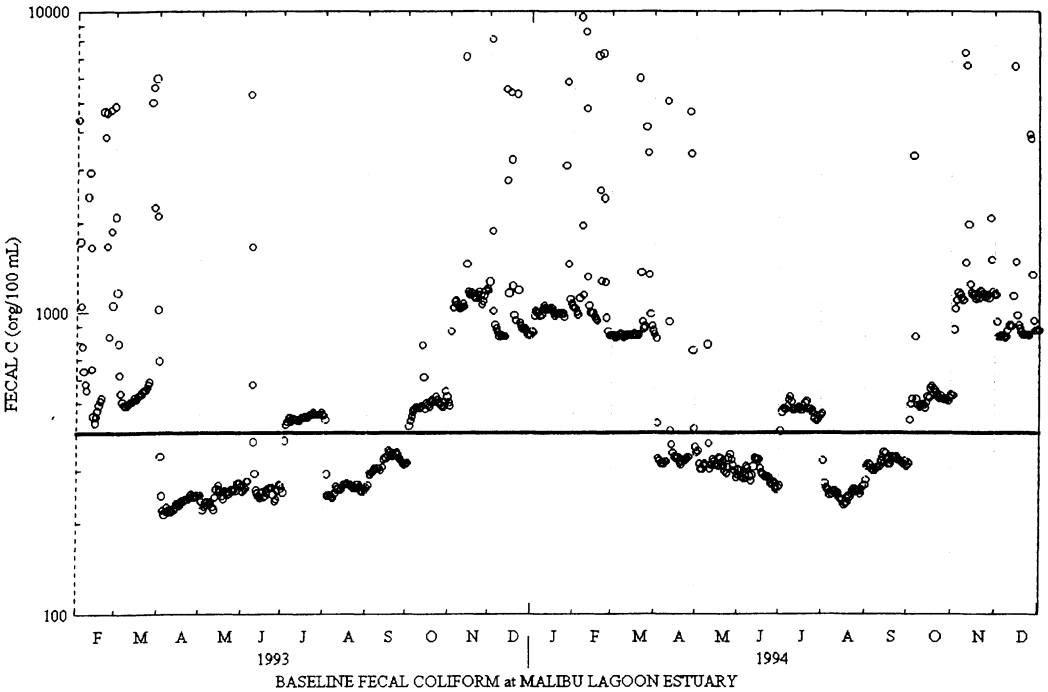

BASELINE FECAL COLIFORM at MIDDLE MALIBU CREEK




BASELINE FECAL COLIFORM at LOWER MALIBU CREEK

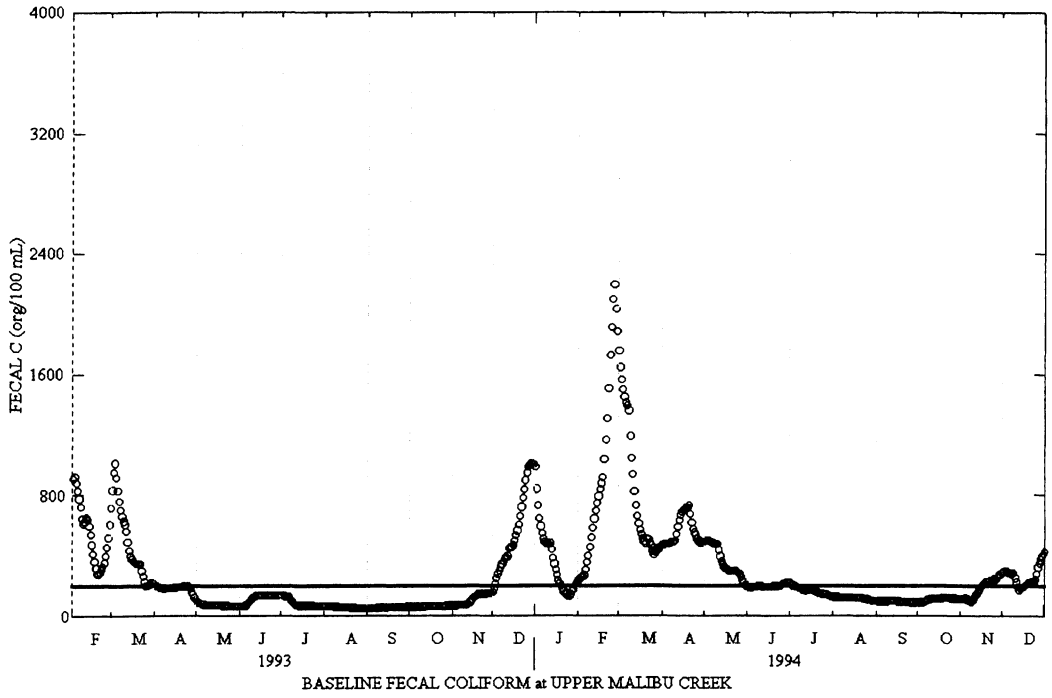


BASELINE FECAL COLIFORM at MALIBU LAGOON SUBWATERSHED

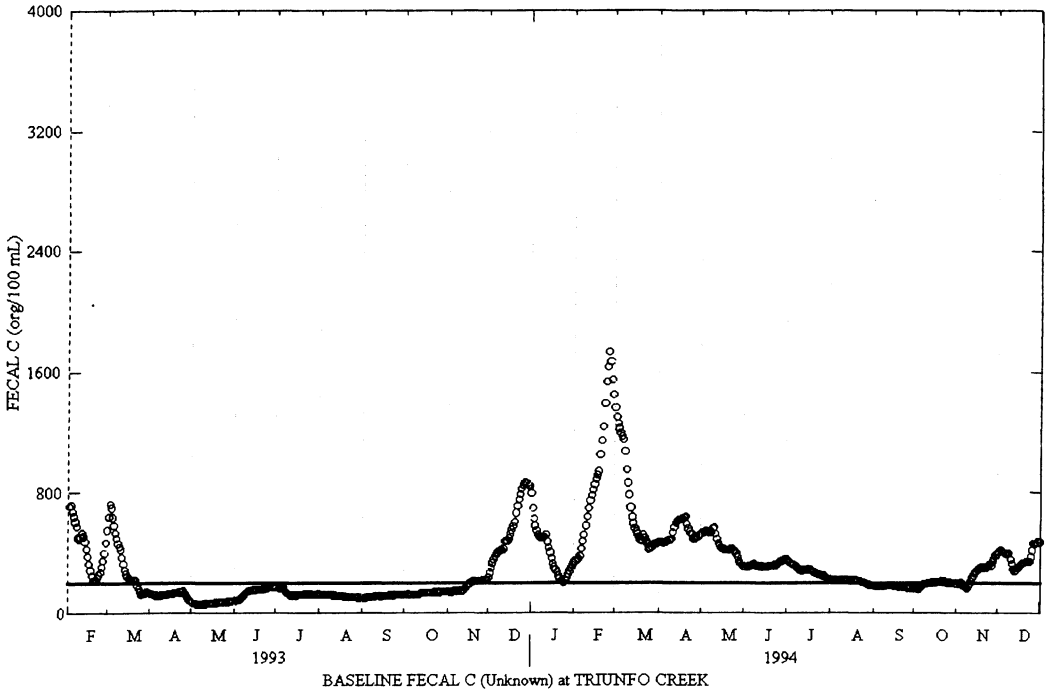


BASELINE FECAL COLIFORM at MALIBU LAGOON ESTUARY

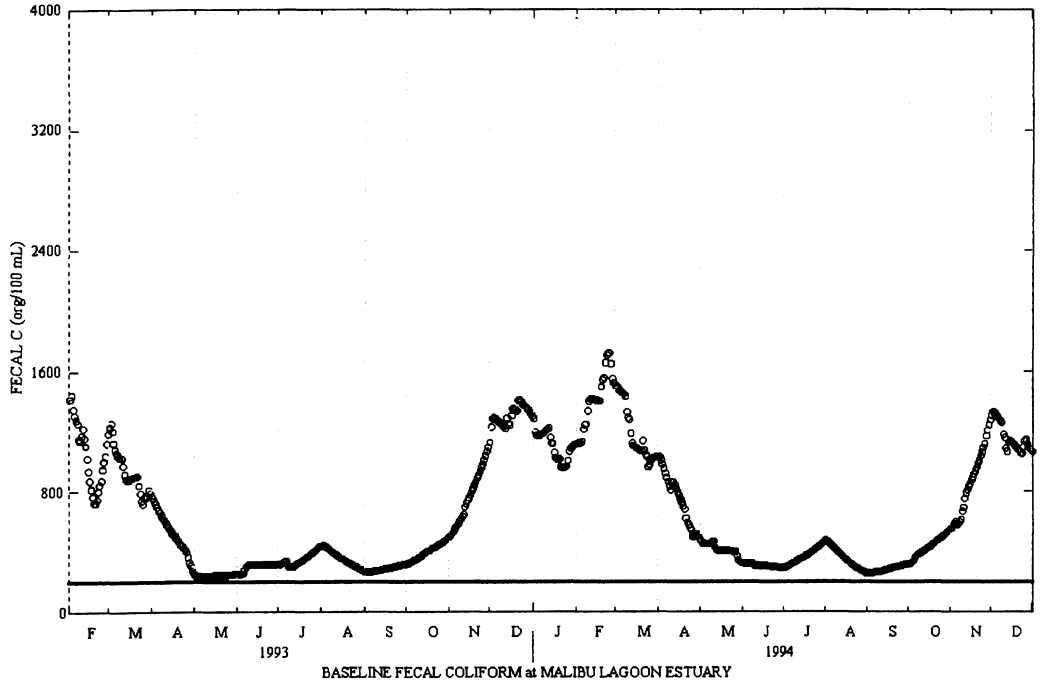
## Appendix 2 - Baseline 30-Day Running Geometric Mean Model Output



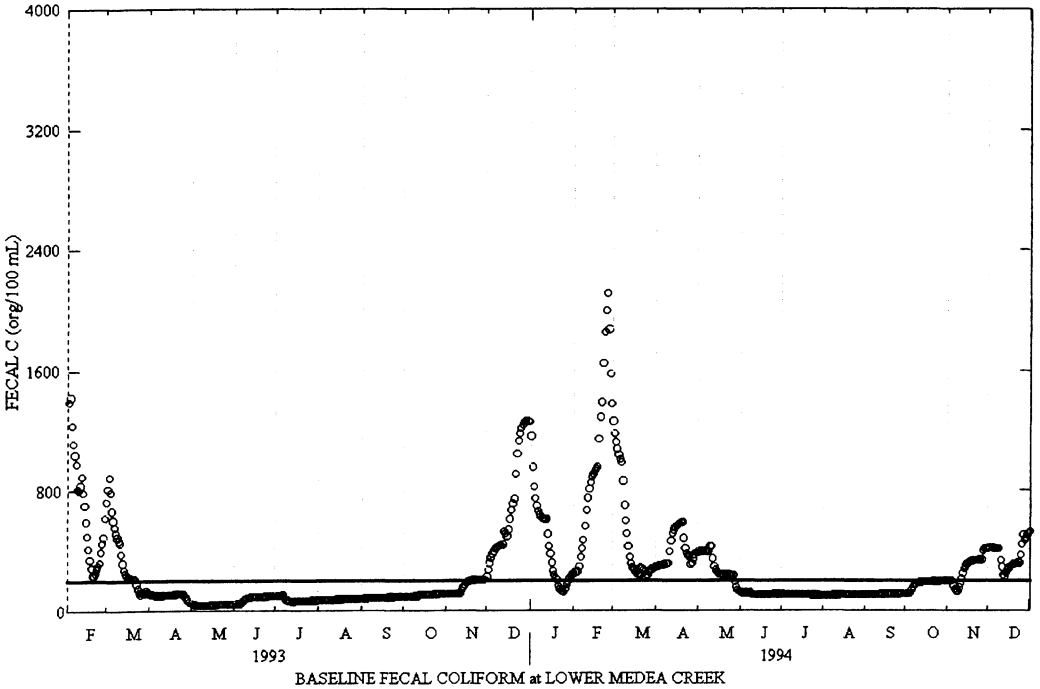

BASELINE FECAL COLIFORM at UPPER MALIBU CREEK



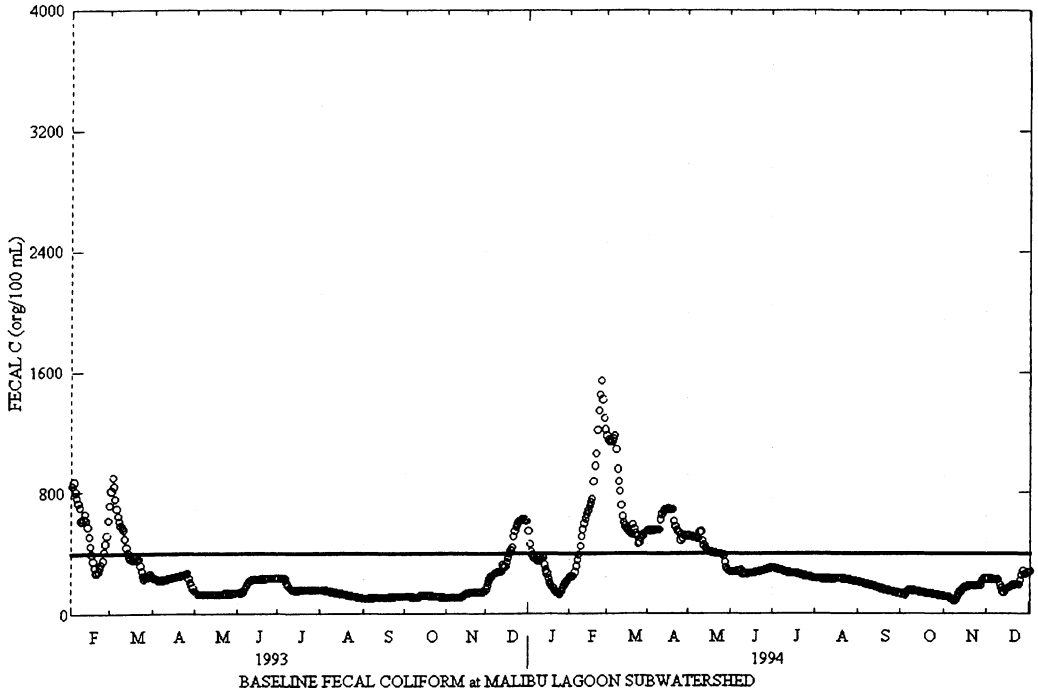

BASELINE FECAL C (Unknown) at TRIUNFO CREEK



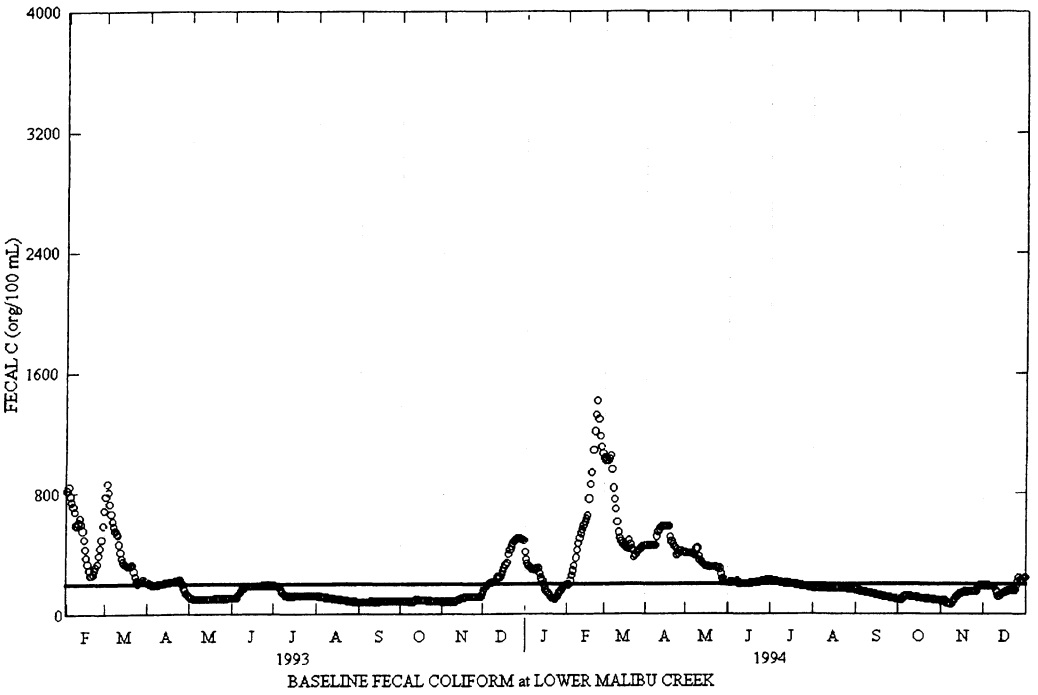
BASELINE FECAL COLIFORM at MALIBU LAGOON ESTUARY



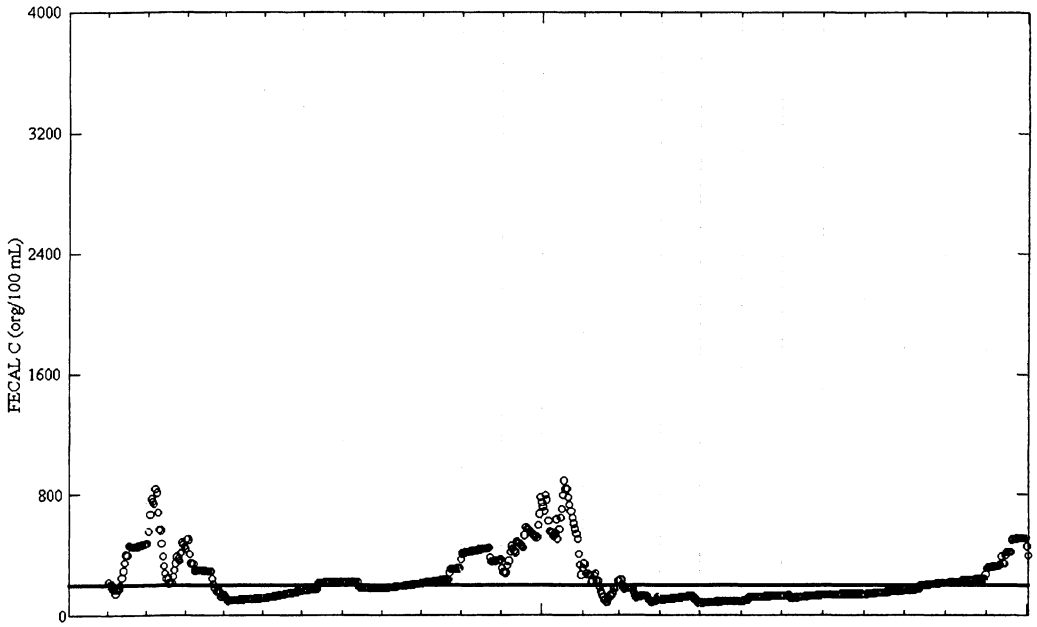
BASELINE FECAL COLIFORM at LOWER MEDEA CREEK



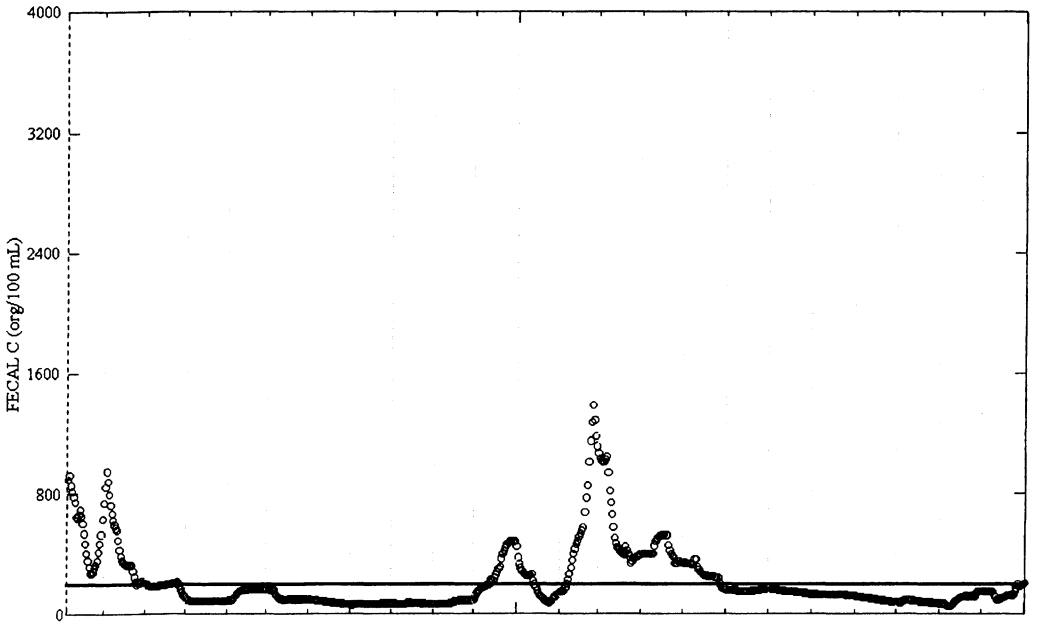
BASELINE FECAL COLIFORM at MALIBU LAGOON SUBWATERSHED



BASELINE FECAL COLIFORM at LOWER MALIBU CREEK

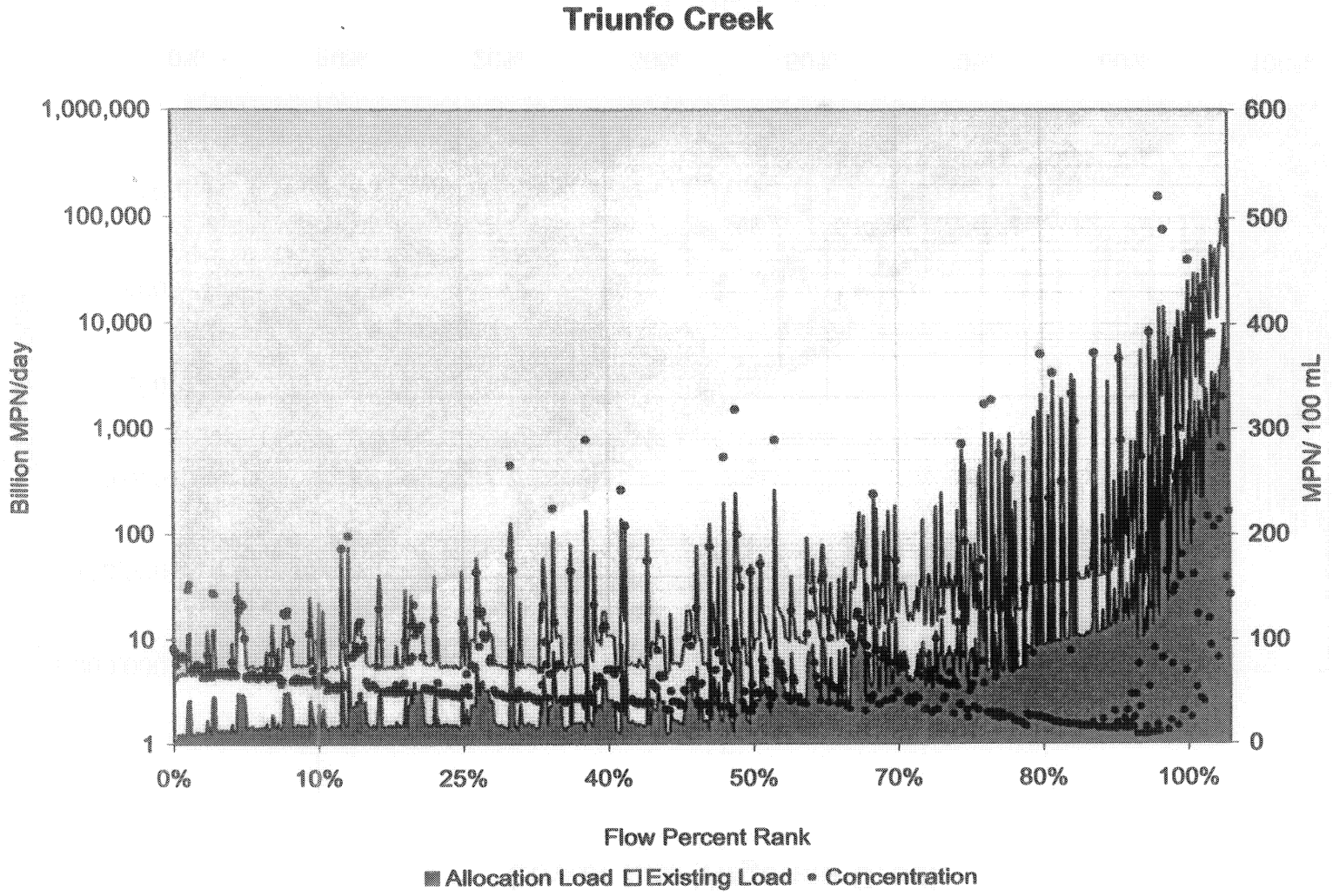


BASELINE FECAL COLIFORM at MALIBU LAGOON ESTUARY

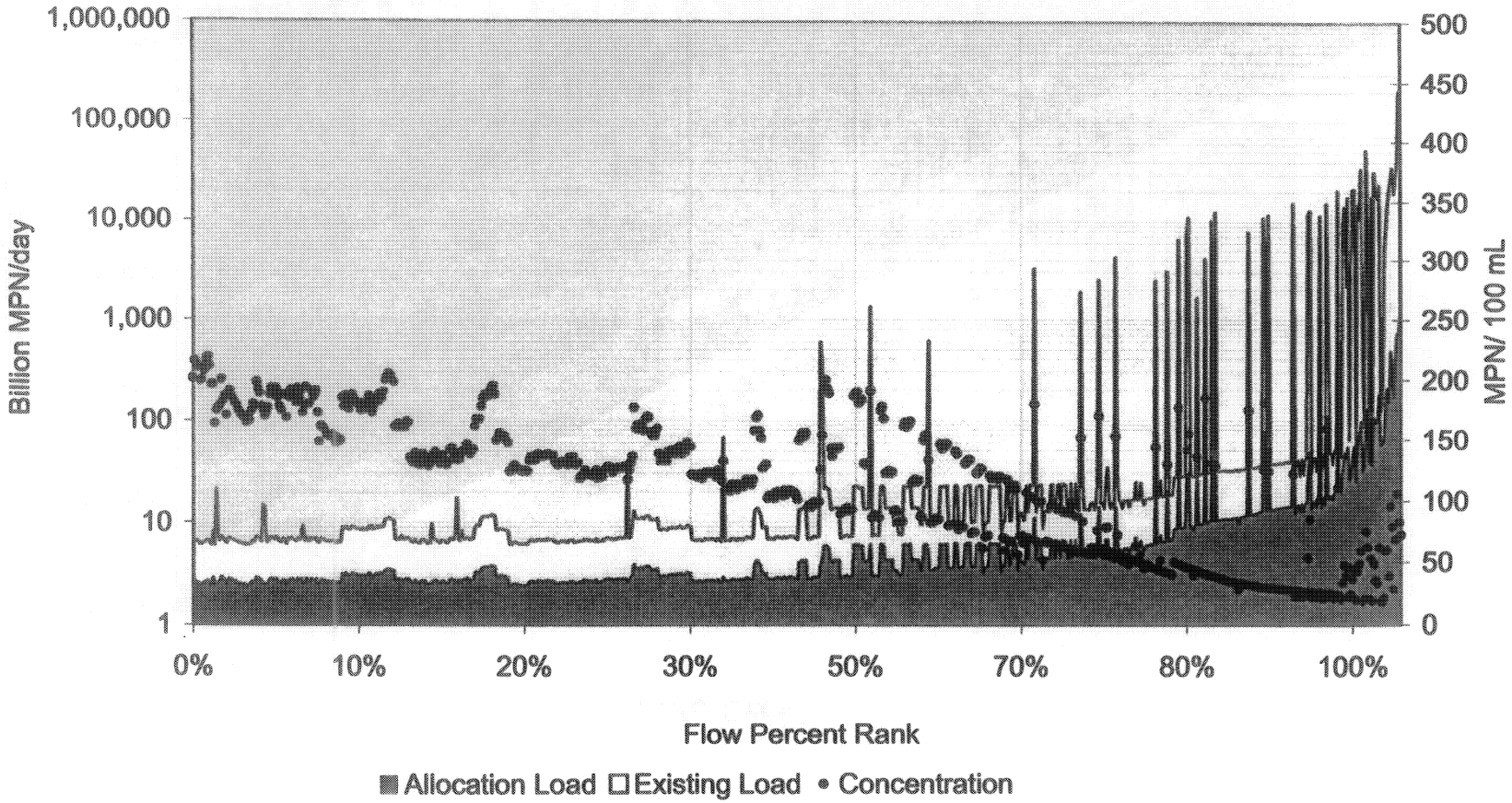


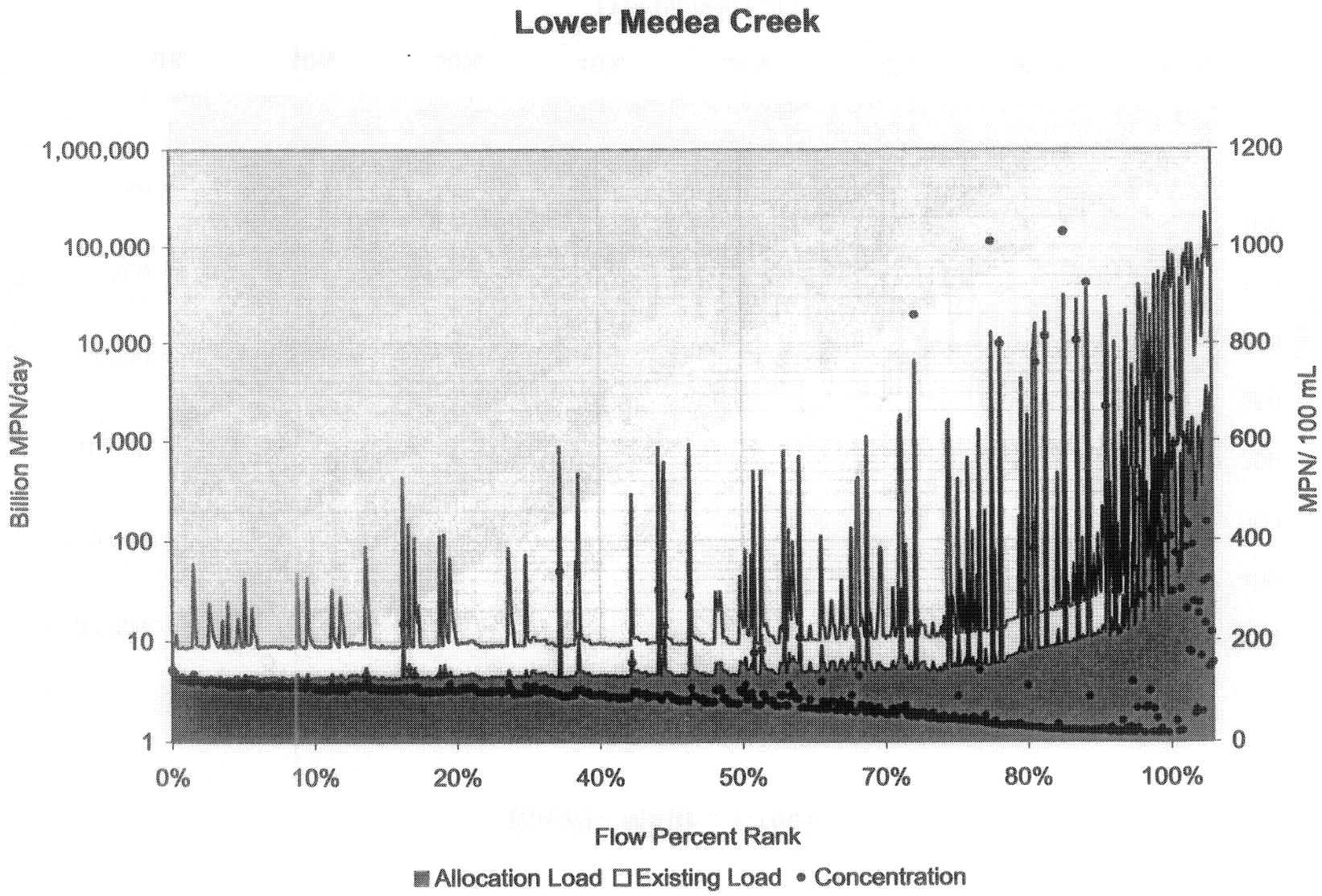
BASELINE FECAL COLIFORM at MIDDLE MALIBU CREEK

## Appendix 3 - Allocations and Predicted Single Sample Compliance

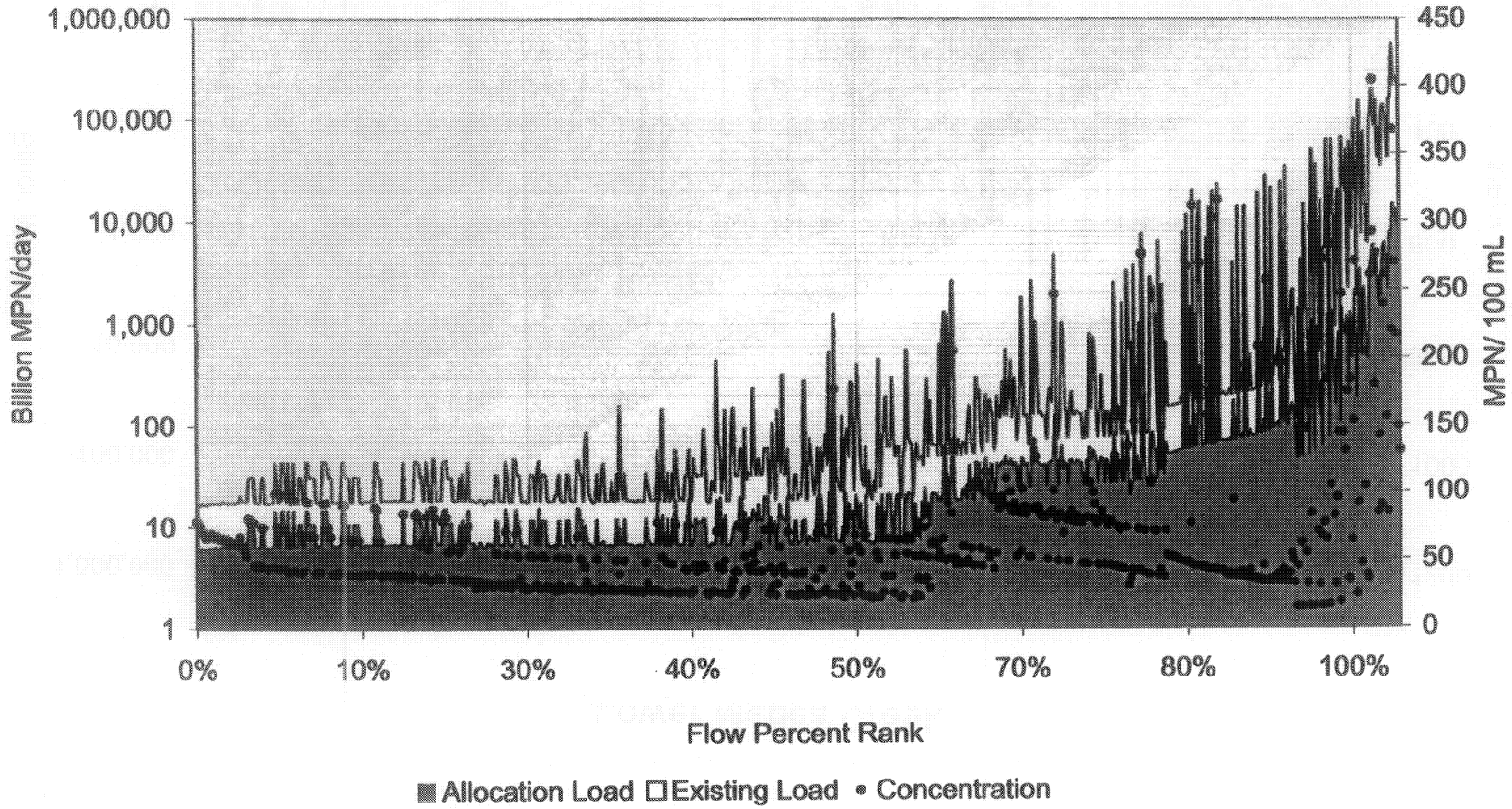

Triunfo Creek
1,000,000
100,000
10,000
1,000
100
10
1
Billion MPN/day
600
500
400
300
200
100
0
MPN/ 100 mL
0%
10%
25%
40%
50%
70%
80%
100%
Flow Percent Rank
Allocation Load
Existing Load
Concentration

## Lower Las Virgenes Creek

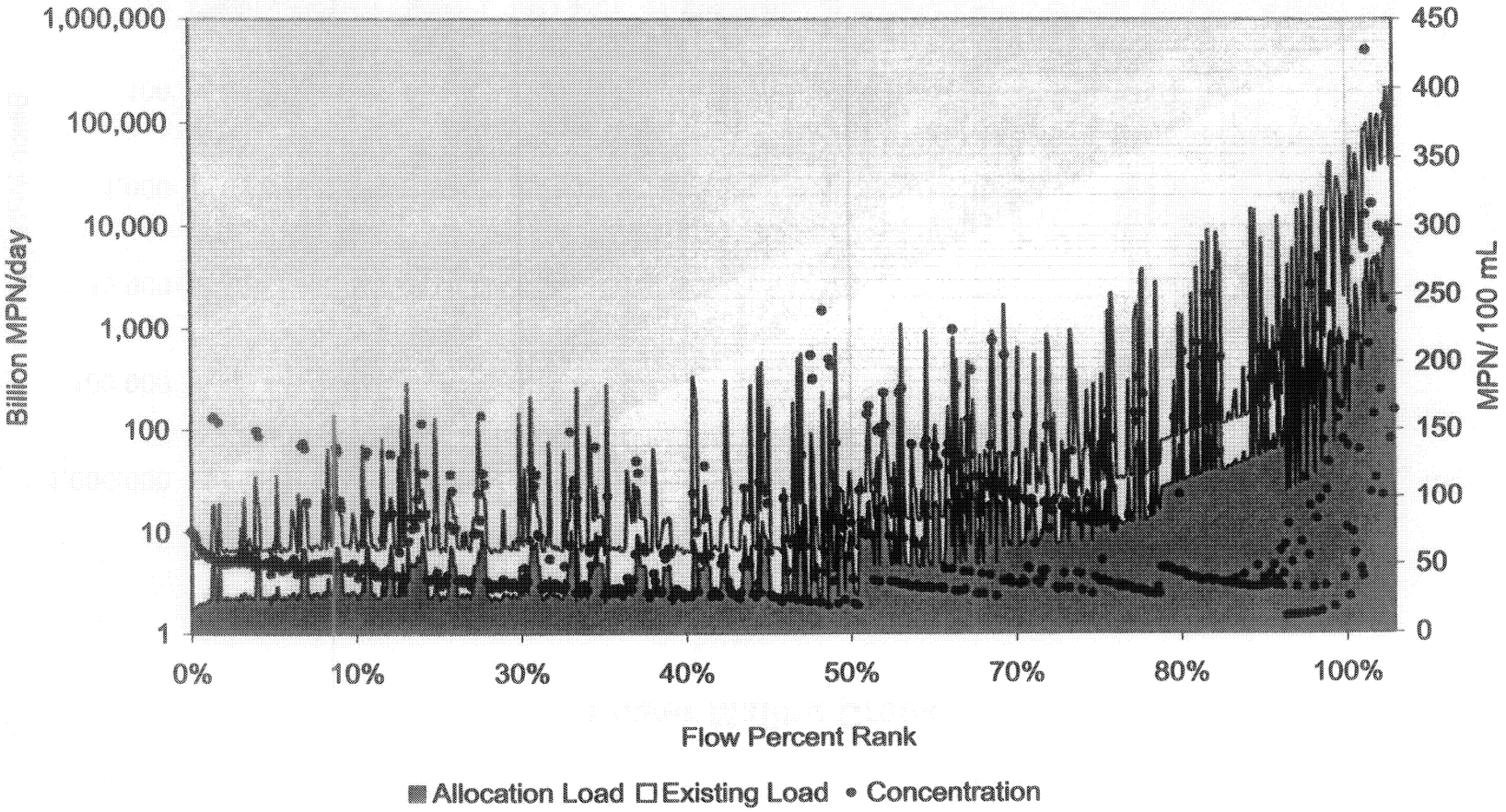



Lower Medea Creek
1,000,000
100,000
10,000
1,000
100
10
1
Billion MPN/day
1200
1000
800
600
400
200
0
MPN/ 100 mL
0%
10%
20%
40%
50%
70%
80%
100%
Flow Percent Rank
Allocation Load
Existing Load
Concentration

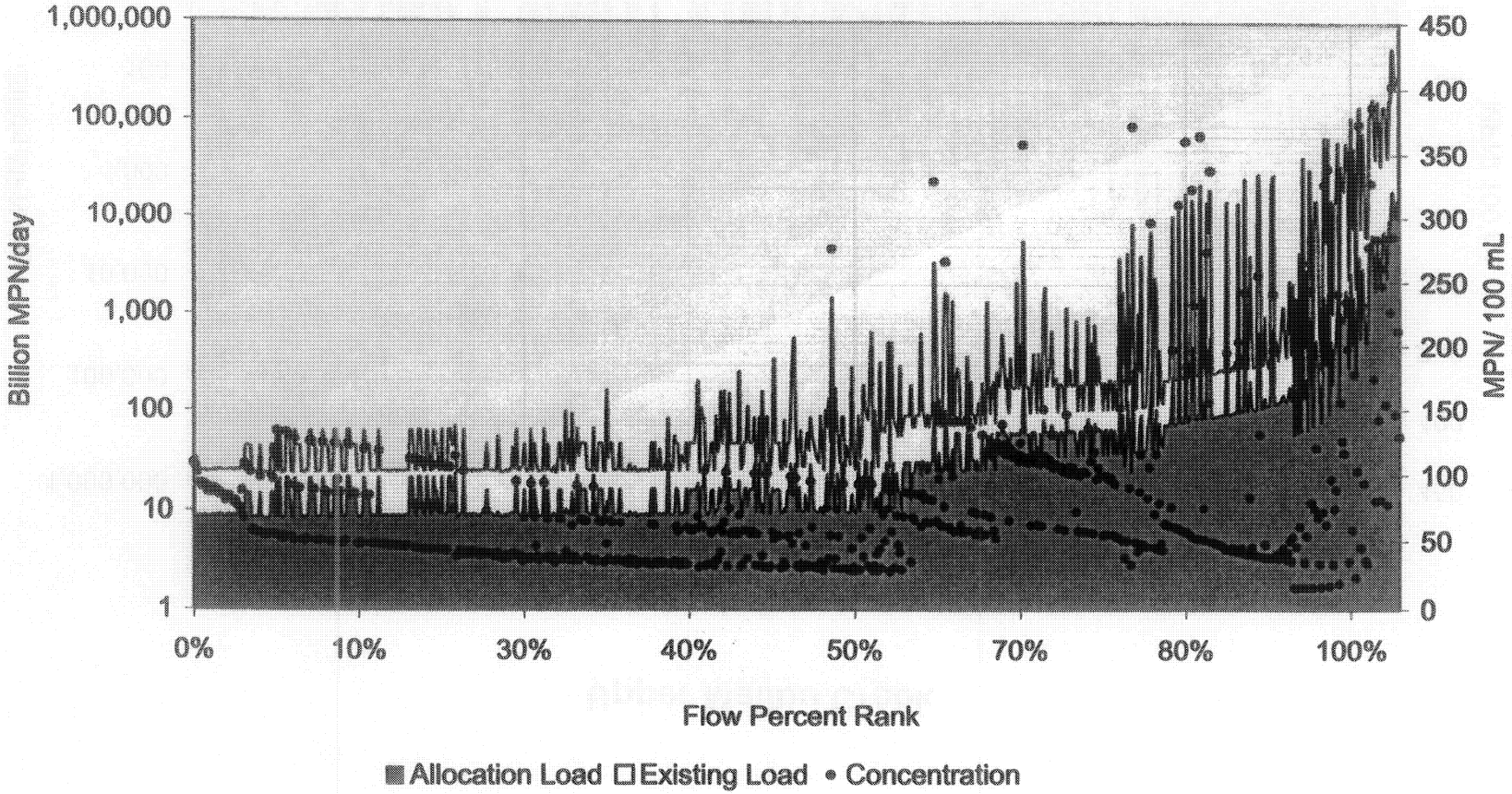
## Middle Malibu Creek

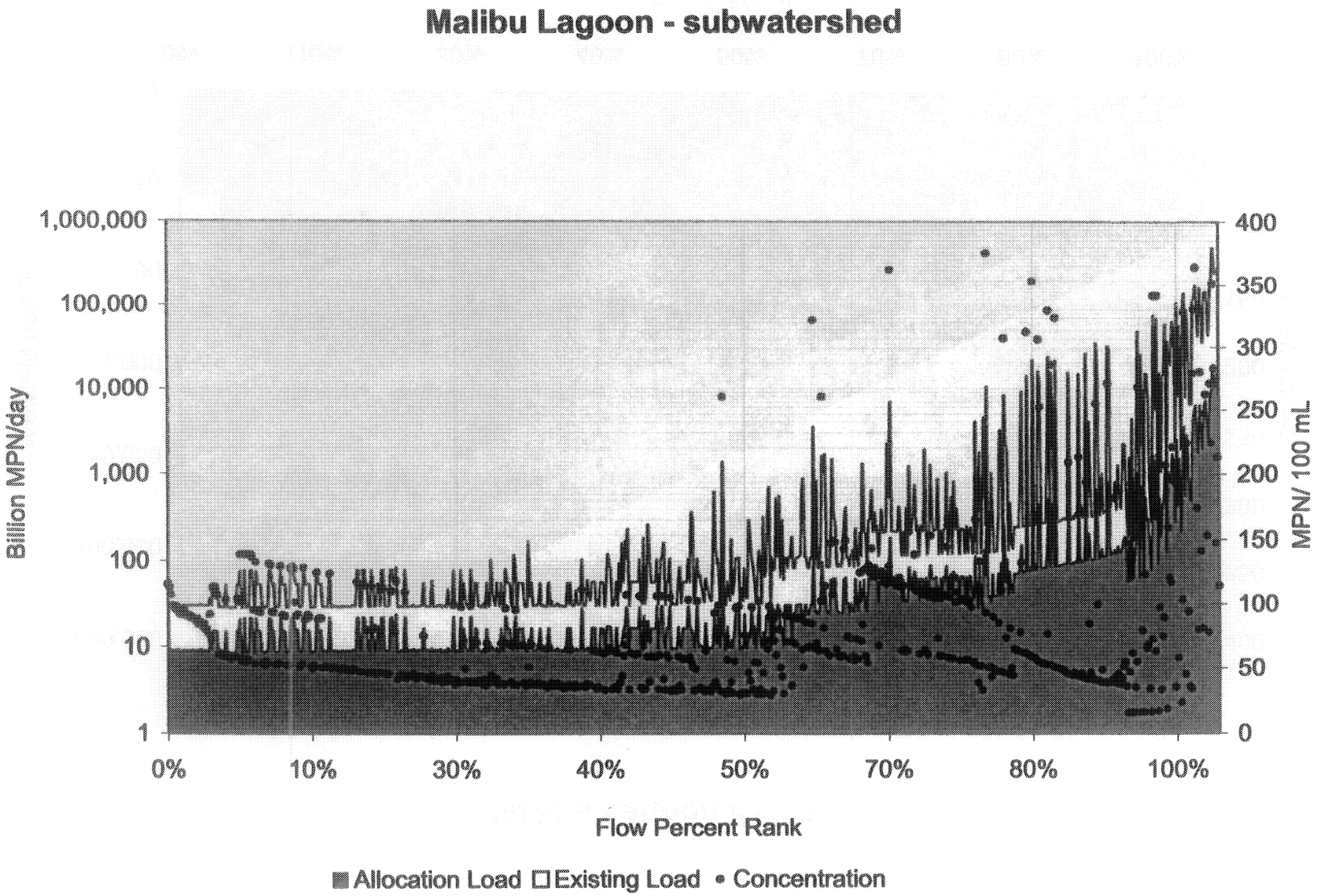


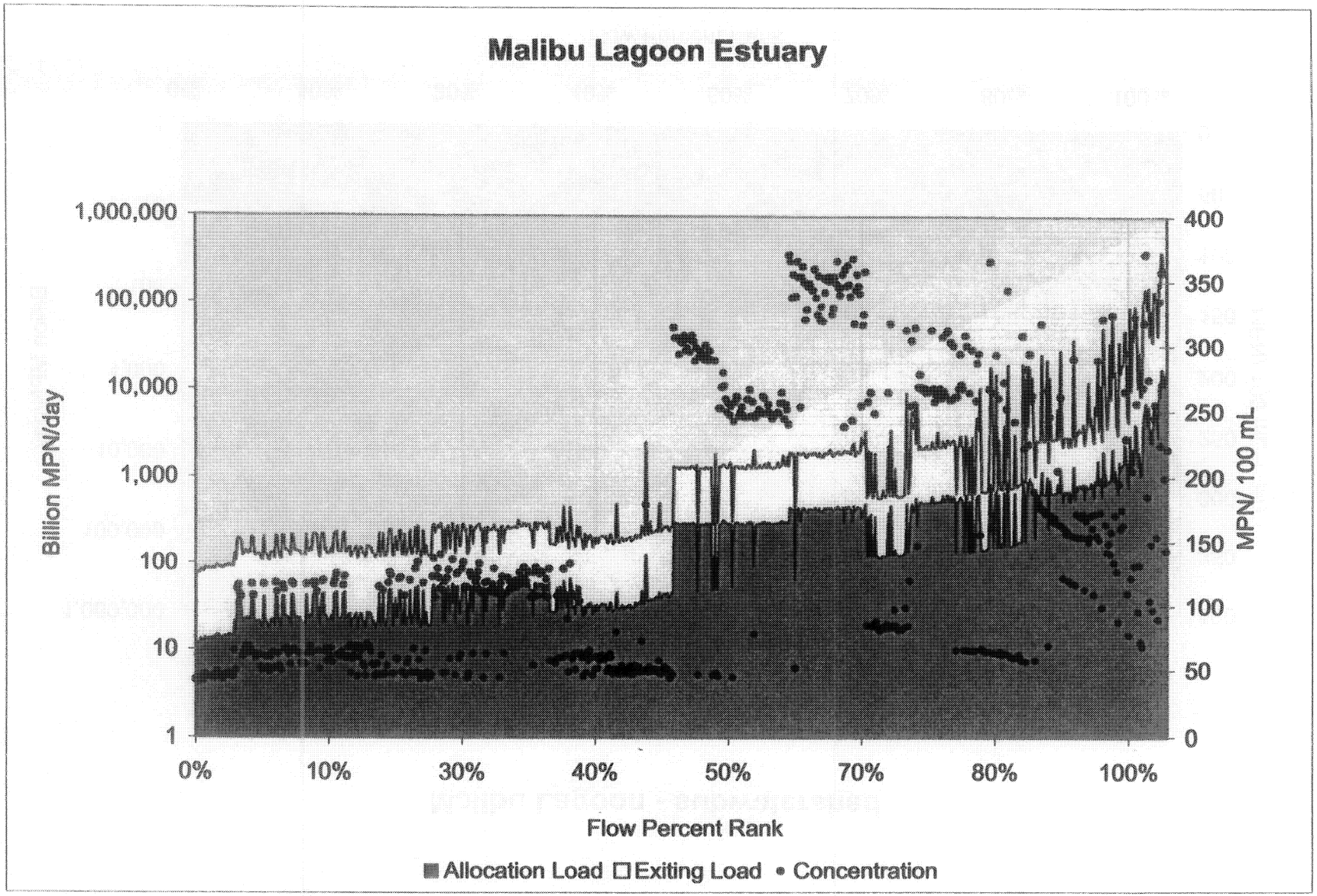
## Upper Malibu Creek



## Lower Malibu Creek

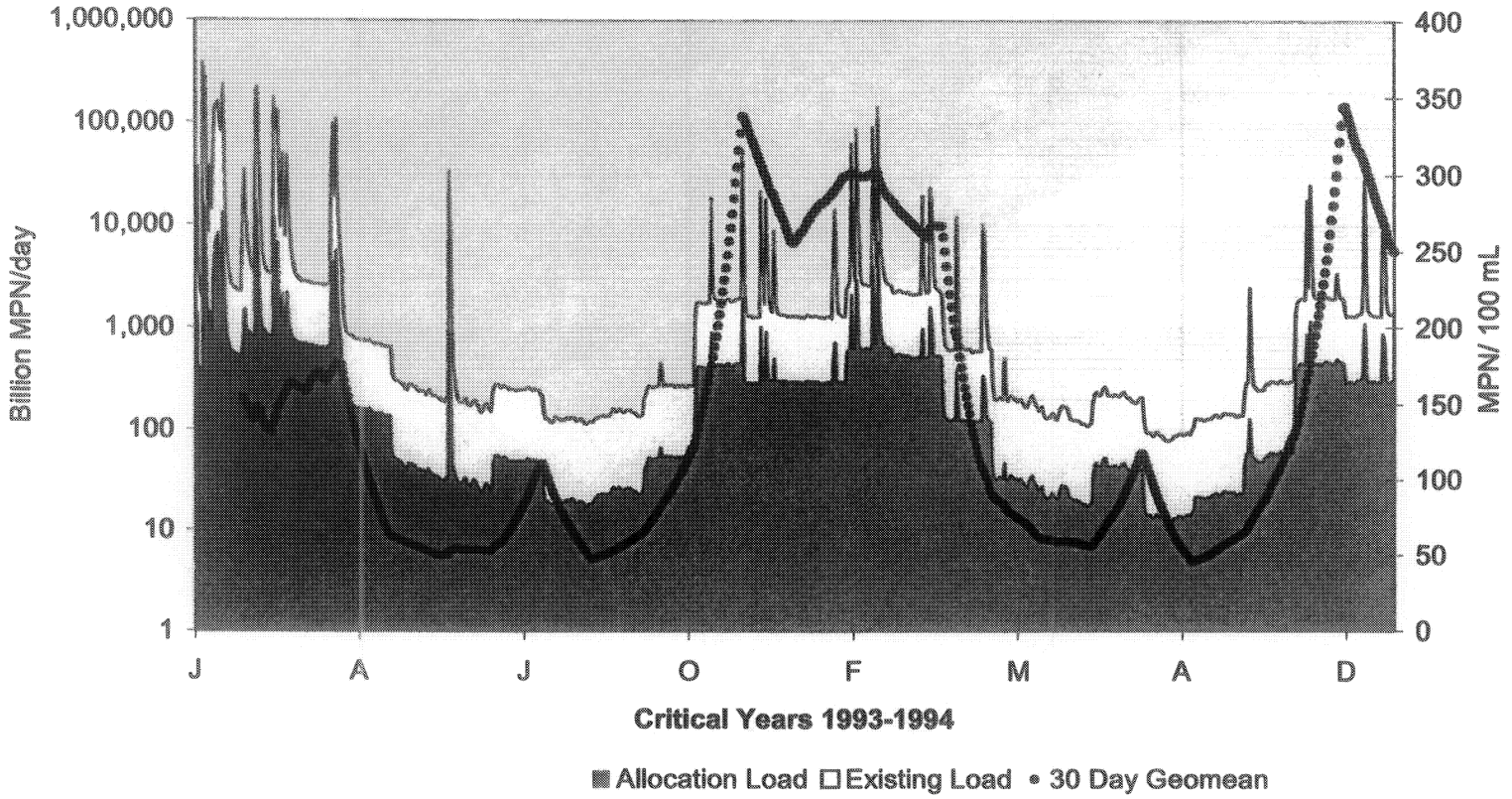



Malibu Lagoon - subwatershed
1,000,000
100,000
10,000
1,000
100
10
1
Billion MPN/day
400
350
300
250
200
150
100
50
0
MPN/ 100 mL
0%
10%
30%
40%
50%
70%
80%
100%
Flow Percent Rank
Allocation Load
Existing Load
Concentration

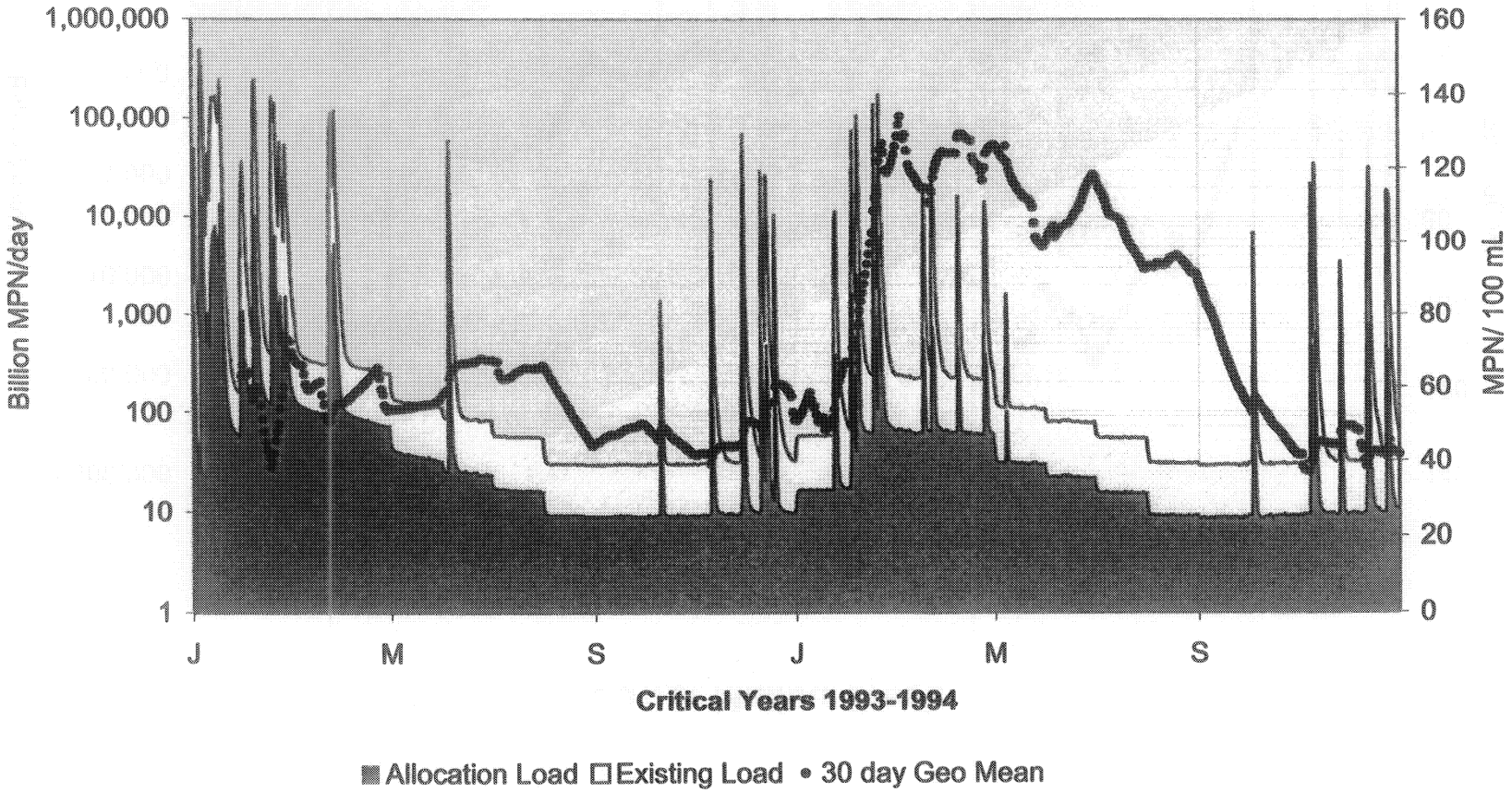

Malibu Lagoon Estuary
1,000,000
100,000
10,000
1,000
100
10
1
Billion MPN/day
400
350
300
250
200
150
100
50
0
MPN/ 100 mL
0%
10%
30%
40%
50%
70%
80%
100%
Flow Percent Rank
Allocation Load
Exiting Load
Concentration

**Appendix 4 - Allocations and Predicted 30-Day Running Geometric Mean Compliance**

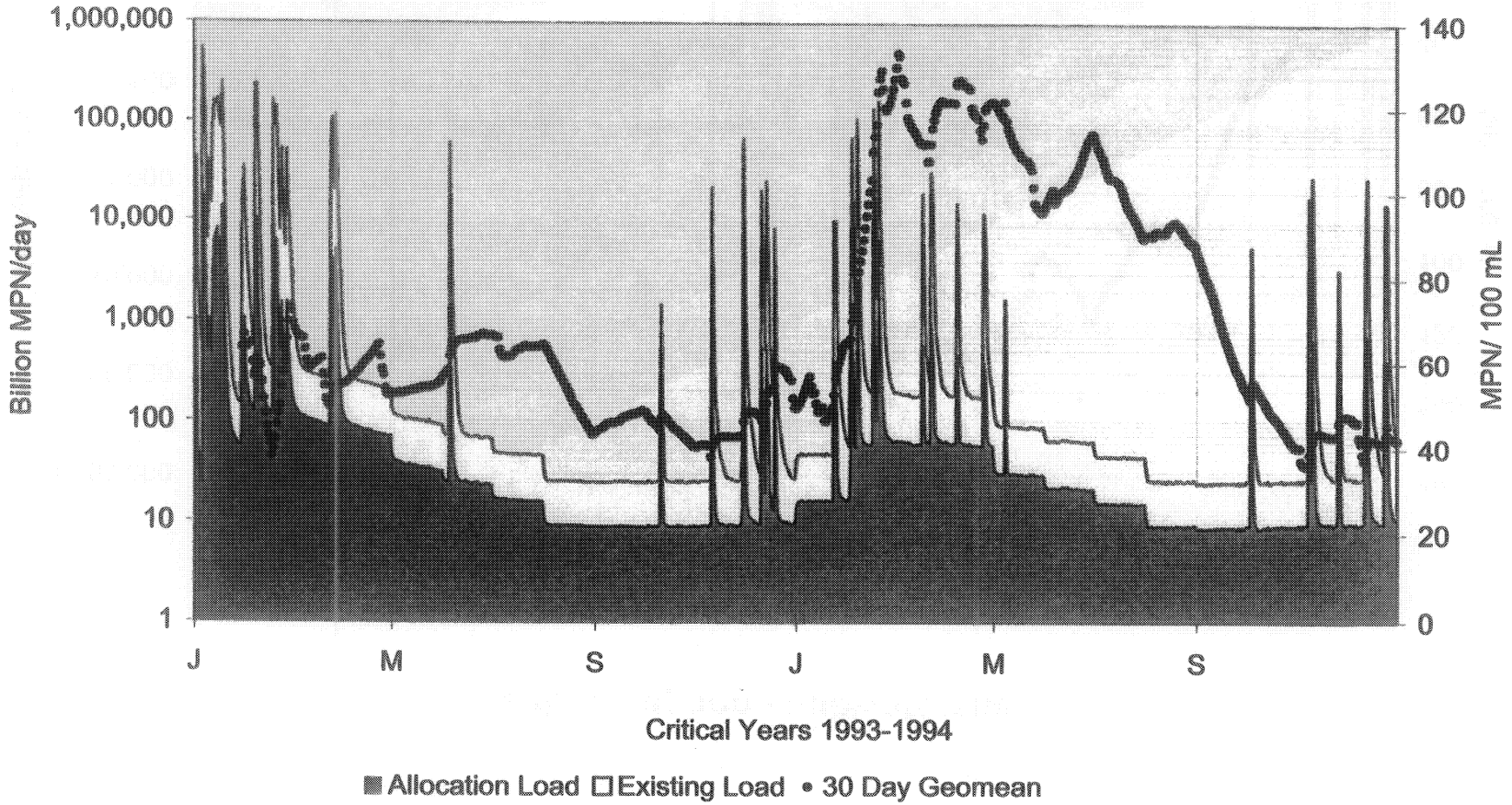
## Malibu Lagoon - Estuary



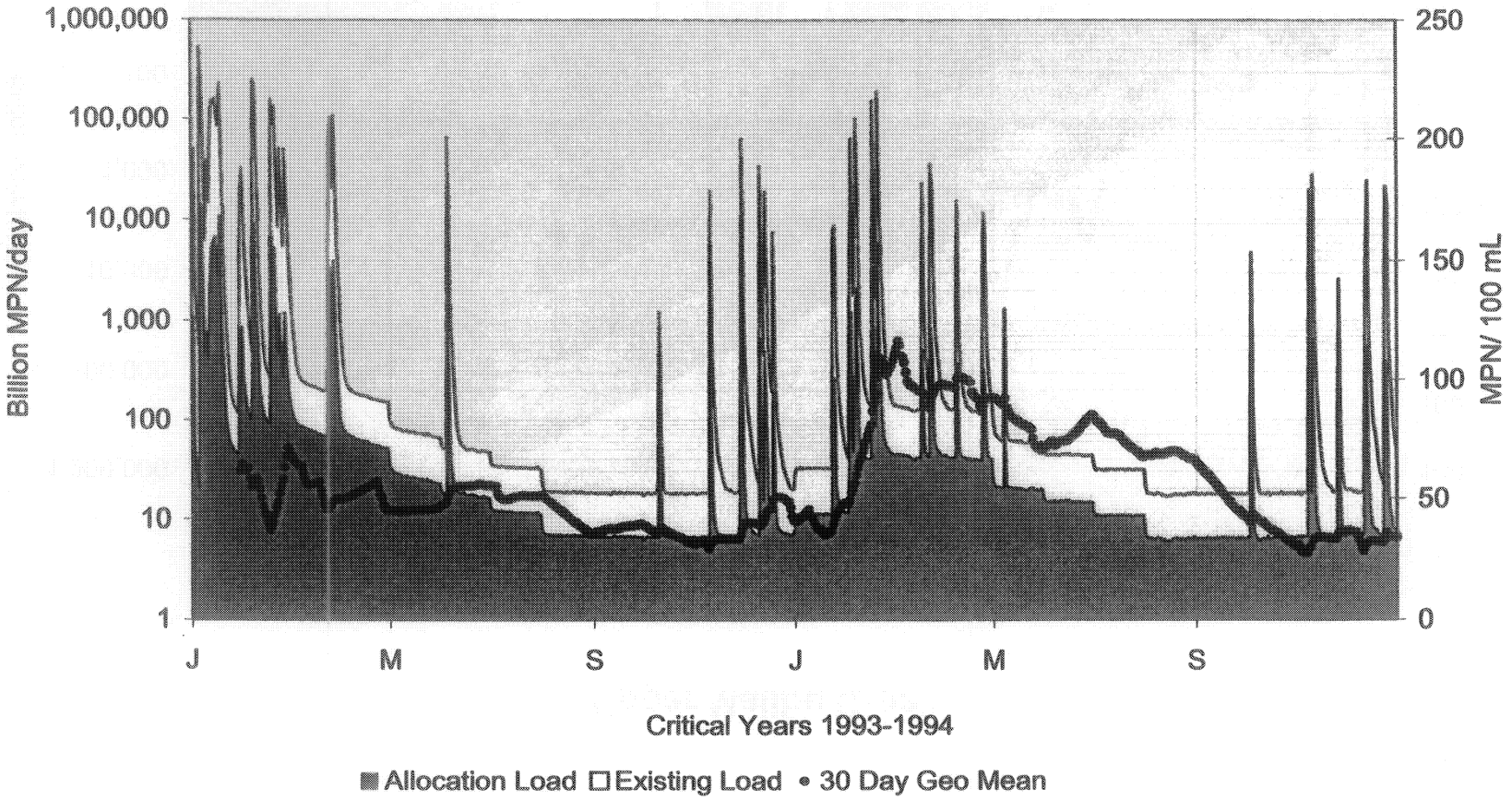
## Malibu Lagoon - subwatershed



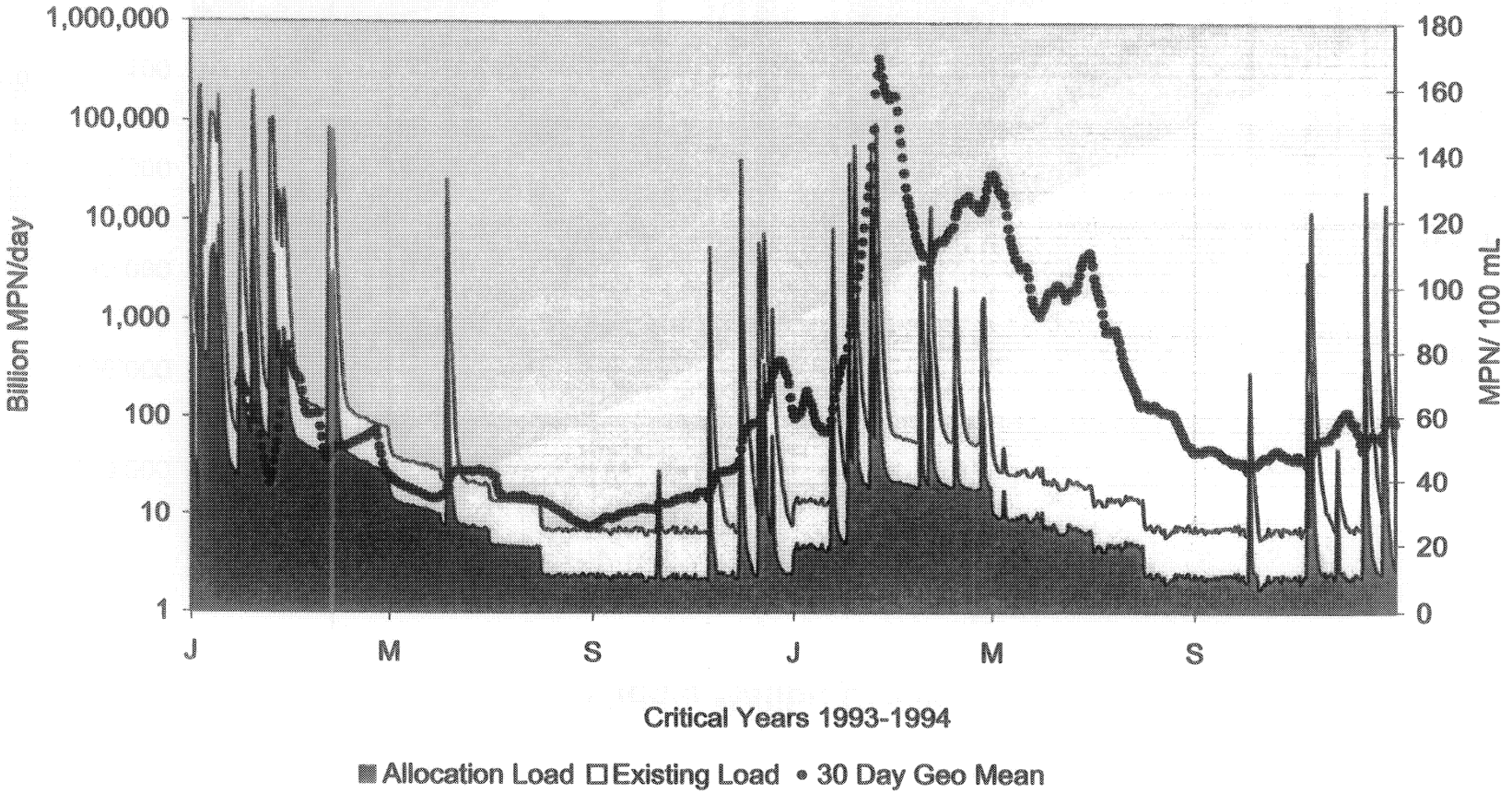
## Lower Malibu Creek



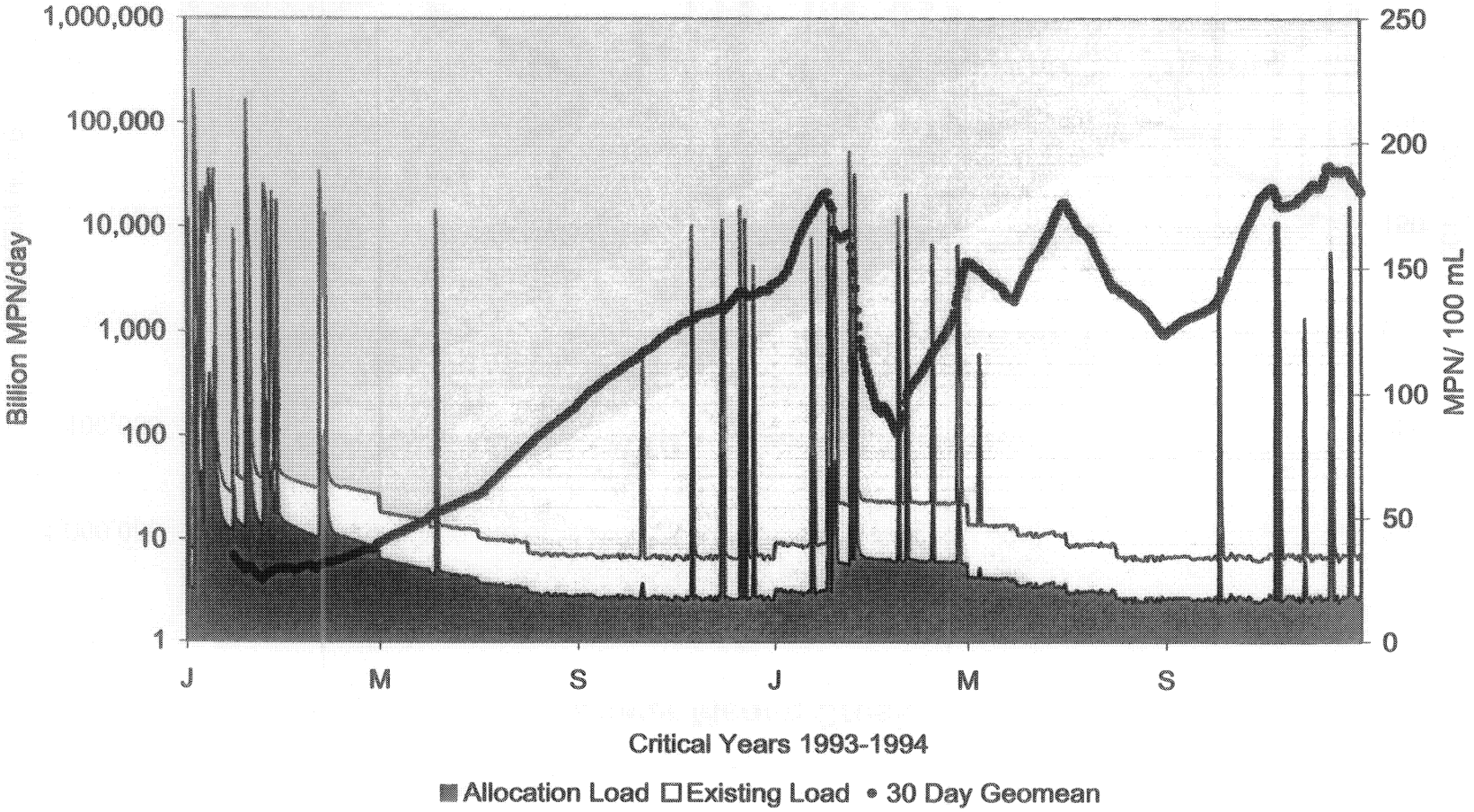
## Middle Malibu Creek



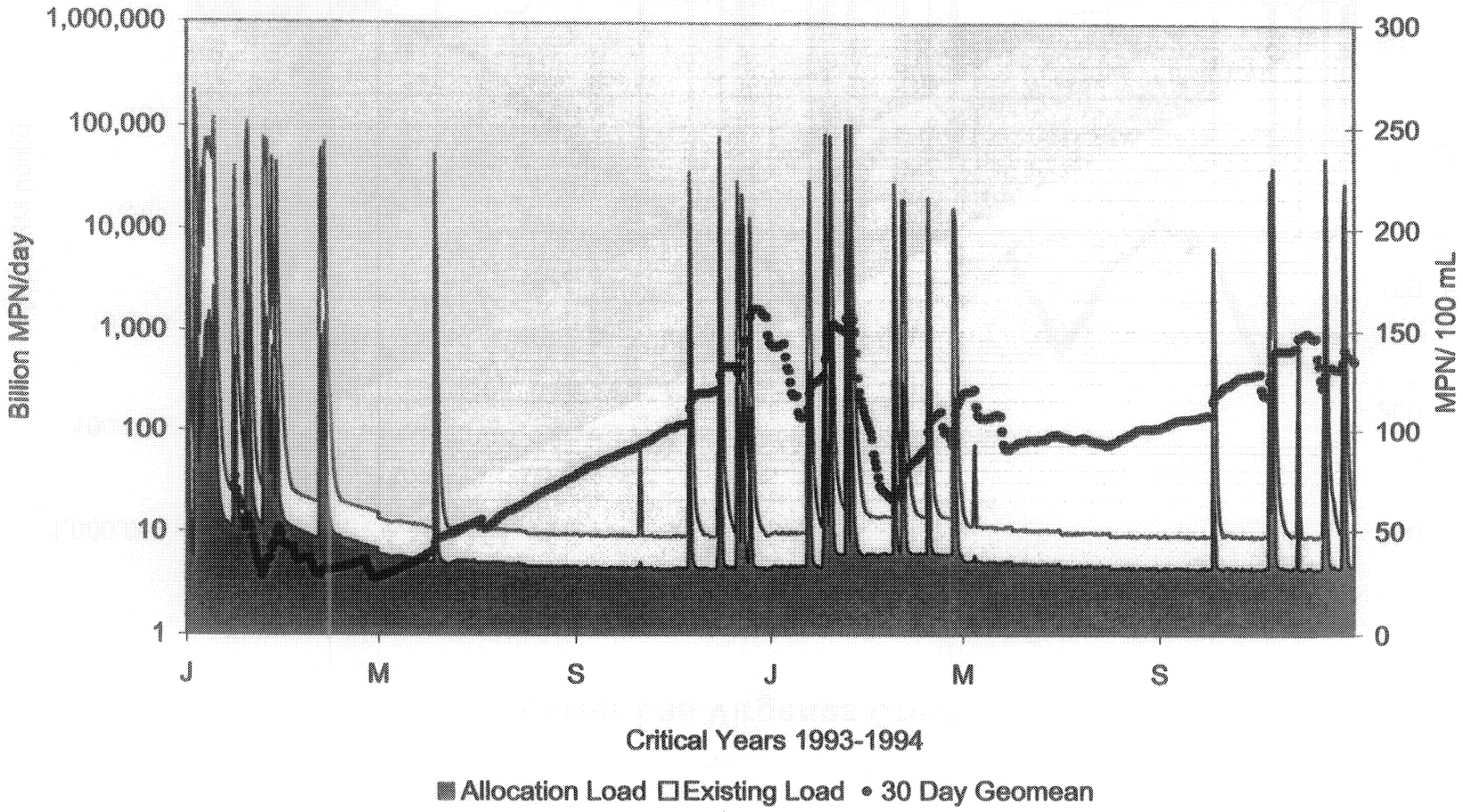
## Upper Malibu Creek



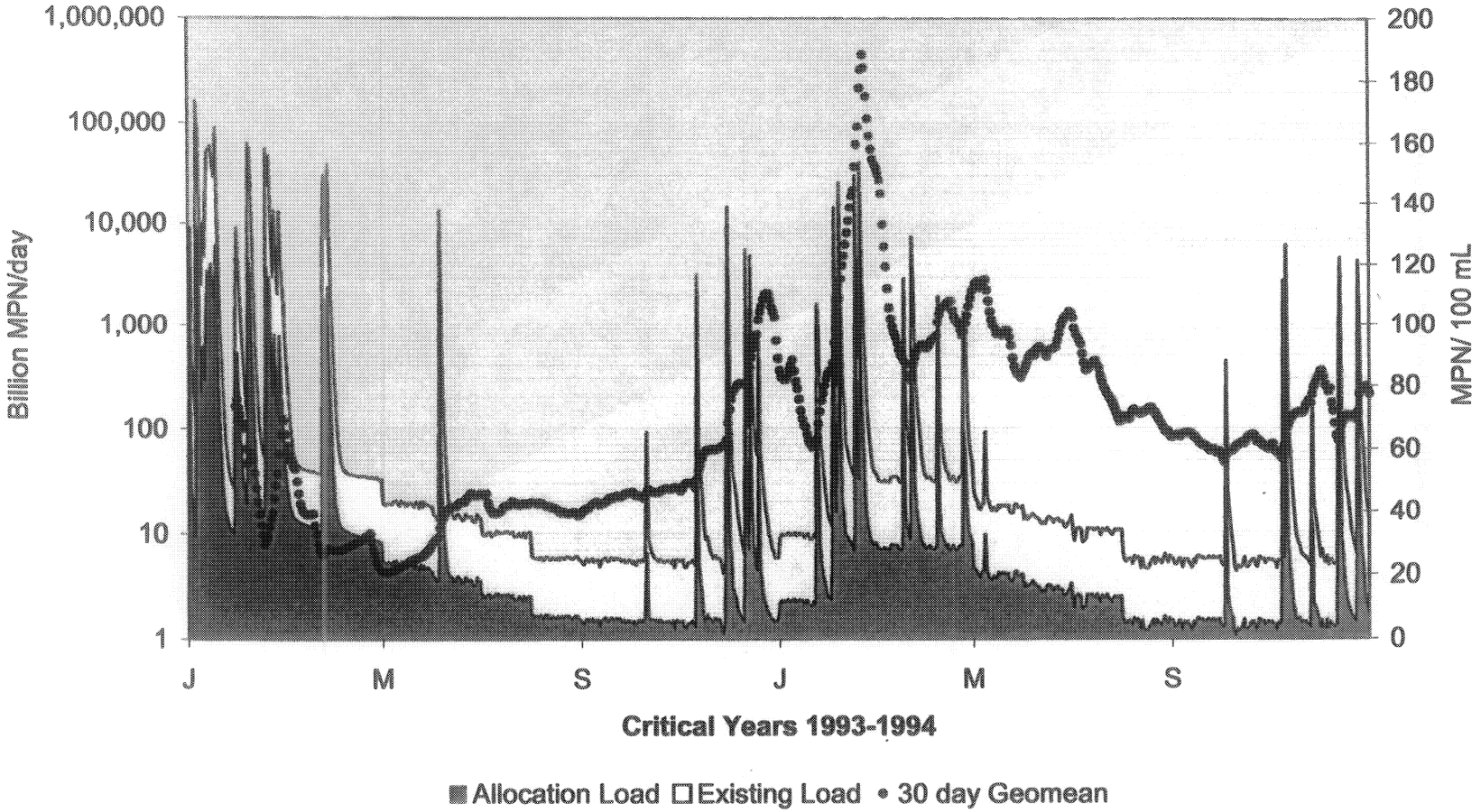
## Lower Las Virgenes Creek



## Lower Medea Creek



## Triunfo Creek



## Appendix 5 - Allocation Loads by Subwatershed

## Potrero Canyon Creek Watershed

| Source Category | Existing Fecal Coliform Loads (no/yr) | Fecal Coliform Allocation (no./yr) |
|---|---|---|
| Commercial/Industrial | 1.94E+13 | 1.08E+12 |
| High/Med. Density Residential | 2.98E+14 | 1.68E+13 |
| Low Density Residential | 2.12E+12 | 1.22E+11 |
| Rural Residential | 3.32E+11 | 1.94E+10 |
| Agriculture/Livestock | 9.50E+10 | 9.46E+10 |
| Vacant | 5.12E+11 | 5.06E+11 |
| Chapparral/Sage Scrub | 1.24E+12 | 1.23E+12 |
| Grasslands | 1.06E+11 | 1.04E+11 |
| Woodlands | 1.85E+09 | 1.52E+09 |
| Imported Water | 7.37E+11 | 7.37E+11 |
| **Total** | **3.22E+14** | **2.07E+13** |

## Hidden Valley Watershed

| Source Category | Existing Fecal Coliform Loads (no/yr) | Fecal Coliform Allocation (no./yr) |
|---|---|---|
| Commercial/Industrial | 1.70E+13 | 9.44E+11 |
| High/Med. Density Residential | 4.66E+12 | 2.64E+11 |
| Low Density Residential | 3.73E+13 | 2.14E+12 |
| Rural Residential | 1.58E+13 | 9.22E+11 |
| Agriculture/Livestock | 2.87E+13 | 2.87E+13 |
| Vacant | 5.16E+11 | 5.11E+11 |
| Chapparral/Sage Scrub | 6.29E+12 | 6.22E+12 |
| Grasslands | 1.93E+11 | 1.89E+11 |
| Woodlands | 1.37E+11 | 1.13E+11 |
| Septic Systems | 2.54E+13 | 1.14E+13 |
| **Total** | **1.36E+14** | **5.14E+13** |

## Upper Lindero Creek Watershed

| Source Category | Existing Fecal Coliform Loads (no/yr) | Fecal Coliform Allocation (no./yr) |
|---|---|---|
| Commercial/Industrial | 9.97E+13 | 1.21E+12 |
| High/Med. Density Residential | 3.54E+14 | 4.34E+12 |
| Low Density Residential | 1.10E+13 | 1.37E+11 |
| Vacant | 1.52E+11 | 1.50E+11 |
| Chapparral/Sage Scrub | 4.65E+11 | 4.58E+11 |
| Grasslands | 1.18E+11 | 1.15E+11 |
| Woodlands | 1.81E+09 | 1.29E+09 |
| Imported Water | 5.80E+11 | 5.80E+11 |
| **Total** | **4.66E+14** | **6.99E+12** |

## Fecal Coliform in the Westlake Watershed

| Source Category | Existing Fecal Coliform Loads (no/yr) | Fecal Coliform Allocation (no./yr) |
|---|---|---|
| Commercial/Industrial | 9.47E+14 | 5.26E+13 |
| High/Med. Density Residential | 6.45E+14 | 3.65E+13 |
| Low Density Residential | 5.69E+12 | 3.28E+11 |
| Vacant | 3.86E+11 | 3.82E+11 |
| Chapparral/Sage Scrub | 1.27E+12 | 1.26E+12 |
| Grasslands | 3.03E+11 | 2.98E+11 |
| Woodlands | 1.35E+10 | 1.12E+10 |
| Septic Systems | 2.44E+12 | 2.44E+12 |
| Imported Water | 1.50E+12 | 1.50E+12 |
| **Total** | **1.60E+15** | **9.53E+13** |

## Upper Medea Creek Watershed

| Source Category | Existing Fecal Coliform Loads (no/yr) | Fecal Coliform Allocation (no./yr) |
|---|---|---|
| Commercial/Industrial | 2.30E+14 | 2.79E+12 |
| High/Med. Density Residential | 7.04E+14 | 8.63E+12 |
| Low Density Residential | 1.01E+13 | 1.25E+11 |
| Vacant | 3.33E+10 | 3.29E+10 |
| Chapparral/Sage Scrub | 7.98E+11 | 7.86E+11 |
| Grasslands | 6.01E+10 | 5.86E+10 |
| Woodlands | 1.39E+10 | 9.84E+09 |
| Effluent Irrigation | 9.94E+08 | 9.94E+08 |
| Imported Water | 7.59E+11 | 7.59E+11 |
| **Total** | **9.46E+14** | **1.32E+13** |

## Lower Lindero Creek Watershed

| Source Category | Existing Fecal Coliform Loads (no/yr) | Fecal Coliform Allocation (no./yr) |
|---|---|---|
| Commercial/Industrial | 2.50E+14 | 3.02E+12 |
| High/Med. Density Residential | 2.57E+14 | 3.15E+12 |
| Low Density Residential | 1.83E+12 | 2.27E+10 |
| Rural Residential | 1.19E+11 | 1.51E+09 |
| Vacant | 2.77E+09 | 2.73E+09 |
| Chapparral/Sage Scrub | 4.38E+11 | 4.33E+11 |
| Grasslands | 4.58E+10 | 4.48E+10 |
| Woodlands | 9.55E+09 | 7.27E+09 |
| Imported Water | 2.90E+11 | 2.90E+11 |
| **Total** | **5.10E+14** | **6.97E+12** |

## Lower Medea Creek Watershed

| Source Category | Existing Fecal Coliform Loads (no/yr) | Fecal Coliform Allocation (no./yr) |
|---|---|---|
| Commercial/Industrial | 7.26E+12 | 8.74E+10 |
| Low Density Residential | 4.79E+13 | 5.96E+11 |
| Rural Residential | 3.05E+12 | 0.00E+00 |
| Agriculture/Livestock | 3.34E+11 | 3.33E+11 |
| Vacant | 1.31E+10 | 1.29E+10 |
| Chapparral/Sage Scrub | 1.39E+12 | 1.37E+12 |
| Grasslands | 1.23E+11 | 1.21E+11 |
| Woodlands | 7.94E+09 | 6.52E+09 |
| Septic Systems | 4.48E+12 | 2.24E+12 |
| Effluent Irrigation | 5.48E+09 | 5.48E+09 |
| Imported Water | 1.56E+11 | 1.56E+11 |
| **Total** | **6.47E+13** | **4.93E+12** |

## Cheeseboro Creek Watershed

| Source Category | Existing Fecal Coliform Loads (no/yr) | Fecal Coliform Allocation (no./yr) |
|---|---|---|
| Commercial/Industrial | 6.32E+13 | 7.65E+11 |
| Agriculture/Livestock | 4.32E+08 | 3.95E+08 |
| Chapparral/Sage Scrub | 6.55E+11 | 6.45E+11 |
| Grasslands | 1.33E+11 | 1.29E+11 |
| Woodlands | 2.34E+10 | 1.68E+10 |
| **Total** | **6.40E+13** | **1.56E+12** |

## Palo Comado Creek Watershed

| Source Category | Existing Fecal Coliform Loads (no/yr) | Fecal Coliform Allocation (no./yr) |
|---|---|---|
| Commercial/Industrial | 2.06E+14 | 2.50E+12 |
| High/Med. Density Residential | 2.13E+13 | 2.61E+11 |
| Low Density Residential | 5.67E+13 | 7.03E+11 |
| Agriculture/Livestock | 8.99E+10 | 8.94E+10 |
| Chapparral/Sage Scrub | 9.40E+11 | 9.26E+11 |
| Grasslands | 1.22E+11 | 1.19E+11 |
| Woodlands | 2.39E+10 | 1.71E+10 |
| Imported Water | 2.46E+11 | 2.46E+11 |
| **Total** | **2.85E+14** | **4.86E+12** |

## Upper Las Virgenes Creek Watershed

| Source Category | Existing Fecal Coliform Loads (no/yr) | Fecal Coliform Allocation (no./yr) |
|---|---|---|
| Commercial/Industrial | 7.43E+13 | 6.92E+10 |
| High/Med. Density Residential | 1.45E+14 | 1.37E+11 |
| Low Density Residential | 1.02E+13 | 9.70E+09 |
| Agriculture/Livestock | 1.31E+12 | 1.31E+12 |
| Vacant | 1.97E+11 | 1.95E+11 |
| Chapparral/Sage Scrub | 2.07E+12 | 2.04E+12 |
| Grasslands | 5.62E+11 | 5.48E+11 |
| Woodlands | 5.84E+10 | 4.21E+10 |
| Imported Water | 3.80E+11 | 3.80E+11 |
| **Total** | **2.34E+14** | **4.72E+12** |

## Upper Malibu Creek Watershed

| Source Category | Existing Fecal Coliform Loads (no/yr) | Fecal Coliform Allocation (no./yr) |
|---|---|---|
| Low Density Residential | 2.69E+12 | 2.59E+12 |
| Rural Residential | 3.52E+12 | 3.42E+12 |
| Chapparral/Sage Scrub | 3.28E+12 | 3.24E+12 |
| Grasslands | 8.75E+10 | 8.61E+10 |
| Woodlands | 1.22E+11 | 1.05E+11 |
| Septic Systems | 3.87E+12 | 1.93E+12 |
| **Total** | **1.36E+13** | **1.14E+13** |

## Triunfo Creek Watershed

| Source Category | Existing Fecal Coliform Loads (no/yr) | Fecal Coliform Allocation (no./yr) |
|---|---|---|
| Commercial/Industrial | 1.70E+13 | 9.45E+11 |
| High/Med. Density Residential | 3.77E+13 | 2.13E+12 |
| Low Density Residential | 4.73E+13 | 2.72E+12 |
| Rural Residential | 2.88E+13 | 1.67E+12 |
| Agriculture/Livestock | 5.05E+11 | 5.03E+11 |
| Vacant | 3.27E+10 | 3.23E+10 |
| Chapparral/Sage Scrub | 5.20E+12 | 5.14E+12 |
| Grasslands | 3.15E+10 | 3.10E+10 |
| Woodlands | 1.00E+11 | 8.32E+10 |
| Septic Systems | 3.34E+13 | 8.34E+12 |
| Imported Water | 1.56E+11 | 1.56E+11 |
| **Total** | **1.70E+14** | **2.18E+13** |

## Stokes Creek Watershed

| Source Category | Existing Fecal Coliform Loads (no/yr) | Fecal Coliform Allocation (no./yr) |
|---|---|---|
| Commercial/Industrial | 4.13E+13 | 5.72E+12 |
| Low Density Residential | 1.12E+13 | 1.62E+12 |
| Rural Residential | 2.66E+12 | 3.88E+11 |
| Agriculture/Livestock | 2.02E+11 | 2.00E+11 |
| Vacant | 5.08E+10 | 5.04E+10 |
| Chapparral/Sage Scrub | 2.62E+12 | 2.60E+12 |
| Grasslands | 1.60E+11 | 1.57E+11 |
| Woodlands | 4.94E+10 | 4.22E+10 |
| Septic Systems | 4.94E+10 | 1.73E+12 |
| **Total** | **5.83E+13** | **1.25E+13** |

## Lower Las Virgenes Creek Watershed

| Source Category | Existing Fecal Coliform Loads (no/yr) | Fecal Coliform Allocation (no./yr) |
|---|---|---|
| Commercial/Industrial | 4.67E+14 | 5.62E+13 |
| High/Med. Density Residential | 2.34E+14 | 2.86E+13 |
| Low Density Residential | 6.54E+12 | 8.15E+11 |
| Rural Residential | 1.30E+12 | 1.64E+11 |
| Agriculture/Livestock | 2.69E+10 | 2.53E+10 |
| Vacant | 1.60E+10 | 1.59E+10 |
| Chapparral/Sage Scrub | 2.30E+12 | 2.28E+12 |
| Grasslands | 6.07E+11 | 5.96E+11 |
| Woodlands | 5.12E+10 | 4.25E+10 |
| Septic Systems | 2.04E+12 | 5.09E+11 |
| Effluent Irrigation | 3.73E+09 | 3.73E+09 |
| Imported Water | 4.02E+11 | 4.02E+11 |
| **Total** | **7.14E+14** | **8.97E+13** |

## Cold Creek Watershed

| Source Category | Existing Fecal Coliform Loads (no/yr) | Fecal Coliform Allocation (no./yr) |
|---|---|---|
| Commercial/Industrial | 3.80E+12 | 4.56E+11 |
| Low Density Residential | 6.42E+13 | 8.01E+12 |
| Rural Residential | 3.80E+13 | 4.81E+12 |
| Agriculture/Livestock | 6.21E+11 | 6.20E+11 |
| Vacant | 3.32E+10 | 3.29E+10 |
| Chapparral/Sage Scrub | 5.09E+12 | 5.04E+12 |
| Grasslands | 1.87E+08 | 1.84E+08 |
| Woodlands | 4.98E+10 | 4.35E+10 |
| Septic Systems | 1.22E+13 | 6.11E+12 |
| Imported Water | 1.25E+10 | 1.25E+10 |
| **Total** | **1.24E+14** | **2.51E+13** |

## Middle Malibu Creek Watershed

| Source Category | Existing Fecal Coliform Loads (no/yr) | Fecal Coliform Allocation (no./yr) |
|---|---|---|
| Commercial/Industrial | 1.01E+13 | 1.87E+12 |
| Low Density Residential | 4.97E+12 | 9.54E+11 |
| Rural Residential | 3.64E+12 | 7.08E+11 |
| Agriculture/Livestock | 1.70E+11 | 1.70E+11 |
| Chapparral/Sage Scrub | 1.25E+12 | 1.24E+12 |
| Grasslands | 3.28E+09 | 3.23E+09 |
| Woodlands | 1.14E+11 | 9.95E+10 |
| Septic Systems | 2.04E+12 | 1.02E+12 |
| Effluent Irrigation | 1.47E+09 | 1.47E+09 |
| Tapia Discharge | 5.92E+10 | 5.92E+10 |
| **Total** | **2.24E+13** | **6.12E+12** |

## Lower Malibu Creek Watershed

| Source Category | Existing Fecal Coliform Loads (no/yr) | Fecal Coliform Allocation (no./yr) |
|---|---|---|
| Commercial/Industrial | 1.23E+12 | 1.48E+11 |
| Low Density Residential | 2.55E+11 | 3.20E+10 |
| Rural Residential | 2.74E+11 | 3.45E+10 |
| Agriculture/Livestock | 4.27E+09 | 4.07E+09 |
| Chapparral/Sage Scrub | 2.25E+12 | 2.23E+12 |
| Grasslands | 2.71E+10 | 2.66E+10 |
| Woodlands | 2.48E+10 | 2.12E+10 |
| Septic Systems | 2.04E+11 | 1.02E+11 |
| **Total** | **4.27E+12** | **2.60E+12** |

## Malibu Lagoon Watershed

| Source Category | Existing Fecal Coliform Loads (no/yr) | Fecal Coliform Allocation (no./yr) |
|---|---|---|
| Commercial/Industrial | 9.70E+13 | 4.51E+11 |
| High/Med. Density Residential | 7.15E+12 | 3.34E+10 |
| Low Density Residential | 2.45E+13 | 1.15E+11 |
| Agriculture/Livestock | 1.10E+11 | 1.09E+11 |
| Vacant | 4.59E+09 | 4.22E+09 |
| Chapparral/Sage Scrub | 1.48E+11 | 1.46E+11 |
| Grasslands | 1.19E+09 | 1.10E+09 |
| Woodlands | 2.29E+09 | 1.59E+09 |
| Septic Systems | 1.58E+14 | 1.56E+14 |
| Lagoon Drains | 1.75E+10 | 8.76E+08 |
| Birds | 4.95E+14 | 4.95E+14 |
| Tidal Inflow | 2.44E+13 | 2.44E+13 |
| **Total** | **8.06E+14** | **6.76E+14** |

## Appendix 6 - Modular Treatment Systems Cost

## Storm Treat System s Sizing W orksheet

Note: Enter data in the bolded rows only (m arked 'Enter"); all other param eters are calculated.

| | | |
|---|---|---|
| Project Engineer: | | |
| Project Location: | | |
| | | |
| **Enter Im pervious Area to be Treated:** | **1.00** | **acres** |
| **Enter Design or Local M ean Storm Event:** | **1.00** | **inches** |
| **Enter Design or M ean Storm Duration:** | **12** | **hours** |
| | | |
| W ater Volum e Requiring Treatm ent: (Calculated) | 27225 | gallons |
| | | |
| Treated D ischarge Rate (Recom m ended Average): (G iven)* | 1.00 | gal/m in |
| W ater Residence Tim e in STS Unit: (Calculated) | 0.97 | days |
| Volum e Treated During Storm per Unit: (Calculated) | 720 | gallons |
| Static Volum e of Each STS Unit: (G iven) | 1390 | gallons |
| Volum e Entering Unit During Storm (calculated) | 2110 | gallons |
| | | |
| Num ber of Storm Treat Units Required: (Calculated) | 4 | units |
| Volum e of Detention Required: (Calculated) | 18785 | gallons |
| Volum e of Detention Required: (Calculated) | 2505 | cuft |
| W ater Residence Tim e in Detention: (Calculated) | 3.26 | days |
| Total W ater Residence Tim e in Treatm ent System : (Calculated) | 4.73 | days |
| | | |
| If Detention Volum e is Known: | | |
| **Enter Prelim inary Detention Storage Volum e Available:**** | **30000** | **gallons** |
| Volum e of Detention Required: (Calculated) | 4000 | cuft |
| Num ber of Storm Treat Tanks Required (w/detention): (Calculated) | 1 | units |
| W ater Residence Tim e in Detention: (Calculated) | 0.0 | days |

$6,300 cost per unit
5440 acres to treat
$34,272,000 total cost

* Perform ance of the STS System has been verified up to a m axim um flow rate of 1.00 gpm .
** Include catch/detention basins, pipe (s) between basin (s) and STS Unit (s).

**Appendix 7 - Heal the Bay's Water Quality Monitoring Data**

# Appendix H

**Las Virgenes Municipal Water District, Los Angeles, Preliminary Water System Design Report for Tentative Tract No. 52419 Triangle Ranch, March 2004**

LOR
LVMWD

LAS VIRGENES MUNICIPAL WATER DISTRICT

Dedicated to Providing Quality Water & Wastewater Service

OFFICERS

President
*Charles Caspary*
Director, Division 1

Vice President
*Joseph M. Bowman*
Director, Division 4

Secretary
*Ann Dorgelo*
Director, Division 5

Treasurer
*Glen Peterson*
Director, Division 2
MWD Representative

*Vernon M. Padgett M.D.*
Director, Division 3

*John R. Mundy*
General Manager

*Wayne K. Lemieux*
Counsel

HEADQUARTERS
4232 Las Virgenes Road
Calabasas, CA 91302
(818) 251-2100
Fax (818) 251-2109

WESTLAKE
FILTRATION PLANT
(818) 251-2370
Fax (818) 251-2379

TAPIA WATER
RECLAMATION FACILITY
(818) 251-2300
Fax (818) 251-2309

RANCHO LAS VIRGENES
COMPOSTING FACILITY
(818) 251-2340
Fax (818) 251-2349

www.lvmwd.com

MEMBER AGENCY OF THE
METROPOLITAN WATER
DISTRICT
OF SOUTHERN CALIFORNIA

February 16, 2005

County of Los Angeles
Department of Regional Planning
Mrs. Ellen Fitzgerald, Supervising Regional Planner
Mr. Daryl Koutnik, Staff Biologist
320 West Temple Street
Los Angeles, CA 90012

**Subject: Tract No. 52419 "Triangle Ranch"/"Live Oak Ranch"**

Las Virgenes Municipal Water District ("District") has been asked to provide clarifications regarding a proposed water tank site on the property of the subject proposed development. The District's need is a notional 3-Million gallon tank in the general vicinity of our Cornell Pump Station (located near the intersection of Cornell Road and Agoura Road). The tank must be located on lands with an elevation of 1200 to 1225 feet. The tank is needed to meet future storage and operational requirements in the District's backbone water transmission system. While not needed immediately, the tank is identified as a long-term requirement for the District's overall water system.

A Preliminary Water System Design Report (WSDR) was prepared for Tract 52419 and the report identified a tank site on the property that could be used. As noted above, the need for a tank in this vicinity was identified in our Potable Water System Master Plan. It is not needed specifically for this development. Rather, it is needed in the future as a water system improvement for the District.

All that is required of the developer of the subject tract at this time is the dedication of a fee parcel of land for the tank site (1.5 to 2 acres) and an access easement to the tank site. It is not considered necessary for the developer to build the tank since it isn't required to support the proposed development. The tank would be built by the District when needed. Appropriate CEQA documentation and compliance for the tank construction would be the responsibility of the District.

Please feel free to contact me if there are any questions on this matter at (818) 251-2128 or email at GTalmadge@lvmwd.com.

Sincerely,

C.E. Talmadge
Planning Administrator
Las Virgenes Municipal Water District

CET:acg

LVMWD #2257.00

# Las Virgenes Municipal Water District

# Preliminary Water System Design Report for Tentative Tract No. 52419 Triangle Ranch

## Los Angeles County

VT-L02-099-59

March 2004

BOYLE

5851 Thille Street, Suite 201
Ventura, CA 93003
TEL: (805)644-9704
FAX: (805)642-8277
www.boyleengineering.com

Mr. Gene Talmadge, Planning Administrator
LAS VIRGENES MUNICIPAL WATER DISTRICT
4232 Las Virgenes Road
Calabasas, CA 91302-1994

March 19, 2004

**Preliminary Water System Design Report (LVMWD Report No. 2257.00)**
**for Tentative Tract No. 52419 (Triangle Ranch)**

We are pleased to deliver 21 copies of the *Final* Preliminary Water System Design Report for Tentative Tract No. 52419. The developer proposes to construct 81 single-family units on 320 acres, south of Agoura Hills, on Kanan and Cornell Roads.

Tentative Tract No. 52419 will be served potable water directly from the 1235-ft backbone system, connecting to an existing 14-inch main in Cornell Road west of Cornell Pump Station. In this portion of the system, gradient fluctations are large, with swings in pressures of 50 psi expected during periods of high demand. The recently completed improvements to the District's transmission system have reduced these fluctuations, but additional improvements, as outlined in the 1999 Master Plan may eventually be required.

The developer's plans indicate estate-sized lots and nearly 28 acres of common-area landscaping and cut-and-fill slopes. The use of recycled water is appropriate for such areas. Recycled water would be served from a direct connection to Indian Hills Tank. Stubouts on the recycled water main would also allow service to other large residential lots in the area. This main extension is considered economically feasible, based on the District's criteria of $5500 per acre feet of water delivered per year.

We appreciate the opportunity to provide this report to the District. If there are any questions, don't hesitate to call.

Sincerely,

*Boyle Engineering Corporation*

Dan Ellison, PE
Project Manager

LVMWD # 2257.00

# Preliminary Water System Design Report
## for
## Tentative Tract No. 52419
## Triangle Ranch

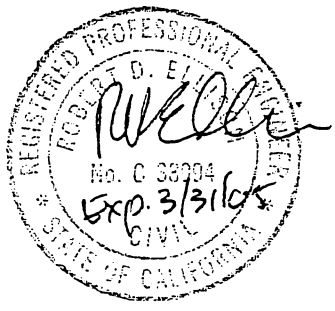

**Las Virgenes Municipal Water District**

Project Manager Michael D. Brown

**Boyle Engineering Corporation**

Project Manager Dan Ellison, PE

Project Engineer Cesar Romero, EIT



VT-L02-099-59

March 2004

# Las Virgenes Municipal Water District
# Preliminary Water System Design Report
# for
# Tentative Tract No. 52419
# Triangle Ranch
# Los Angeles County, California

## Table of Contents

Letter of Transmittal

Section 1 - Introduction ..... 1-1

Section 2 - Proposed Development ..... 2-1

Section 3 - Potable Water Demand ..... 3-1

Section 4 - Existing Potable Water System ..... 4-1

Section 5 - Proposed Potable Water System ..... 5-1

Section 6 - Recycled Water ..... 6-1

Section 7 - Sewer System ..... 7-1

Section 8 - Construction Phasing and Acceptance ..... 8-1

Section 9 - Water Conservation ..... 9-1

Section 10 - Financial Impact on District ..... 10-1

Section 11 - Environmental Review ..... 11-1

Section 12 - Conclusions and Recommendations ..... 12-1

Section 13 - Limitations ..... 13-1

Plates

References

Appendices

# Las Virgenes Municipal Water District
# Preliminary Water System Design Report
# for
# Tentative Tract No. 52419
# Triangle Ranch
# Los Angeles County, California

## Section 1 – Introduction

Tentative Tract No. 52419 is located on approximately 320 acres south of the City of Agoura Hills, straddled along Cornell and Kanan Roads south of Agoura Road in unincorporated Los Angeles County. The proposed development consists of 81 residential lots, 5 dedicated open space lots, and 3 landscape lots.

The purpose of this Preliminary Water System Design Report is to investigate the feasibility of providing potable and recycled water service to the proposed Tentative Tract No. 52419, and to develop preliminary criteria for the facilities required to provide adequate service. Potable water demand for the proposed development is based on the *Potable Water System Master Plan for the Las Virgenes Municipal Water District* (Reference 1). Fire protection requirements will be as determined by the Los Angeles County Fire Department. Recycled water demand for the proposed development is based on the *Recycled Water System Master Plan for Las Virgenes Municipal Water District / Triunfo Sanitation District Joint Venture (Reference 2).*

The owner and developer of Tentative Tract No. 52419 is Sage Community Group, Inc., 3 Corporate Plaza, Suite 102, Newport Beach, CA 92660.

The developer's engineer is Wagner Halladay Inc., 201 E. Yorba Linda Blvd., Placentia, CA 92870-3418.

## Section 2 – Proposed Development

The Tentative Tract No. 52419, shown on **Plate 1**, comprises approximately 320 acres, within the unincorporated area of Los Angeles County, south of Agoura Road and the City of Agoura Hills. One access to the proposed tract will be at the north end of the tract along Kanan Road. Secondary access will be located at the south end of the tract, along Kanan and Cornell Roads.

The Developer's Engineer has indicated that the property will not be rezoned from the existing zoning of CPD (25.7 acres) and RPD-1-27.5U (293.6 acres).[1] The Los Angeles County, Santa Monica Mountains North Area Land Use Plan, designates the land use for the property as Mountain Lands 5 (N5) and Rural Residential 2 (N2), with land uses of one (1) du/5 acres and one (1) du/2 acres, respectively. The proposed development includes 81 residential lots, five dedicated open space lots, and three landscape lots. According to the developer's proposed tentative grading plan, existing ground elevations within the development range from approximately 810 feet along the graded slopes adjacent to the Kanan Road entrance at the south end of the tract, to nearly 1000 feet along the graded slopes adjacent to the proposed "H" Street, at the east end of the development. Building pad elevations range from 843 feet near the north west edge of the development on the east side of Kanan Road (Residential Lot 44), to 948 feet on the east side of the development (Residential Lot 74).

[1] Based on personal communication with Dana S. Halladay (Wagner Halladay, Inc.) on January 6, 2004.

## Section 3 – Potable Water Demand

The potable water demand estimated for the proposed development is shown in **Table 1**. Demand will be generated by residential use. The average daily demand presented in Reference 1 for mountain lands and rural residential use in this area of Los Angeles County is 250 gpd/person, resulting in demand criteria of 738 gpd/unit. This demand factor is based on historical usage and is fairly typical of new medium-density residential developments throughout the District. Demand of 1000 gpd/unit has been estimated for estate-sized lots (> 1 acre) within the proposed development.

**TABLE 1**

**Estimated Potable Water Demand for Tentative Tract No. 52419**

| | | | | Estimated Water Demand (gpm) | | |
|---|---|---|---|---|---|---|
| Hydraulic Gradient Zone | Land Use | No. of Units | Demand Criteria | Average Day Demand | Maximum Day Demand | Peak-hour Demand |
| 1235 | Residential | 74 Units | 738 gpd/unit(1) | 38 | 80 | 180 |
| 1235 | Residential | 7 Units | 1000 gpd/unit(2) | 5 | 11 | 26 |
| | | | **Total Demand** | **43** | **91** | **206** |

(1) Based on 250 gpd/person and 2.95 persons/unit; lot size < 1 acre

(2) Estate-size lot > 1 acre

This report proposes that recycled water be used for irrigation of residential landscaping. Recycled water use must comply with the requirements set forth in the Department of Health Services (DHS) "Purple Book" and in the LVMWD Administration Code. If potable water use was reduced to indoor use only, the average demand could be as low as 125 gpd/person. However, it is likely that some outdoor use of potable water will occur. It is also uncertain which of the proposed residences will qualify as "ranchettes" under the Department of Health Services regulations. Therefore the Master Plan

figure of 250 gpd/person was used to estimate potable water demand. Because the potable water piping is sized to transmit fire flows, using a less conservative average demand would not reduce the size of the required piping. Recycled water demand is estimated in Section 6. Maximum-day demand (MDD) and peak-hour demand (PHD) are based on peaking factors of 2.1 X ADD and 5.25 X ADD, respectively, from Table 5-8 of the *Potable Water System Master Plan.*

The developer has not yet established fire hydrant locations, however, in an earlier review the Los Angeles County Fire Department outlined minimum fire flow requirements. Based on the Los Angeles County Fire Department's review, dated February 22, 1999, a 1250-gpm fire flow must be available for the residential units shown on the developer's grading plan, with a residual pressure of 20-psi maintained for two hours at the flowing fire hydrants. For this preliminary report, hydrant locations were chosen using the Los Angeles County Fire Prevention Code as guidance.

The final determination of actual fire flow requirements and hydrant locations will be made by the Los Angeles County Fire Department upon submittal of the developer's final grading plan. Pipeline sizes were determined by analyzing these preliminary fire flows simultaneously with maximum day demand flows. Once actual fire flow requirements are known, this Preliminary Water Service Design Report may need to be revised.

## Section 4 – Existing Potable Water System

The proposed Triangle Ranch Development will be served from the District's 1235-foot gradient system. The existing potable water facilities located near the proposed development are shown on **Plate 1**. The 1235-foot gradient system includes the 8-MG Calabasas Tank, the 4.2-MG Equestrian Trails Tank, the 3-MG Morrison Tank, and Cornell Pump Station (used to balance the 1235-foot system and its regulatory reservoirs by pumping either east or west). The 10,000-acre-foot Las Virgenes Reservoir provides seasonal storage for the District. Las Virgenes Reservoir supplies the 1235-foot system via Westlake Pump Station. The 1235-foot system is also supplied through the MWDSC "turnouts" on the east side of the district. Water transmitted through the 1235-foot system supplies over 90% of the District's current customers, either directly or by supplying the water that is distributed to most of the subsystems.

The existing potable water system includes a 14-inch pipe along Cornell Road, which connects to a 24-inch pipe at the intersection of Agoura Road and Cornell Road (just west of Cornell Pump Station). The hydraulic gradient in the vicinity of the development is heavily influenced by the operation of Cornell Pump Station. When the pump station is pumping from east to west, the gradient near the development can be as high as 1260 feet. At times when the pump station is not operating, or when it pumps from west to east, the gradient may drop to around 1100 feet. The Development will be supplied from the discharge side of Cornell Pump Station when it is pumping westward.

The *Potable Water Master Plan* (Reference 1) outlined needed improvements to the potable water system, including several which will improve pressures near Cornell Pump Station during periods of high demand. Improvements were recently constructed that increase the capacity of the 'backbone' transmission lines along the 101-Freeway. These improvements have increased the suction pressure at Cornell Pump Station as much as 16 psi during peak-hour demand. Discharge pressures also have increased. It is anticipated that additional improvements to the back-bone system will be needed, within a few years, to meet the growing demands placed on the District by various developments.

# Section 5 – Proposed Potable Water System

## 5.1 Proposed Distribution System

The proposed potable water system, necessary to serve the Triangle Ranch Development is shown in **Plate 2**. Fire hydrant locations have yet to be determined by the Los Angeles County Fire Department. The preliminary hydrant locations shown on **Plate 2** were utilized in our analysis. These hydrants shall conform to AWWA Standard C503 with 6"x 4"x 2-1/2" bronze heads. The proposed system will be capable of providing required fire flows (1250 gpm) to all hydrants at pressures greater than the current required minimum residual pressure of 20 psi.

The proposed water system will deliver water to the Triangle Ranch Development from multiple connections to the existing 14-inch main in Cornell Road, as well as through a connection to the 8-inch pipe at the intersection of Kanan and Silver Creek Roads. The on-site piping shown in **Plate 2** was sized to accommodate both Peak Hour Demand and Maximum Day Demand with the required fire flow.

The developer will be required to dedicate rights-of-way to the District for public water lines that are outside of public streets.

Hydraulic gradients and pressures expected at key locations within the Triangle Ranch Development during various demand conditions are shown in **Table 2**. All of the units within the proposed development have service connections below an elevation of 1076 feet and may experience maximum pressures greater than 80 psi. All of the units will require individual pressure reducing valves ahead of the building plumbing to limit pressures to not more than 80 psi, as required by the Uniform Plumbing Code. All of the units with service connections below an elevation of 914 feet, including most of the Kanan side of the development and some lots on the Cornell side, may experience maximum pressures greater than 150 psi. These units will require individual pressure reducing valves on the District's side of the service meter in addition to valves ahead of the building plumbing.

areas within the system. As these and other developments occur within the District, the need for additional improvements to the backbone system will increase.

The *Potable Water Master Plan* identified the areas adjacent to Agoura Pump Station and the area southeast of Kimberly Pump Station as areas within the 1235-foot system that experience pressures below the District standard of 43-psi minimum pressure. Service pressures in these areas are expected to be 1-2 psi lower during peak-hour demand when Oak Creek is being served.

## 5.2 Possible Cornell Tank Site

One of the backbone improvements recommended in the Potable Water Master Plan is the Cornell Tank (3.0 MG, HWL ≈ 1220). By providing storage in the center of the system, this tank would help maintain pressures in the area during periods of high demand. Moreover, the tank would mitigate a growing storage deficit in the 1235-foot zone.

A possible site for this tank is near the north-end of the development, just east of Cornell Road. The proposed location, as shown on **Plate 2,** is located along a ridgeline where ground elevations range from approximately 1200 to 1225 feet. The geology of the area is also believed to be favorable for the siting of a tank.

Access to the new tank could be provided by an extension of the existing Knight Drive near Indian Hills Tank; however, additional easements or fee parcels would be needed. Based on a review of the contours shown on the Developer's grading plan for Triangle Ranch, the terrain appears amenable for the construction of such a road.

Because the location is on the crest of a ridge, view-shed mitigation could be more difficult here than at other possible locations. The District plans to perform a Tank Siting Study to confirm the best location for the new Cornell Tank within a year. The study will address geological conditions at various sites, as well as economic feasibility, constructibility, view-shed mitigation and other environmental issues. Should the Tank Siting Study confirm that the location shown on Plate 2 is the preferable alternative, the Developer may be required to dedicate a fee parcel to the District.

## TABLE 2

### Hydraulic Gradients in the proposed Triangle Ranch Development Potable Water System – 1235-Foot Zone

| Location | Maximum-Day Demand Peak Hour | Maximum-Day Demand + Fire Flow[2] | Maximum Gradient |
|---|---|---|---|
| Lowest Pad<br>Lot No. 44<br>(Elevation 843 feet) | 1098 ft<br>(110 psi) | 1055 ft<br>(92 psi) | 1260 ft<br>(181 psi) |
| Highest Pad<br>Lot No. 74<br>(Elevation 948 feet) | 1096 ft<br>(64 psi) | 1050 ft<br>(44 psi) | 1260 ft<br>(135 psi) |
| Highest and Most Remote Fire Hydrant -- Cornell Side<br><br>Near Lot No. 71<br>(Elevation 940 feet) | 1095 ft<br>(67 psi) | 1038 ft<br>(42 psi) | 1260 ft<br>(139 psi) |

Notes:

1. The gradients shown are in the water main. The calculated pressures do not include any head loss between the point of connection to the main and the point of use.
2. Preliminary fire flows were determined using the guidelines outlined in the Los Angeles County Fire Department Fire Flow and Hydrant Requirements. The Fire Department has not yet specified fire flow requirements for the development.

As shown in **Table 2** above, all lots and hydrants within the development will receive water at pressures which meet District standards. This development will create an appreciable demand on the existing system; however, these demands are only about one-third (1/3) of those estimated for the nearby Oak Creek Development.[2] As discussed in Section 5 of the Water System Design Report for Oak Creek (Reference 4), the demands associated with the Oak Creek Development will affect pressures at other

[2] The Oak Creek Development is being constructed just north of the Triangle Ranch Development, on the opposite side of the Ventura Freeway. The Preliminary Water System design Report for The Oak Creek Development was completed on January of 2002.

## Section 6 – Recycled Water

This section is pursuant to District Water Ordinance No. 11-86-161, Title 3-3.206 and Title 3-2.209. Recycled water is available and should be used for irrigation and construction within the proposed development.

The proposed Triangle Ranch Development will be served from the Western Recycled Water System. The nearest connection point is Indian Hills Tank, situated on the ridge just east of the tract boundary.

### 6.1 Western Recycled Water Distribution System

The Western Recycled Water Distribution System, constructed by Las Virgenes Municipal Water District/Triunfo Sanitation District Joint Venture, serves recycled water to users generally along the Ventura Freeway corridor from Las Virgenes Road to the Ventura County line. Recycled water enters the system via Headquarters West Pump Station, which is located east of the LVMWD District Headquarters on Las Virgenes Road. The 2.5-MG Indian Hills Tank (HWL=1225 feet) provides regulatory storage for the Western Recycled Water Distribution System.

### 6.2 Recycled Water Demand for Landscape Irrigation

Approximately 72 acres of common landscaped area, cut-and-fill slopes, and residential lots within the development have been identified as potential areas for irrigation with recycled water.[3] It is also recommended that irrigation of large cut-and-fill slopes use recycled water, under the supervision of the homeowner's association. Irrigation of individual lots will be the responsibility of individual homeowners.

The annual recycled water demand for these 72 acres is estimated to be 216 acre-feet, based on an application rate of 3 ft/yr. Using the Flow Criteria Graph for recycled water use presented in Reference

---

[3] Includes 1.72 acres of common landscape area + approximately 26 acres of cut-and-fill slopes + 44 acres of residential lot acreage (front and back yards). It is assumed the cut-and-fill slopes, as well as the residential lots, will also be landscaped and irrigated with recycled water.

3, the peak recycled water demand within the proposed development is estimated to be 828 gpm during a ten-hour nighttime operating period. The size of irrigation meter(s) will depend on the specific requirements for irrigation water as determined by the developer's landscape architect.

## 6.3 Proposed Recycled Water System

### *6.3.1 Recycled Water Service Alternatives*

Three alternatives were examined for providing recycled water to the development:

- **Alternative 1**: Connect to main at Canwood Drive, near Oak Creek development. This alternative entails the installation of approximately 2750 linear feet of 12-inch[4] diameter pipe from the north end of the development to the existing main in Canwood Drive on the opposite side of the 101 Freeway. This option would require the new recycled water main be placed inside the existing District-owned pipe sleeve at the Kanan Road Bridge. The estimated construction cost for this pipeline is approximately $300,000. This option **is not recommended** since the planned 6-inch main across the Oak Creek property frontage will not provide the capacity needed for the Triangle Ranch development and other potential recycled water customers within its vicinity.

- **Alternative 2**: Tie in to main at Thousand Oaks Blvd. Install approximately 5400 linear feet of 12-inch diameter pipe from the north end of the development to the existing 24-inch main in Thousand Oaks Blvd[4]. This option would also require the new recycled water main be placed inside the existing District-owned pipe sleeve at the Kanan Road Bridge. The estimated construction cost for this pipeline is approximately $600,000. This option will allow for the Oak Creek main in Canwood to be looped with the rest of the system.

---

[4] Pipe size to be verified pending completion of recycled water service study for large residential single family lots "Ranchettes" within the vicinity of Triangle Ranch and other areas of the District. This study is expected to be completed by the District within the next year.

- **Alternative 3**: Tie in to Indian Hills Tank. Install approximately 2000 linear feet of 10-inch[4] diameter pipe from the easternmost end of the Cornell side of the development (near Lots 66 & 67) to Indian Hills Tank. The estimated construction cost for this pipeline is approximately $160,000.

Based on a comparison of preliminary construction costs, Alternative 3 is recommended over Alternative 2. Alternative 1 is not considered due to the insufficient capacity of the 6-inch main in Canwood. It is assumed a 10-inch pipe from Indian Hills Tank to Triangle Ranch will be sufficient to provided service to this development and other large residential single family lots ("Ranchettes") within the vicinity; However, demands for these Ranchettes are uncertain pending completion of a recycled water service study in this area and other areas of the District.

A comprehensive environmental study along the proposed pipeline alignment, as well as a geological study and preliminary survey, are recommended to determine the constructibility and environmental impacts the pipeline could present. The pipeline within Silver Creek Road entails a creek crossing. As an alternative, an alignment within Cornell Road to where it intersects with Kanan Road may be preferred. Though longer, this route avoids the environmental, permit, and construction complications associated with a creek crossing.

Because the main from Indian Hills Tank to the intersection of Cornell Road and Silver Creek Road would be sized to serve customers outside of the tract, some District participation in the cost of its construction may be warranted.

### *6.3.2 Proposed Distribution System*

The proposed recycled water facilities necessary to serve the Triangle Ranch Development are shown on **Plate 3**. This distribution system will function to meet the recycled water irrigation requirements for the cut-and-fill slopes along the perimeter of both the Kanan and Cornell sides of the development, as well as the three proposed landscape lots and the 81 residential lots. The design of all in-tract recycled water service connections will be the responsibility of the developer.

Hydraulic gradients and pressures expected for the recycled water system are listed in **Table 3**. These hydraulic gradients are estimated on the basis of build-out demand identified in Reference 2.

**TABLE 3**

**Hydraulic Gradients in the proposed Triangle Ranch Recycled Water System**

| Location | Peak Flow Nighttime | Maximum Gradient[1] |
|---|---|---|
| Lowest, Most Remote Pad Lot No. 44 (Elevation 843 feet) | 1093ft (108 psi) | 1225 ft (165 psi) |
| Highest Pad Lot No. 74 (Elevation 948 feet) | 1196 ft (107 psi) | 1225 ft (120 psi) |

Note 1: The gradients shown are in the proposed recycled water main

Pressures available at the irrigation nozzles will be dependent on the design of the private on-site irrigation system. Because the maximum expected pressure in the recycled water mains may exceed 150 psi, pressure-reducing valves will be required at all service locations below an elevation of 880 feet. Based on a minimum service pressure of 107 psi and assuming a properly designed and functioning irrigation system, all areas within the development can receive recycled water. All uses of recycled water must comply with Health Department and District rules and regulations.

## 6.4 Economic Feasibility

An opinion of the probable costs associated with the construction of the recycled water system required to serve the proposed development is included in **Table 4.** The estimated total cost of constructing the facilities is approximately $940,000. The estimated cost per acre-ft of water served is approximately $4,330, which is less than the District's benchmark of $5,500 per acre-feet of water served per year. Per District policy, system construction costs below $5,500 per acre-feet are considered economically feasible based on the cost of developing new water sources for Southern California. These costs do not include engineering, administration, or contingency.

TABLE 4
Opinion of Probable Costs
Recycled Water Facilities – Alternative 3

| Item | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|
| 4-inch Recycled Waterline | 400 | LF | $ 61 | $ 25,000 |
| 6-inch Recycled Waterline | 3450 | LF | $ 66 | $ 230,000 |
| 8-inch Recycled Waterline | 2000 | LF | $ 77 | $ 155,000 |
| 10-inch Recycled Waterline (unpaved) | 2000 | LF | $ 77 | $ 155,000 |
| 10-inch Recycled Waterline (paved) | 2400 | LF | $ 94 | $ 225,000 |
| Creek Crossing HDD | 1 | LS | $ 150,000 | $ 150,000 |
| **Subtotal** | | | | $ 940,000 |
| Annual Demand (AF) | | | | 217 |
| **Total Cost/AF** | | | | $ 4,330 |

According to the District Ordinance, the developer may be eligible for a rebate of up to 50 percent of the Water Conservation Fees paid to the District for recycled water distribution facilities that will be dedicated to the District. As discussed in Section 6.3.1, some District participation in financing a portion of these facilities may be warranted.

## Section 7 - Sewer System

The proposed Triangle Ranch Development is located within the Las Virgenes Municipal Water District's service area and has been annexed to the District's U-1 Sanitation Improvement District.[5]

An existing LVMWD sewer trunk line runs through the proposed development along Cornell and Caleta Roads, intersecting the Tentative Tract boundaries near the intersection of Silver Creek Road and Caleta Road. The developer shall be responsible for locating, protecting, and relocating as required, the existing sewer trunk line. The estimated average daily sewage that will be generated by the development is shown in **Table 4.**

**TABLE 5**

**Sewage Generation**

| Land Use | Units | Daily Generation Rate (gallons/unit) | Daily Total (gallons) |
|---|---|---|---|
| Residential - Single Family | 81 | 290[1] | 23,490 |

Notes:

1 – Based on 100 gpd/person and 2.9 persons/unit

The sewer collection system will be operated and maintained by the County of Los Angeles. The following table compares estimated sewage generation and recycled water usage for the tract over a period of one year.

**TABLE 6**

**Sewage Generation Versus Recycled Water Usage**

| | Usage for 81 Units mg/year |
|---|---|
| Sewage Generated | 8.6 |
| Recycled Water Used | 70.4 |
| Net | -61.8 |

[5] According to LVMWD staff, the vicinity of the Triangle Ranch development was annexed to the District's U-1 Sanitation Improvement District as of the date of District formation (1963)

## Section 8 - Construction Phasing and Acceptance

Construction phasing for the Triangle Ranch Development has not yet been determined. However, according to the developer's engineer, it is likely that phasing of the development will be required. If the water system is to be constructed in phases, then the conclusions and recommendations of this Water System Design Report will need to be reviewed. It is possible (though not likely) that the sizes of some pipes may need to be adjusted to provide satisfactory service at the conclusion of an intermediate phase.

In accordance with standard policy, the District will consider final acceptance of the potable and recycled water systems when a previously defined, separately bonded phase of the project is completed. Construction shall be considered complete for a phase when all facilities related to the potable and recycled water systems have been installed in accordance with the District's standards and the approved water system design report, and all meter boxes have been set to grade in concrete sidewalks.

The developer must comply with the Special Conditions for bonds, temporary risers and hose bibs, and repair of damage to accepted water system components set forth in the District's memorandum entitled, "Review of Policy - Acceptance of Tract Water Systems (July 14, 1989)."

## Section 9 - Water Conservation

In accordance with District Water Ordinance 11-86-161 and District policy, the following water conservation measures are required:

- Waste and leakage of water is not allowed.

- For residential development, all toilets installed shall use 1.6 gallons or less per flush, and all showerheads shall flow at 2.5 gallons per minute, or less, at 80 psi.

In addition, if a model home display is to be provided, one of the models must be landscaped with water efficient (Xeriscape) plant materials and irrigated with an appropriate water conserving irrigation system. Further, the Xeriscape model shall be designed to be drought tolerant; irrigation and intensive planting are discouraged. Turf shall occupy no more than 30% of the landscaping. The model home display shall draw attention to the specific landscape materials and irrigation techniques utilized.

To obtain maximum benefit of the limited water resources of the State of California, Las Virgenes Municipal Water District has adopted landscape ordinances that require plant materials and irrigation systems to be water efficient.

In accordance with District Ordinance No. 1-93-205, landscape and irrigation plans must be submitted to the District for review. The landscape and irrigation plans must be in conformance with District landscaping and irrigation specifications as contained in the Las Virgenes Municipal Water District Landscaping Guide.

## Section 10 - Financial Impact on District

The proposed new potable water system facilities within the Triangle Ranch Development are primarily for the benefit of the proposed development, but provide no benefits to the existing District system. District financial participation in new potable water system facilities within the Triangle Ranch Development is not warranted under District Rules and Regulations.

Portions of the proposed recycled water system have been upsized to provide service to potential customers outside of the tract*. Some District participation in the cost of these facilities may be warranted. The actual size of the pipelines is dependent on the results of a study that is planned for later this year. That study will investigate the feasibility of providing recycled water to "Ranchettes" in the vicinity of Triangle Ranch, and elsewhere in the District

The developer may be eligible for a rebate of a portion of the costs of the recycled water distribution system facilities that are to be dedicated to the District. This rebate shall not exceed 50 percent of the water conservation fees paid by the developer to the District. All on-site recycled waterlines will be installed by the developer and owned by the property owner.

---

* The 8-inch and 10-inch mains in particular.

## Section 11 - Environmental Review

The District is a "responsible agency" for the purpose of environmental review of this project under the California Environmental Quality Act (CEQA). The lead agency for the environmental review of this project under the CEQA is Los Angeles County. Environmental documents have not been completed for this proposed development.

Prior to approval of a "Final" Water System Design Report for this project, copies of adopted environmental and planning documents must be provided to the District, showing conditions of approval.

## Section 12 - Conclusions And Recommendations

A. It is concluded that:

1. To provide adequate potable water service to the proposed development, the following facilities must be installed by the developer:

   a) The water mains and appurtenances shown on **Plate 2**, (with two connections to the existing pipeline in Cornell Road, and one connection to the existing pipeline in Silver Creek Road.)

   b) New fire hydrants conforming to AWWA Standard C503-95. The number and location of new fire hydrants are **yet to be determined** by the Los Angeles County Fire Department.

2. All of the lots within the Triangle Ranch Development are below elevation 1076 feet and may experience pressures in excess of 80 psi. Pressure-reducing valves will be required ahead of building plumbing in accordance with the 80-psi limitation imposed by the Uniform Plumbing Code.

3. All of the lots within the Triangle Ranch Development with service connections below an elevation of 914 feet may experience maximum pressures greater than 150 psi. Individual pressure reducing valves will be required on the District's side of each of these service meters.

4. All of the proposed potable water system improvements are within the District's main 1235-foot pressure zone and should be designed to accommodate hydraulic gradients not less than 1260 feet.

5. The developer must be required to dedicate rights-of-way to the District for all pipelines not within public streets.

6. Recycled water shall be used for irrigation of common areas, as well as cut and fill slopes and individual lots within the Triangle Ranch Development. In order to extend recycled water service to the development, the improvements shown on **Plate 3** should be installed.

7. All recycled water improvements shall be designed to accommodate hydraulic gradients of no less than 1225 feet.

8. The proposed development is located within the service area of the District's U-1 Sanitation Improvement District.

9. Construction phasing for the development has not yet been determined.

10. District financial participation in the recycled water system facilities within the Triangle Ranch Development is warranted. The full extent of financial participation will be verified upon further study of the recycled water demands posed by neighboring ranchettes.

11. The developer will be responsible for the cost of extending the District's recycled water main across the property.

12. Environmental documentation, in compliance with CEQA has not been completed.

B. It is recommended that:

1. The potable water system facilities, shown on **Plate 2** and outlined above, be approved for planning purposes only.

2. The District require the developer to dedicate rights-of-way for District facilities and for all pipelines not in public streets.

3. The District requires the use of recycled water for common area irrigation, individual lot irrigation, large cut-and-fill slopes, and construction grading within the proposed development as shown on **Plate 3** and outlined above. It is further recommended that the recycled water facilities shown on **Plate 3** be approved for planning purposes only.

4. The District require all above-ground District-owned facilities (i.e. meters larger than 2 inches, detector check installations, and backflow prevention devices) be installed above ground and screened from view in accordance with District standard plans.

5. The Board determine that District financial participation in new recycled water system facilities within the Triangle Ranch Development is warranted, to the extent that certain pipelines may be sized to accommodate additional demands.

6. The Board determine that the cost of extending recycled water service to the property will be borne by the developer, subject to reimbursement up to an amount of 50 percent of the water conservation fees paid by the developer, and the incremental cost of the oversized mains.

7. The developer will be required to submit documents showing that Los Angeles County has adopted environmental documentation in compliance with CEQA.

8. A final water system design report be prepared and approved following completion of the environmental review process.

## Section 13 - Limitations

*Report Intent.* This Water System Design Report is intended only to develop the hydraulic information necessary to design a water system. No effort has been made at this time to precisely locate existing or proposed facilities. Conflicts may develop as more information is discovered about both existing and proposed pipelines, street grades, etc. Corrections of conflicts related to this project will be the responsibility of the applicant.

*Project Changes.* This Water System Design Report is based upon maps of the Triangle Ranch Development prepared by Wagner Halladay, Inc., and upon information submitted by the developer of the subject property and his representatives. Accordingly, this design report may be subject to modification to reflect changes made by the applicant or conditions imposed by the environmental review process. This report may also be subject to modification to reflect additions or amendments to the District's Water Ordinance and the District's Design Standards prior to approval of the final design. Any revision in the above information or development map or deviation therefrom may invalidate the conclusions and recommendations. A supplemental or amended report must be prepared for the use of the District at the applicant's sole expense if the project or the data is changed.

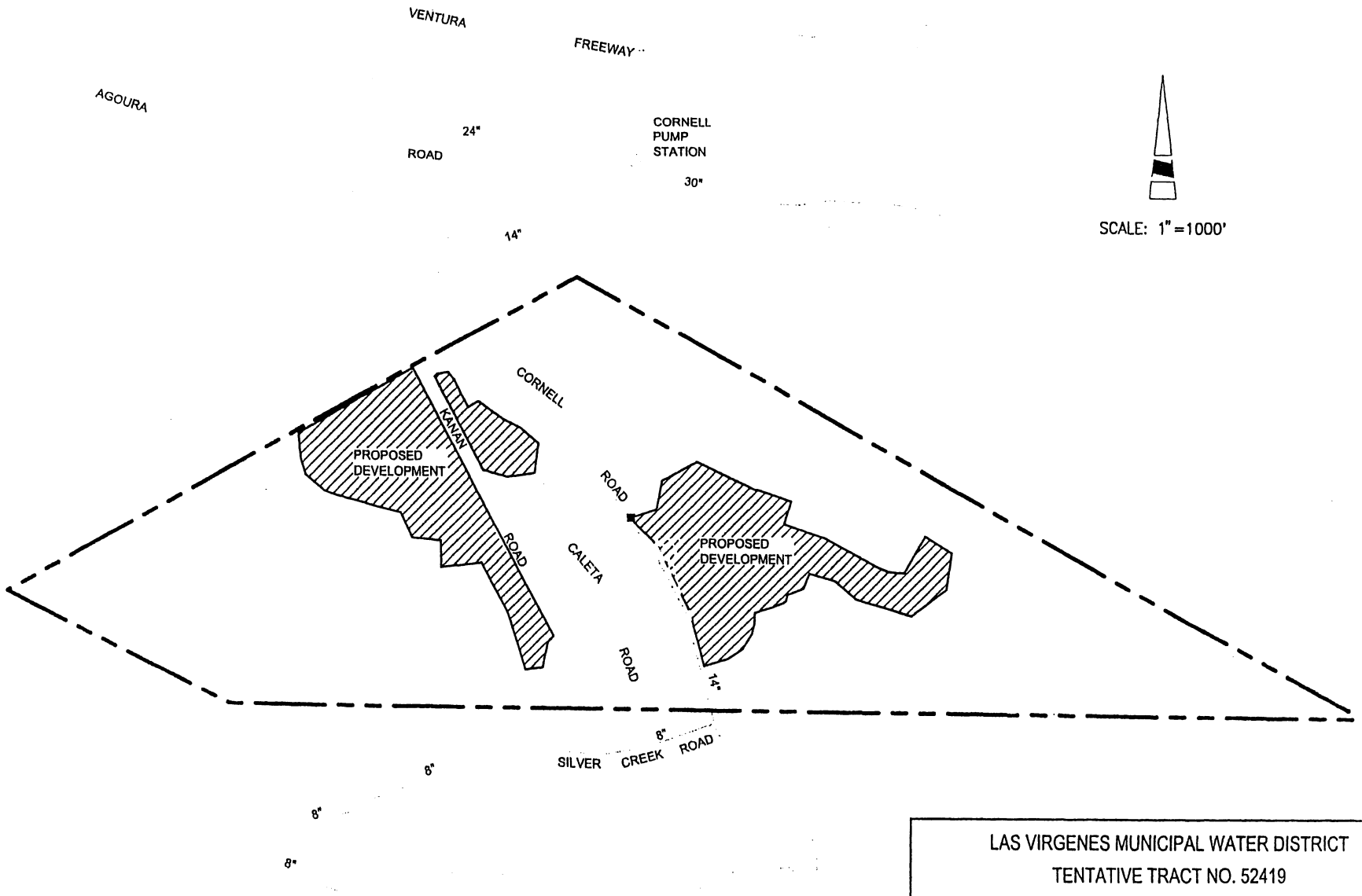
*Other Agency Approvals.* This Water System Design Report has been prepared at the request of the developer of the Triangle Ranch Development. Approval of this report does not indicate the District either supports or opposes the underlying project or any related project. District staff will answer questions concerning this report. However, the project proponent is solely responsible for securing necessary project approvals from state, regional, and local agencies with jurisdiction by law without the express or implied intervention or support of the District.

*Project Delays.* This Water System Design Report is based upon the assumption that the project will be implemented in due course. A supplement, amendment or complete report must be prepared for the use of the District at the proponent's sole expense if the project is unduly delayed.

*Warranty of Supply.* The approval of this Water System Design Report does not constitute a commitment by the District to supply water or provide sanitation service to the project. The project will

be assured of connection to the water and sanitation systems of the District only if the proponent also satisfies all terms and conditions for service as set forth in the District's code, and capacity is available at the time arrangements for service are finalized.

DWG: F:\ellison\L0209959 - Triangle Ranch WSDR\CAD\Planset\G-001.dwg USER: gdavis
DATE: Feb 25, 2004 5:11pm XREFS: BORDER ALT-SITE-B



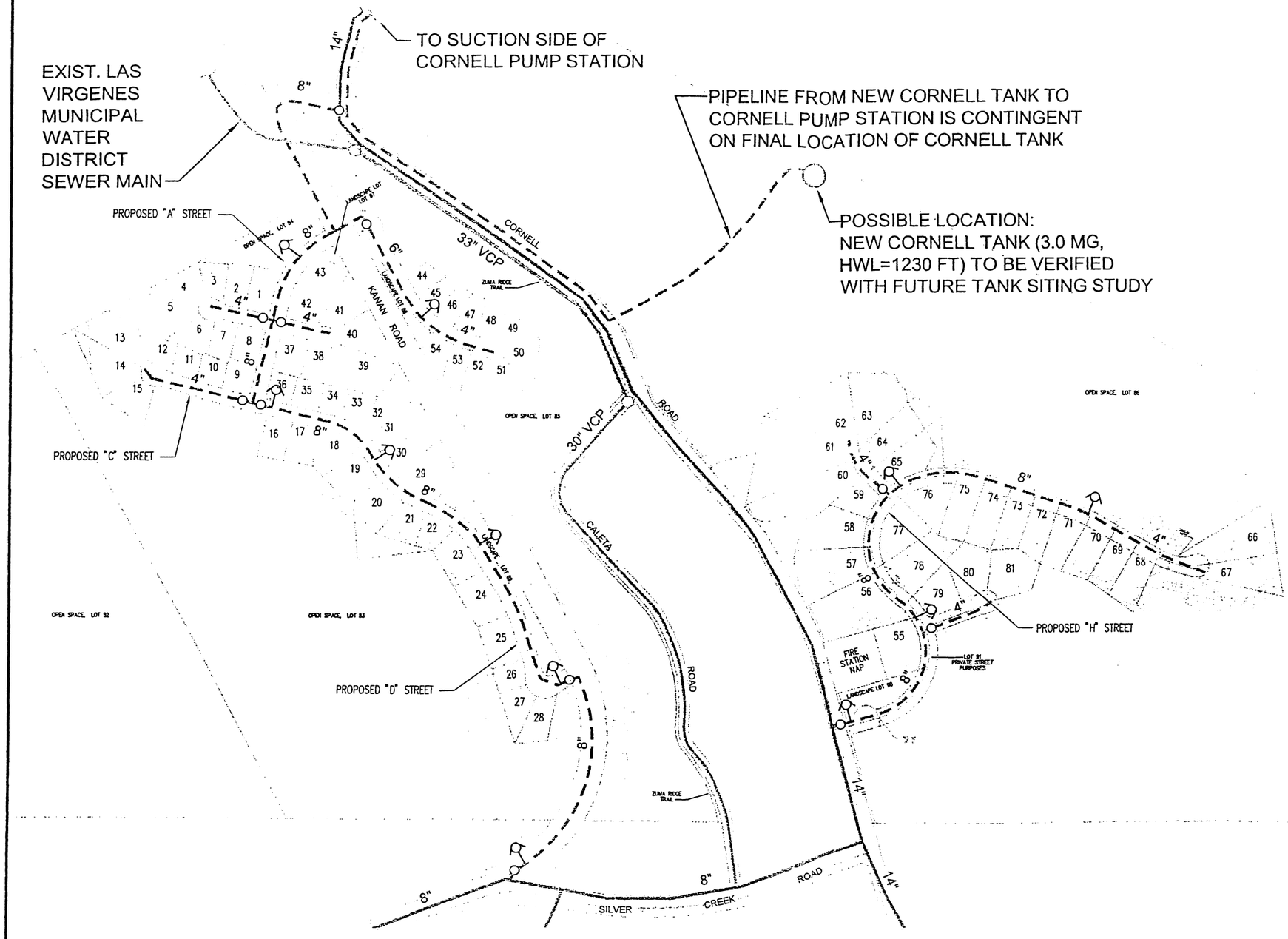

BOYLE ENGINEERING CORPORATION

LAS VIRGENES MUNICIPAL WATER DISTRICT

TENTATIVE TRACT NO. 52419

# VICINITY MAP
# EXISTING POTABLE WATER SYSTEM

VT-L02-099-59 JAN. 2004 | PLATE 1




LEGEND

EXISTING 1235' ZONE WATERLINE — 8" — HYDRANT / VALVE

PROPOSED 1235' ZONE WATERLINE — 8" — HYDRANT / VALVE

EXISTING LVMWD SEWER MAIN

200' 100' 0 200' 400'
SCALE IN FEET

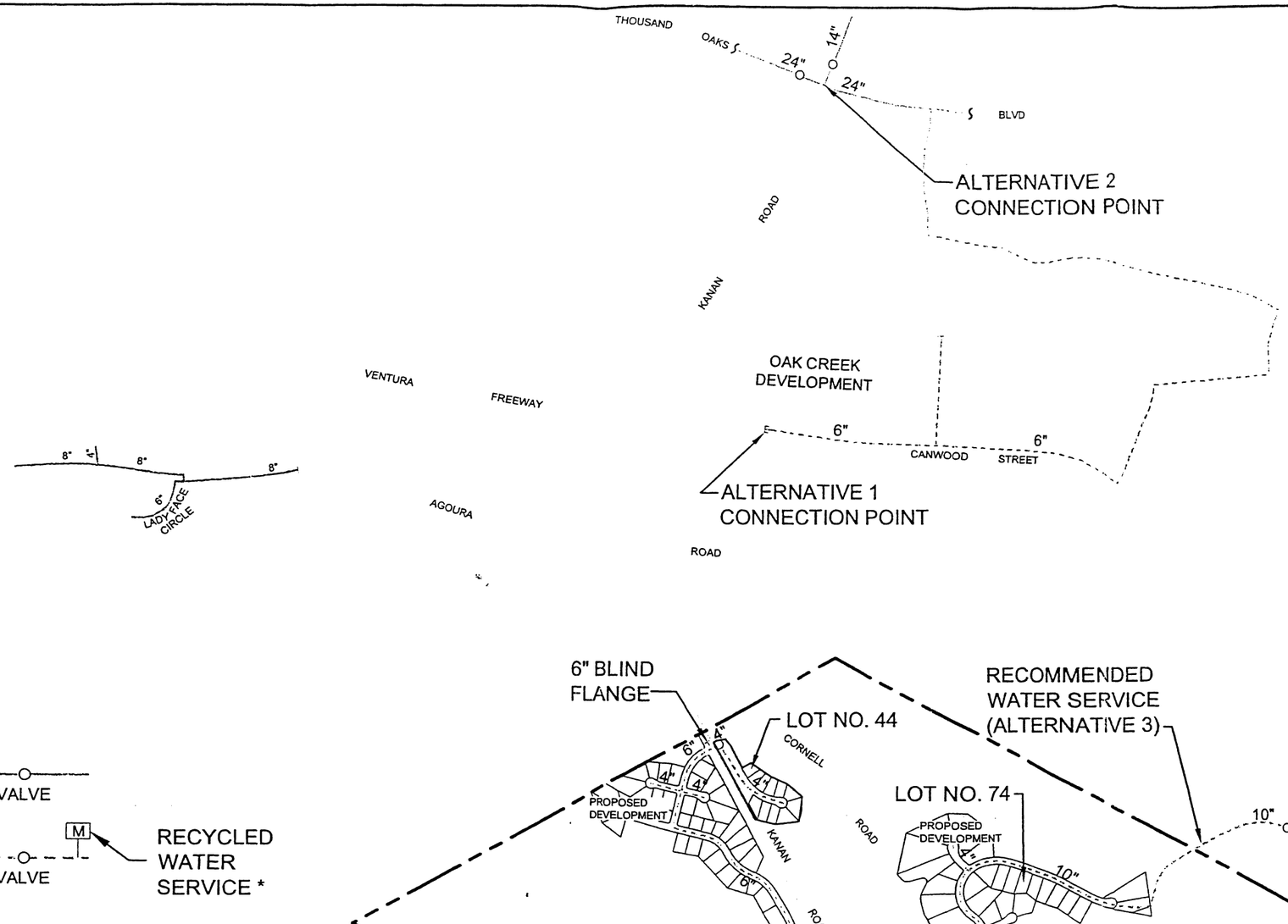
BOYLE ENGINEERING CORPORATION

LAS VIRGENES MUNICIPAL WATER DISTRICT
TENTATIVE TRACT NO. 52419

# PROPOSED POTABLE WATER SYSTEM

VT-L02-099-59 JAN. 2004 | PLATE 2

DWG: F:\ellison\L0209959 - Triangle Ranch WSDR\CAD\Planset\C-001.dwg USER: gdavis
DATE: Mar 19, 2004 9:49am XREFS: ALT-SITE-B Scantopo Ztopo BORDER2

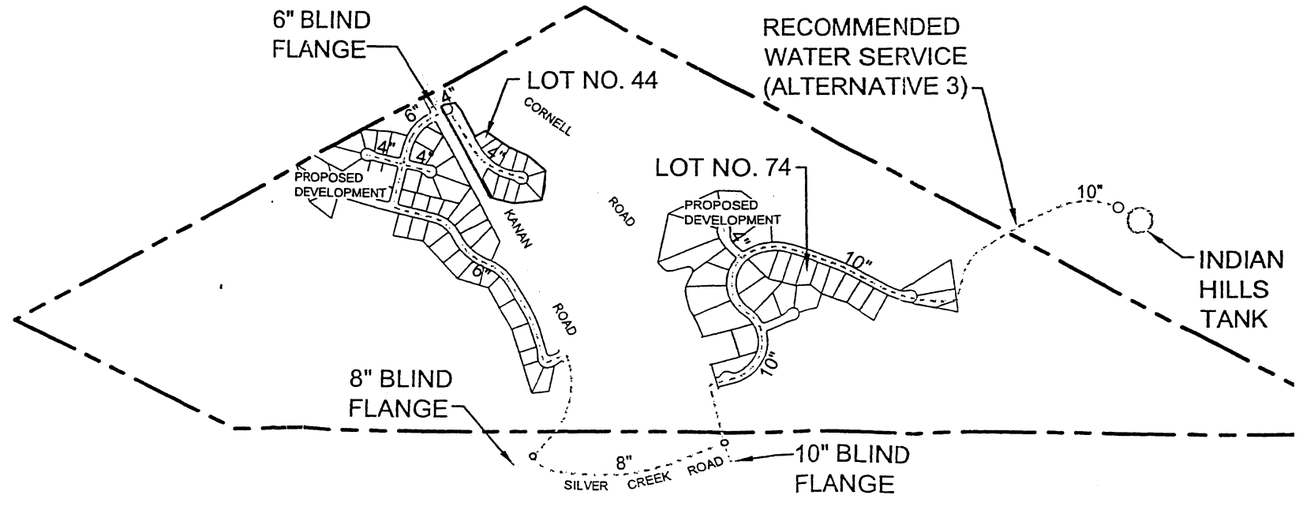


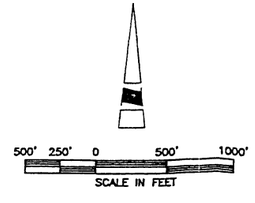

LEGEND

EXISTING 1225' ZONE WATERLINE — 8" — VALVE

PROPOSED 1225' ZONE WATERLINE — 8" — M — VALVE — RECYCLED WATER SERVICE *

ACTUAL LOCATIONS AND SIZES OF RECYCLED WATER SERVICES TO BE DETERMINED BY THE DEVELOPER'S LANDSCAPE ARCHITECT




BOYLE ENGINEERING CORPORATION

LAS VIRGENES MUNICIPAL WATER DISTRICT
TENTATIVE TRACT NO. 52419

# EXISTING AND PROPOSED RECYCLED WATER SYSTEM

VT-L02-099-59 JAN. 2004 | PLATE 3

DWG: F:\ellison\L0209959 - Triangle Ranch WSDR\CAD\Planset\G-002.dwg USER: gdavis
DATE: Mar 19, 2004 9:40am XREFS: ALT-SITE-B BORDER2 parcels(12-8-03)

## References


1. "Potable Water System Master Plan for the Las Virgenes Municipal Water District," Boyle Engineering Corporation, December 1999.

2. "Recycled Water System Master Plan for Las Virgenes Municipal Water District - Triunfo Sanitation District Joint Venture," Boyle Engineering Corporation, April 1999 (LVMWD Report No. 2096.00).

3. "Master Plan for Calabasas Recycled Water System," Boyle Engineering Corporation, March 1989 (LVMWD Report No. 1684).

4. "Preliminary Water System Design Report for the Oak Creek Development," Boyle Engineering Corporation, January 2002 (LVMWD Report No. 2184.00).

5. Los Angeles County Fire Prevention Code, Appendix F.