Appendix D
Geotechnical Investigation
(e-deliverable only)

Appendix D-1
Geotechnical Investigation (2012)

GEOTECHNICAL INVESTIGATION

MASTER PLAN REVISION

CHIQUITA CANYON LANDFILL

CASTAIC, CALIFORNIA

FOR

CHIQUITA CANYON LANDFILL

JANUARY 27, 2012

JOB NO. 2002-036-004

VOLUME 1 OF 2

RTF&A

GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

January 27, 2012

Chiquita Canyon Landfill
29201 Henry Mayo Drive
Castaic, California 91384

Job No. 2002-036-004

Attention: Mr. Michael Dean
District Manager

Gentlemen:

We are pleased to submit our report of "Geotechnical Investigation, Master Plan Revision (MPR), Chiquita Canyon Landfill, Castaic, California" for the site. This report summarizes our opinions on the stability of slopes planned for the proposed landfill development, and for slopes associated with the entrance road area.

Based on the current field conditions and our knowledge of the site geologic conditions, the proposed Master Plan Revision development will be safe from hazard of landslide, settlement, or slippage, and will not adversely affect the geotechnical conditions of off-site properties, provided our recommendations and the requirements of the Los Angeles County Building Code are followed.

Our report incorporates the latest Golder Associates (Golder) Excavation Plan, dated November 2011. This geotechnical report supersedes our August 12, 2011 report, which was based on Golder's April 2011 plan.

-oOo-

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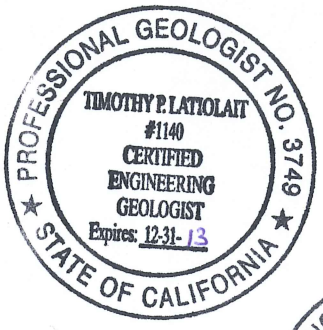
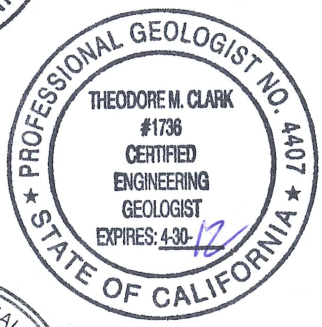
If you should have any questions regarding this report please feel free to contact us.







Respectfully submitted,

R. T. FRANKIAN & ASSOCIATES

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GEOTECHNICAL INVESTIGATION

MASTER PLAN REVISION

CHIQUITA CANYON LANDFILL

CASTAIC, CALIFORNIA

FOR

CHIQUITA CANYON LANDFILL

JANUARY 27, 2012

JOB NO. 2002-036-004

INTRODUCTION

This report presents the results of R. T. Frankian & Associates (RTF&A) geotechnical investigation for the Master Plan Revision (MPR) for the Chiquita Canyon Landfill (CCL). The investigation was performed at the request of Mr. Michael Dean of CCL and is based on the November 2011 *Excavation Plan* for the MPR, prepared by Golder Associates (Golder) and presented in Appendix A. The MPR includes extending the currently approved landfill footprint into the areas northeast and south of the active Main Canyon landfill, the relocation of the entrance road, and changes to the existing south and east sedimentation basins. The report summarizes our opinions on the stability of slopes planned in the following areas:

- northeast of the Main Canyon landfill, where the MPR grading limits include the lined landfill area, permanent cut slopes above the landfill perimeter, and grading for the east stormwater basin; and

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- south of the Main Canyon landfill, where the MPR grading limits include the lined landfill area, permanent cut slopes above the landfill, grading for the south stormwater basin, and the future entrance road south of Primary Canyon.

This geotechnical report does not, however, address future grading within the MPR areas designated as "Potential Borrow Area" and "MRF and Household Hazardous Waste Facilities Location."

This report presents the results of RTF&A's evaluation of the geologic and geotechnical conditions at the subject site. The purpose of the evaluation is to identify existing or potential geologic hazards and substantiate that the site is suitable for the proposed development from a geotechnical and geologic perspective. This data is provided for incorporation into an Environmental Impact Report (EIR). Our findings and recommendations are based on the results of our site geologic mapping and subsurface investigation, review of published data, and appropriate engineering and geologic analyses. The assessment of general site environmental conditions for the presence of contaminants in the soils and groundwater at the site was beyond the scope of this investigation.

Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report has been prepared for CCL and their design consultants, to be used solely for planning and design of the MPR and associated grading.

PROJECT DESCRIPTION

NORTH AND EAST CANYON EXCAVATION AREA

The North and East Canyon Excavation Area will encompass northern portions of the property known as North Canyon and East Canyon. In this area, the MPR extends the lined landfill footprint north and northeast of the active Main Canyon landfill and includes a proposed east stormwater basin in the vicinity of the existing east sedimentation basin. The MPR grading plan includes permanent cut slopes above the perimeter of the proposed landfill, lined cut slopes and fill slopes within the landfill area, and permanent cut slopes above the proposed east basin. The proposed landfill liner limit is approximately coincident with the downslope side of the perimeter road.

North Canyon is located in the north portion of the site, just north of the active Main Canyon landfill (Figure 1). The topography of the North Canyon site is dominated by a southerly-draining canyon with moderately-steep bedrock slopes forming the west, north, and east canyon walls. These slopes descend to the canyon bottom at an overall gradient of approximately 1½:1 (horizontal:vertical). The floor of the canyon has been modified by at least two episodes of filling, including fill placed in the mid-1990s during construction of Canyon C Cell 2, and in 2003-2004 when fill material was generated during removal of the Northridge earthquake landslide. As much as 70± feet of fill has been placed in North Canyon since the 1990s, changing the canyon configuration from a steeply-incised canyon to one that is somewhat broad and flat-bottomed.

The East Canyon topography is characterized by a series of southerly- to easterly-descending ridges that border two southerly-draining tributaries of Castaic Creek. The natural slopes descend toward the two canyons at gradients ranging generally from 1½:1 to 3:1. The northern portion of the East Canyon includes an existing 3:1 southeasterly-facing 180± feet high fill slope constructed for two off-site water tanks. Approximately two-thirds of the fill slope is located within the CCL property.

Existing site elevations range from approximately 1,660 feet above mean sea level (msl) at the upper reaches of North Canyon to 1,100 feet msl at the confluence of the two tributary canyons of Castaic Creek.

The North and East Canyon Excavation Area extends from the northwest corner of CCL (above the perimeter road of Main Canyon landfill) to the eastern property line, immediately north of Canyon "B" landfill and northwest of the post office. The proposed floor of the excavation will range from approximate elevations 1,175 feet msl to 1,125 feet msl. Numerous cut slopes will be graded as part of the North and East Canyon development. Proposed slope gradients will range from 2:1 to 4:1. The maximum proposed cut slope height will be approximately 300 feet.

The location of North and East Canyon areas are shown on the Geotechnical Map, North and East Canyon Excavation Area (Figure 2.1).

SOUTH MAIN CANYON AND ENTRANCE ROAD

The South Main Canyon and Entrance Road areas lie within the southwest portion of the property. The geologic/geotechnical conditions within South Main Canyon were previously addressed by RTF&A in our November 20, 2009 report (RTF&A, 2009b); the geologic/geotechnical conditions along the Entrance Road were presented in RTF&A's January 13, 2012 report (RTF&A, 2012b). In the South Main Canyon area, the MPR grading plan includes extending the lined landfill footprint south of the active Main Canyon landfill. The proposed MPR entrance road is east of the existing landfill entrance, along the south side of the closed Primary Canyon landfill.

The South Main Canyon includes the main southerly-draining canyon, an easterly-draining tributary canyon, and ascending canyon slopes, located northwest of an existing sedimentation basin. Natural slope gradients range from 1½:1, for the slopes at the head of the canyon, to 4:1. Elevations range from approximately 1,330 feet msl to 980 feet msl.

A new stormwater basin is proposed for the South Main Canyon area, coinciding with the footprint of the existing sedimentation basin, with the basin bottom established at approximate elevation 965 feet msl. Side slopes for this basin will be graded at an inclination of 2:1 and attain a maximum height of approximately 125 feet.

A new landfill Entrance Road is proposed in the southwest corner of the site, with the road alignment beginning at the current intersection of Franklin Parkway and Wolcott Way, extending west-southwesterly toward the current landfill entrance. The topography along the proposed Entrance Road is characterized by a relatively flat alluviated area along the north side of State Highway 126, bordering moderately to steeply-ascending bedrock slopes. Cut-and-fill grading will be utilized for the Entrance Road, including south- and west-facing cut slopes up to 160 feet high. Proposed slope grades will range from 1½:1 to 2:1.

The South Main Canyon area and the future Entrance Road are depicted on the Geotechnical Map, South Main Canyon and Entrance Road (Figure 2.2).

SUBSURFACE EXPLORATION

Field exploration was conducted within the project site to develop and refine our understanding of the geologic surface and subsurface conditions. In particular, attention was focused on the underlying geologic structure and stratigraphy that will affect the slope stability of the proposed excavation plan. The explorations were conducted within North Canyon (for this current MPR investigation), East Canyon (RTF&A, 2006a and 2006b), South Main Canyon (RTF&A, 2009a), and the area of the future Entrance Road (RTF&A, 2012b).

The North Canyon investigation included exploring the subsurface conditions beneath the site by excavating 10 bucket auger borings (designated Borings B-1-10 through B-7-10, B-9-10, and B-11-10) and four hollow-stem auger borings (designated HS-1-10 through HS-4-10). The East Canyon investigation included the excavation of

eight bucket auger borings, designated B-1-03 through B-8-03. The South Main Canyon investigation included the excavation of three bucket-auger borings (B-1-09 through B-3-09) and three rotary-wash borings (WB-1-09 through WB-3-09). Investigation of the Entrance Road consisted of exploring the subsurface conditions by excavating six bucket auger borings (designated Borings B-8-10 and B-1-11 through B-5-11).

We obtained undisturbed samples from the borings for laboratory examination and testing. Standard Penetration Test (SPT) samples were also obtained from the hollow-stem auger borings.

The locations of the various borings are depicted on the Geologic Map, presented as Figure 1, and the Geotechnical Map, Figures 2.1 and 2.2. The logs of the borings are presented in Appendix B.

The surface geologic conditions within the landfill were previously mapped by EMCON (1990a), Harding Lawson and Associates (1987), and GeoLogic Associates (2005c), and mapped at a regional scale by professionals of the Dibblee Foundation (1993), the United States Geological Survey (USGS) (Winter and Durham, 1962), and California Division of Mines and Geology (CDMG) (Barrows, 1986).

LABORATORY ANALYSES

We performed laboratory tests on selected samples obtained from the borings to aid in the classification of the soils, for use in slope stability analyses, and to determine the pertinent engineering properties of the subsurface earth materials. The following tests were performed:

- moisture content and dry density determinations;
- direct shear tests;
- consolidation tests;
- plasticity index; and
- grain size analyses.

The results of the tests are presented in Appendix C.

GEOLOGY

REGIONAL GEOLOGY

CCL is located at the eastern end of the Ventura basin within the Transverse Ranges geomorphic province of California. The Ventura basin consists of a narrow, elongate sedimentary trough extending from the Santa Barbara Channel on the west to the San Gabriel fault on the east. The axis of the trough trends east-west, reflecting the overall east-west trend of the Transverse Ranges, and generally coincides with the Santa Clara River Valley and Santa Barbara Channel. The Ventura basin has been an area of subsidence and sediment accumulation since the beginning of the Tertiary period, with the present trough-like form developing near the beginning of the Miocene epoch (Winterer and Durham, 1962).

The structure of the basin is defined as a highly folded "synclinorium" formed by north-south compressional forces (Kew, 1924) and containing a maximum 50,000± feet of marine and nonmarine Tertiary through Quaternary age sediments (Bailey and Jahns, 1954). Two main periods of general deformation of the Ventura basin are indicated by the regional geologic structure: one in middle to late Miocene (represented by deposition of the Modelo Formation) and the other during the Pleistocene epoch, after deposition of the Plio-Pleistocene Saugus Formation (Kew, 1924; Winterer and Durham, 1962; Yeats et al., 1994). The flanks of the Ventura basin synclinorium are broken by a series of large reverse/thrust faults including the Santa Susana and Oak Ridge faults on the southern flank, and the Red Mountain and San Cayetano faults on the northern flank (Bailey and Jahns, 1954; Yeats et al., 1994). The San Gabriel fault, the dominant geologic feature in the Santa Clarita Valley, forms the eastern Ventura basin boundary and separates the Ventura basin from the structurally similar Soledad basin.

Sedimentary rock units comprising the eastern Ventura basin include approximately 2,000 feet of undifferentiated middle to late Eocene age rocks; 1,000± feet of the middle Miocene age Topanga Formation; 5,000± feet of the late Miocene age Modelo Formation; 4,000± feet of the late Miocene to early Pliocene age Towsley Formation; 5,000± feet of the Pliocene age Pico Formation; and 7,000± feet of the Plio-Pleistocene Saugus Formation (Winterer and Durham, 1962). The undifferentiated Eocene units and the Topanga, Modelo, Towsley, and Pico formations are composed of marine sediments; the Saugus Formation is composed of interfingering shallow-water marine, brackish water, and nonmarine units (Kew, 1924; Winterer and Durham, 1962). These Tertiary period rocks rest unconformably on pre-Cretaceous age metamorphic and igneous basement rocks of the San Gabriel Mountains.

Within the Santa Clarita Valley, the primary sedimentary rock formations are the Pico and Saugus formations. The Pico Formation outcrops along the northern flanks of the Santa Susana Mountains and in the Chiquita Canyon-Val Verde area. The Saugus Formation overlies the Pico Formation and comprises most of the hills of the valley between Newhall and Castaic. These two formations have been deformed into a series of closely spaced anticlines and synclines whose moderately to steeply-dipping flanks are broken by the Holser fault and cut off diagonally by the San Gabriel fault (Bailey and Jahns, 1954). Other geologic materials exposed within the valley include Pleistocene fanglomerate deposits of the Pacoima Formation (exposed in the southern portion of the valley) (Oakeshott, 1958), sporadic remnant terrace deposits of Pleistocene age, and Holocene alluvium mantling the valley floor.

The site is located within a region of high seismic activity primarily related to the active San Cayetano, Oak Ridge, Santa Susana, and San Gabriel faults, all of which are located within six miles of the site. Secondary, potentially active faults near the site include the nearby Holser fault.

LOCAL GEOLOGY

The site is situated on the northerly limb of the Ventura basin "synclinorium," approximately 1,000 feet south of the Holser fault. The Holser fault is a regional structure and may branch from the active San Gabriel fault (Winterer and Durham, 1962). Data compiled from oil company well logs indicate that the Holser fault is a south-dipping reverse fault with approximately 2,200 feet of dip-slip separation within the area of the Castaic Junction Oil field (Stitt, 1986). Studies completed by Allen E. Seward Engineering Geology (Seward, 1986 and 1993) examined the Holser fault for Holocene activity in the Hasley Industrial Park north of the site. Seward (1986) concluded that while deformation of the fault has clearly affected Quaternary sediments of the Saugus Formation, no offset has occurred in the overlying Holocene sediments.

The geologic structure beneath the site is dominated by four subparallel northwest-southeast trending, through-going folds. The folds are related to the north-south compressional forces within the hanging wall of the Holser fault system, which lies north of the study site. The axial traces of the folds are shown on the Geologic Map, Figure 1. Two of the through-going folds, consisting of an anticline on the south and a syncline to the north, transect the North and East Canyon Excavation Area. The geologic structure beneath the site is shown on the Site Geologic Sections, presented as Figure 3.

Geologic mapping of the site was previously performed by RTF&A in 2003 and 2004 as part of our Slope Stability Study and Geologic Fault Study for East Canyon (RTF&A, 2006a and 2006b). Additional geologic mapping was performed during our 2010 site exploration. The geologic units identified within the site during the geologic mapping are discussed below.

GEOLOGIC UNITS

The soil and bedrock materials encountered within the site consist of man-made deposits, alluvium, landslide debris, terrace deposits, and bedrock units of the Saugus and Pico formations. The various geologic units exposed within the landfill are depicted on the 1" = 200 feet Geologic Map, Figure 1. Units specific to the North and East Canyon Excavation Area and the South Main Canyon Entrance Road are presented on the 1" = 100 feet Geotechnical Maps, included as Figures 2.1 and 2.2, respectively. A description of each unit is presented as follows:

Man-made Deposits (af, afr, afs and cef): Man-made deposits consist of uncompacted artificial fill (map unit "af") and compacted (or certified) engineered fill (map unit "cef") associated with past grading activities on-site, and artificial fill materials related to landfill refuse disposal activities including stockpile fill (map unit "afs") and refuse fill (map unit "afr"). The fill materials are composed primarily of reworked Pico and Saugus Formation units and, in the case of the refuse fill, compacted municipal solid waste and associated cover materials primarily derived from reworked Pico and Saugus Formation materials.

Alluvium (Qal): Holocene age alluvium ("Qal") is present in the canyons and major drainage courses within the site and as Santa Clara River flood plain deposits adjacent to State Highway 126. As observed, the alluvium generally consists of sand and silty sand with scattered gravel and cobbles, derived from local bedrock exposures. The alluvium is generally loose to moderately dense and uncemented.

Older Alluvium (Qoa): Pleistocene age (older) alluvium ("Qoa") is limited to the southerly-draining tributary in the East Canyon area, immediately west of landslide Qols A. The older alluvium is composed of unconsolidated to poorly consolidated mixtures of sand, gravel, silt, and clay.

Terrace Deposits (Qt): Pleistocene age terrace deposits occur on-site along State Highway 126 southeast of the existing landfill entrance and as isolated and limited

remnant stream channel deposits. The terrace deposits are typically composed of poorly consolidated deposits of coarse sand, gravel and silt with cobbles, and, to a lesser extent, boulders.

Landslide Debris (Qd, Qls, Qols): Three types of deposits attributable to slope failure have been identified at the site, and these consist of debris flow deposits (Qd), Holocene landslides (Qls), and a Pleistocene landslide (Qols). The debris flow deposits are derived from weathered bedrock and slope wash materials and consist of unconsolidated sand, silt, and clay. These deposits typically occur within ravines and on slopes steeper than approximately 2:1.

Materials designated as Holocene landslide debris range from poorly consolidated, highly weathered rock materials to relatively coherent, moderately hard to hard sandstone, siltstone, and claystone units derived from the underlying Saugus or Pico formations. Depending on the amount of movement, the entire landslide or the upper portions of the landslide debris are disturbed.

The central portion of the East Canyon is mantled by an older landslide deposit (Qols) that appears to be comprised of older alluvium as well as Pico and Saugus Formation materials.

Saugus Formation (QTs): Plio-Pleistocene age non-marine sedimentary rock units of the Saugus Formation ("map unit "QTs") outcrop in the eastern and southern portions of the site. Saugus Formation units typically consist of poorly to moderately well-bedded, light yellowish brown to pinkish gray, fine- to coarse-grained, pebble- to cobble-bearing sandstone and silty sandstone with moderate brown siltstone to clayey siltstone. This formation is poorly to moderately well-bedded and ranges from friable to moderately hard. The fine-grained clayey beds, typical of the lower Saugus Formation, represent some of the weakest material within the formation.

Pico Formation (Tp): Marine sedimentary rock units of the Pliocene age Pico Formation (map unit "Tp") are exposed in the northern and western portions of the site.

These units are comprised of grayish orange to light gray sandstone, yellowish gray to yellowish brown siltstone, and limited brownish gray fossiliferous siltstone and sandstone. These units range from soft near the surface to moderately hard at depth. The fossiliferous beds tend to be more resistant than surrounding units, as indicated by the prominent, ridge-forming fossiliferous siltstone ("Ridge-Forming Coquina") near the mouth of North Canyon.

The Pico formational contact with the overlying Saugus Formation is interfingering, gradational, and not always readily discernible, particularly in exploratory borings. Within the site and for the purposes of this study, RTF&A has defined the top of the Pico Formation as the first appearance of fossiliferous beds. Where fossiliferous beds are missing from the stratigraphic section, we have defined the contact using color as an indicator. In particular, the presence of Munsell hues "5Y" is more common within the Pico Formation and may indicate the approximate contact with the Saugus Formation.

GROUNDWATER

Groundwater occurs in both the Saugus and Pico formations in the Chiquita Canyon area. In these sedimentary rocks, groundwater is present primarily in the intergranular porosity, with the more permeable, coarser-grained sandstone and conglomeratic units yielding more water than the siltstone and finer-grained sedimentary rocks.

Beneath most of the site, the uppermost water-bearing unit is the Saugus Formation, except in the northwest area approximately coincident with the Pico Formation outcrop area (Figure 1). The majority of the groundwater monitoring wells and piezometers are completed in the Saugus Formation, where the depth to groundwater ranges from approximately 33 feet at well DW-7 to 345 feet at well DW-23. Groundwater elevations in Saugus wells vary from near 920 feet msl along the south

property line (DW-7 and DW-12) to 1,080 feet msl in the East Canyon (DW-26 and PZ-7). Seasonal groundwater elevation variations are less than a few feet at most hillside locations, with greater fluctuations in wells along canyon bottoms.

Groundwater is also present in the Pico Formation. Eight monitoring points (DW-8, DW-19, DW-25, DW-27, DW-28, PZ-5, PZ-6, and PZ-8) have been completed in the Pico Formation (Figure 1). Groundwater depths range from approximately 72 feet at PZ-6 in the East Canyon to 335 feet at DW-28 on the slope of the northwest ridgeline. Pico Formation groundwater elevations vary from about 1,105 feet msl in the East Canyon (PZ-6) to 1,221 feet msl in the North Canyon (PZ-8). The seasonal groundwater elevation variations are less than a few feet at wells DW-8, DW-19, DW-25, and PZ-5. Piezometer PZ-6, located in the bottom of the East Canyon, showed a greater seasonal groundwater elevation fluctuation of over 10 feet.

SLOPE STABILITY

GENERAL

Twenty cut slopes are planned for development of the North and East Canyon Excavation Area; six cut slopes are proposed for the South Main Canyon and Entrance Road. In both areas, the proposed landfill liner limit is approximately coincident with the downslope side of the perimeter road, shown on Figures 2.1 and 2.2. The cut slopes are designated Cut Slope CS-1 through Cut Slope CS-25, with locations shown on Figures 2.1 and 2.2. Proposed cut slope gradients will range from 2:1 to 4:1. The maximum cut slope height is approximately 300 feet (Cut Slope CS-1). The lower 200 feet of this cut slope will be lined and eventually buried by refuse. Cut Slope CS-24 is the highest proposed permanent cut slope, with a permanent height of approximately 225 feet. Data specific to all of the cut slopes, including slope height, gradient, and underlying geologic conditions are summarized in Table 1, Summary of Cut Slopes.

Natural slopes within the site are underlain by bedrock of the Pliocene age Pico

Formation and the younger Plio-Pleistocene age Saugus Formation. Collectively, these formations are composed of bedded sedimentary rock units. Claystone units are common within both formations. These claystone units are most likely responsible for the landslides within the site, including the landslide complex located in East Canyon (landslides Qls G through Qls L, Figure 2.1).

Bedding planes within the Pico Formation are well developed and are poorly to moderately well developed within the Saugus Formation. The bedding can constitute planes of weakness. Where bedding is adversely oriented, or "daylighted," with respect to natural or cut slopes, potential for "block-glide" failure exists. Block-glide slides are common within both the Saugus and Pico formations.

STABILITY ANALYSES

Slope stability analyses were performed using the program Slope/W by GEO-SLOPE International Ltd., which utilized Spencer's or Bishop's Method. Within Los Angeles County, a static factor of safety of 1.5 and a seismic factor of safety of 1.1 is required for permanent slopes. The MPR excavation slopes outside of the lined landfill footprint are considered permanent slopes. Within the landfill liner limit, the temporary excavation slopes will be lined and eventually covered with refuse. We understand that for a particular lined cut slope, the local placement of refuse may continue for several years before the final landfill grade is attained. However, there will not be any structures or access by the public below these temporary slopes. Within Los Angeles County, temporary slopes are required to meet a static factor of safety of 1.25, which was utilized in this report for the evaluation of the excavation plan for slopes that are proposed to be lined.

The slope stability evaluation presented in this report addresses the proposed slopes indicated on the MPR Excavation Plan (Appendix A) associated with construction of the landfill liner, the east and south stormwater basins, and the entrance road. We

understand that the static and seismic stability of the MPR landfill liner and the refuse fill will be evaluated by Golder Associates.

SHEAR STRENGTH PARAMETERS

The recommended shear strength parameters are based on the results of the direct shear test results, presented in Appendix C, performed on representative samples of the earth materials encountered within our exploratory borings. In addition, we also reviewed shear strength parameters presented in the referenced reports for the subject site and nearby vicinity. The plots of peak, single shear residual (SSR), and multi-shear residual (MSR), as appropriate, are presented on the attached direct shear test summaries. Presented below are the selected bedding plane shear strengths, as well as the cross-bedding and compacted fill shear strengths recommended for slope stability evaluation at the site.

MATERIAL	COHESION (psf)	ANGLE OF SHEARING RESISTANCE (degrees)
Landslide Failure Plane (MSR)	100	10
QTs & Tp Bedding Plane (MSR)	200	18
QTs Cross Bedding (SSR)	600	36
Tp Cross Bedding (SSR)	500	30
Compacted Fill (SSR)	350	30

GEOLOGIC SECTIONS AND ASSUMED CRITICAL FAILURE SURFACE

The analyses were based on subsurface conditions, as depicted on the Geologic Sections, Figures 4.1 and 4.2. The existing topography, proposed grading scheme, and subsurface geologic structure are shown on the attached Geologic Sections. Where Geologic Sections traverse the proposed landfill perimeter, the lined slopes (temporary slopes within the landfill footprint) and permanent slopes (above the landfill perimeter) are also designated. For analyses where the location of weak bedding planes is unknown

or uncertain, one is assumed to be located at the critical location, typically near the toe of the slope. Although the highest measured groundwater level is indicated on the Geologic Sections, the analyses generally assumed a phreatic surface above the critical failure surface for bedding plane failures. The critical failure surfaces and factors of safety are added to the Geologic Sections for presentation as Geotechnical Sections in this report. The Geotechnical Sections and Slope Stability Analyses results are presented as Figure 5. The slope stability calculations are presented in Appendix D.

RESULTS OF STABILITY ANALYSES

Cut Slope CS-1: Cut Slope CS-1 (Figure 2.1) will be graded as a south- to southeast-facing, 2:1 slope. The total slope height is approximately 300 feet. The upper 200 feet of the slope (above the proposed perimeter road) is planned as a permanent cut slope; the lower 100 feet of the slope (below the perimeter road) will be lined in the future and covered by waste. The cut slope will expose Pico Formation units in which the underlying bedding strikes generally east-west to east-northeast and dips 36 to 50 degrees to the south. As depicted on Geologic Section S11-S11' (Figure 4.1), the bedding is favorably oriented with respect to Cut Slope CS-1, and the cut slope is considered grossly stable from a geologic standpoint.

Cut Slope CS-2: Cut Slope CS-2 (Figure 2.1) is proposed as a south-southeast-facing, 2:1 slope. The total slope height is approximately 150 feet, with the upper (permanent) portion of the cut slope approximately 80 feet high and the lower (lined) portion of the slope 70 feet high. The cut slope will expose Pico Formation units in which the underlying bedding strikes generally east-northeast and dips 40 to 47 degrees to the southeast. As depicted on Geologic Section S12-S12' (Figure 4.1), this bedding orientation is favorable with respect to Cut Slope CS-2, and the cut slope is considered grossly stable from a geologic standpoint.

Cut Slope CS-3a: Cut Slope CS-3a (Figure 2.1) is proposed as a south- to east-southeast-facing, 2:1 slope. The total slope height is approximately 220 feet, with the upper (permanent) portion of the cut slope approximately 175 feet high and the lower (lined) portion of the slope 45 feet high. Bedding within the underlying Pico Formation strikes east-northeast and dips 39 to 52 degrees toward the southeast. As depicted on Geologic Section S26-S26" (Figure 4.2), a 19-degree bedding component is defined by a distinctive marker bed, identified as a "Ridge-Forming Coquina." The 19-degree bedding is essentially parallel to the apparent slope gradient, as reflected on the Geologic Section, and Cut Slope CS-3a is considered grossly stable from a geologic standpoint.

Cut Slope CS-3b: Cut Slope CS-3b (Figure 2.1) will be graded as an east-southeast-facing, 2:1 slope to a height of approximately 75 feet. The entire slope represents a temporary slope that will be lined and eventually buried by waste. As depicted on Geologic Section S26-S26' (Figure 4.2), bedding within the underlying Pico Formation strikes generally east-west and dips approximately 58 degrees toward the south, resulting in an apparent dip of 33 degrees south, relative to the proposed cut slope. As the apparent bedding dips steeper than the proposed cut slope gradient, Cut Slope CS-3b is considered grossly stable from a geologic standpoint.

Cut Slope CS-4: Cut Slope CS-4 (Figure 2.1) will be graded as a 2:1 to 4:1, southeast-facing cut slope. The overall slope height is approximately 210 feet, with the proposed permanent and lined portions of the slope approximately 120 feet and 90 feet high, respectively. The cut slope will expose Pico Formation units, landslides Qls E and Qls F, and artificial fill. The bedding in the underlying Pico Formation strikes generally northwest to north-south and dips 25 to 40 degrees to the south and east. As depicted on Geologic Section S16-S16' (Figure 4.1), the bedding is essentially parallel to the slope gradient, as reflected on the Geologic Section, and Cut Slope CS-4 is considered grossly stable from a geologic standpoint.

The proposed cut slope will remove Qls E and the artificial fill. Qls F, which underlies the artificial fill in the area of the cut slope, will also require removal during grading. Any removals exceeding proposed grade will require restoration of grade by placement of certified engineered fill.

Cut Slope CS-5: Cut Slope CS-5 (Figure 2.1) is proposed as a southeast- to south-facing, 2:1 to 3:1 slope. The total slope height is approximately 120 feet, with the upper (permanent) portion of the cut slope approximately 30 feet high and the lower (lined) portion of the slope 90 feet high. The cut slope will encounter Pico Formation units, landslide Qls F, and artificial fill. Bedding within the underlying Pico Formation strikes northeast and dips 27 to 33 degrees toward the southeast. As depicted on Geologic Section S15-S15' (Figure 4.1), a 24-degree bedding component is adversely oriented, or "daylighted," with respect to Cut Slope CS-5. Stability analyses performed for potential failure along the adversely oriented bedding indicate that the proposed cut slope exceeds the temporary factor of safety requirements of 1.25. The slope stability results are indicated on the Geotechnical Sections (Figure 5), and the slope stability calculations are presented in Appendix D.

Landslide Qls F and artificial fill, depicted on Geologic Section S24-S24' (Figure 4.2), should be removed to elevation 1,400 feet msl. Proposed slope grades should then be re-established with compacted fill as a stability fill. The need for backdrains above the proposed landfill liner should be evaluated during grading operations. The stability fill and backdrains should be constructed in accordance with the recommendations presented in this report and as shown on Figure 6 – Stability Fill Details for Grossly Stable Slopes.

Cut Slope CS-6: Cut Slope CS-6 (Figure 2.1) will be graded as a south-southeast-facing, 2½:1 to 3:1 slope. The overall slope height is approximately 290 feet, with the proposed permanent and lined portions of the slope approximately 95 feet and 195 feet high, respectively. The cut slope will encounter Pico and Saugus Formation

units and landslide Qls H through Qls J. Strike of the bedding in the underlying formations ranges from northwest to northeast, with easterly dips between 16 and 44 degrees. As indicated on Geologic Sections S17-S17' (Figure 4.1) and S20-S20' (Figure 4.2), a bedding component ranging from 19 to 25 degrees will likely be exposed in the cut slope. Stability analyses performed for potential failure along the adversely oriented bedding indicate that the proposed cut slope exceeds the temporary factor of safety requirements of 1.25. The slope stability results are indicated on the Geotechnical Sections (Figure 5), and the slope stability calculations are presented in Appendix D.

It is anticipated that grading of Cut Slope CS-6 will remove Qls H through Qls J. If any landslide debris remains after completion of the cut slope, the debris should be removed and compacted fill placed to restore grade.

Cut Slope CS-7: Cut Slope CS-7 (Figure 2.1) will be graded as a southeast- to southwest-facing, 2:1 to 3:1 slope. The total slope height is approximately 205 feet high, with the upper (permanent) portion of the cut slope approximately 35 feet high and the lower (lined) portion of the slope 170 feet high. The cut slope will encounter Saugus Formation units and landslides Qls G through Qls I, and Qls L. Bedding in the underlying Saugus Formation strikes from north-south to northeast with easterly dips between 20 and 40 degrees. As indicated on Geologic Section S5-S5' (Figure 4.1), a daylighted bedding component of 17 degrees will be exposed in the cut slope. Stability analyses performed for potential failure along the adversely oriented bedding indicate that proposed cut slope exceeds the temporary factor of safety requirements of 1.25. The slope stability results are indicated on the Geotechnical Sections (Figure 5), and the slope stability calculations are presented in Appendix D.

It is anticipated that grading of Cut Slope CS-7 will remove landslides Qls G through Qls I, and Qls L. If any landslide debris remains after completion of the cut slope, the debris should be removed and certified engineered fill placed to restore grade.

Cut Slope CS-8: Cut Slope CS-8 (Figure 2.1) is proposed as a southwest-facing, 2:1 slope. The total slope height is approximately 225 feet, with the upper (permanent) portion of the cut slope approximately 75 feet high and the lower (lined) portion of the slope 150 feet high. The cut slope will encounter Saugus Formation units in which the underlying bedding strikes northwest to northeast and dips 20 to 53 degrees toward the east. This bedding orientation is favorable with respect to Cut Slope CS-8, and the cut slope is considered grossly stable from a geologic standpoint.

Cut Slope CS-9: Cut Slope CS-9 (Figure 2.1) will be graded as a 150-feet-high, 2:1, south-facing slope. The entire slope represents a temporary slope that will be lined and eventually buried by waste. The cut slope will encounter Saugus Formation units, landslides Qls N and Qls O, and Pleistocene (older) landslide Qols A. The axis of an easterly-plunging syncline will cross the footprint of Cut Slope CS-9. Bedding on the north flank of the syncline, relative to the cut slope, strikes north-south to northeast and dips 23 to 31 degrees to the east; bedding along the south flank of the syncline strikes northwest and dips 30 to 50 degrees to the northeast. As depicted on Geologic Sections S19-S19' and S25-S25' (Figure 4.2), this bedding orientation is unfavorable relative to stability of Cut Slope CS-9. Stability analyses performed for potential failure along the adversely oriented bedding indicate that the proposed cut slope exceeds the temporary factor of safety requirements of 1.25. The slope stability results are indicated on the Geotechnical Sections (Figure 5), and the slope stability calculations are presented in Appendix D.

It is anticipated that grading of Cut Slope CS-9 will remove Qols A and Qls O. If any debris remains from these two landslides after completion of the cut slope, the debris should be removed and compacted fill placed to restore grade. The upper portion of Qls N lies outside of the grading footprint. This slide is estimated to be between 15 and 20 feet thick at this location (see Geologic Section S25-S25', Figure 4.2). It is recommended that the entire landslide be removed during grading and the existing

grades above the grading footprint be re-established by placing compacted fill. The need for backdrains above the proposed liner should be evaluated during grading operations.

Cut Slope CS-10: Cut Slope CS-10 (Figure 2.1) will be graded as a southwest-facing, 2:1 slope. The overall slope height is approximately 185 feet, with the proposed permanent and lined portions of the slope approximately 75 feet and 110 feet high, respectively. The cut slope will expose Saugus Formation units in which the underlying bedding strikes northwest and dips 45 to 60 degrees toward the northeast (see Geologic Section S2-S2', Figure 4.1). Based on the northeasterly bedding dip, the southwesterly-facing cut slope is considered grossly stable from a geologic standpoint.

Cut Slope CS-11: Cut Slope CS-11 (Figure 2.1) is proposed as a west-southwest-facing, 2:1 slope. The total slope height is approximately 150 feet, with the permanent portion of the cut slope approximately 65 feet high and the lined portion of the slope 85 feet high. As depicted on Geologic Section S1-S1' (Figure 4.1), the cut slope will expose Saugus Formation units in which the underlying bedding strikes northwest and dips 40 to 60 degrees to the northeast. This bedding orientation is favorable with respect to the southwest-facing cut slope, and Cut Slope CS-11 is considered grossly stable from a geologic standpoint.

Cut Slope CS-12: Cut Slope CS-12 (Figure 2.1) is planned as a 100-feet-high, 2:1 slope that will face northwest and southeast. The cut slope will be graded to develop the east stormwater basin and will be a permanent slope, unassociated with grading of future landfill cells. The cut slope will encounter Saugus Formation units and landslide Qls P. The axis of a northwest-southeast-trending anticline will cross the footprint of Cut Slope CS-12. Bedding on the north flank of the anticline, where the proposed cut slope will face to the northwest, strikes northwest and dips 27 to 40 degrees to the northeast. The bedding is favorably oriented with respect to the northwest-facing segment of Cut Slope CS-12 and is considered grossly stable from a geologic standpoint.

On the south flank of the anticline, where the proposed cut slope will face southeast, the bedding strikes generally east-west and dips 49 to 79 degrees to the south (see Geologic Section S21-S21', Figure 4.2). This bedding orientation is favorable relative to the southeast-facing segment of Cut Slope CS-12, and the cut slope is considered grossly stable from a geologic standpoint.

It is anticipated that the proposed grading will remove all of Qls P. If any landslide debris from Qls P remains after completion of the cut slope, the debris should be removed and certified engineered fill placed to restore grade.

Cut Slopes CS-13, CS-14 and CS-15: Cut Slopes CS-13, CS-14, and CS-15 (Figure 2.1) will consist of permanent, southwest-facing, 2:1 cut slopes graded along the northeast side of the future east stormwater basin. Cut Slopes CS-13, CS-14, and CS-15 will be graded to maximum heights of approximately 50 feet, 20 feet, and 50 feet, respectively. The three cut slopes will expose Saugus Formation units in which the underlying bedding strikes generally east-west and dips 35 degrees to near-vertical. This bedding orientation is favorable relative to the three southwest-facing cut slopes, and Cut Slope CS-13, CS-14, and CS-15 are considered grossly stable from a geologic standpoint.

Cut Slope CS-16: Cut Slope CS-16 (Figure 2.1) is planned as a 110-feet-high, 2:1 slope that will face northwest. This cut slope will be graded as a temporary slope that will be lined and eventually buried by waste. Cut Slope CS-16 will encounter Saugus Formation units in which the underlying bedding strikes generally east-west and dips 50 degrees to the south. This bedding orientation is favorable with respect to Cut Slope CS-16, and the cut slope is considered grossly stable from a geologic standpoint.

Cut Slope CS-17: Cut Slope CS-17 is planned as a 2:1 slope that will face south and attain a maximum height of approximately 155 feet. The cut slope will encounter Saugus Formation units and Pleistocene terrace deposits. As depicted on Geologic Sections S22-S22' and S27-S27' (Figure 4.2), the axis of an anticline is located in the

area of the proposed toe of the cut slope. Bedding north of the anticlinal axis and beneath the proposed cut slope strikes northwest and dips 9 to 24 degrees towards the northeast. This bedding orientation is considered favorable with respect to stability of Cut Slope CS-17. South of the anticlinal axis the bedding strikes northeast and dips 10 to 20 degrees to the southeast, with an apparent out-of-slope bedding dip of 5 degrees. Due to the relatively flat bedding angle, the portion of the cut slope south of the anticline is considered grossly stable by inspection.

Terrace deposits will likely be exposed in the lower portion of Cut Slope CS-17. Bedding within the terrace deposits is essentially flat-lying and is grossly stable.

Both the Saugus Formation and the terrace deposits are subject to erosion and surficial failures due to the weakly cemented nature of the materials. Furthermore, grading of the slope as currently designed will result in some adverse fill-over-cut conditions where the slope crosses minor drainage gullies. Consequently, it is recommended that a stability fill slope with backdrains be constructed against the face of Cut Slope CS-17, both above and below the proposed Entrance Road. Above the Entrance Road, the stability fill should have a keyway measuring 35 feet wide and three feet deep, with the stability fill extending upslope from the Entrance Road to the upper drainage terrace.

Below the road the stability fill slope should be 15 feet wide and three feet deep. The stability fill should extend from the Entrance Road down to State Highway 126 (Henry Mayo Drive) from proposed road elevation 1000 feet to 975 feet. Upgradient of the proposed road elevation 1000 feet, the stability fill slope should extend from the terrace drain down to Henry Mayo Drive.

Cut Slope CS-18 Cut Slope CS-18 (Figure 2.2) is planned as a 200-feet-high, east-facing, permanent, 2:1 slope on the west side of the proposed South Main Canyon stormwater basin. The cut slope is underlain by Saugus Formation units in which the underlying bedding strikes northwest to northeast and dips nine to 32 degrees to the

east. As depicted on Geologic Section S23-S23', easterly-dipping bedding ranging from 10 to 17 degrees will be exposed in the planned 2:1 cut slope. Stability analyses performed for potential failure along the adversely-dipping bedding indicate that proposed Cut Slope CS-18 meets the temporary factor of safety of 1.25.

A portion of landslide Qls A will encroach into CS-18. The landslide should be removed and compacted fill placed, if necessary, to restore slope grades.

Cut Slope CS-19: Cut Slope CS-19 (Figure 2.1) is proposed as a west-southwest-facing, 2:1 slope. The slope is located above the future perimeter road in the East Canyon area and is planned as a permanent, 50±-feet-high cut slope. Cut Slope CS-19 will expose Saugus Formation units in which the underlying bedding strikes northeast and dips 18 to 23 degrees to the southeast. This bedding orientation is favorable with respect to west-southwest-facing cut slope, and Cut Slope CS-19 is considered grossly stable from a geologic standpoint.

Cut Slope CS-20: Cut Slope CS-20 will be graded as a southeast-facing, 2:1 slope, to a height of approximately 100 feet. The cut slope will be graded for a debris basin along the north side of the project. As depicted on Geologic Section S28-S28', the upper portion of the cut slope (above the proposed terrace drain) will expose Saugus Formation units; Pleistocene terrace deposits will likely be encountered below the terrace drain. Bedding in the Saugus Formation strikes northwest and dips 15 degrees to the northeast, with an apparent bedding of 6 degrees dipping into the proposed cut slope. The Saugus Formation bedding orientation is favorable with respect to the southeast-facing cut slope. Bedding within the terrace deposits is essentially flat-lying and is grossly stable. Accordingly, Cut Slope CS-20 is considered grossly stable from a geologic standpoint.

Cut Slope CS-21: Cut Slope CS-21 (Figure 2.2) is proposed as a west-facing, permanent, 2:1 slope that will be graded along the east side of the future Entrance Road. The cut slope, attaining a maximum height of approximately 85 feet, will encounter

Saugus Formation units in which the underlying bedding strikes northwest and dips 14 to 22 degrees to the northeast. This bedding orientation is favorable with respect to Cut Slope CS-21, and the cut slope is considered grossly stable from a geologic standpoint.

Cut Slope CS-22: Cut Slope CS-22 (Figure 2.2) will consist of a limited exposure of bedrock surrounded by compacted fill along the northern slope of the proposed South Main Canyon stormwater basin. The cut slope will be graded at 2:1, face south-southeast, and attain a maximum height of approximately 100 feet. Cut Slope CS-22 is underlain by Saugus Formation units in which the bedding strikes north-northwest and dips 11 to 18 degrees to the east. This bedding orientation is favorable with respect to Cut Slope CS-22, and the cut slope is considered grossly stable from a geologic standpoint.

Cut Slope CS-23: Cut Slope CS-23 (Figure 2.1) will constitute the western limit of the floor of the North and East Canyon Excavation Area. The slope will be graded at 2:1, face east-northeast to east, and attain a maximum height of 85 feet. Cut Slope CS-23 will be a temporary cut slope that will be lined and eventually buried by waste. The cut slope will expose sedimentary rock units of the Pico and Saugus formations in which the underlying bedding strikes generally east-west and dips 47 to 64 degrees toward the south. This bedding orientation is favorable with respect to Cut Slope CS-23, and the cut slope is considered grossly stable from a geologic standpoint.

Cut Slope CS-24: Cut Slope CS-24 (Figure 2.2) will be graded as an east- to north-facing, 2½:1 slope. The overall slope height is approximately 235 feet, with the proposed permanent and lined portions of the slope approximately 70 feet and 165 feet high, respectively. The cut slope will be graded in South Main Canyon, south of the existing Main Canyon landfill. This area is currently covered by stockpile fill soil. The cut slope will, for the most part, expose the fill soils and, to a lesser extent, Saugus Formation units. Bedding within the underlying Saugus Formation strikes north-northwest to northwest and dips 20 to 44 degrees toward the east. In general, this

bedding is oriented parallel to, or dipping steeper than, the proposed 2½:1 (approximately 22-degree) cut slope gradient. Development of Cut Slope CS-24 will require removal of the stockpile fill soil. Once the stockpile is removed, the slope will need to be reconstructed as an engineered fill slope to reestablish the proposed landfill slope grades. This engineered fill would essentially buttress any potential daylighted bedding that may be encountered in the cut slope. Accordingly, the cut slope is considered grossly stable from a geologic standpoint.

Cut Slope CS-25: Cut Slope CS-25 (Figure 2.1) is proposed as a permanent, southeast-facing, 2:1 slope to a height of approximately 35 feet. The cut slope will expose Pico Formation units in which the underlying bedding strikes north-south and dips 30 to 40 degrees to the east. This bedding orientation dips steeper than the 2:1 (26-degree) slope gradient, and Cut Slope CS-25 is considered grossly stable from a geologic standpoint.

Proposed Fill Slopes: A proposed fill slope of about 125 feet in height is proposed for South Main Canyon above the proposed basin. Stability analysis for a 130-feet-high, 2:1, compacted fill slope is presented in Appendix D and meets the static and seismic factor of safety requirements for grossly stable permanent fill slopes of 1.5 and 1.1, respectively.

Permanent Cut Slopes: Several permanent cut slopes will remain after landfill closure of the proposed MPR. The highest cut slope (Cut Slope CS-1) will be about 200 feet high, as illustrated on Geologic Section S11-S11'. Slope stability calculations for a cross bedding failure for Geologic Section S11-S11' are presented in Appendix D and meet the permanent and seismic factor of safety requirements for grossly stable permanent slopes of 1.5 and 1.1, respectively.

GEOLOGIC HAZARDS

GENERAL

Potential geologic hazards include, but are not limited to, primary earthquake hazards (ground shaking and ground rupture), secondary earthquake hazards from earthquake ground shaking (such as liquefaction, tsunamis, and seiches), and landslides/slope instability. Earthquakes have the potential to inflict the greatest loss of life and property damage. Consequently, the proximity of a site to active or potentially active faults is a key element in assessing the potential for earthquake damage.

The major cause of damage from earthquakes is generally the result of strong ground shaking from movement along a fault or fault zone. Ground shaking could occur not only immediately adjacent to the earthquake epicenter, but also within areas for many miles in all directions. Damage due to actual fault displacement or ground rupture beneath a structure may also occur; however, fault ground rupture is much less common and is typically confined to areas along, or immediately adjacent to, the fault surface trace.

Landslides are common hazards in southern California, particularly in hillside areas underlain by sedimentary rock units. Landslides can occur in terrain ranging from vertical cliffs to slopes as gentle as one or two degrees. Materials on slopes that are subject to landsliding include rock, soil, artificial fill, or combinations of these materials.

FAULTS

General: Earthquakes result from movement along faults or volcanic activity. In California, earthquakes are more commonly associated with faults or fault zones, and the southern California region is historically seismically active. The numerous faults in California include both active and potentially active faults. In accordance with criteria established for the Alquist-Priolo Earthquake Fault Zoning program (Hart and Bryant, 1999) by the California Geological Survey (CGS), formerly known as CDMG, a fault can

be considered active if it has demonstrated movement within the Holocene epoch, or approximately the last 11,000 years. Faults that have demonstrated Quaternary movement (last 1.6 million years), but lack strong evidence of Holocene movement, are classified as potentially active. Faults that have not moved since the beginning of the Quaternary period are deemed inactive.

Site Faults: As part of CCL's MPR for landfill development, a fault study (including an extensive subsurface investigation) was performed by RTF&A (2006b) within the footprint of the future North and East Canyon Excavation Area. The purpose of this fault study was to investigate previously mapped faults in the North and East Canyon area to determine if the site meets the State Class III landfill siting criteria for ground rupture that states, "landfills shall not be located on a known Holocene fault" (27 California Code of Regulations, Section 20260[d] and the Federal location restriction for fault areas [40 Code of Federal Regulations, Part 258.13]).

Based on the geologic fault investigation, RTF&A concluded that no mappable, through-going, continuous active or potentially active faults underlie the site, and the site is not within an Alquist-Priolo Earthquake Fault Zone, as established by CGS. The closest active (and zoned) fault to the site is the San Gabriel fault, located approximately 3.3 miles to the east-northeast. In our opinion, there is little probability of surface rupture due to faulting occurring on-site during the design life of the project.

A discussion of nearby active and potentially active faults is presented in the following sections.

Active Faults: The site is located within an area potentially susceptible to severe ground shaking, due to the close proximity of several active faults, including the San Gabriel, Oak Ridge, Santa Susana, and San Cayetano faults.

San Gabriel Fault: The nearest active fault is the San Gabriel fault, located approximately 3.3 miles east-northeast of the site. The San Gabriel fault extends approximately 90 miles through the Transverse Ranges of southern California. The San

Gabriel fault consists of a zone of imbricate, steeply north-dipping faults. Throughout most of its extent, the fault has strong geomorphic expression, with the faults comprising the zone characterized by displaced geologic units, deflected drainages, strike valleys, notched ridges, subparallel faulting, fracturing, and folding (Oakeshott, 1958; Wentworth and Yerkes, 1971).

Within the Santa Clarita Valley, from Castaic Creek to the San Gabriel Mountains, the fault crosses the Castaic lowlands and the Santa Clara River, where its course is marked by a belt of braided small faults and steep dips in Pliocene and Pleistocene beds. Since most of the displacement within the fault zone took place before deposition of these geologically young beds, the fault's trend through this area is not nearly as conspicuous as within the rocks along the southwestern margin of the Ridge basin or in the basement rocks of the San Gabriel Mountains (Crowell, 1982). The location of the fault, however, is somewhat defined by the steeply-dipping and folded beds of the Plio-Pleistocene Saugus Formation, and the fault is exposed in cut slopes, roadcuts, and trenches.

Prior to 1979, most geologists studying the San Gabriel fault acknowledged that late Pleistocene (approximately the past 100,000 years) activity along the fault zone was probable, but evidence for possible Holocene activity was judged to be very questionable (Kahle, 1986). However, after completing a geologic and geomorphic investigation of the San Gabriel fault, Weber (1979) concluded that some evidence strongly suggested Holocene activity. Subsequently, Cotton and Seward (1984) conducted exploratory trenching along segments of the fault zone in the Santa Clarita Valley. Although no surface evidence of faulting was recognized, at least two trenches revealed displacement of Holocene age alluvial deposits. Radiocarbon analyses of detrital charcoal from faulted alluvial materials in a trench excavated in Rye Canyon yielded an age of 3,500±250 years before present. Alluvium dated as 1,550±190 years before present was

shown to be unfaulted in the same trench, establishing limits of latest movement on the Castaic-Bouquet Junction segment of the San Gabriel fault.

Based on the findings of Weber (1979), Cotton and Seward (1984), and the recommendations of Kahle (1986) for a CDMG Fault Evaluation Report for the fault, the State Geologist established an Alquist-Priolo Earthquake Fault Zone for the San Gabriel fault in 1987 within the Newhall Quadrangle.

Santa Susana Fault: The Santa Susana fault, located approximately six miles southwest of the site, consists of a complex zone of primarily north-dipping thrust faults. The fault zone extends northeastward from the Santa Susana Mountains across San Fernando Pass, and into the San Gabriel Mountains. A short segment of the Santa Susana fault ruptured during the 1971 San Fernando earthquake (Southern California Earthquake Data Center [SCEDC], 2010); however, the remainder of the fault zone has not demonstrated displacement since late Pleistocene time (Slosson and Barnhart, 1967).

Oak Ridge Fault: The Oak Ridge fault is a south-dipping reverse fault that forms a ridge to the south of its trace. The fault extends for a distance of approximately 56 miles from Piru, on the east, to offshore, at a point about 20 miles south of Santa Barbara. The onshore segment of the Oak Ridge fault is roughly parallel to both the Santa Clara River and State Highway 126. The offshore segment is associated with a definite zone of active seismicity (Southern California Earthquake Data Center [SCEDC], 2010). The only known Holocene surface rupture is found onshore, between the towns of Bardsdale and Fillmore (Yeats et al., 1986b; Powell, 1991).

At its eastern end, the Oak Ridge fault appears to be overthrust by the Santa Susana fault, becoming a “blind thrust fault” (SCEDC, 2010). The fault associated with the 1994 Northridge earthquake is probably associated with the Oak Ridge fault system. At its closest point, the Oak Ridge fault is situated approximately seven miles west-southwest of the site.

San Cayetano Fault: The San Cayetano fault is an east-west trending, north-dipping thrust fault that extends approximately 28 miles from the foothills north of Piru to the southeastern edge of Ojai Valley. Weber et al. (1973) and Kahle (1985) suggest that Holocene fault activity is indicated by well-defined fault scarps and offset Holocene sediments. The San Cayetano fault is located approximately 9.5 miles west of the site.

Other Active Faults: Other, more distant but significantly active faults include the San Fernando fault zone, located approximately 12 miles southeast of the site, and the San Andreas fault zone, located approximately 20 miles to the northeast.

Potentially Active Faults: The potentially active Holser fault is situated approximately 1,000 feet north of the site. The Holser fault consists of a south-dipping, sharply folded reverse fault (Winterer and Durham, 1962) that trends east-southeast from near Piru Creek to at least Castaic Junction. The Holser fault post-dates deposition of the Pico Formation and is believed to be a "backthrust" of a subsurface thrust fault that represents the intersection of the San Cayetano and Santa Susana faults at depth (Yeats et al., 1994). Weber (1979) states that there is no clear evidence of Holocene activity along the Holser fault but "plentiful evidence" that activity has occurred in the past 100,000 years. Geolabs (2007) recently conducted a surface fault rupture hazard assessment for the Holser fault within Parcel Map 18108, located east of CCL. Geolabs concluded that the last known movement on the Holser fault was approximately 40,000 to 100,000 years ago. Consequently, the fault is considered potentially active.

Inactive Faults: The inactive Del Valle fault is located approximately 1.2 miles southwest of the site. This fault trends eastward from the Los Angeles-Ventura County Line for nearly two miles, turning southward before crossing San Martinez Grande Canyon near its confluence with the Santa Clara River. According to Winterer and Durham (1962), the eastward-trending segment of the Del Valle fault consists of a

south-dipping reverse fault; the southward-trending segment is considered a tear (strike-slip) fault.

Blind-Thrust Faults: A growing body of geologic and seismologic data, supplemented by regional structural interpretations, suggests Pliocene to modern deformation in the Los Angeles basin is partly accommodated by developing basement-involved fold and thrust belts (Davis et al., 1989; Hauksson, 1990; Shaw and Suppe, 1996). The fold and thrust belts are expressed at the ground surface by elongate, low-lying anticlinal ridges. At the core of these anticlinal ridges are low-angle, blind-thrust faults rising off a basal detachment surface. Recognized blind-thrust faults in the Los Angeles and Ventura basins include the Elysian Park, Compton-Los Alamitos, Oak Ridge, and Northridge blind-thrust faults.

The closest known blind-thrust to the site is the Northridge blind-thrust fault. The site, however, is not underlain by any known blind-thrust fault.

LANDSLIDES

The site is mantled by several landslides. Most of the major landslides were previously identified by EMCON (1990a) and other workers within the subject site boundaries. The landslides are, in part, due to the orientation of the geologic structure, as well as the weak materials exposed within the upper Pico Formation and lower Saugus Formation.

Several Holocene landslides (designated “Qls A” through “R”) and one Pleistocene (older) landslide (designated “Qols A”) have been identified within the proposed MPR grading limits. The landslides typically consist of translational slides that failed along a weak, unsupported bedding plane. Landslides located within the footprint of the North and East Canyon Excavation Area include Qls E through Qls R, and Qols A. Landslides located within the proposed grading limits of the South Main Canyon landfill and Entrance Road consist of Qls A through Qls D.

Landslide Qls G constitutes a major landslide complex within the northern portion of the site that was reactivated during the 2004-2005 winter storms when a record rainfall of 48.15 inches occurred at the site. In addition to the Qls G complex, numerous smaller slides have been identified adjacent to Qls G, including Qls H through Qls L.

An older, previously unidentified landslide was discovered by RTF&A during exploration for the 2006 fault study (RTF&A, 2006b). The older landslide appears to be derived primarily from bedrock of the Pico Formation, although lithologies of Saugus Formation and older alluvium are intermixed within the landslide mass. The geomorphology of the landslide suggests that no recent movement has occurred within the mass, as there are no signs of open fractures, scarps, grabens, or hummocky terrain. The base of the older landslide was identified in borings B-1-03 and B-9-10 at depths of 40 feet and 17 feet, respectively. Geologic sections were constructed through the slide (Geologic Sections S1-S1' and S19-S19') and indicate the landslide will likely be removed as part of development of the North and East Canyon Excavation Area. Any Qols A material remaining at the completion of the excavation to proposed grade should be removed and replaced with certified compacted fill.

DEBRIS FLOW HAZARD

Debris flows, consisting of a moving mass of heterogeneous debris lubricated by water, are generated by shallow soil slips in response to heavy rainfall. Whereas landslides depend on deep percolation of groundwater and may not respond to the effects of heavy rainfall until long after a storm, debris flows "occur during, and only during, heavy rainfall" (Campbell, 1975). According to Campbell (1975), damage from debris flows is due chiefly to inundation by, or high-velocity impact of, the debris mass. Campbell identifies three conditions for debris flow potential:

- a mantle of colluvial soil or a wedge of colluvial ravine soil;

- a slope angle ranging from 27 to 56 degrees (slopes steeper than 56 degrees generally do not have a continuous mantle of colluvium and are most commonly bare bedrock); and

- soil moisture equal to or greater than the colluvial soil's liquid limit.

No existing debris flow deposits have been identified within the proposed MPR grading footprint. Within the MPR footprint, the proposed grading will eliminate most of the debris flow hazard by the removal of debris flow–susceptible material (i.e., weathered bedrock, slope wash, and residual soil) and with the construction of drainage/stormwater basins. The potential for debris flows still exists along the perimeter of the proposed MPR development area. The proposed landfill design should allow for the clean-up or control of any debris flows that may encroach into the landfill area and perimeter maintenance road.

The potential for debris flows also exists within the natural drainages and slopes along the north side of the future entrance road, specifically where the entrance road will cross in front of three significant drainage gullies. As presently designed, there is no protection from debris flows emanating from the three gullies, and any such flows would greatly impact use of the entrance road and operation of the scales. The project design should consider elevating the roadway higher than the mouths of the gullies so that runoff and debris flows could be diverted around and/or beneath the roadway. Other alternatives for debris protection could include debris walls and/or debris basins at the mouths of the three gullies. Additional debris flow evaluation and mitigation should be performed as part of future development of rough grading plans for the entrance road.

EXPANSIVE SOILS

The site is underlain by bedrock of the Pico and Saugus formations, both of which contain potentially expansive clay-rich strata, as discussed above. Additional testing of

expansive properties of the soils may be required if improvements, buildings, or other structures sensitive to expansive soils are planned for the site. Additional testing should be completed during the grading plan review, if deemed necessary by the project geotechnical and civil engineers.

FLOODING

Review of Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps indicate that the site is not within a known flood zone. The nearest mapped flood zone boundary related to Castaic Creek is approximately 1,500 feet southeast of the site.

LIQUEFACTION

The State of California Seismic Hazard Map for the Val Verde Quadrangle (California Geological Survey, 2002) indicates that portions of the alluvial soils at site are located within a potential liquefaction area.

Liquefaction may occur when saturated, loose to medium dense, cohesionless soils are densified by ground vibrations. The densification results in increased pore water pressures if the soils are not sufficiently permeable to dissipate these pressures during, and immediately following, an earthquake. When the pore water pressure is equal to, or exceeds, the overburden pressure, liquefaction of the affected soil layers occurs. For liquefaction to occur, three conditions are required:

- ground shaking of sufficient magnitude and duration;
- soils that are susceptible to liquefaction; and
- a groundwater level at or above the level of the susceptible soils during the ground shaking.

For a site to be considered susceptible to liquefaction using the criteria and methodology initially developed by Seed and Idriss (1982), liquefaction of underlying soil layers must result in an observed surface effect such as sand boils, mud-spouts, surface water seepage, ground cracking, or quicksand-like conditions.

Lateral spreading can result in ground cracking and may occur when a site is sloped or is near a free-face and there is a sufficiently continuous liquefiable layer on which the overlying soils can move laterally.

Ground settlement may occur during seismic shaking of an area. The settlement can be caused by liquefaction of loose, granular soils and by compaction of loose, but not necessarily liquefiable, soils.

As a result of the existing and proposed grading, loose alluvial soils within the proposed development area will be removed and replaced with compacted fill soils. The alluvium within the proposed development area will be mantled by certified engineered fill. The alluvial soils are underlain by bedrock materials. Accordingly, the site will be underlain by a combination of bedrock materials, dense alluvial deposits, and certified engineered fill.

Due to the historic, high groundwater levels at the site, which are lower than the base of alluvial deposits (RTF&A, 2012b), the site is considered to have a very low potential for liquefaction. The site is also not considered as being subject to lateral spreading.

CONCLUSIONS AND RECOMMENDATIONS

GEOLOGIC CONSIDERATIONS

General: Based on the geologic data developed during the MPR geotechnical investigation, it is our opinion that the site may be developed as planned, provided our recommendations are incorporated in the design of the project.

Faulting: No mapped active or potentially active faults underlie the site, and the site is not within an Alquist-Priolo Earthquake Fault Zone, as established by CGS

(Hart and Bryant, 1999). The closest active fault to the site is the San Gabriel fault, located approximately 3.3 miles to the east-northeast.

Landslides: Several landslides are located within the site boundaries, as depicted on the Geologic Map, Figure 1. Landslides lying within the proposed grading limits of the North and East Canyon Excavation Area are designated as Qols A, and Qls E through Qls R (see Figure 2.1.); landslides located within the South Main Canyon landfill area include Qls A through D (see Figure 2.2).

North and East Canyon Excavation Area: Landslides Qols A, Qls E, and Qls G through Qls R lie within the proposed grading limits of the North and East Canyon Excavation Area and will require complete removal. Most of these landslides occur above planned excavation grades and will be removed as part of the excavation. Any of these landslides not eliminated by the proposed excavation will need to be removed below proposed excavation grade, and the grades restored by placement of certified engineered fill.

Landslide Qls F will be removed below elevation 1,400 feet msl, with the remaining portion of the slide mass above elevation 1,400 feet remaining in place.

Other landslides lie upslope and outside of the expansion grading limits. These landslides, in their present configuration, are stable. Any renewed movement or partial movement of these slides will result in debris accumulating on the future perimeter road, which may require some maintenance but will not adversely impact the landfill or future landfill operations.

South Main Canyon and Entrance Road: Landslides Qls A through Qls D are located along the west side of the South Main Canyon landfill area. As indicated on the grading plan, the majority of landslide Qls A lies within a future fill area associated with the toe berm for the proposed landfill. This entire landslide mass, estimated to be approximately 15 to 20 feet deep, should be removed prior to placement of certified

engineered fill. The cut area impacted by removal of the landslide should have proposed grade restored by placement of certified engineered fill.

Landslides Qls B through Qls D lie within a future fill area and should be removed prior to fill placement.

Debris Flow: The natural drainages and slopes within the site will be susceptible to debris flows generated during repeated heavy rains. The proposed design should allow for the clean-up or control of any debris flows that may encroach into the landfill area and perimeter maintenance road.

The natural drainages and slopes along the north side of the entrance road will be susceptible to debris flows generated during repeated heavy rains. The project design for the entrance road should consider elevating the roadway higher than the mouths of the existing gullies north of the road so that runoff and debris flows could be diverted around and/or beneath the roadway. Other alternatives for debris protection could include debris walls and/or debris basins at the mouths of the three gullies. Additional debris flow evaluation and mitigation should be performed as part of future development of rough grading plans.

Groundwater: The measured groundwater elevations beneath the site lie below the proposed excavation grades for the North and East Canyon Excavation Area, and the South Main Canyon and Entrance Road development. Accordingly, groundwater is not likely to be encountered during site grading.

Rippability: Grading operations can be performed using conventional grading equipment. Heavy ripping may be needed when excavating well-cemented sandstone or conglomerate beds.

GRADING

Site Preparation: Prior to performing earthwork, the existing vegetation and any deleterious debris should be removed from the area of proposed grading. Existing

utility lines should be relocated or properly protected in-place. All unsuitable soils, landslide material, and uncertified fills in the areas of grading receiving new fill should be removed to competent earth materials and replaced with engineered fill.

Material for Fill: The on-site soils, less any debris or organic matter, may be used in required fills. Rocks or hard fragments larger than eight inches may not be placed in the fill without special treatment. Rocks or hard fragments larger than four inches shall not compose more than 25 percent of the fill or a lift. Soils containing more than 25 percent rock or hard fragments larger than four inches must be compacted with successive passes (e.g., with a sheepsfoot roller) until rock or hard fragments larger than four inches constitute less than 25 percent of the fill or lift.

Compaction: After the site is cleared and excavated as recommended, the exposed soils should be carefully observed for the removal of all unsuitable deposits. Next, the exposed soils should be scarified to a depth of six inches, brought to about two percent above optimum moisture content, and rolled with heavy compaction equipment. The upper six inches of exposed soils should be compacted to at least 90 percent of the maximum dry density obtainable by the ASTM D 1557-02 Method of Compaction.

After compacting the exposed soils, all required fills should be placed in loose lifts not more than eight inches in thickness, and compacted to at least 90 percent. The moisture content of the fill soils at the time of compaction should be about two to four percent above optimum moisture content. Compacted fill should not be allowed to dry out before subsequent lifts are placed.

Grades should be sloped so as not to direct water flow over slope faces; surface water should be directed to proposed drainage devices (i.e., terrace benches and downdrains).

GENERAL GRADING REQUIREMENTS

1. All fills, unless otherwise specifically designed, shall be compacted to at least 90 percent of the maximum dry unit weight as determined by ASTM D 1557-02 Method of Soil Compaction.

2. No fill shall be placed until the area to receive the fill has been adequately prepared, and subsequently approved by the Geotechnical Consultant of Record or his representative.

3. Fill soils should be kept free of debris and organic material.

4. Rocks or hard fragments larger than eight inches may not be placed in the fill without approval of the Geotechnical Consultant of Record or his representative, and in a manner specified for each occurrence.

   Bedrock fragments larger than eight inches or fill soils containing greater than 25 percent of bedrock fragments larger than four inches in diameter must be compacted using successive passes of a sheepsfoot compactor, or until rock fragments constitute less than 25 percent of the fill material.

5. The fill material shall be placed in layers which, when compacted, shall not exceed eight inches per layer. Each layer shall be spread evenly and shall be mixed thoroughly during the spreading to ensure uniformity of material and moisture.

6. When moisture content of the fill material is too low to obtain adequate compaction, water shall be added and thoroughly dispersed until the soil is approximately two to four percent above optimum moisture content.

7. When the moisture content of the fill material is too high to obtain adequate compaction, the fill material shall be aerated by blading, or other satisfactory methods, until the soil is approximately two to four percent above optimum moisture content.

8. Fill and cut slopes should not be constructed at gradients steeper than 2:1.

GRADING OBSERVATION

Construction observation should be made by a Geotechnical Consultant of Record during any grading activities within the site, to verify the findings within this report. Additional recommendations may be required for landfill design based on conditions uncovered during grading.

SEISMICITY

The following parameters were determined based on the USGS website, 2007 California Building Code (CBC), and ASCE Standard 7-05. Additional analyses of the seismic criteria of the site, including spectral response, may be necessary for the design of the proposed cell slopes. The need for this additional evaluation to support the evaluation of the cell slopes is referred to Golder.

CALIFORNIA BUILDING CODE SEISMIC DESIGN

Under Section 1613 Earthquake Loads of the CBC, the following coefficients and factors apply to seismic force design at the subject site. The ground motion parameters were determined using the Ground Motion Parameter Calculator at the USGS website.

Latitude	34.427722
Longitude	-118.648116
Site Class	C
Ss	2.247
S1	0.687
SMs	2.247
SM1	0.893
SDs	1.498
SD1	0.595

SEISMIC HAZARD ZONE REPORT

The seismic hazard zone report for the Val Verde Quadrangle was reviewed to determine the site Peak Ground Acceleration (PGA) (California Geological Survey, 2002).

Based on review of Figure 3.5 of the seismic hazard zone report, the Magnitude Weighted Pseudo-Peak Acceleration with a 10 percent exceedance in 50 years is about 0.59g.

SEISMIC SPECTRUM

The USGS website was utilized to determine the response spectrum for the subject site. The Site Modified Spectrum, MCE Spectrum, and the Design Response Spectrum from the USGS website is presented in Figure 7.

DEAGGREGATED SEISMIC SOURCE PARAMETERS

The USGS website was used to determine the Probability Seismic Hazard Deaggregation for a 2,475-year return period for a site with Vs = 760 m/s. The graph from the USGS website is presented in Figure 8.

FRISK SITE-SPECIFIC GROUND MOTION ANALYSIS

The probabilistic MCE was determined in accordance with Section 21.2.1 of ASCE Standard 7-05 for five percent damped acceleration response spectrum having approximately two percent probability of exceedance within a 50-year period (return interval 2,500 years) using the program FRISK for the Bozorgnia, Campbell, Niazi (1999) Holocene, Soil-pseudo, Rel Vel, with five percent damping attenuation relationship. The results are presented in Figure 9, and the factors are summarized below.

Factors	Value
Sds	1.95
Sd1	1.25
Sms	2.92
Sm1	1.87

PGA = Sds/2.50 = 0.78

SECTION 111 STATEMENT

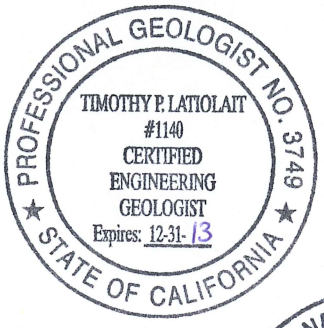
Based on our review of the MPR grading plan and the referenced reports, it is our professional opinion that the proposed MPR development will be safe from hazard of landslide, settlement, or slippage and will not adversely affect the geotechnical conditions of off-site properties, provided our recommendations and the requirements of the Los Angeles County Building Code are followed.

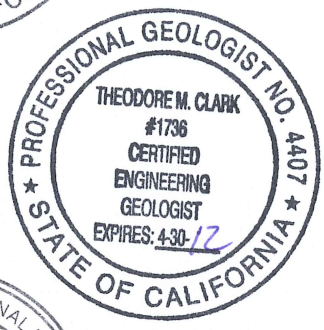
LIMITATIONS

Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers and engineering geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report has been prepared for Chiquita Canyon Landfill and their design consultants, to be used solely for planning and design. The report has not been prepared for use by other parties and may not contain sufficient information for purposes of other parties or other uses.

-oOo-

Please contact us if you have any questions regarding the recommendations presented in this report.







Respectfully submitted,

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Table 1

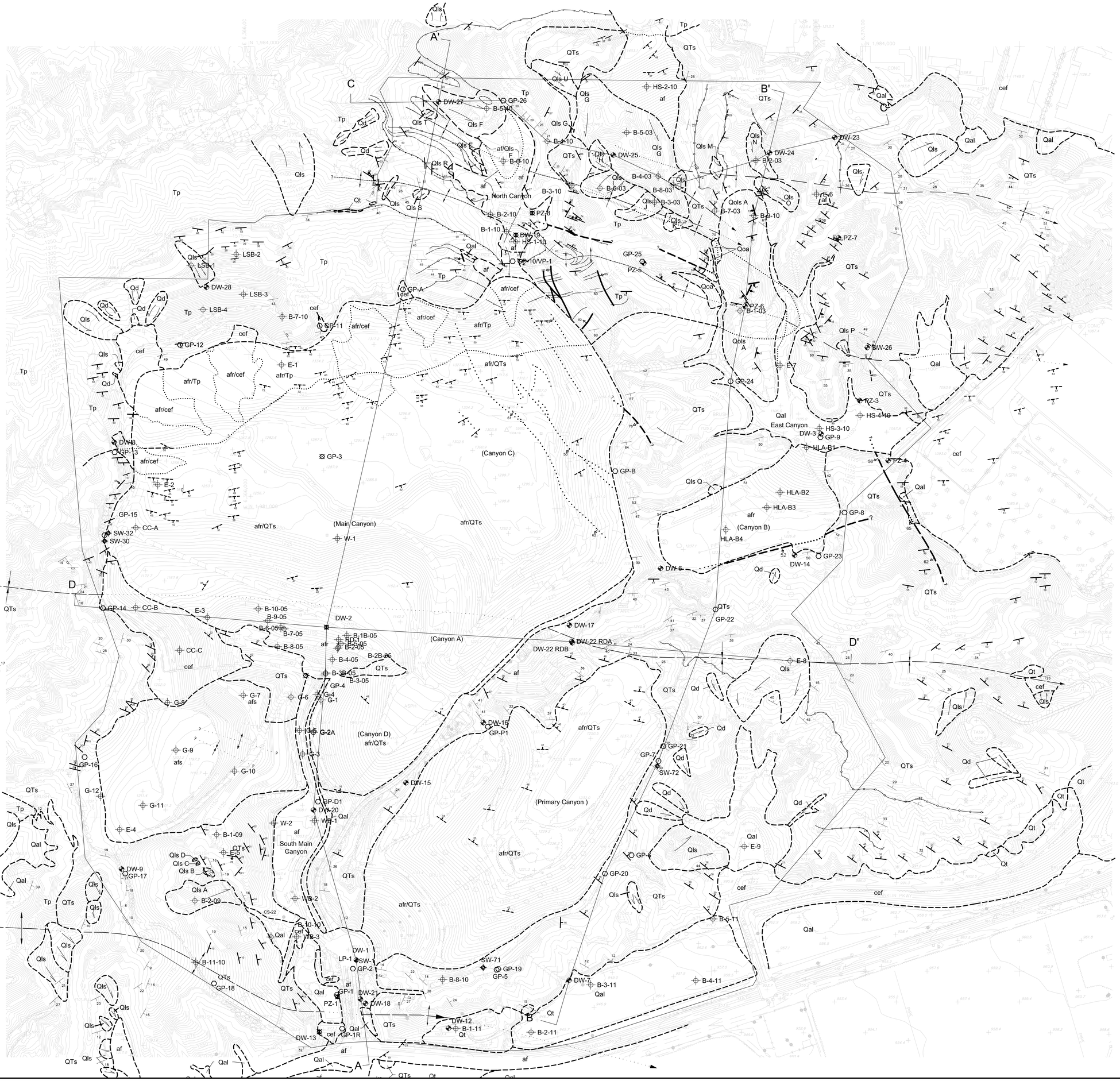
Summary of Cut Slopes
Chiquita Canyon Landfill
Master Plan Revision

CUT SLOPE	FIGURE NO.	SLOPE GRADIENT	SLOPE HEIGHT (total/permanent)	SLOPE FACE DIRECTION	GEOLOGIC MATERIALS	GEOLOGIC SECTION	GEOLOGIC STABILITY	MITIGATION
CS-1	2.1	2:1	300'/200'	S to SE	Tp	S11-S11'	Bedding dipping steeper than slope gradient; grossly stable	None
CS-2	2.1	2:1	150'/80'	SSE	Tp	S12-S12'	Bedding dipping steeper than slope gradient; grossly stable	None
CS-3a	2.1	2:1	220'/175'	ESE	Tp	S13-S13', S26-S26'	Bedding dipping parallel to or steeper than slope gradient; grossly stable	None
CS-3b	2.1	2:1	75'/0	ESE	Tp	S26-S26'	Bedding dipping steeper than slope gradient; grossly stable	None
CS-4	2.1	2:1 to 4:1	210'/120'	SE	Tp, Qls E, Qls F, af	S16-S16'	Bedding dipping parallel to or steeper than slope gradient; grossly stable	Qls E & Qls F and af to be removed during grading
CS-5	2.1	2:1 to 3:1	120'/30'	SE to S	Tp, Qls F, af	S15-S15', S24-S24'	Daylighted bedding; stable by analyses	Remove Qls F and af below elevation 1400 feet; reconstruct as stability fill to restore grade
CS-6	2.1	2½:1 to 3:1	290'/95'	SSE	Tp, QTs, Qls H-J	S17-S17', S20-S20'	Daylighted bedding; stable by analyses	Remove Qls H through Qls J during grading
CS-7	2.1	2:1 to 3:1	205'/35'	SE to SW	QTs, Qls G - I, & Qls L, af	S5-S5'	Daylighted bedding; stable by analyses	Qls G - I, Qls L to be removed during grading.
CS-8	2.1	2:1	225'/75'	SW	QTs	---	Favorable bedding; grossly stable	None
CS-9	2.1	2:1	150'/0	S	QTs, Qols A, Qls N, Qls O	S19-S19', S25-S25'	Daylighted bedding; stable by analyses	Qols A, Qls N & Qls O to be removed during grading. Restore existing grades above MPR grading footprint with compacted fill
CS-10	2.1	2:1	185'/75'	SW	QTs	S2-S2'	Favorable bedding; grossly stable	None
CS-11	2.1	2:1	150'/65'	WSW	QTs	S1-S1'	Favorable bedding; grossly stable	None
CS-12	2.1	2:1	100'/100'	NW and SE	QTs, Qls P	S21-S21'	Favorable bedding; grossly stable	None
CS-13	2.1	2:1	50'/50'	SW	QTs	---	Favorable bedding; grossly stable	None
CS-14	2.1	2:1	20'/20'	SW	QTs	---	Favorable bedding; grossly stable	None
CS-15	2.1	2:1	50'/50'	SW	QTs	---	Favorable bedding; grossly stable	None
CS-16	2.1	2:1	110'/0	NW	QTs	---	Favorable bedding; grossly stable	None

Table 1

Summary of Cut Slopes
Chiquita Canyon Landfill
Master Plan Revision

CUT SLOPE	FIGURE NO.	SLOPE GRADIENT	SLOPE HEIGHT (total/permanent)	SLOPE FACE DIRECTION	GEOLOGIC MATERIALS	GEOLOGIC SECTION	GEOLOGIC STABILITY	MITIGATION
CS-17	2.2	2:1	160'/160'	S	QTs, Qt	S22-S22', S27-S27'	Favorable bedding; grossly stable	Construct stability fills above and below entrance to control erosion
CS-18	2.2	2:1	200'/200'	E	QTs, Qls A	S23-S23'	Daylighted bedding; stable by analyses	Remove Qls A during grading; if needed, place compacted fill to restore slope grades
CS-19	2.1	2:1	50'/50'	WSW	QTs	---	Favorable bedding; grossly stable	None
CS-20	2.2	2:1	100'100'	SE	QTs, Qt	S28-S28'	Favorable bedding; grossly stable	None
CS-21	2.2	2:1	85'/85'	W	QTs	---	Favorable bedding; grossly stable	None
CS-22	2.2	2:1	100'/100'	SSE	QTs	---	Favorable bedding; grossly stable	None
CS-23	2.1	2:1	85'/0	ENE to E	Tp, QTs	---	Favorable bedding; grossly stable	None
CS-24	2.2	2-1/2:1	235'/60'	E to N	QTs, afs	---	Bedding dipping steeper than slope gradient; grossly stable	Remove "afs" and reconstruct as engineered fill slope
CS-25	2.1	2:1	35'/35'	SE	Tp	---	Bedding dipping steeper than slope gradient; grossly stable	None



EXPLANATION

- GEOLOGIC CONTACT; QUERIED WHERE UNCERTAIN OR INFERRED; DOTTED WHERE CONCEALED
- GRADATIONAL GEOLOGIC CONTACT
- ANTICLINAL FOLD; APPROXIMATELY LOCATED, QUERIED WHERE UNCERTAIN, DOTTED WHERE CONCEALED
- SYNCLINAL FOLD; APPROXIMATELY LOCATED QUERIED WHERE UNCERTAIN, DOTTED WHERE CONCEALED
- STRIKE AND DIP OF BEDDING
- STRIKE AND DIP OF CONCEALED BEDDING
- STRIKE AND DIP OF SLIDE PLANE
- STRIKE AND DIP OF JOINT
- SILTSTONE BED
- SANDSTONE BED
- FOSSIL BED
- RIDGE-FORMING COQUINA
- SURFICIAL FAILURE

af	ARTIFICIAL FILL
afr	ARTIFICIAL FILL, REFUSE - FILLED AND COMPACTED SOLID WASTE
afs	ARTIFICIAL FILL STOCKPILE
cef	CERTIFIED ENGINEERED FILL
Qal	ALLUVIUM
Qd	DEBRIS FLOW
Qls	LANDSLIDE DEBRIS
Qols	OLDER LANDSLIDE DEBRIS
Qoa	OLDER ALLUVIUM
Qt	TERRACE DEPOSITS
QTs	SAUGUS FORMATION
Tp	PICO FORMATION

- B-2-10 EXPLORATORY BORING
- DW-24/PZ-3 GROUNDWATER MONITORING WELL
- DW-19/PZ-8 GROUNDWATER MONITORING WELL DESTROYED
- SW-1 VADOSE ZONE MONITORING WELL
- GP-14 VADOSE GAS PROBE
- LP-2 VACUUM PRESSURE LYSIMETER
- A A' GEOLOGIC SECTION LINE

SCALE 1"= 200'

200' 0 200' 400' 600'

CONTOUR INTERVAL 5'

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Geologic Map

PREPARED FOR: Chiquita Canyon Landfill

Project Location: Chiquita Canyon Landfill, Master Plan Revision, Castaic, California

SCALE	DRAWN BY	CHECKED BY
AS SHOWN	JH	TMC
DATE		JOB NO.
1-27-2012	Figure 1	2002-036-004

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Remove Qls F
below Elevation 1400 feet

Portion of Qls F to remain in place
(Above Elevation 1400 feet)

Perimeter Road

STORMWATER BASIN

EXPLANATION

- GEOLOGIC CONTACT: QUERIED WHERE UNCERTAIN OR INFERRED; DOTTED WHERE CONCEALED
- GRADATIONAL GEOLOGIC CONTACT
- ANTICLINAL FOLD: APPROXIMATELY LOCATED; QUERIED WHERE UNCERTAIN; DOTTED WHERE CONCEALED
- SYNCLINAL FOLD: APPROXIMATELY LOCATED QUERIED WHERE UNCERTAIN; DOTTED WHERE CONCEALED
- STRIKE AND DIP OF BEDDING
- STRIKE AND DIP OF CONCEALED BEDDING
- STRIKE AND DIP OF SLIDE PLANE
- STRIKE AND DIP OF JOINT
- SILTSTONE BED
- SANDSTONE BED
- FOSSIL BED
- RIDGE-FORMING COQUINA
- SURFICIAL FAILURE
- af ARTIFICIAL FILL
- afr ARTIFICIAL FILL, REFUSE - FILLED AND COMPACTED SOLID WASTE
- afs ARTIFICIAL FILL STOCKPILE
- cef CERTIFIED ENGINEERED FILL
- Qal ALLUVIUM
- Qd DEBRIS FLOW
- Qls LANDSLIDE DEBRIS
- Qols OLDER LANDSLIDE DEBRIS
- Qoa OLDER ALLUVIUM
- QT TERRACE DEPOSITS
- QTs SAUGUS FORMATION
- Tp PICO FORMATION

- B-2-10 EXPLORATORY BORING
- DW-24/PZ-3 GROUNDWATER MONITORING WELL
- SW-1 VADOSE ZONE MONITORING WELL
- GP-14 VADOSE GAS PROBE
- LP-2 VACUUM PRESSURE LYSIMETER
- A A' GEOLOGIC SECTION LINE
- CR COMPLETE REMOVAL OF Qls
- PR PARTIAL REMOVAL OF Qls
- R=8'-12' RECOMMENDED REMOVAL DEPTH PRIOR TO PLACING FILL

B-1-10 · B-2-10 · B-3-10 · B-4-10 · B-5-10 · B-6-10 · B-7-10 · B-9-10

Geotechnical Map

PREPARED FOR: Chiquita Canyon Landfill

PROJECT LOCATION: North and East Canyon Excavation Area
Master Plan Revision
Castaic, California

SCALE	DRAWN BY	CHECKED BY
1"=100'	JH	TPL/TMC
DATE	Figure 2.1	JOB NO.
1-27-2012		2002-036-004

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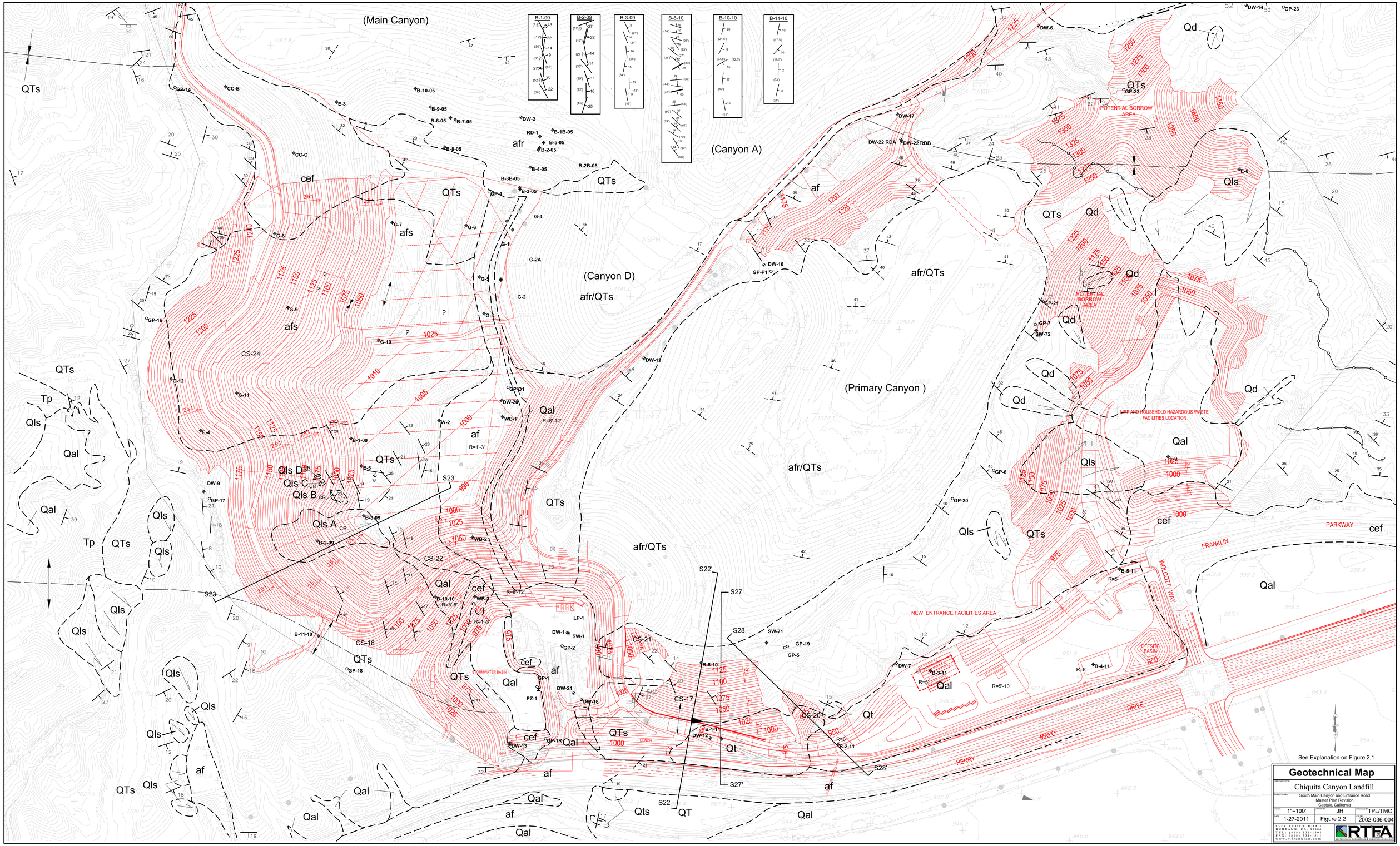
(Main Canyon)
(Canyon A)
(Canyon D)
(Primary Canyon)
POTENTIAL BORROW AREA
MRF AND HOUSEHOLD HAZARDOUS WASTE FACILITIES LOCATION
NEW ENTRANCE FACILITIES AREA
STORMWATER BASIN
OFFSITE BASIN
FRANKLIN
PARKWAY
WOLCOTT WAY
HENRY
MAYO
DRIVE
QTs
Qd
Qls
Qal
Qt
Qts
Tp
afr
afr/QTs
af
cef
afs
Qls A
Qls B
Qls C
Qls D
CS-17
CS-18
CS-20
CS-21
CS-22
CS-24
S22
S22'
S23
S23'
S27
S27'
S28
S28'
See Explanation on Figure 2.1
Geotechnical Map
PREPARED FOR
Chiquita Canyon Landfill
PROJECT LOCATION
South Main Canyon and Entrance Road
Master Plan Revision
Castaic, California
SCALE 1"=100'
DRAWN BY JH
CHECKED BY TPL/TMC
DATE 1-27-2011
Figure 2.2
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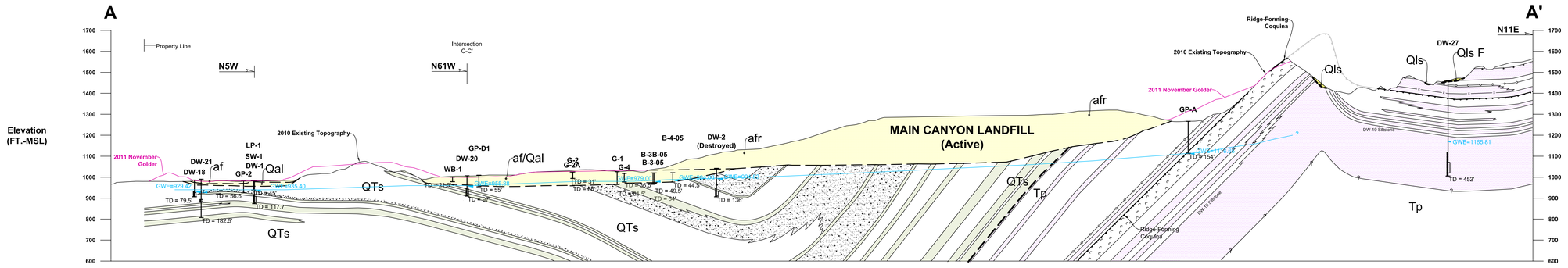
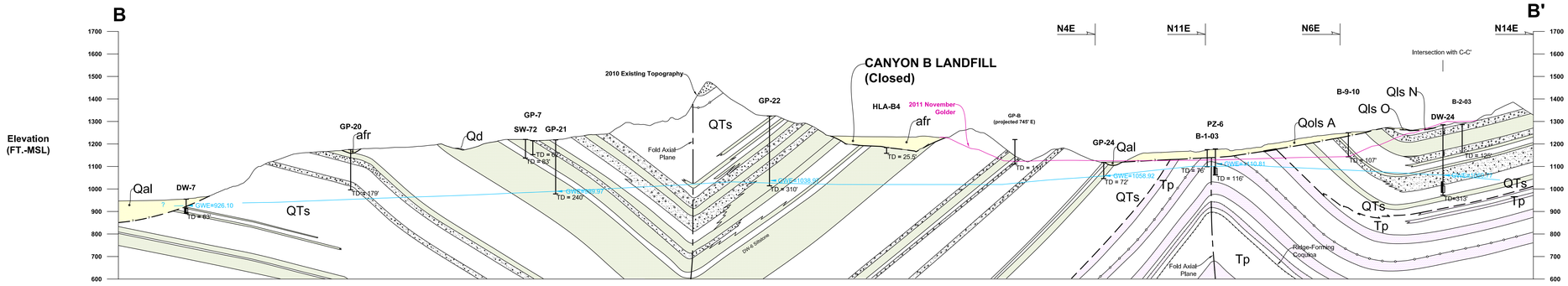
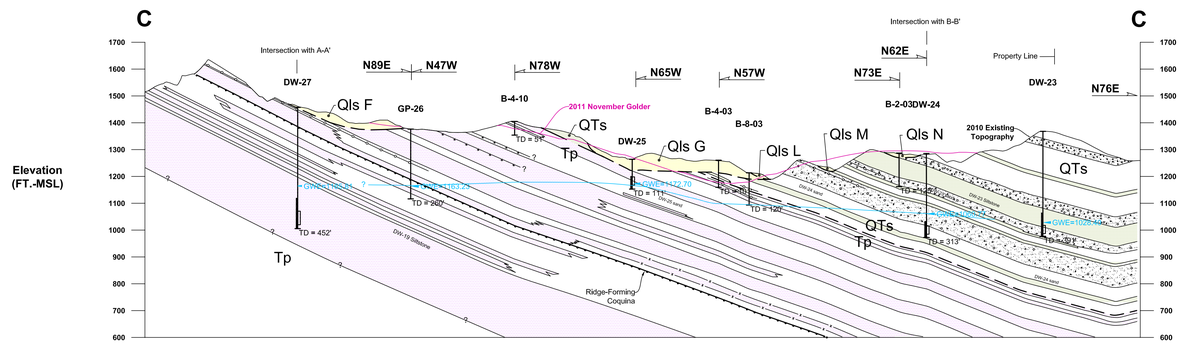
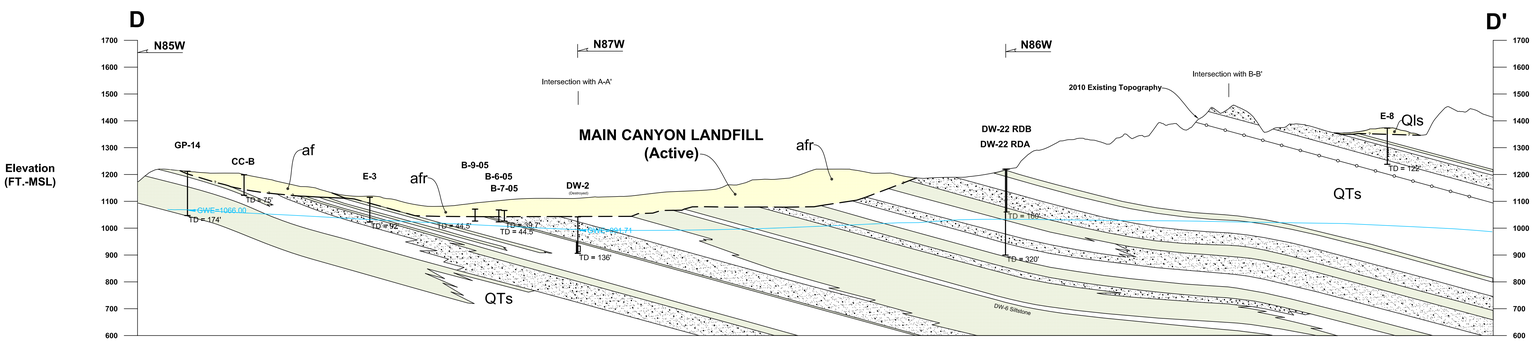




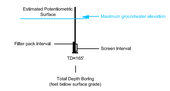




EXPLANATION

- af — Artificial Fill
- afr — Artificial Fill Refuse
- Qal — Quaternary Alluvium
- Qsaug — Saugus Formation Coarse-grained; sandstone with gravel
- QTs — Saugus Formation Coarse-grained; primarily sandstone
- QTs — Saugus Formation Fine-grained; primarily siltstone, mudstone or claystone
- Tp — Pico Formation Coarse-grained; primarily sandstone
- Tp — Pico Formation Fine-grained; primarily siltstone, mudstone or claystone
- Tp — Fossil rich; Primarily Sandstone
- Siltstone Bed
- Sandstone Bed
- Fossil Bed

DW-15 — Monitoring Well or Piezometer



Geologic Sections

PREPARED FOR: Chiquita Canyon Landfill

Project Location: Chiquita Canyon Landfill, Castaic, California

SCALE	DRAWN BY	CHECKED BY
1"=200'	JH	TMC
DATE: 1-27-2012	Figure 3	JOB NO: 2002-036-004

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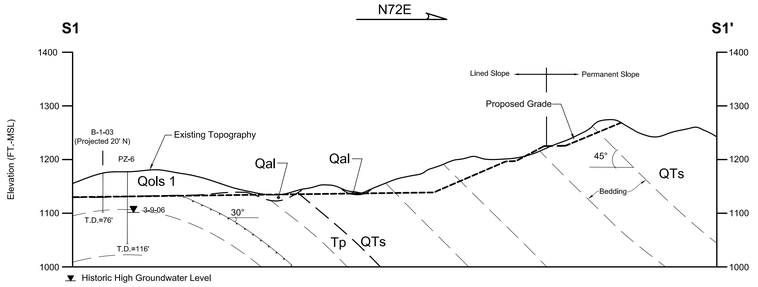

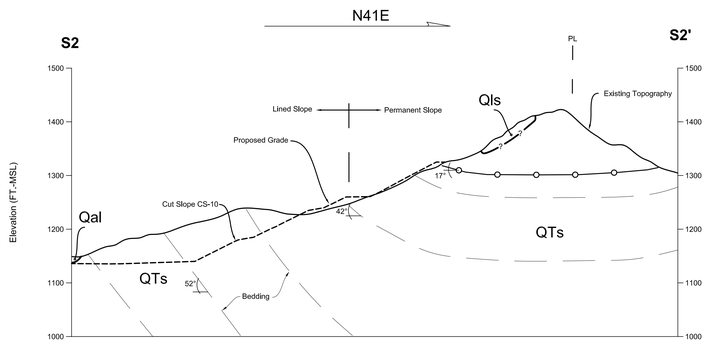

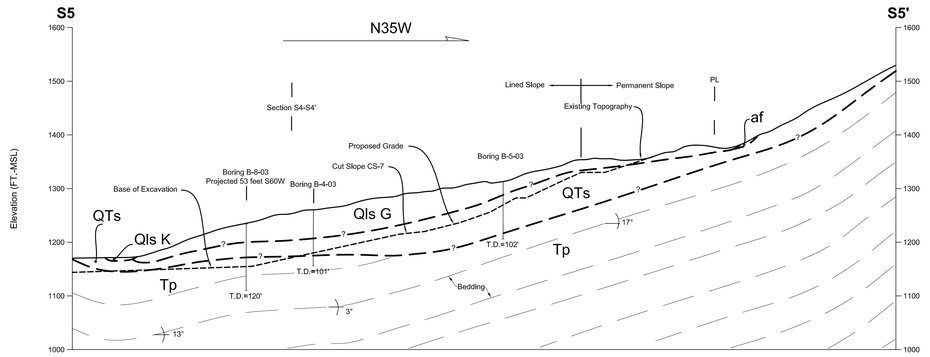

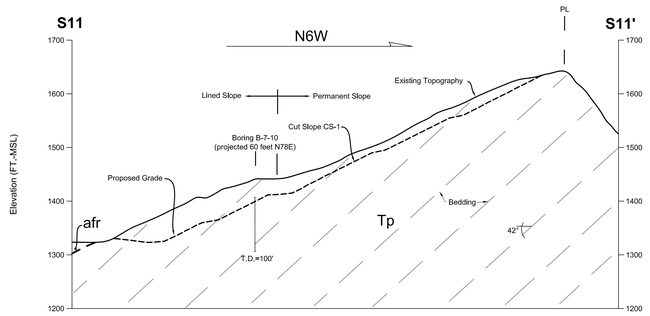

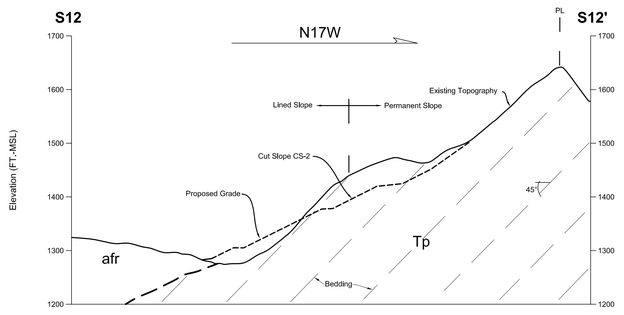

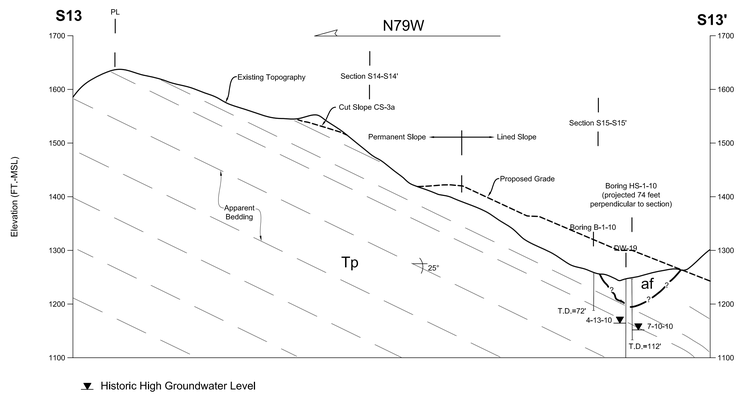

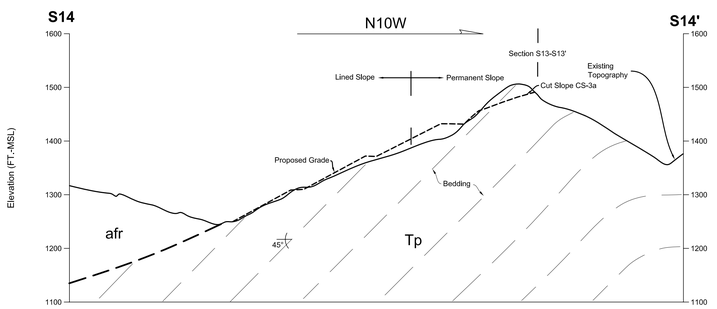

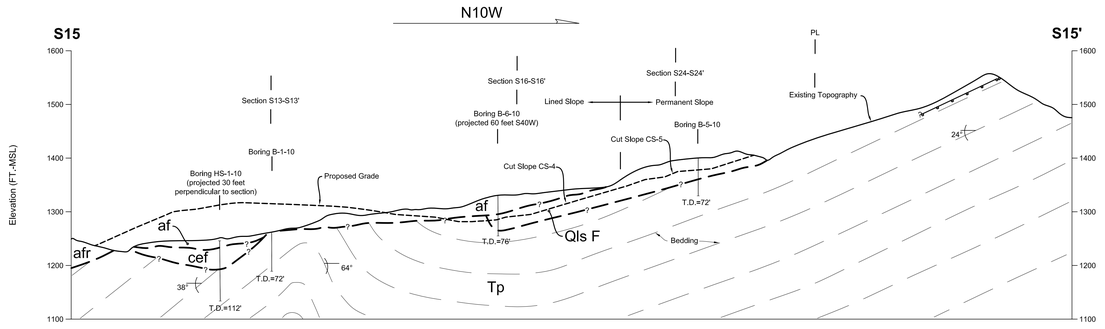

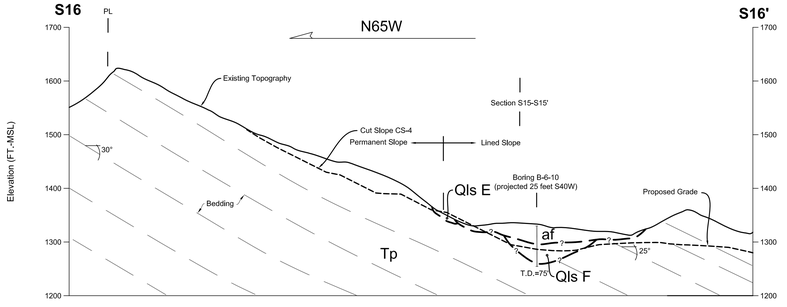

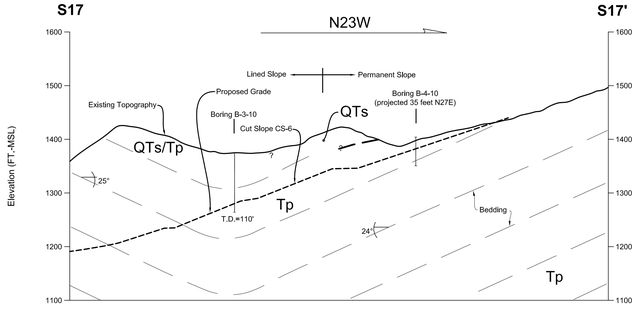

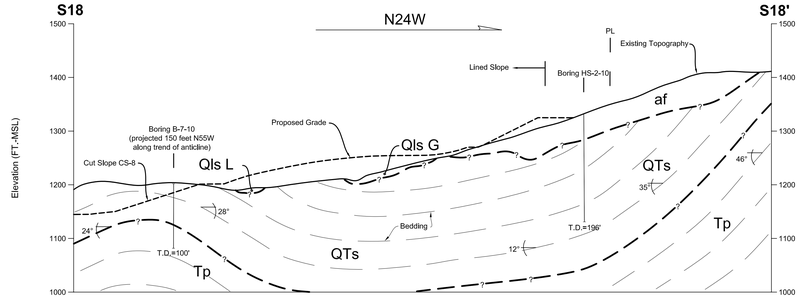

Geologic Sections

PREPARED FOR

Chiquita Canyon Landfill

Project Location

Master Plan Revision
Castaic, California

SCALE	DRAWN BY	CHECKED BY
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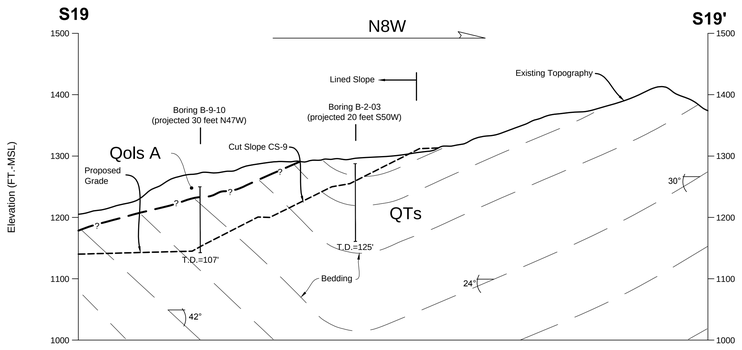

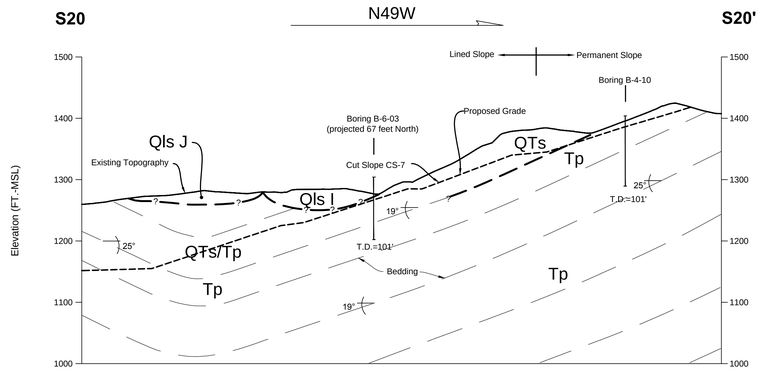

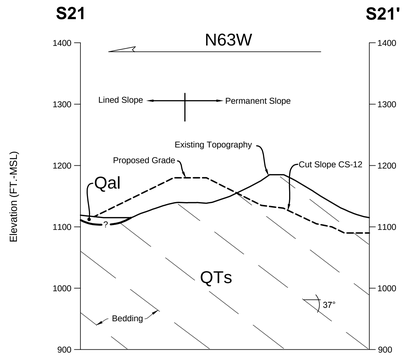

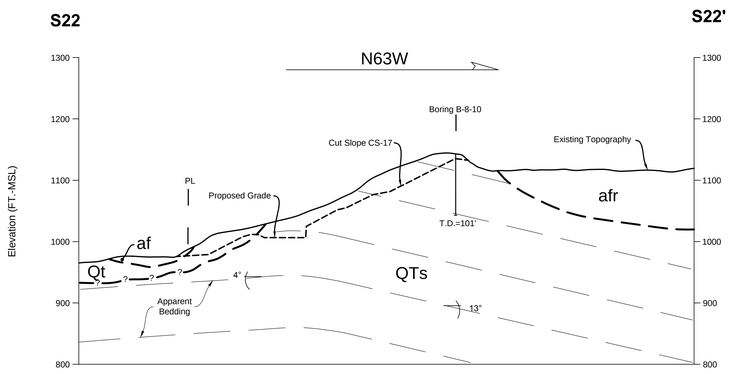

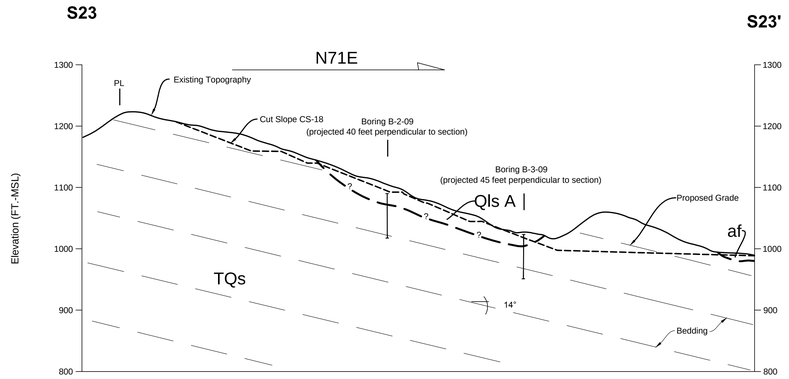

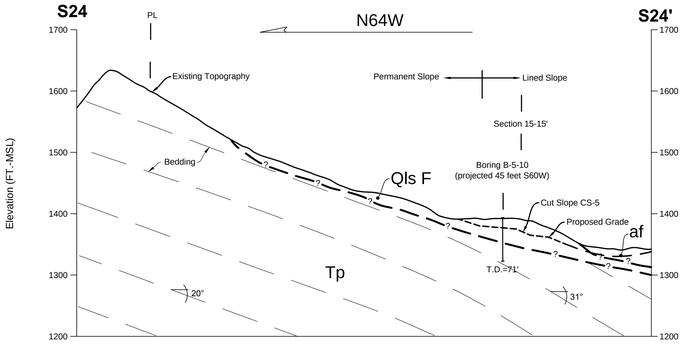

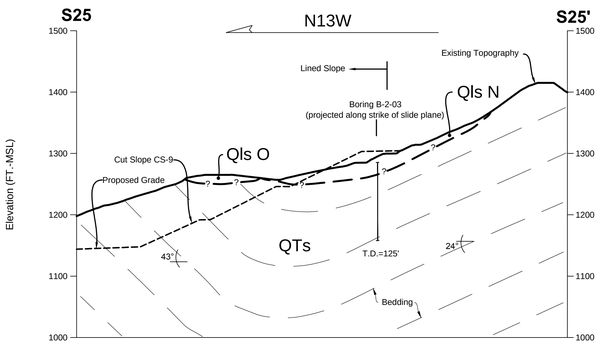

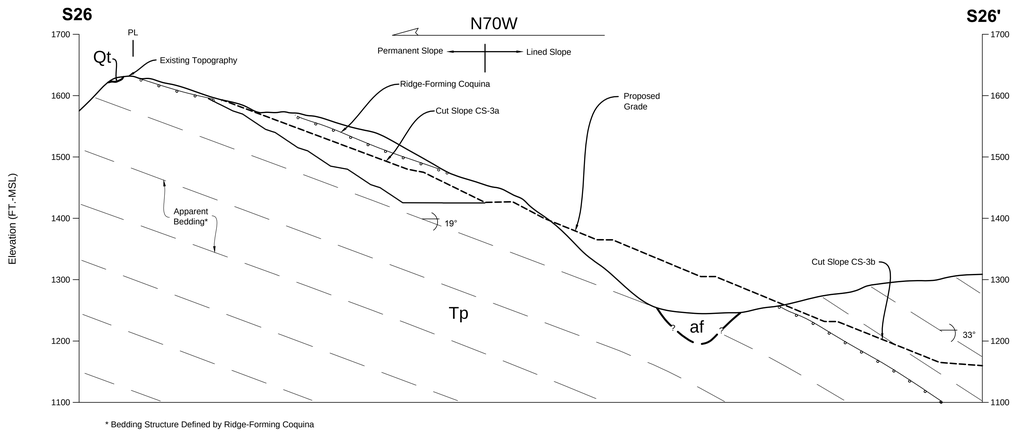

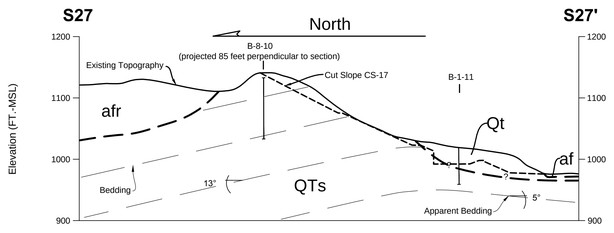

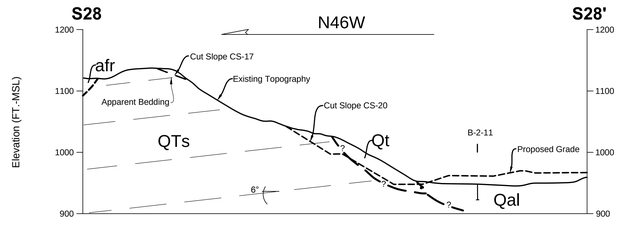

Geologic Sections

PREPARED FOR
Chiquita Canyon Landfill

Project Location
Master Plan Revision
Castaic, California

SCALE	DRAWN BY	CHECKED BY
AS SHOWN	JH	TPL
DATE		JOB NO.
1-27-2012	Figure 4.2	2002-036-004

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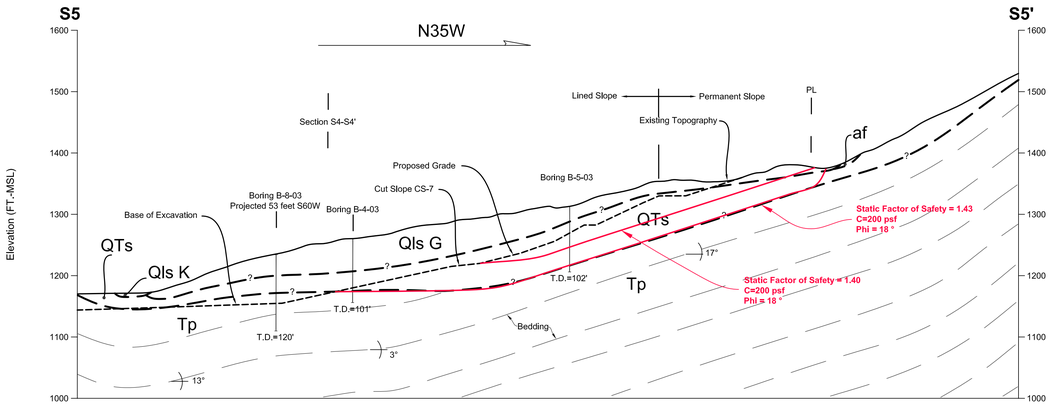

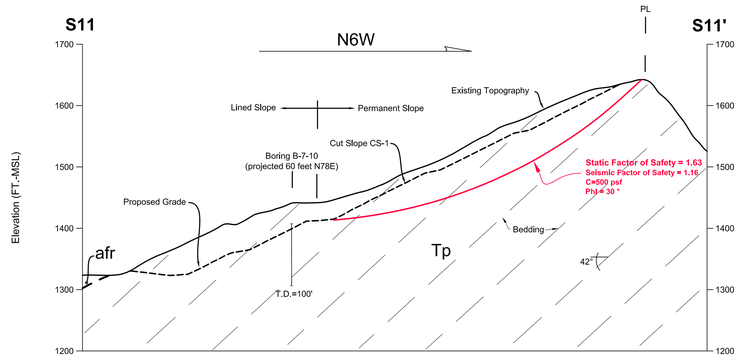

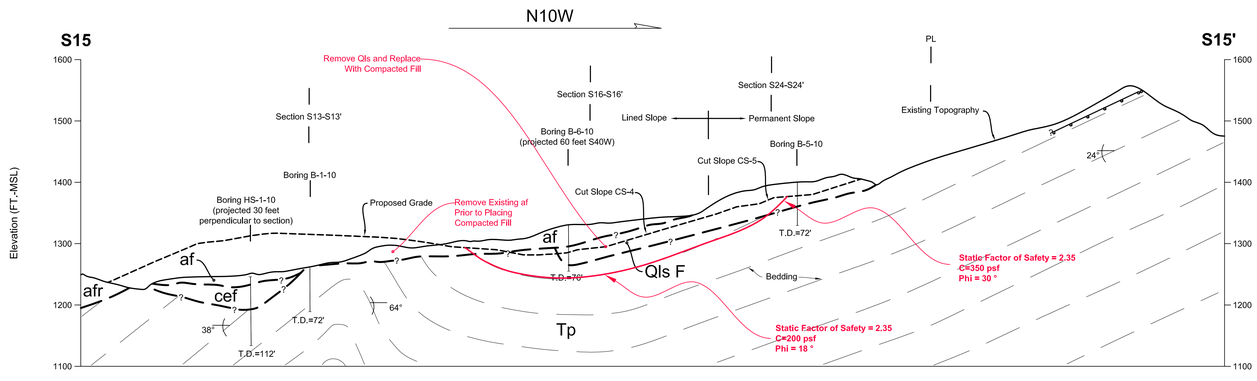

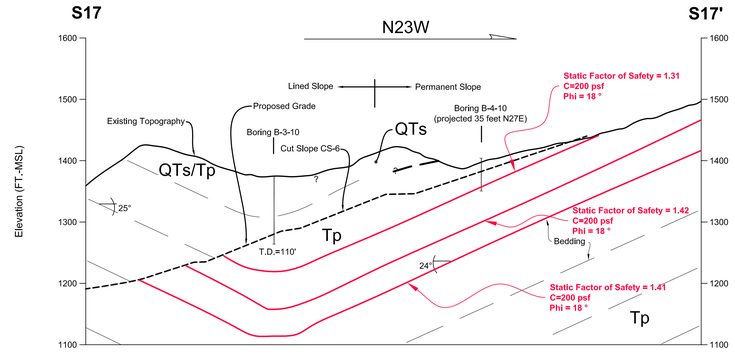

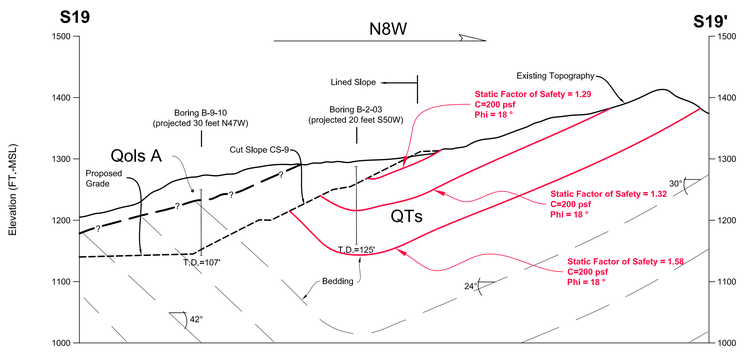

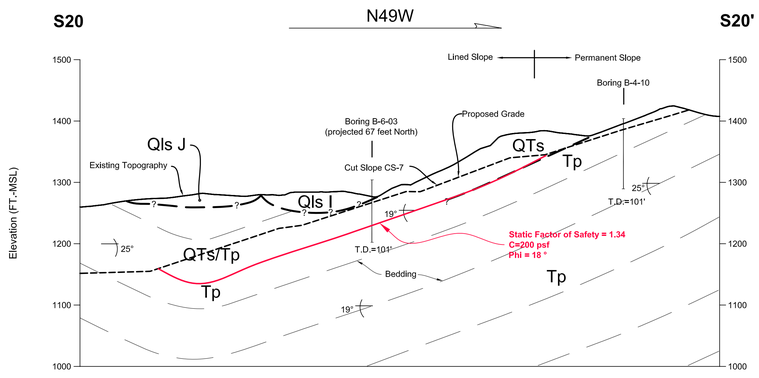

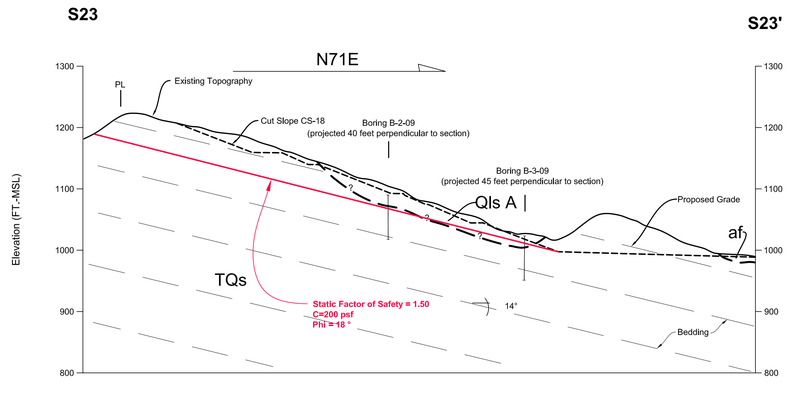

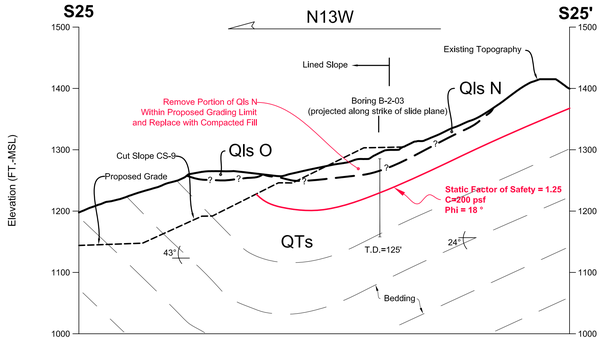

Geotechnical Sections

PREPARED FOR

Chiquita Canyon Landfill

Project Location

Master Plan Revision
Castaic, California

SCALE	DRAWN BY	CHECKED BY
AS SHOWN	JH	TPL
DATE		JOB NO.
1-27-2012	Figure 5	2002-036-004

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GEOTECHNICAL INVESTIGATION

MASTER PLAN REVISION

CHIQUITA CANYON LANDFILL

CASTAIC, CALIFORNIA

FOR

CHIQUITA CANYON LANDFILL

JANUARY 27, 2012

JOB NO. 2002-036-004

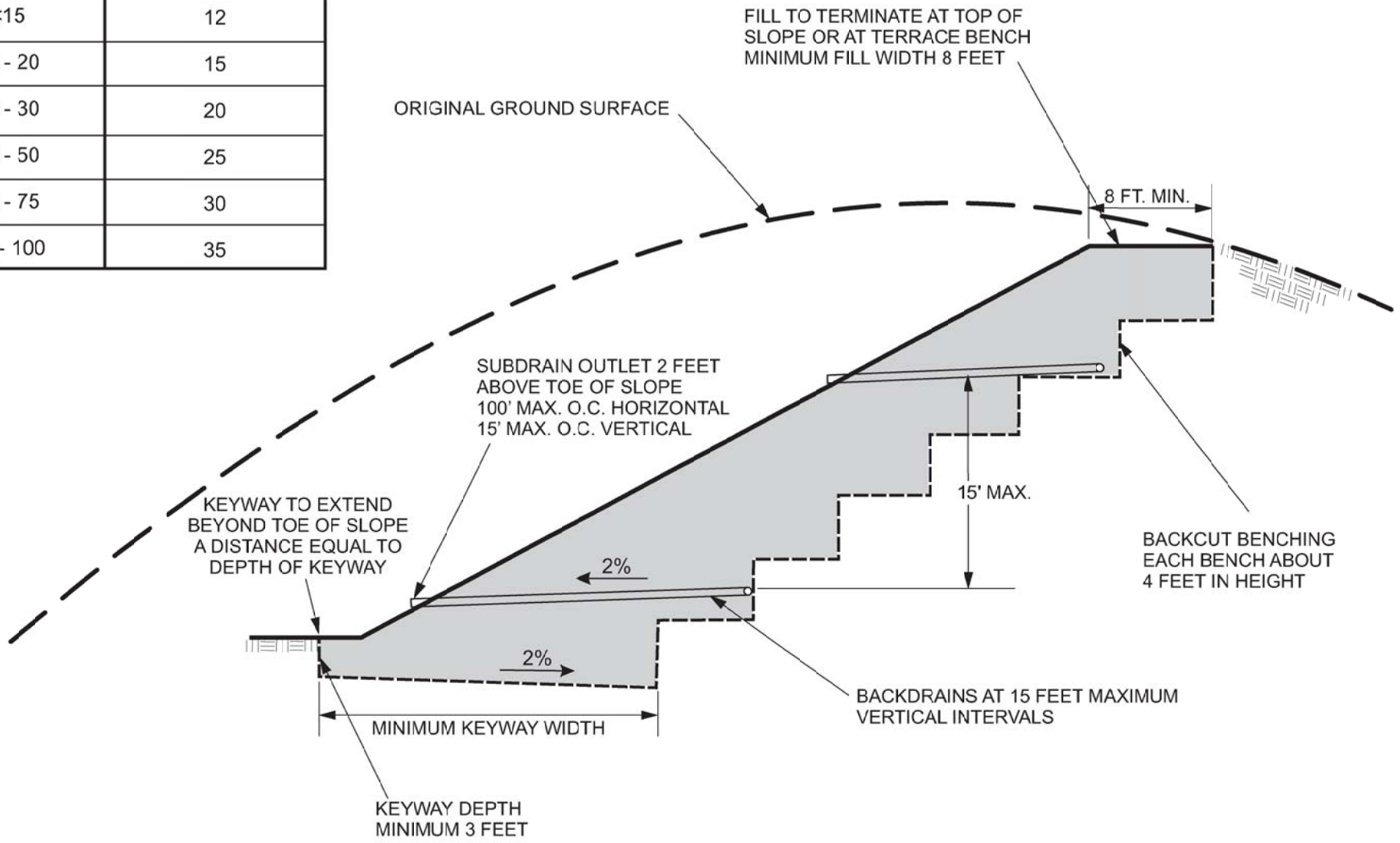
VOLUME 2 OF 2

RTF&A

GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

STAB2

STABILITY FILL HEIGHT (FEET)	MINIMUM WIDTH OF KEYWAY (FEET)
<15	12
15 - 20	15
20 - 30	20
30 - 50	25
50 - 75	30
75 - 100	35

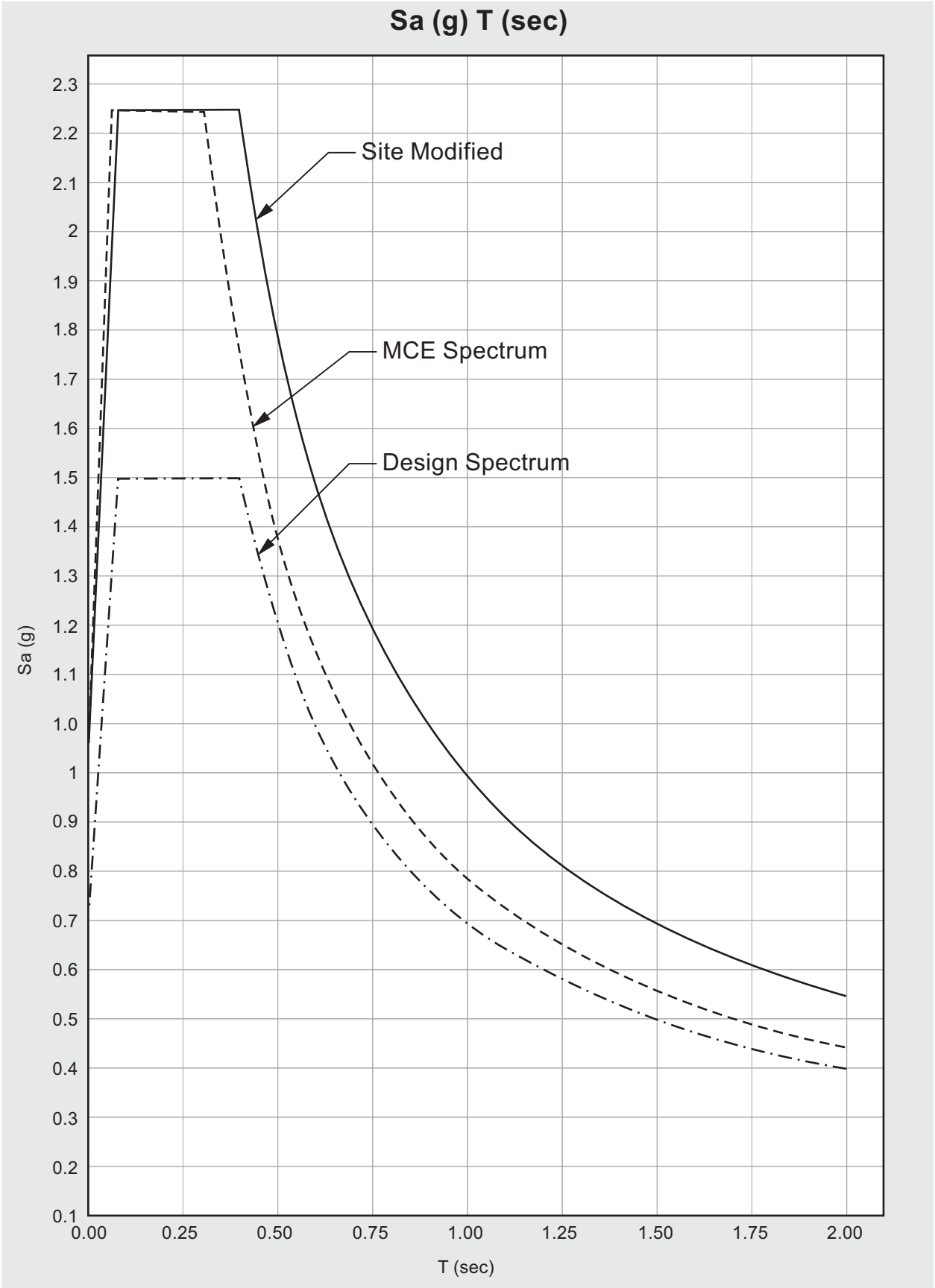


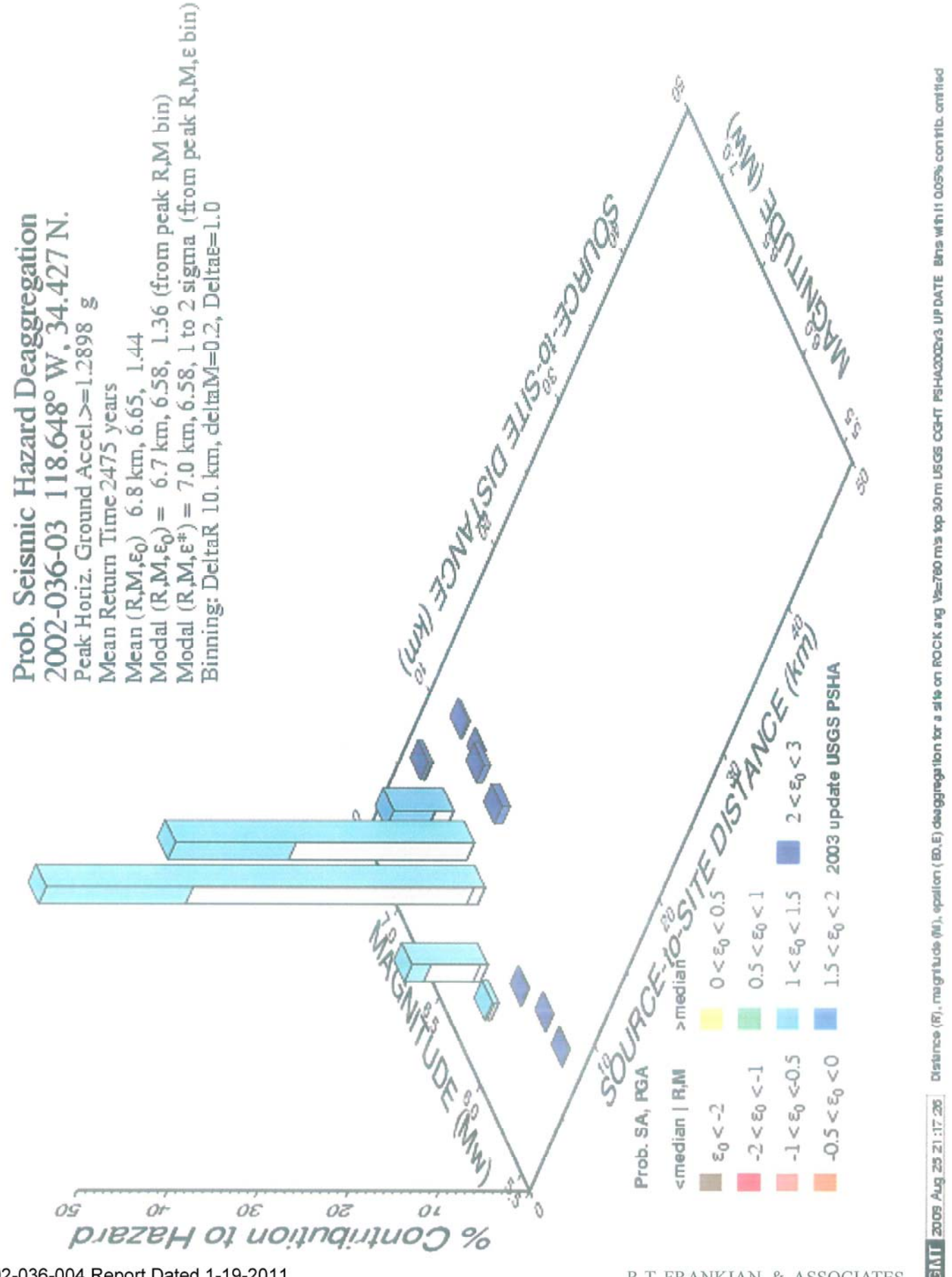
STABILITY FILL DETAILS FOR GROSSLY STABLE SLOPES

NOT TO SCALE

NOTE:
SUBDRAIN PIPES ALONG BACKCUT SHOULD CONSIST OF AT LEAST 4" DIAMETER SLOTTED PIPE WITH AT LEAST 6" OF F-1 FILTER MATERIAL ON ALL SIDES OF THE PIPE.

SEISMIC SPECTRUM

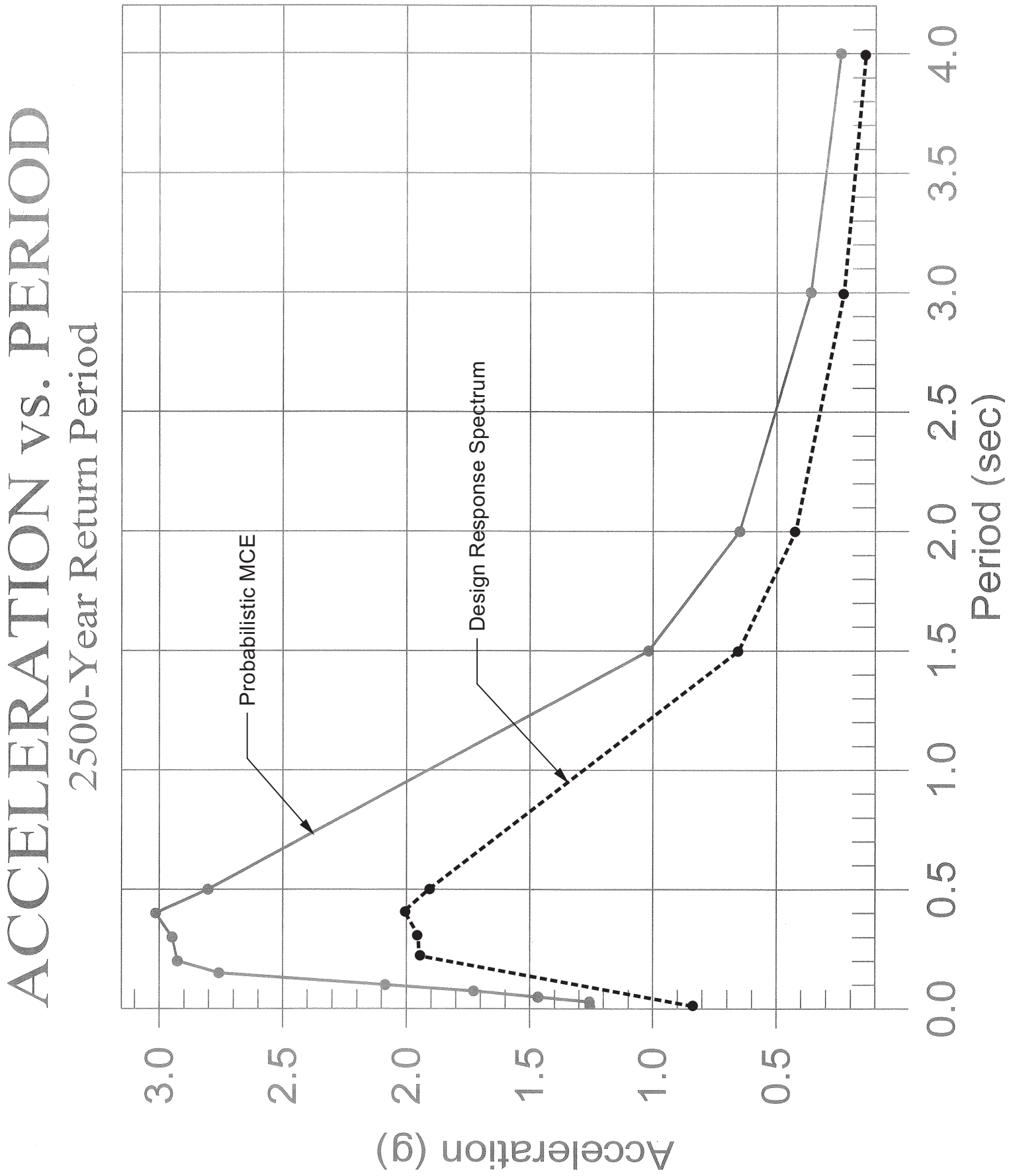




R.T. FRANKIAN & ASSOCIATES

Figure 8

PROBABILISTIC MCE

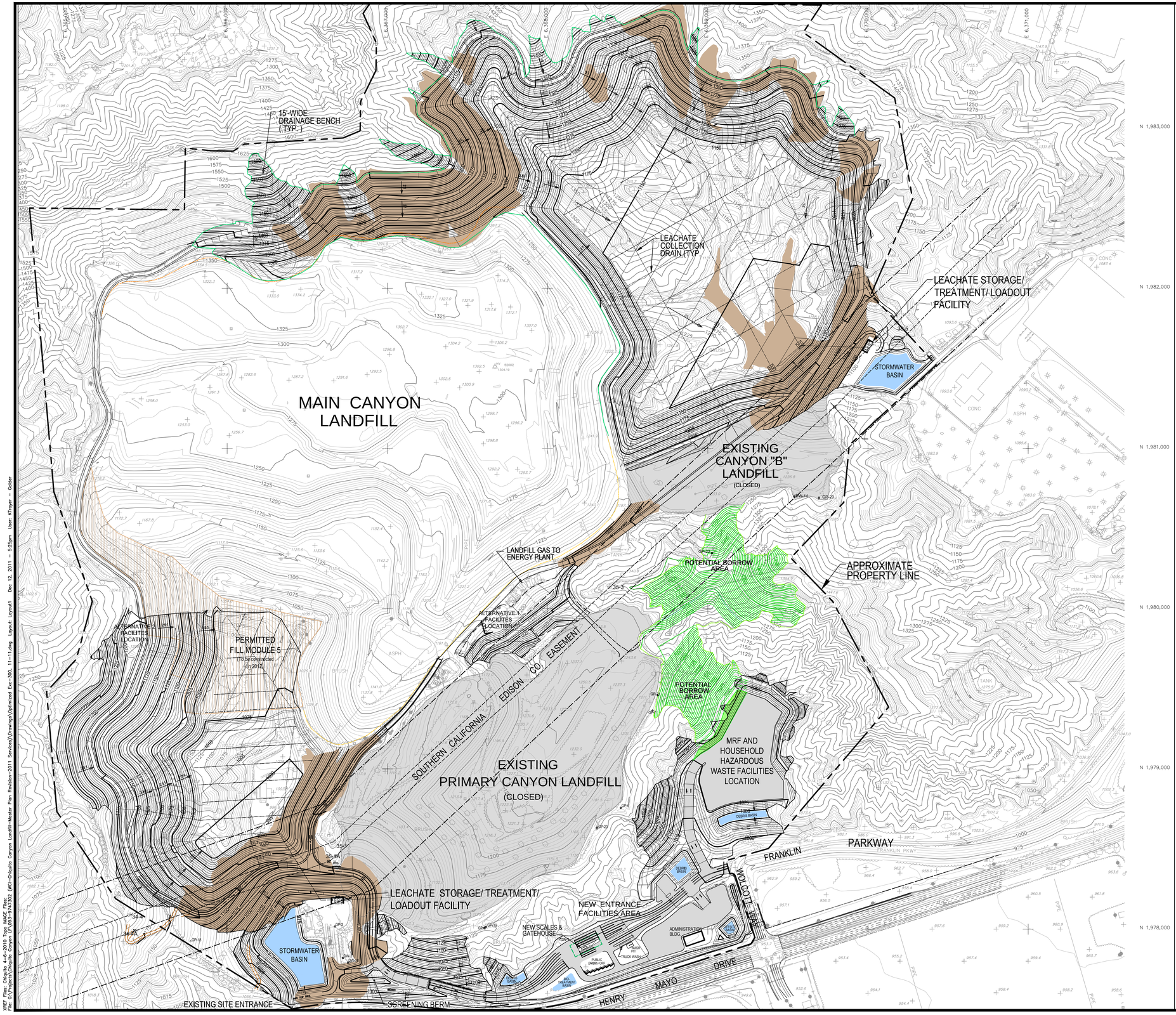


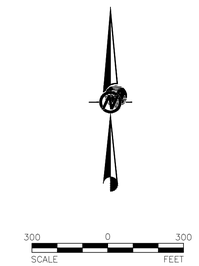
Chiquita Canyon Landfill
January 27, 2012
2002-036-004

APPENDIX A

EXCAVATION PLAN (GOLDER ASSOCIATES, NOVEMBER 2011)

RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY





NOTE: Areas contoured with green contours represent borrow areas and are not mandatory for the construction of the landfill, but are designed to help the project soil balance. The space that is gained around the MRF due to the borrow areas is the area shaded green and equals 0.6 additional acreage.

Base compiled by photogrammetric methods
by Don Read Corporation, Brea, CA
Date of photography: April 6, 2010

PROJECT

WASTE CONNECTIONS, INC.
CHIQUITA CANYON LANDFILL
LOS ANGELES COUNTY, CALIFORNIA

TITLE

EXCAVATION PLAN

Golder Associates
Sunnyvale, California

PROJECT No. 093-9747302			FILE No.
DESIGN	SER	NOV 2011	SCALE AS NOTED REV. 0
CADD	KLT	DEC 2011	2
CHECK			
REVIEW			

XREF Files: Chiquita 4-6-2010 Topo IMAGE Files:
File: G:\Projects\Chiquita Canyon LF\093-9747302 (WCI-Chiquita Canyon Landfill-Master Plan Revision-2011 Services)\Drawings\Optimized Exc-300, 11-11.dwg Layout: Layout1 Dec 12, 2011 - 5:25pm User: KTroyer - Golder

Chiquita Canyon Landfill
January 27, 2012
2002-036-004

APPENDIX B

FIELD EXPLORATIONS

RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

APPENDIX B

FIELD EXPLORATIONS

RECONNAISSANCE GEOLOGIC MAPPING

During geologic mapping, local surficial deposits (both natural and man-made) and bedrock units were mapped on a 1 inch = 100 feet topographic base map compiled by Don Read Corporation, based on April 4, 2010 photography. Geologic structural features, including bedding, were observed, measured, and plotted on the base map. Previous geologic mapping of the North and East Canyon was conducted in 2003.

EXCAVATION AND LOGGING OF EXPLORATORY BORINGS

The project site exploration has been conducted over a nine year period beginning in 2003 and concluding in 2011 as detailed below:

- eight bucket auger borings, designated B-1-03 through B-8-03, that were excavated for East Canyon in 2003;

- five bucket auger borings (B-1-09 through B-3-09, B-10-10 and B-11-10) and three rotary wash borings (WB-1-09 through WB-3-09) excavated within South Main Canyon in 2009 and 2010;

- nine bucket auger borings (B-1-10 through B-9-10) and four hollow-stem auger borings (HS-1-10 through HS-4-10) excavated within North & East Canyon, and above the future Entrance Road, in 2009; and

- five bucket auger borings (B-1-11 through B-5-11) excavated for the future Entrance Road in 2011.

Several of the bucket auger borings were down-hole logged by a Certified Engineering Geologist to directly observe the subsurface geologic units and structure. The locations of the various exploratory borings are shown on the attached Geotechnical Maps, Figure 2.1 and 2.2. The soils/rock units encountered were classified in accordance with the Unified Soil Classification System. Rock types were identified using standard rock nomenclature. The boring logs are presented in this appendix.

Boring HS-1-10, drilled to a depth of 112 feet below existing ground surface, was completed as a temporary piezometer, with well screen placed from 88 feet to 108 feet. Boring HS-2-10 was drilled to a depth of 199 feet and completed as a temporary

piezometer with well screen placed from 180 to 190 feet. Both temporary piezometers were monitored for water levels prior to destruction on July 14, 2010.

Undisturbed and bulk samples of the subsurface materials were collected for laboratory inspection and testing. The lined-barrel sampler used to take undisturbed samples has an external diameter of 3.25 inches and an internal diameter of 2.625 inches. The depths at which the undisturbed samples were obtained are indicated on the logs. The number of blows required to drive the sampler 12 inches with the hammer is also shown on the boring logs.

In addition to obtaining undisturbed samples, Standard Penetration Tests (SPT) were performed within some of the hollow-stem auger borings. The results of the tests are indicated on the boring logs. The Standard Penetration Tests were performed in accordance with the ASTM D1586 Test Method.

BORING B-1-03

JOB NUMBER: 2002-036-01 By: D.G. Francuch
DATE DRILLED: 10-13-03
EQUIPMENT USED: 24"-Diameter Bucket Auger
ELEVATION: 1175+/-
SURFACE CONDITIONS:
SAMPLING METHOD: 2 5/8-inch drive

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG (SW NE)	SOIL TYPE



0-40 feet: OLDER LANDSLIDE (Qols)

@ 0 feet: CLAYEY SILTSTONE, plastic to moderate stiff, moist, caliche pods, brownish gray (5Y 4/1)

@ 5 feet: blebs of dark brown siltstone within light reddish brown silty sand

@ 11 feet: CLAYSTONE, plastic, moist, dark reddish brown (10R 3/4)

Slide Plane: N60W, 85W, 1"-2" thick

@ 11.3 feet: CLAYEY SILTSTONE, olive gray (5Y 4/1)

@ 14 feet: SANDSTONE, fine to coarse grained, moderately hard, moist, moderate yellowish brown (10YR 5/4)

@ 19 feet: CLAYEY SILTSTONE, stiff, moist, micaceous, pale yellowish brown (10YR 6/2)

@ 21 feet: Sheared Claystone, Irregular dips to NW, 1"-2" thick

@ 25 feet: CLAYEY SANDSTONE, fine grained, clayey to silty sand, moderately hard, moist, moderate yellowish brown (10YR 5/4)
@ 26 feet: Shear, N30E, 45NW, 1/4" reddish brown clay gouge
@ 26.5 feet: Bedding, approx. N70W, 20NE, sandstone
@ 27 feet: SILTSTONE (ML), some fine grained sand and clay, moderately hard, moist, light brown (5YR 5/6)
@ 27.5 feet: Shear, irregular, bedding discontinuos N10E, 52SE

@ 30 feet: color changes to light olive gray (5Y 5/2)

@ 35 feet: SANDSTONE, fine to medium grained with small cobbles, moderately hard, moist, light olive gray (5Y 5/2)

@ 38 feet: SILTSTONE, minor to trace clay, moderately hard, moist, light olive gray (5Y 5/2)
@ 39.5 feet: Shear, N35W, 65SW well defined clay shear polished, below 39.5 feet gradual color change to olive gray, no distinct shears or slide planes

Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

LOG OF BORING

BORING B-1-03 (CONTINUED)

JOB NUMBER: 2002-036-01
DATE DRILLED: 10-13-03

By: D.G. Francuch

Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
26				45, 50, 55, 60, 65, 70, 75, 80		SW NE; no log	

40-76 feet: PICO FORMATION (Tp)

@ 40 feet: SILTY CLAYSTONE, dark reddish brown (10R 3/4) to olive gray (5Y 4/1), Bedding parallel to shear

@ 43 feet: SILTY CLAYSTONE, hard, moist, olive gray (5Y 4/1), conchoidal fracture possible contact with bedrock, note hardness and color change

@ 45.5 feet: Bedding N85W, 47SW , sandstone bed in siltstone

@ 47 feet: fossiliferous, small clam fragments and caliche bed, Bedding: N90W, 54S, 1 foot thick

@ 56 feet: zone of sandstone blocks in clay matrix, discontinuous high angle shear, polished claystone above with hackly fracture

@ 57 feet: CLAYEY SANDSTONE: fine grained sand with silt and clay, hard, moist, greenish gray (5GY 6/1)

@ 59 feet: Shear, N75E, 50SE, poorly developed zone of discontinuous sandstone blocks within siltstone

@ 60 feet: SILTY CLAYSTONE, approximately 6" thick

@ 61 feet: SANDSTONE, fine grained sand, hard, moist, light olive gray (5Y 6/1)

@ 68 feet: Bedding, N80W, 52SW, dark brown clayey siltstone bed in sandstone 4" thick ,Fault offsets siltstone bed

@ 69 feet: CLAYSTONE, moderately hard, moist, semi-plastic, dark yellowish brown (10YR 4/2)

70 feet: increase in moisture

@ 72 feet: CLAYEY SANDSTONE, fine to medium grained sand with clay, hard, moist, light olive gray (5Y 6/1)

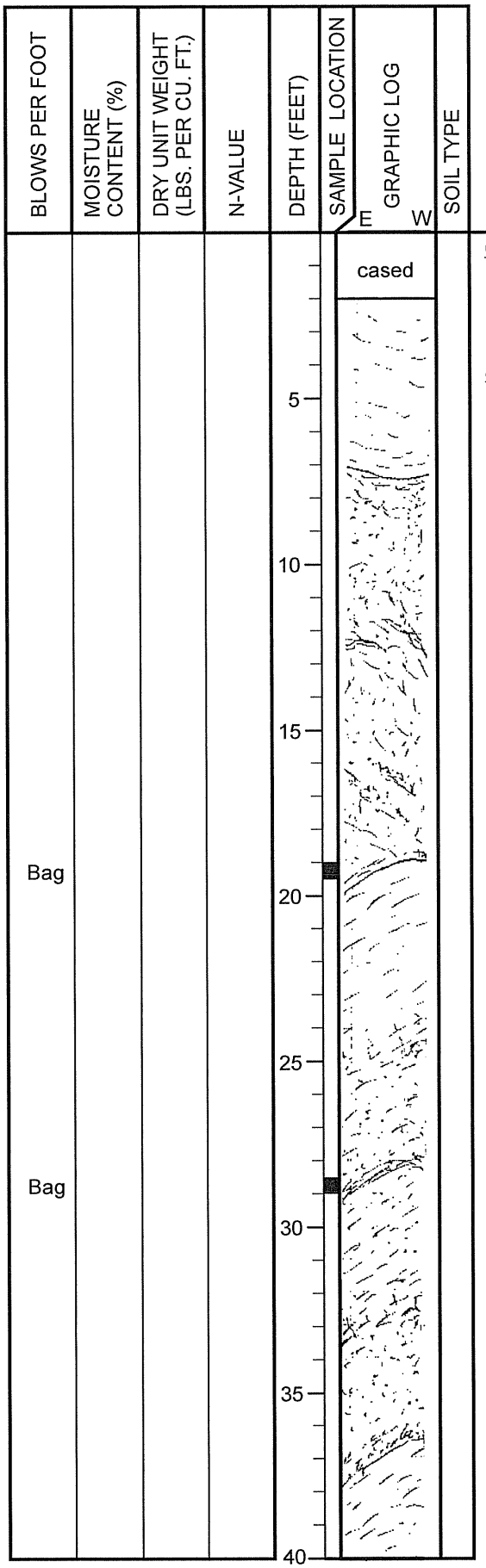
TOTAL DEPTH 76 FEET.
No Groundwater. No caving.
Downhole logged to 71 feet.

SAMPLE DEPTH	KELLY WEIGHT
0-28'	5952 lbs.
28-55'	3921 lbs.
55-84'	2531 lbs.
84-114'	1407 lbs
+1000 lbs/30 ft. stem	

LOG OF BORING

BORING B-2-03

JOB NUMBER: 2002-036-01 By: D.G. Francuch
DATE DRILLED: 10-13-03 - 10-14-03
EQUIPMENT USED: 24"-Diameter Bucket Auger
ELEVATION: 1287+/-
SURFACE CONDITIONS:
SAMPLING METHOD: 2 5/8-inch drive



0-4 feet: ARTIFICIAL FILL (af)
@ 0 feet: SANDY SILT (SM), silt with fine sand, loose, dry, pale yellowish brown (10YR 6/2)

4-19 feet: LANDSLIDE (Qls)
@ 4 feet: SILTSTONE, soft, moist, light olive gray (5Y 5/2)

@ 7 feet: Slide Plane: N75W, 11SW, olive gray siltstone over brown sandy siltstone 8" thick soil zone with sandstone blocks
@ 8 feet: stopped drilling on 10/13/03 @ 15:30
Resume drilling on 10/14/03 @ 7:00

@ 11 feet: SANDY SILTSTONE: fine sand, moderately hard, moist, moderate yellowish brown (10YR 5/4)
@ 12 feet: chaotic assemblage of sandy silt and clayey siltstone

@ 19 feet: Slide Plane: N25E, 22SE 2-3"zone of dark brown polished clay, moderately plastic

19-125 feet: SAUGUS FORMATION (QTs)
@ 19 feet: SILTSTONE, moderately hard to hard, moist, light olive gray (5Y 5/2)

@ 24 feet: Bedding; N40E, 34SE; limey siltstone bed, 8" thick

@ 28 feet: Bedding; N30E, 28SE, dark olive green clayey siltstone

@ 31 feet: CLAYEY SILTSTONE, trace fine sand, hard, moist, dark yellowish brown (10YR 4/2)
@ 32 feet: Bedding; N50E, 31SE, limey siltstone
@ 32 feet: wood fragments in siltstone
@ 33 feet: SANDSTONE, fine grained, hard, moist, yellowish gray (5Y 7/2)

@ 36 feet: Increased drilling effort
@ 37 feet: Bedding N60E, 38SE; pebble bed in sandstone
@ 37 feet: CLAYEY SILTSTONE, hard, moist, moderate yellowish brown (10 YR 5/4)

Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

LOG OF BORING

BORING B-2-03 (CONTINUED)

JOB NUMBER: 2002-036-01
DATE DRILLED: 10-13-03 - 10-15-03

By: D.G. Francuch

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
Bag				45	E	W	
				50			
				55			
Bag				60			
				65			
				70			
				75			
				80			

@ 49.5 feet: Bedding; N40E, 22SE, limey siltstone
@ 50 feet: SANDY SILTSTONE, some fine sand, moderately hard, dry to moist, yellowish gray (5Y 7/2)

@ 56 feet: CLAYEY SILTSTONE, moderately hard to hard, moist, light olive gray (5Y 5/2), Bedding; N40E, 25SE, clay bed 1" thick

@ 63.9 feet: Bedding; N40E, 24SE, clay bed 1" thick
@ 64 feet: SANDSTONE, fine grained sand, moderately hard, moist, pale olive (10Y 6/2)
@ 65.5 feet: Bedding; N25E, 28SE, clay bed 8" thick
@ 66 feet: CLAYEY SILTSTONE, hard moist, moderate yellowish brown (10YR 5/4)

@ 73 feet: limey siltstone

@ 79 feet: SILTSTONE, trace fine sand, hard, moist, dark yellowish brown (10YR 4/2)
@ 79.3 feet: bedding; N40E, 29SE, limey siltstone bed, 12" thick

Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

LOG OF BORING

BORING B-2-03 (CONTINUED)

JOB NUMBER: 2002-036-01
DATE DRILLED: 10-13-03 - 10-15-03

By: D.G. Francuch

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG (E / W)	SOIL TYPE
				85			
				90			
				95			
				100			
				105			
				110			
				115			
				120			

@ 89 feet: Bedding; N45E, 28SE
@ 89 feet: SILTSTONE, trace fine to medium grained sand, moderately hard to hard, moist, dusky yellow (6Y 6/4)

@ 90 feet: SANDSTONE, fine to medium grained sand, trace silt, moderately hard, moist, moderate yellowish brown (10YR 5/4)

@ 95 feet: SANDSTONE, fine to coarse grained with large pebbles, moderately hard, moist, yellowish gray (5Y 7/2)

@ 98 feet: Bedding; N55E, 28SE, pebbly sandstone bed 6" thick

@ 104 feet: Bedding; N30E, 31SE, heavy mineral, fine sand bed

@ 110 feet: SANDSTONE, fine to coarse grained sand with medium pebbles, moderately hard, moist, yellowish gray (5Y 7/2)

@ 115 feet: Bedding; N40E, 22SE, gray sandstone over reddish brown sandstone
@ 115 feet: SILTY SANDSTONE, fine to coarse grained sand, some silt, trace small pebbles, moderately hard to hard, moist, grayish orange (10YR 7/4)
@ 118 feet: Stopped drilling at 15:30 on 10-14-03
resume drilling @ 7:00 on 10-15-03

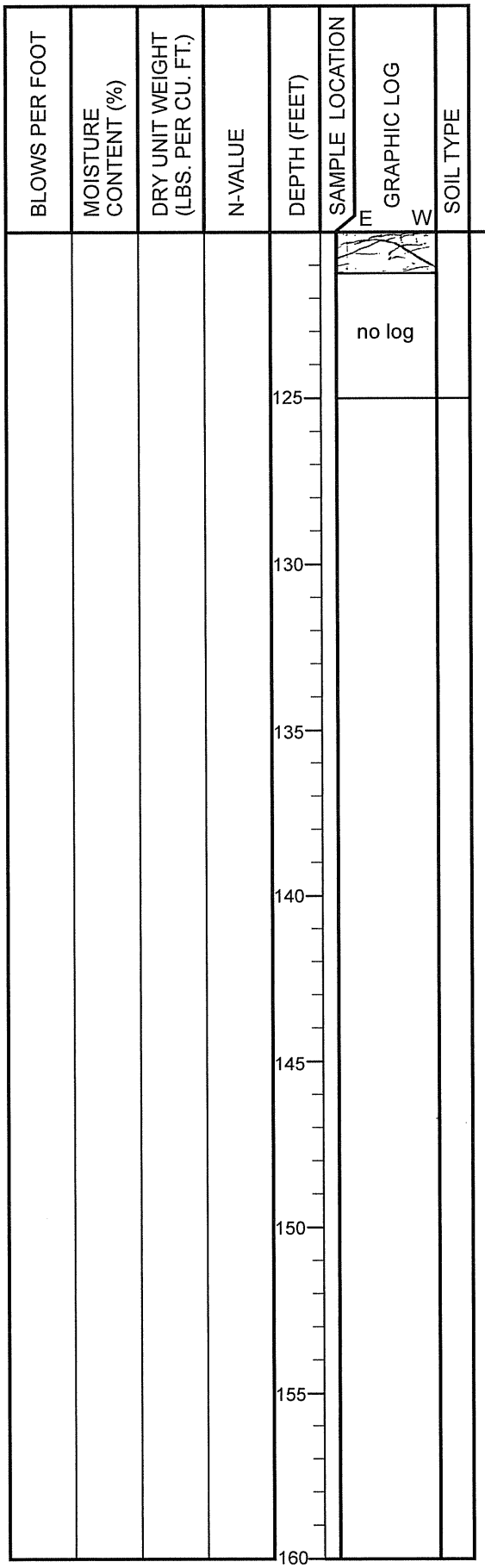
Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

LOG OF BORING

BORING B-2-03 (CONTINUED)

JOB NUMBER: 2002-036-01 By: D.G. Francuch
DATE DRILLED: 10-13-03 - 10-15-03



@ 120.5 feet: Bedding; N45E, 24SE at contact
@ 121 feet: SILTSTONE, trace clay, moderately hard, moist, light brown (5YR 5/6)

@ 124 feet: small cobbles

TOTAL DEPTH 125 FEET.
No Groundwater. No caving.
Downhole logged to 121 feet.

SAMPLE DEPTH	KELLY WEIGHT
0-28'	5952 lbs.
28-55'	3921 lbs.
55-84'	2531 lbs.
84-114'	1407 lbs
+1000 lbs/30 ft. stem	

Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

LOG OF BORING

BORING B-3-03

JOB NUMBER: 2002-036-01 By: D.G. Francuch
DATE DRILLED: 10-16-03
EQUIPMENT USED: 24"-Diameter Bucket Auger
ELEVATION: 1203.5
SURFACE CONDITIONS:
SAMPLING METHOD: 2 5/8-inch drive

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG (S / N)	SOIL TYPE



0-6 feet: LANDSLIDE (Qls)

@ 0 feet: SILT (ML), soft, dry, some caliche staining, light olive gray (5Y 6/1)

@ 4 feet: SILTY SANDSTONE, fine grained sand with silt, moderately hard, dry, moderate yellowish brown (10YR 5/4)

@ 6 feet: Slide Plane; N60W, 14SW, dark brown clay, 2" thick, gypsum

6-16 feet: ALLUVIUM (Qal)

@ SILT (ML), trace clay, moderately hard to moderately soft, dry, yellowish gray, (5Y 7/2)

@ 8 feet: PEBBLY SAND (SP), fine to coarse grained sand with small to large pebbles, hard, dry, intermixed with silt, yellowish gray, (5Y 7/2)

@ 11-14 feet: well bedded sand deposits, shallow dip to north

@ 13 feet: medium cobbles up to 6" diameter

@ 14-16 feet: base of alluvium, irregular erosional contact

16-110 feet: PICO FORMATION (Tp)

@ 16 feet: SILTY SANDSTONE, fine sand with some silt, hard, moist, dusky yellow (5Y 6/4)

@ 16 feet: Bedding approximate; N40W, 52NE, limey siltstone

@ 22 feet: Fracture; N35W, 52NE, 54 SE,1/16" clay gouge

@ 25 feet: increased drilling effort

@ 28 feet: Minor fault; N10E, 54SE, 1/8" clay gouge

@ 29 feet: Minor fault; N20W, 34NE, ½" - 2" wide zone, clay shears 1/16" thick

@ 29 feet : Bedding; N55W, 47NE siltstone bed cut by fault

@ 33 feet: Minor Fault; N/S, 43E, ½"- 1" wide shear zone of 1/16" clay gouge

@ 34 feet: SANDSTONE, fine to medium grained, trace silt, hard, moist, yellowish gray (5Y 7/2)

@ 36 feet: Bedding approximate; N30W, 57NE, fine grain sandstone/ siltstone

@ 36 feet: SANDY SILTSTONE, some fine grained sand, moderately hard, moist, light olive gray (5Y 5/2)

@ 39 feet: Minor Fault; N80W, 72NE, 1/8" -1/4" thick red clay gouge

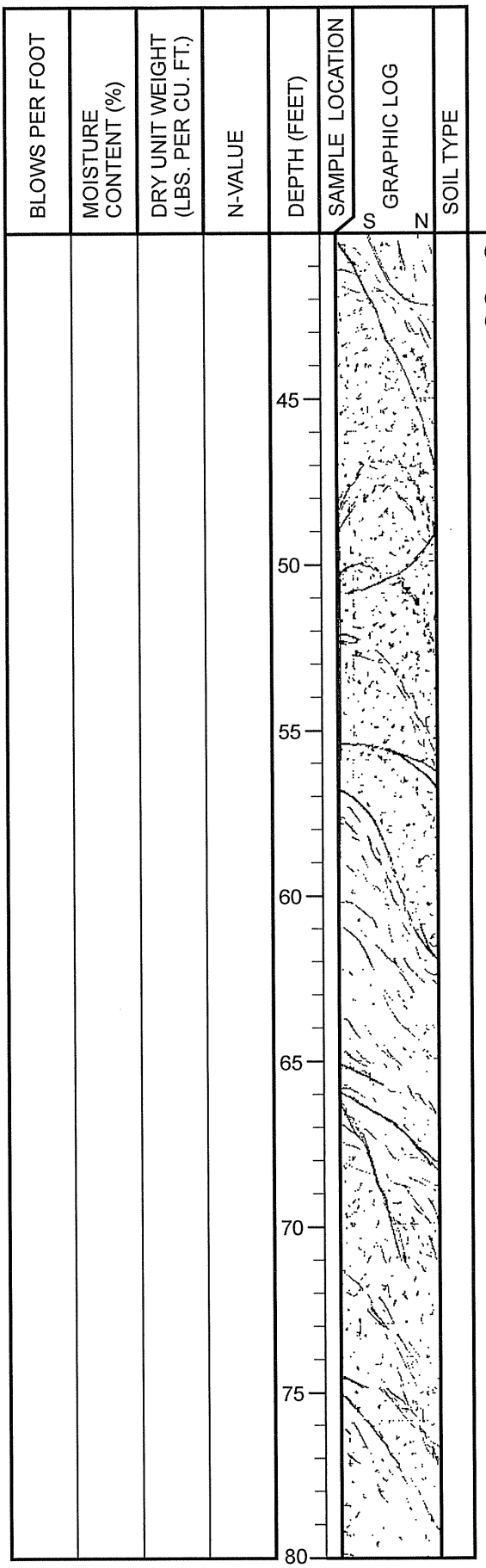
Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

LOG OF BORING

BORING B-3-03 (CONTINUED)

JOB NUMBER: 2002-036-01
DATE DRILLED: 10-16-03



@39 feet: CLAYEY TO SANDY SILTSTONE, some clay, some fine sand, hard, moist, moderate yellowish brown (10YR 5/4)
@ 40 feet: Shear; subparallel to minor fault at 39 feet
@ 42 feet: SANDSTONE, fine to coarse grained sand, trace silt, hard, moist, pale yellowish brown (10YR 6/2)

@ 49 feet: Bedding; N50W, 63NE, coarse sandstone

@ 53 feet: PEBBLY SANDSTONE, fine to coarse sand with small to medium pebbles, moderately hard to hard, moist, pale yellowish brown (10YR 6/2)
@ 55.5 feet: Minor Fault; N75W, 24NE, 1/4" to 1" thick shear zone of 1/8" - 1/4" clay gouge

@ 57 feet: Bedding; N55W, 57NE, coarse sandstone / siltstone
@ 57 feet: SILTSTONE, trace fine grained sand, trace clay, hard, moist, moderate yellowish brown (10YR 5/4)

@ 65 feet: moisture increase
@ 66 feet: Minor Fault; N15E, 30SE, 1/8" - 1/4" thick clay gouge

@ 72 feet: increase in clay content

@ 75 feet: SILTSTONE, trace clay, hard, moist, moderate yellowish brown (10YR 5/4)
@ 75 feet: Bedding; N50W, 62NE

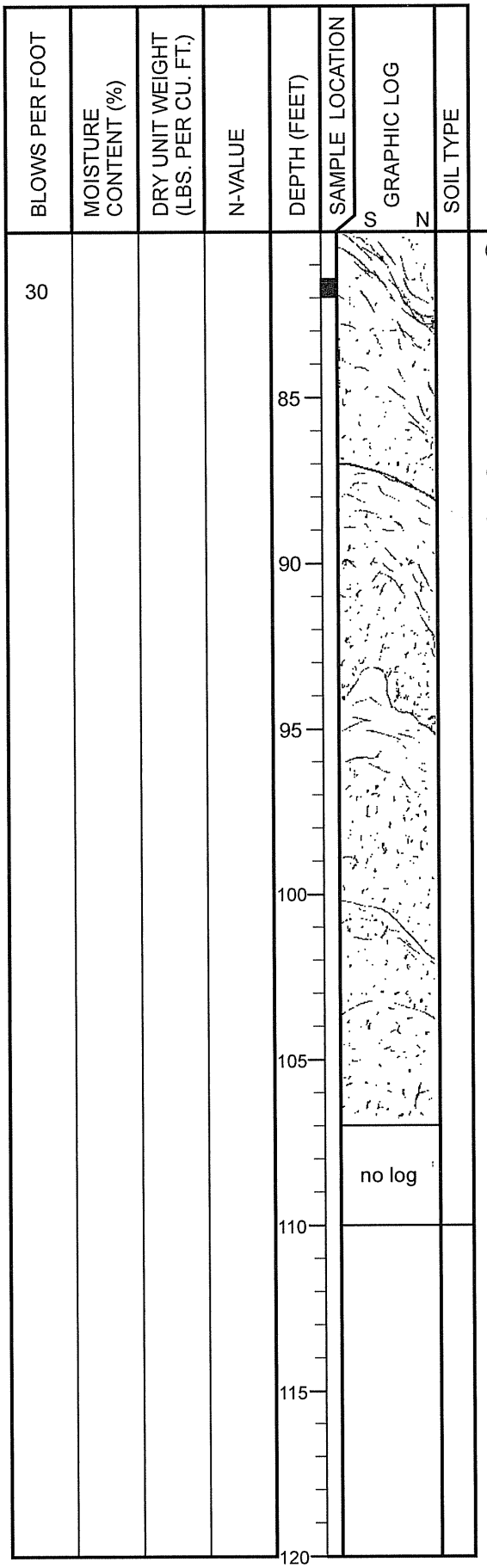
Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

LOG OF BORING

BORING B-3-03 (CONTINUED)

JOB NUMBER: 2002-036-01
DATE DRILLED: 10-16-03



@ 80 feet: CLAYEY SILTSTONE, hard, moist, moderate yellowish brown (10YR 5/4)

@ 87 feet: Minor Fault, N20E, 25SE, 1/8" clay gouge, separates silty sandstone from siltstone

@ 87 feet: SILTSTONE, trace fine sand, hard, moist, moderate yellowish brown (10YR 5/4)

@ 90 feet: SANDSTONE, fine to coarse grained sand, trace small pebbles, hard, moist, pale yellowish brown (10YR 6/2)

@ 94 feet: SILTSTONE, moderately hard, moist, moderate yellowish brown, (10YR 5/4), Erosion surface; N/S 33E

@ 96 feet: Bedding approximate; N35E, 24SE

@ 100 feet: SANDY SILTSTONE: some fine grained sand, moderately hard, moist, pale yellowish brown (10YR 6/2)

@ 103 feet: SILTY SANDSTONE, fine to coarse grained sand, some silt, hard, moist, moderate brown (5YR 4/4), Bedding approx. N20E, 23SE

@ 105 feet: SANDSTONE, fine to coarse grained, hard, moist, pale yellowish brown (10YR 6/2)

TOTAL DEPTH 110FEET.
No Groundwater.
Minor caving at 8-15 feet.
Downhole logged to 106 feet.

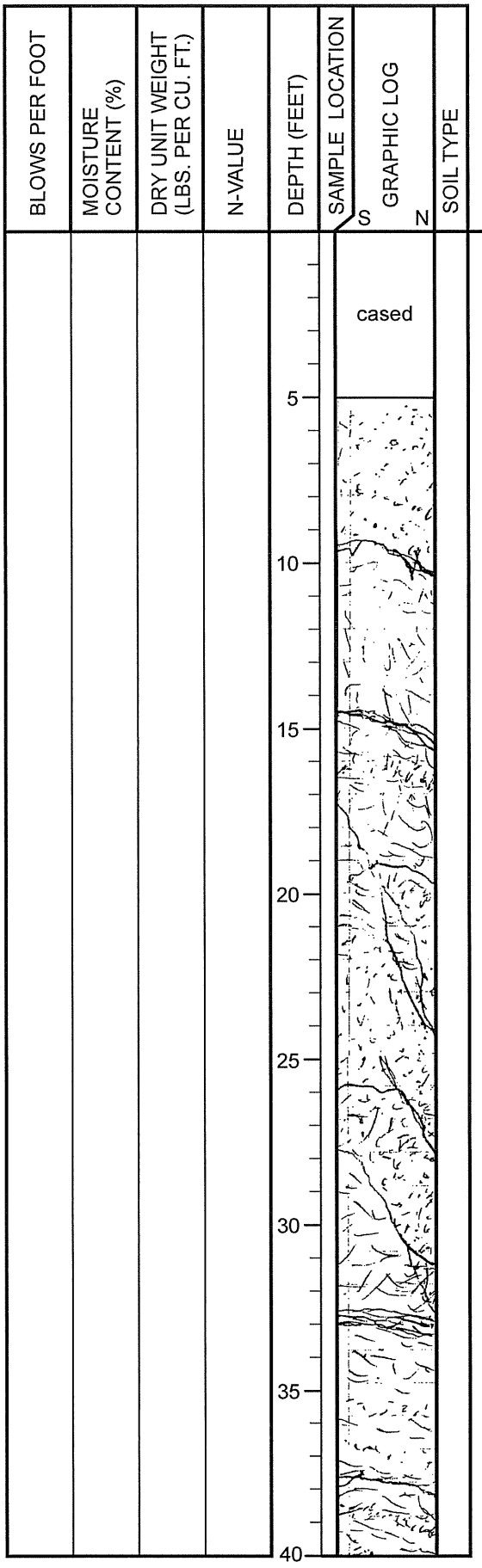
SAMPLE DEPTH	KELLY WEIGHT
0-28'	5952 lbs.
28-55'	3921 lbs.
55-84'	2531 lbs.
84-114'	1407 lbs
+1000 lbs/30 ft. stem	

Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

LOG OF BORING

BORING B-4-03

JOB NUMBER: 2002-036-01 By: D.G. Francuch
DATE DRILLED: 10-21-03 - 10-28-03
EQUIPMENT USED: 24"-Diameter Bucket Auger
ELEVATION: 1260.6
SURFACE CONDITIONS:
SAMPLING METHOD: 2 5/8-inch drive



0-53 feet: LANDSLIDE (Qls)

@ 0 feet: GRAVELLEY SANDSTONE, fine to coarse grained sand with pebbles and gravel up to 6" diameter, soft, dry, pale yellowish brown (10YR 6/2)

@ 10 feet: Bedding approximate; N50E, 16SE

@ 10.5 feet: SILTSTONE, moderately soft, dry, moderate yellowish brown (10YR 5/4),

@13 feet: density increase

@ 15.5 feet: Slide Plane, N40E, 28SE, reddish brown silty clay, 3"-5" thick

@ 19 feet: SANDSTONE, fine to coarse grained sand with trace small pebbles, moderately hard, dry to moist, pale yellowish brown (10YR 6/2),

@ 22 feet: cobbles up to 6" diameter

@ 27 feet: SANDY SILTSTONE, fine sand, hard, moist, moderate yellowish brown (10YR 5/4),

@ 32 feet: CLAYEY SILTSTONE, moderately hard to hard, moist, moderate yellowish brown (10YR 5/4),

@ 33.2 feet: Slide Plane: N70E, 6SE 4"-5" thick reddish brown waxy clay

@ 36 feet: SANDY SILTSTONE, fine grained sand and silt, moderately hard, moist, moderate yellowish brown (10YR 5/4),

@ 40 feet: pods of sand in siltstone matrix

Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

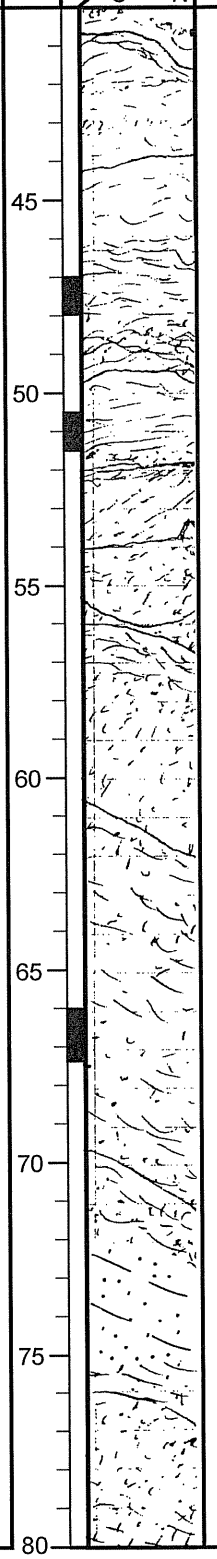
LOG OF BORING

BORING B-4-03 (CONTINUED)

JOB NUMBER: 2002-036-01
DATE DRILLED: 10-21-03 - 10-28-03

By: D.G. Francuch

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
					S	N	



Bag
Bag
Bag

@ 40 feet: slight increase in grain size
@ 41.5 feet: Slide Plane N80E, 29SE, 4"-5" thick reddish brown waxy clay
@ 42 feet: CLAYEY SILTSTONE: some clay, hard, moist, moderate yellowish brown (10 YR 5/4),
@ 43 feet: SILTSTONE to SANDY SILTSTONE, cobbles up to 8" diameter
@ 45.5 feet: waxy to plastic brown clay
@ 47 feet: SILTY CLAYSTONE, some silt, moderately hard, moist, moderately plastic, moderate yellowish brown (10YR 5/4),
@ 48 feet: SANDY SILTSTONE, fine grained sand, hard, moist, trace large pebbles of cemented sandstone, moderate yellowish brown (10YR 5/4),
@ 48.5 to 50.5 feet: numerous low angle fractures
@ 50.5 feet: CLAYEY SILTSTONE, moderate yellowish brown (10YR 5/4)
@ 51 feet: CLAYSTONE, plastic, moist, possible, slide plane, dark yellowish brown (10YR 4/2),
@ 51.9 feet: Slide Plane, N5W, 7SW, 1"-2" thick reddish brown clay, plastic
@ 52 feet: SANDSTONE, fine to medium grained sand, trace silt, pale yellowish brown (10YR 6/2),
@ 53 feet: Slide Plane, N60W, 6SW, ½" thick red clay gouge

53 - 81 feet: SAUGUS FORMATION (QTs)

@ 53 feet: SANDSTONE, fine to medium grained sand, trace silt, hard, moist, pale yellowish brown (10YR 6/2)
@ 56 feet: Minor fault; N25W, 25NE ½" thick red clay gouge
@ 56.5 feet: Bedding; N/S, 40E, sandstone/siltstone
@ 62 feet: Bedding; N30E, 28SE, fine grained sandstone/siltstone
@ 62 feet: SILTSTONE, hard, moist, dark yellowish brown (10YR 4/2)
@ 65 feet: SILTY CLAYSTONE, some silt, hard to very hard, moist, dark yellowish brown (10YR 4/2)
@ 70 feet: Drilling rate slows
@ 71 feet: Bedding approximate; N40E, 29SE, clayey silt/silty sandstone
@ 71 feet: SILTY SANDSTONE; fine to coarse grained sand with silt, hard, moist, dark yellowish brown (10YR 4/2)
@ 77 feet: Gradational contact

Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

LOG OF BORING

BORING B-4-03 (CONTINUED)

JOB NUMBER: 2002-036-01
DATE DRILLED: 10-21-03 - 10-28-03

By: D.G. Francuch

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG (S / N)	SOIL TYPE
				85, 90, 95, 100, 105, 110, 115, 120		no log	

81 -101 feet: PICO FORMATION (Tp)

@ 81 feet: Bedding, N40E, 24SE, limey siltstone bed 5" thick

@ 82 feet:
Rig down 13:50 on 10-21-03
Resume drilling 7:30 on 10-28-03

@ 84.7 feet: Bedrock, N40E, 33SE

@ 85 feet: PEBBLY SANDSTONE, yellowish gray (5Y 7/2), fine to coarse grained sand, trace medium to large pebbles, hard, moist

@ 90 feet: Bedding, N10E, 20SE, pebbly sandstone / silty sandstone

@ 91 feet: Bedding, N40E, 31SE, 1" thick clayey siltstone

93.5 feet: Bedding, N40E, 35SE, coarse grained sandstone / siltstone

93.5 feet: SANDY SILTSTONE, moderate yellowish brown (10YR 5/4), some fine to medium grained sand, hard, moist

@ 98 feet: moisture increase

TOTAL DEPTH 101FEET.
No Caving.
No Groundwater.
Downhole logged to 95 feet.

SAMPLE DEPTH	KELLY WEIGHT
0-30'	5962 lbs.
30-57'	3921 lbs.
57-86'	2531 lbs.
86-116'	1407 lbs
+600 lbs/30 ft. stem	

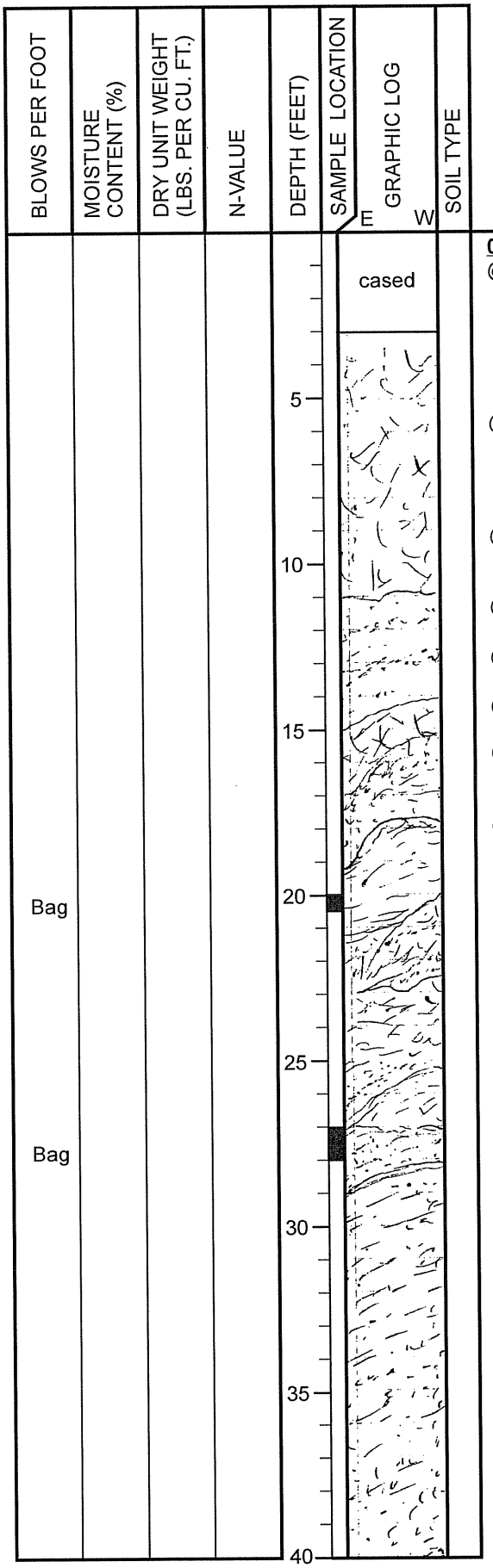
Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-5-03

JOB NUMBER: 2002-036-01 By: D.G. Francuch
DATE DRILLED: 10-29-03
EQUIPMENT USED: 24"-Diameter Bucket Auger
ELEVATION: 1306.8
SURFACE CONDITIONS:
SAMPLING METHOD: 2 5/8-inch drive



0-28 feet: LANDSLIDE (Qls)

@ 0 feet: SANDSTONE, fine to medium grained sand, soft, dry, pale yellowish brown, (10YR 6/2)

Hole cased from 0-3 feet

@ 6 feet: SANDY SILTSTONE, silt with fine grained sand, moderately hard, dry to moist, moderate yellowish brown (10YR 5/4)

@ 9 feet: color change to grayish orange (10YR 7/4)

@ 11 feet: SANDSTONE, fine to coarse grained sand, trace silt, trace small to medium pebbles, soft, dry, yellowish gray (5Y 7/2),

@ 11-14 feet: Minor caving of sands

@ 14 feet: SILTSTONE, moderately hard, moist, moderate yellowish brown (10YR 5/4),

@ 14 to 17.8 feet: chaotic mix of sand and siltstone

@ 17.8 feet: Slide Plane, N/S, 40E, 2"-3" thick reddish brown clay, waxy, no distinct slide surface

@ 19 feet: CLAYEY SILTSTONE, silt with clay, moderately soft, moist, moderate yellowish brown (10YR 5/4)

@ 20 feet: SILTSTONE, hard, moist, moderate yellowish brown (10YR 5/4)

@ 25 feet: Bedding approximate, N10W, 43NE

@ 25 feet: CLAYSTONE, plastic, moist, moderate yellowish brown (10YR 5/4) to olive gray (5Y 4/1)

@ 28 feet: Slide Plane, N40E, 24SE, 1"-3' thick red to dark gray clay gouge, striations 12,° S 15° E

@ 28 feet: CLAYEY SILTSTONE, moderately hard to hard, moist, dark yellowish brown (10YR 4/2),

28.1-95.5 feet: SAUGUS FORMATION (QTs)

@ 34 feet: SILTSTONE, trace fine sand, hard, moist, moderate yellowish brown (10YR 5/4)

@ 37 feet: SILTY SANDSTONE, fine to medium grained sand with silt, hard, moist, moderate yellowish brown (10YR 5/4)

(CONTINUED ON THE FOLLOWING FIGURE)

Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

LOG OF BORING

BORING B-5-03 (CONTINUED)

JOB NUMBER: 2002-036-01
DATE DRILLED: 10-21-03 - 10-28-03

By: D.G. Francuch

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
				45	E	 W	
				50			
				55			
				60			
				65			
				70			
				75			
				80			

@ 40.3 feet: Bedding approximate, N10E, 28SE, coarse sandstone

@ 40 feet: PEBBLY SANDSTONE, pale yellowish brown (10YR 6/2), fine to coarse grained sand with small to large pebbles, hard, moist

@ 46 feet: Bedding, N30E, 33SE, coarse sandstone

@ 51.7 feet: Fracture, N30E, 63NW, 1/4" thick silt gouge, approximate ½"-1" normal offset

@ 52.3 feet: Bedding, N/S, 26E, coarse sandstone

@ 62 feet: Bedding, N15E, 22SE, medium to coarse grained sandstone

@ 69 feet: Bedding, N/S, 18E, fine to coarse grained sandstone

@ 70 feet: PEBBLY SANDSTONE, fine to coarse grained sand with small to large pebbles, hard, moist, yellowish gray (5Y 7/2)

@ 74 feet: Bedding, N10E, 22SE, coarse sandstone / siltstone

@ 74 feet: SILTY SANDSTONE, fine to coarse grained sand with silt, hard, moist, moderate yellowish brown (10YR 5/4)

@ 77 feet: Bedding, N15E, 30SE, fine to coarse grained sandstone in silty sandstone

Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

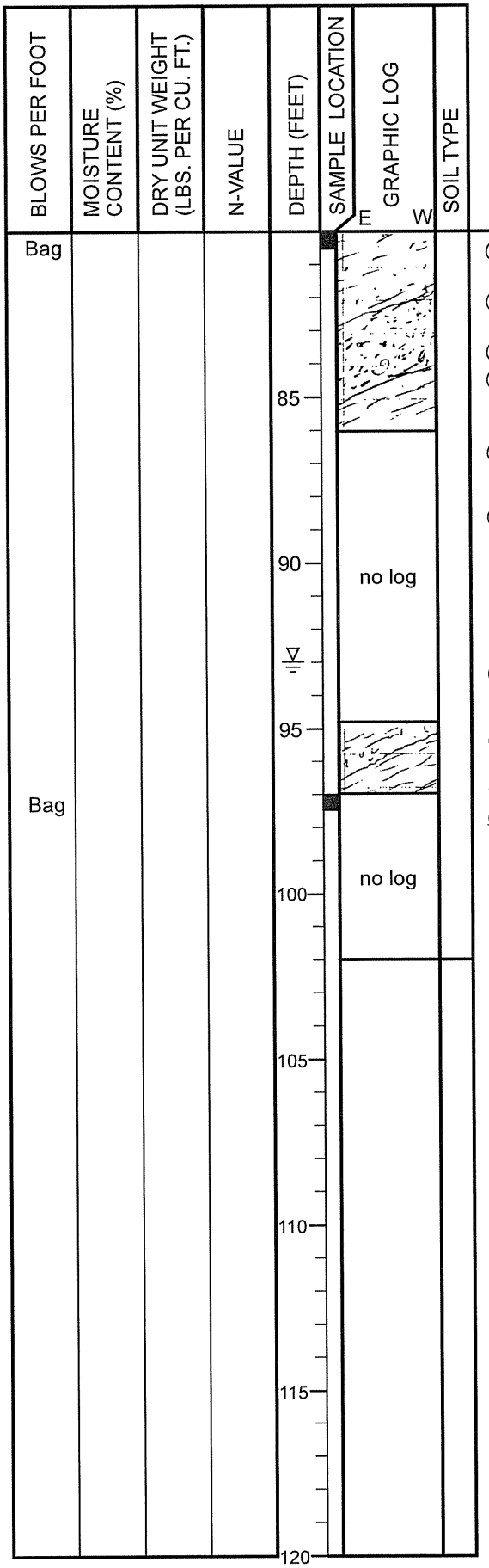
(CONTINUED ON THE FOLLOWING FIGURE)

LOG OF BORING

BORING B-5-03 (CONTINUED)

JOB NUMBER: 2002-036-01
DATE DRILLED: 10-21-03 - 10-28-03

By: D.G. Francuch



@ 79 feet: SILTSTONE, trace fine to coarse sand, hard, moist, moderate yellowish brown (10YR 5/4)

@ 80 feet: CLAYEY SILTSTONE, some clay, hard, moist, moderate yellowish brown (10YR 5/4)

@ 82 feet: Bedding, N30E, 22SE, siltstone/fine to coarse sandstone

@ 82 feet: SANDSTONE, fine to coarse grained sand with some small to medium pebbles, hard, moist, moderate yellowish brown (10YR 5/4)

@ 84 feet: SILTSTONE, hard, moist, moderate yellowish brown (10YR 5/4)

@ 86-95 feet: No log due to low oxygen

@ 93-97 feet: perched groundwater, boring wall wet but no free water

@ 95 feet: CLAYEY SILTSTONE, silt with some clay, hard, moist, moderate yellowish brown (10YR 5/4)

@ 95.5 feet: Bedding, N/S, 24E

@ 95.5-102 feet: PICO FORMATION (Tp)

@ 95.5 feet: CLAYSTONE, trace silt, hard to very hard, moist, medium dark gray (N4),
No seepage below 97 feet.

@ 100 feet: SILTY SANDSTONE, fine grained sand with silt, hard, moist, dark greenish gray (5GY 4/1)

TOTAL DEPTH 102 FEET.
Minor Caving 11-14 feet.
Minor seepage 93-97 feet.
Downhole logged to 97 feet.

SAMPLE DEPTH	KELLY WEIGHT
0-30'	5962 lbs.
30-57'	3921 lbs.
57-86'	2531 lbs.
84-116'	1407 lbs
+600 lbs/30 ft. stem	

Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES
FIGURE A-2.5c

BORING B-6-03

JOB NUMBER: 2002-036-01 By: D.G. Francuch
DATE DRILLED: 10-30-03 - 10-31-03
EQUIPMENT USED: 24"-Diameter Bucket Auger
ELEVATION: 1305.3
SURFACE CONDITIONS:
SAMPLING METHOD: 2 5/8-inch drive

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
23				40	S N	cased	



0-31.1 feet LANDSLIDE (Qls)

@ 0 feet: SILTY SANDSTONE, fine to grained sand with silt, hard, moist, pale yellowish brown (10YR 6/2)

@ 4 feet: Fracture

@ 5 feet: pebbles up to 2" in diameter

@ 8 feet: color change to moderate yellowish brown (10YR 5/4), Bedding approximate; N65E, 55SE

@ 8.5 feet: rootlets

@ 9 feet: SANDY SILTSTONE, silt with fine grained sand, moderately hard, moist, moderate yellowish brown (10YR 5/4)

@ 10 feet: Fracture; N55W, 45NE, 1/8" -1/4" clay gouge separates silty sandstone from pebbly sandstone

@ 13 feet: SANDSTONE, fine to medium grained sand, hard, dry to moist, yellowish gray (5Y 7/2)

@ 13-15 feet: rootlets

@ 17 feet: SILTY SANDSTONE, fine to coarse grained sand with silt, moderately hard, moist, grayish orange (10YR 7/4)

@ 17 feet: Fracture; N65W, 82NE

@ 20 feet: rootlets

@ 20.5 feet: Bedding; N10E, 26SE, irregular contact

@ 21.5 feet: PEBBLY SANDSTONE, fine to coarse grained sand, trace silt, pebbles up to 2" diameter, hard, moist, pale yellowish brown (10YR 6/2)

@ 25 feet: Fracture splits into two strands, separates fine grained sand from coarse grained sand

@ 28 feet: Bedding? N10E, 46SE, irregular contact

@ 28 feet: SILTSTONE, moderately hard, moist, moderate yellowish brown (10YR 5/4)

@ 31.1 feet: Slide Plane; N5W, 22NE, 3" wide zone of waxy clay sandwiched between two shears each 1/16"-1/8" thick gouge

31.5-96 feet: SAUGUS FORMATION (QTs)

@ 31.5 feet: CLAYEY SILTSTONE, trace fine to medium grained sand, hard, moist, moderate yellowish brown (10YR 5/4)

@ 34 feet: Minor Fault; N50W, 42NE, 1/16" wide clay gouge, 4"reverse offset (apparent)

@ 35 feet: SANDSTONE, fine to medium grained sand, moderately hard, moist, moderate yellowish brown (10YR 5/4)

@ 38 feet: Fracture N45W, 46NE, 1/16"-1/8" wide silt gouge

@ 39 feet: SANDSTONE, fine to coarse grained sand, trace pebbles up to 2" diameter, moderately hard, moist, pale yellowish brown (10YR 6/2),

Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

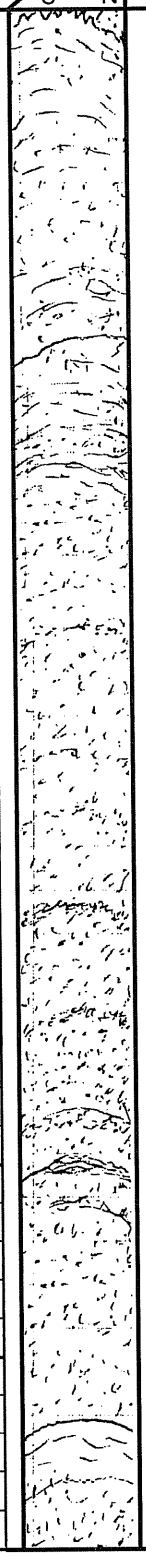
(CONTINUED ON THE FOLLOWING FIGURE)

LOG OF BORING

BORING B-6-03 (CONTINUED)

JOB NUMBER: 2002-036-01
DATE DRILLED: 10-30-03 - 10-31-03

By: D.G. Francuch

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
				45	S N		
				50			
				55			
				60			
				65			
				70			
				75			
				80			

@ 40 feet: Bedding, N/S, 23E, contact, worm burrows
@ 40 feet: SANDY SILTSTONE, silt with fine sand, trace clay, hard, moist, moderate brown (5YR 4/4),

@ 46 feet: SILTY SANDSTONE, fine grained sand with silt, hard, moist, gradational contact, moderate brown (5YR 4/4),

@ 47 feet: PEBBLY SANDSTONE, fine to coarse grained sand with pebbles and small cobbles, up to 4" diameter, hard, moist, moderate yellowish brown (10YR 5/4)

@ 50 feet: Fracture; N40E, 30SE, 1/8" wide clay gouge

@ 50 feet: SANDY SILTSTONE, silt with fine to medium sand, moderately hard, moist, moderate yellowish brown (10YR 5/4)

@ 52 feet: SILTY SANDSTONE, fine grained sand with silt, moderately hard, moist, pale yellowish brown (10YR 6/2)

@ 54 feet: Bedding, N10E, 26SE

@ 54 feet: SANDSTONE, fine to coarse grained sand, trace small pebbles, moderately hard, moist, yellowish gray (5Y 7/2)

@ 60.5 feet: Bedding; N5W, 24NE, fine grained sandstone,

@ 63 feet: PEBBLY SANDSTONE, fine to coarse grained sand with medium pebbles, trace cobbles up to 8" diameter, hard, moist, yellowish gray (5Y 7/2)

Stopped @ 69 feet, @ 15:30 on 10/30/03
Resume @ 7:00 on 10/31/03

@ 70.7 feet: Bedding; N5E, 22SE, coarse grained sandstone / fine grained sandstone

@ 71.6 feet: Bedding; N/S, 26E ½"-3" thick clayey siltstone

@ 72 feet PEBBLY SANDSTONE, fine to coarse grained sand with small pebbles, moderately hard, moist, yellowish gray (5Y 7/2)

@ 77.8 feet: Bedding; N5W, 23NE contact
@ 77.8 feet: SANDY SILTSTONE, silt with fine to coarse grained sand, trace clay, hard, moist, moderate yellowish brown (10 YR 5/4),

Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

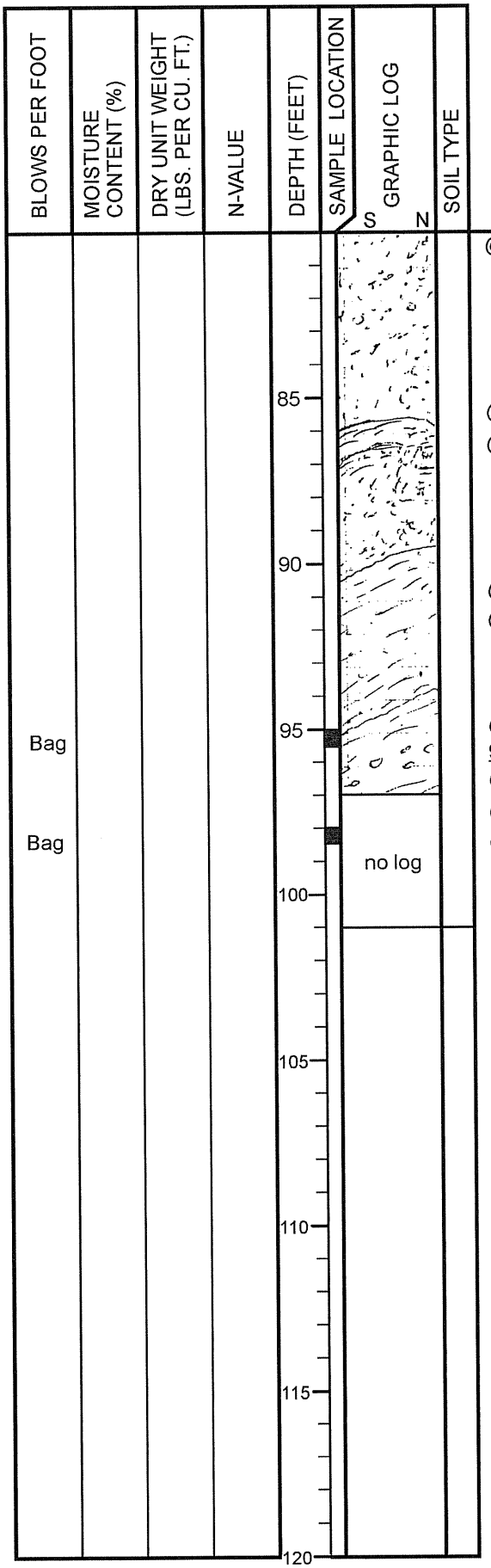
(CONTINUED ON THE FOLLOWING FIGURE)

LOG OF BORING

BORING B-6-03 (CONTINUED)

JOB NUMBER: 2002-036-01
DATE DRILLED: 10-30-03 - 10-31-03

By: D.G. Francuch



@ 81 feet: SANDSTONE, fine to coarse grained sand, trace small pebbles up to 1" diameter, moderately hard, moist, pale yellowish brown (10YR 6/2),

@ 85.5 feet: Bedding N15W, 27NE, contact

@ 85.5 feet: SILTY SANDSTONE, fine grained sand with silt, hard, moist, moderate yellowish brown (10YR 5/4)

@ 90.7 feet: Bedding; N/S, 23E, contact

@ 90.7 feet: CLAYEY SILTSTONE, silt with clay, hard, moist, moderate yellowish brown (10YR 5/4),

@ 95 feet: Bedding N/S, 27E, parting in siltstone

96-101 feet: PICO FORMATION (Tp)

@ 96 feet: limey siltstone

@ 97 feet: CLAYEY SILTSTONE, hard, moist, light olive gray (5Y 5/2)

@ 98 feet: SILTY CLAYSTONE, clay with silt, moderately hard to hard, moist, medium dark gray (N4)

TOTAL DEPTH 101 FEET.
No Caving.
No groundwater.
Downhole logged to 97 feet.

SAMPLE DEPTH	KELLY WEIGHT
0-30'	5962 lbs.
30-57'	3921 lbs.
57-86'	2531 lbs.
86-116'	1407 lbs
+600 lbs/30 ft. stem	

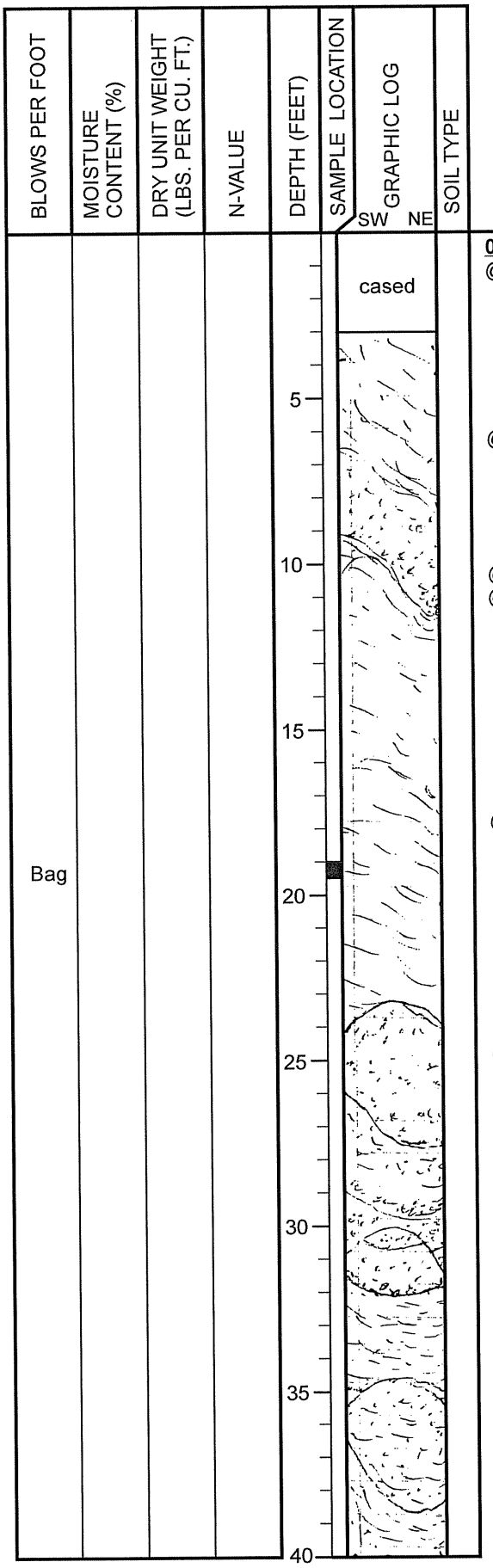
Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-7-03

JOB NUMBER: 2002-036-01 By: D.G. Francuch
DATE DRILLED: 11-3-03 - 11-4-03
EQUIPMENT USED: 24"-Diameter Bucket Auger
ELEVATION: 1201+/-
SURFACE CONDITIONS:
SAMPLING METHOD: 2 5/8-inch drive



0-74 feet: SAUGUS FORMATION (QTs)

@ 0 feet: SILTY SANDSTONE, fine to medium grained sand with silt, moderately hard, moist, light brown (5YR 6/4)

@ 6 feet: SANDY SILTSTONE, silt with fine grained sand, trace coarse grained sand, moderately hard, moist to dry, grayish orange (10YR 7/4)

@ 10 feet: Bedding; N40W, 50NE
@ 10 feet: SILTY CLAYSTONE, clay with silt, hard, moist, moderate yellowish brown (10YR 5/4)

@ 18 feet: plastic clay, gray

@ 24.4 feet: Minor Fault; N75E, 35SE, 1/4" wide brown silt gouge

@ 26 feet: Bedding; N60W, 44NE
@ 26 feet: SILTY SANDSTONE, fine grained sand with silt, moderately hard, moist, pale yellowish brown (10YR 6/2)

@ 31 feet: Minor Fault; N90W, 44S, 1/8" wide silt gouge, 2" normal apparent offset
@ 32 feet: Bedding N30W, 46NE

@ 34 feet: CLAYEY SILTSTONE, silt with clay, trace fine to medium grained sand, hard, moist, moderate yellowish brown (10YR 5/4)

@ 35.5 feet: Minor Fault; N90W, 37S, 1/16" -1/8" wide clay gouge

@ 36 feet: CLAYSTONE, clay with trace silt, moderately hard, moist, dark yellowish brown (10YR 4/2)

@ 36.5 feet: Bedding N40W, 53NE, silt/silty clay

(CONTINUED ON THE FOLLOWING FIGURE)

Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

LOG OF BORING

BORING B-7-03 (CONTINUED)

JOB NUMBER: 2002-036-01
DATE DRILLED: 11-3-03 - 11-4-03

By: D.G. Francuch

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
						SW NE	
Bag				45			
7				50			
				55			
				60			
				65			
				70			
				75			
				80			

@ 42 feet: SILTY CLAYSTONE, clay with silt, moderately hard, moist, light olive gray (5Y 6/1)

@ 44 feet: Minor Fault N55W, 90, joins clay bed at 44'

@ 44 feet: SILTY SANDSTONE, fine grained sand with silt, moderately hard, moist, yellowish gray (5Y 7/2)

@ 45 feet: Bedding: N35W, 33NE, 1"thick gray clay

@ 46 feet: CLAYSTONE, moderately soft, moist, plastic, light olive gray (5Y 5/2)

@ 48 feet: CLAYEY SILTSTONE, silt with clay, hard, moist, olive gray (5Y 4/1)

@ 53 feet: CLAYSTONE, moderately soft, moist, plastic, medium dark gray (N4)

@ 54 feet: Bedding N30W,49 NE, 4-5" thick plastic gray clay

@ 58 feet: SILTSTONE, hard, moist, medium dark gray (N4)

@ 63 feet: Minor Fault: N10W, 47SW, ½"-1" wide zone of silt and clay gouge

@ 65 feet: Shear: N10E, 55SE, along base of sheared claystone

@ 67 feet: Bedding: N35W, 35NE

@ 70 feet: CLAYSTONE, moderately soft, moist, plastic, medium dark gray (N4)

@ 72 feet: Bedding: N20W, 35NE

@ 72 feet: SANDY SILTSTONE, silt with fine grained sand, moderately hard, moist, pale olive (10Y 6/2)

@ 74-111 feet: PICO FORMATION (Tp)

@ 74 feet: SILTY CLAYSTONE, clay with silt, hard, moist, fossiliferrous, dark gray (N3),

@ 77 feet: Bedding: N50E, 43SE, truncated by sheared clay

Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

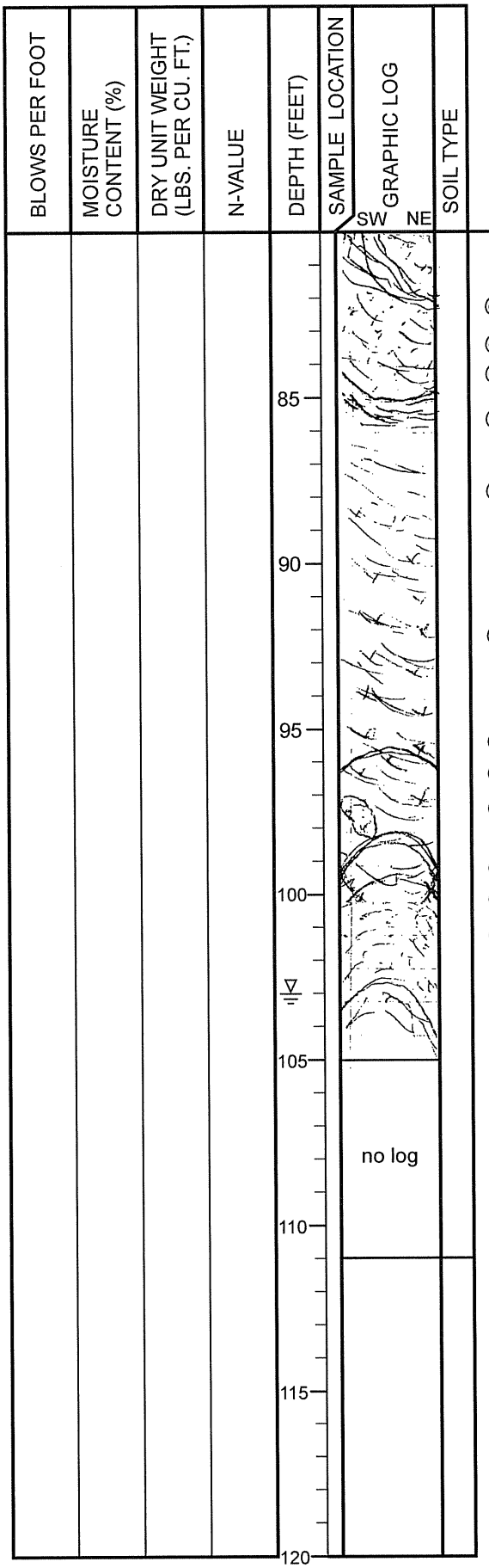
LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-7-03 (CONTINUED)

JOB NUMBER: 2002-036-01
DATE DRILLED: 11-3-03 - 11-4-03

By: D.G. Francuch



@ 82 feet: CLAYSTONE, moderately soft, moist, plastic, dark gray (N3)

@ 84 feet: Bedding: N10W, 26NE, siltstone/claystone

@ 84 feet: SILTSTONE, hard, moist, fossiliferrous, dark greenish gray (5GY 4/1)

@ 85 feet: Rig down @ 13:00 on 11/3/03
resume drilling @ 7:55 on 11/4/03
No water from bottom of boring @ 85 feet

@ 87 feet: limey siltstone, very hard

@ 92 feet: CLAYSTONE, hard, moist, moderate plasticity, dark greenish gray (5GY 4/1)

@ 95 feet: SILTSTONE, hard, moist, dark greenish gray (5GY 4/1)

@ 96 feet: Shear: N60W, 35SW, brown clay 1" thick

@ 97 feet: sandstone block 12" diameter in claystone matrix, sheared

@ 99 feet: Shear N40E, 50SE, 1" clay gouge

@ 100 feet: Bedding N40E, 46SE

@ 100 feet: increase in moisture, perched groundwater above clay at 103 feet

@ 104 feet: CLAYEY SILTSTONE, silt with clay, hard to very hard, moist, dark greenish gray (5GY 4/1)

@ 104 feet: Bedding N50E, 39SE, siltstone / claystone

TOTAL DEPTH 111 FEET.
No Caving.
Minor perched water at 100-103 feet.
Downhole logged to 105 feet.

SAMPLE DEPTH	KELLY WEIGHT
0-30'	5952 lbs.
30-57'	3921 lbs.
57-86'	2531 lbs.
86-116'	1407 lbs
+600 lbs/30 ft. stem	

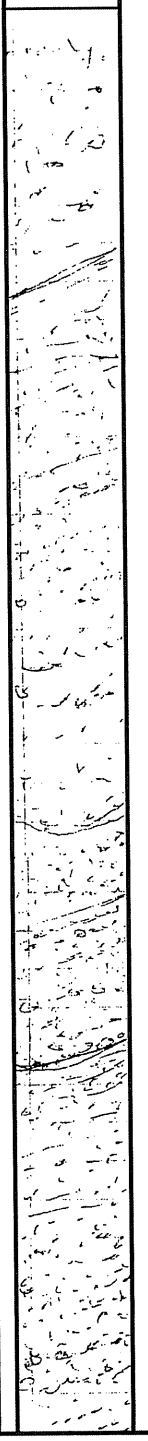
Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-8-03

JOB NUMBER: 2002-036-01 By: D.G. Francuch
DATE DRILLED: 11-4-03 - 11-5-03
EQUIPMENT USED: 24"-Diameter Bucket Auger
ELEVATION: 1213.6
SURFACE CONDITIONS:

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
				5, 10, 15, 20, 25, 30, 35, 40	E W		

0-30.5 feet: LANDSLIDE (Qls)

@ 0 feet: SANDY SILTSTONE, silt with fine grained sand, moderately soft, dry to moist, moderate yellowish brown (10YR 5/4)

@ 7 feet: PEBBLY SANDSTONE, fine to coarse grained sand with pebbles up to 3" in diameter, moderately soft, moist, yellowish gray (5Y 7/2),

@ 10 feet: Slide plane; N/S, 31E, 1" thick plastic clay gouge, reddish brown

@ 10 feet: SANDY TO CLAYEY SILTSTONE, moderately soft, moist, semi plastic, moderate yellowish brown (10YR 5/4)

@ 15 feet: Bedding; N10E, 28SE

@ 15 feet: SANDSTONE, fine to coarse grained sand with small pebbles, moderately hard, moist, yellowish gray (5Y 7/2)

@ 18 feet: PEBBLY SANDSTONE, fine to coarse grained sand with pebbles up to 3" diameter, pale yellowish brown (10YR 6/2)

@ 24 feet: Bedding; N70E, 24SE, cross-bedding coarse sandstone

@ 27 feet: Bedding; N55E, 20SE

@ 27 feet: COBBLY SANDSTONE, fine to coarse grained sand with pebbles and cobbles up to 5", hard, moist, yellowish gray (5Y 7/2)

@ 30.5 feet: Slide plane: N25E, 31SE, polished surface

30.5 -76 feet: SAUGUS FORMATION (QTs)

@ 30.6 feet: CLAYSTONE, moderately soft, moist, plastic (possible slide plane), moderate brown (5YR 4/4)

@ 32.5 feet: SILTSTONE, trace fine sand, trace clay, moderately hard, moist, moderate brown (5YR 4/4)

@ 35 feet: PEBBLY SANDSTONE, fine to coarse grained sand with pebbles up to 2" diameter, moderately hard, moist, pale yellowish brown (10YR 6/2)

Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

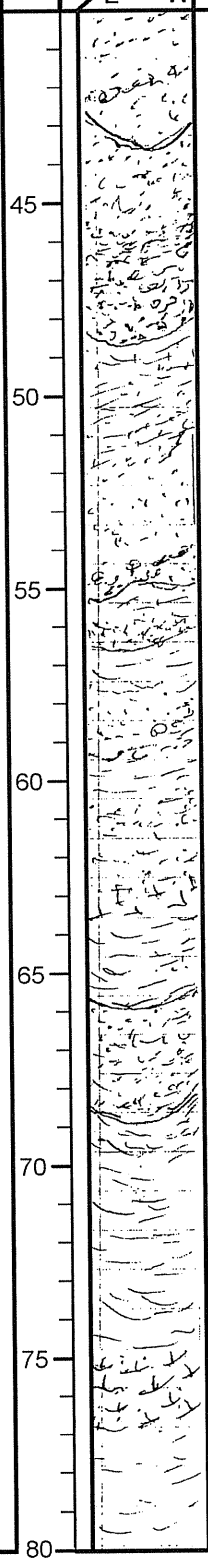
LOG OF BORING

BORING B-8-03 (CONTINUED)

JOB NUMBER: 2002-036-01
DATE DRILLED: 11-4-03 - 11-5-03

By: D.G. Francuch

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG (E / W)	SOIL TYPE



@ 42.7 feet: Fault; N65E, 49SE, reddish brown, clayey silt gouge ½"-1" wide
@ 43 feet: interbedded silt and clay within sandstone

@ 45.5 feet: Bedding; N20E, 22SE, medium to coarse grained sandstone

@ 48 feet: Bedding; N20E, 22SE, striations 20° due south
@ 48 feet: SILTSTONE, trace clay, moderately hard to hard, moist, moderate brown (5YR 4/4)
@ 50 feet: Stopped drilling @ 17:05 on 11/4/03
Resume drilling @ 6:40 on 11/5/03

@ 52 feet: SANDSTONE, fine to coarse grained sand, some pebbles up to 2" diameter, moderately hard to hard, moist, yellowish gray (5Y 7/2)

@ 56 feet: SANDY SILTSTONE, silt with fine grained sand, moderately hard, moist, gradational contact, moderate yellowish brown (10YR 5/4)
@ 57 feet: Bedding, N5E, 22SE, fine grained sandstone in siltstone

@ 60 feet: PEBBLY SANDSTONE, fine to coarse grained sand with pebbles up to 1" diameter, moderately hard to hard, moist, pale yellowish brown (10YR 6/2),

@ 65 feet: SANDY SILTSTONE, silt with fine grained sand, hard, moist, moderate yellowish brown (10YR 5/4)

@ 69 feet: Bedding; N65E, 40SE
@ 69 feet: SILTY SANDSTONE, fine grained sand with silt, hard, moist, pale yellowish brown (10YR 6/2)

@ 72 feet: SILTSTONE, hard, moist, laminated, moderate yellowish brown (10YR 5/4),

@ 74 feet: CLAYEY SILTSTONE, silt with clay, hard, moist, moderate yellowish brown (10YR 5/4),

76-120 feet: PICO FORMATION (Tp)
@ 76 feet: limey siltstone

Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

LOG OF BORING

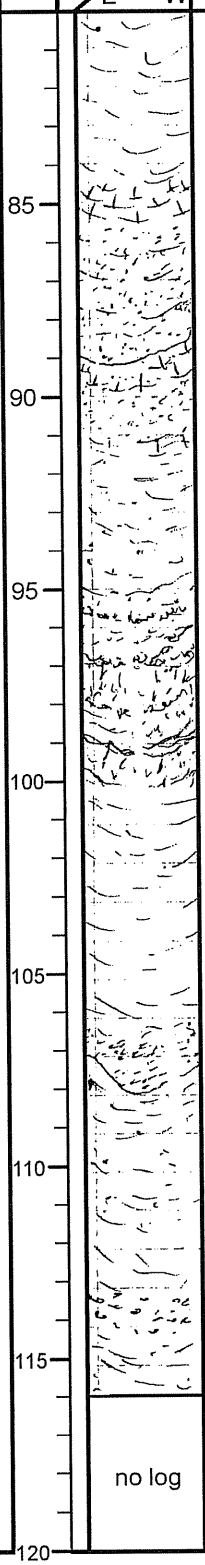
R.T. FRANKIAN & ASSOCIATES
FIGURE A-2.8b

BORING B-8-03 (CONTINUED)

JOB NUMBER: 2002-036-01
DATE DRILLED: 11-4-03 - 11-5-03

By: D.G. Francuch

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE



@ 82 feet: SILTY SANDSTONE, fine to medium grained sandstone with silt, hard, moist, dark yellowish brown (10YR 4/2)

@ 85 feet: Bedding approximate; N50E, 38SE, limey siltstone
@ 85 feet: SANDY SILTSTONE, silt with fine grained sand, hard, moist, limey, moderate yellowish brown (10YR 5/4),

@ 89 feet: Bedding; N45E, 27SE
@ 89 feet: SILTY SANDSTONE, fine to medium grained sand with silt, moderately hard, moist, limey, yellowish gray (5Y 7/2),
@ 91 feet: CLAYEY SILTSTONE, silt with clay, trace fine grained sand, hard, moist, moderate yellowish brown (10YR 5/4)
@ 92 feet: SILTSTONE, hard, moist, moderate yellowish brown (10YR 5/4)

@ 95.5 feet: Bedding; N30E, 23SE
@ 96 feet, PEBBLY SANDSTONE, fine to coarse grained sand with pebbles up to 2" diameter, hard moist, yellowish gray (5Y 7/2)

Stopped logging @ 96 feet on 11/5/03 at 16:50
Resume logging on 11/6/03 @ 7:15
@ 98 to 100 feet: interbedded siltstone and sandstone
@ 100 feet: SILTSTONE, hard to very hard, moist, limey, moderate yellowish brown (10YR 5/4)

@ 107 feet: Bedding approximate: N30E, 28SE, fine grained sandstone

@ 107 feet: CLAYEY SILTSTONE, silt with clay, moderately hard to hard, moist, dark yellowish orange (10YR 6/6)

@ 108 feet: increase in moisture

@ 112 feet: Begin stemming @ 12:10
@ 113 feet: Bedding, approximate, N35E, 27SE, pebble bed
@ 114 feet: SILTY SANDSTONE, fine grained sand with silt, hard, moist, moderate yellowish brown (10YR 5/4)

SAMPLE DEPTH	KELLY WEIGHT
0-30'	5952 lbs.
30-57'	3921 lbs.
57-86'	2531 lbs.
86-116'	1407 lbs
+600 lbs/30 ft. stem	

TOTAL DEPTH 120 FEET.
No Caving.
No Groundwater
Downhole logged to 116 feet.

Note: The log of subsurface conditions shown hereon applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES
FIGURE A-2.8c

BORING B-1-09

JOB NUMBER: 2002-036-03
DATE DRILLED: 7/13/09
EQUIPMENT USED: 24" Rotary Bucket rig with Sleeve sampler. Driving weights - 5952 lbs. (0-30'), 3921 lbs. (30-57'), and 2531 lbs. (57-86')
ELEVATION: 1150'
DRILLING CO.: Tri-Valley
LOGGED BY: TL
BORING DEPTH: 0-84.5'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
				0			ML
4	2.6	121	-	10			
8	3.1	120	-	20			
10	4.5	118	-	30			
				40			

ARTIFICIAL FILL (af)
SANDY SILT: soft, dry, light gray

SAUGUS FORMATION (QTs)
INTERBEDDED SANDSTONE, SILTY SANDSTONE, and SANDY SILTSTONE, very fine to medium, low hardness, dry, light gray (N7) to greenish gray (5GY 6/1), average bed thickness is 1-2', weakly cemented, poorly-defined bedding
@ 3 feet: 6" thick reddish brown lenticular siltstone
@ 3.5 feet: Contact N26W, 43NE

BEDDING: N5E, 22SE

pale yellowish brown (10YR 6/2) to yellowish gray (5Y 7/2)

BEDDING: N10E, 14SE

SANDSTONE: very fine to coarse, with gravel, weakly cemented, low hardness, slightly moist

BEDDING: N20W, 9NE: undulatory contact

SILTSTONE: massive, trace fine to coarse sand, low hardness, slightly moist, pale yellowish brown (10YR 6/2)

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-03.GPJ FRANKIAN.GDT 11/20/09

LOG OF BORING

BORING B-1-09 (CONTINUED)

JOB NUMBER: 2002-036-03
DATE DRILLED: 7/13/09
EQUIPMENT USED: 24" Rotary Bucket rig with Sleeve sampler. Driving weights - 5952 lbs. (0-30'), 3921 lbs. (30-57'), and 2531 lbs. (57-86')
ELEVATION: 1150'
DRILLING CO.: Tri-Valley
LOGGED BY: TL
BORING DEPTH: 0-84.5'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
14	6.6	127	-	45			
20	4.8	124	-	50			
11	9.2	122	-	55			
15	7.2	123	-	60			
				65			
				70			
				75			
				80			

SANDSTONE: fine to coarse, weakly cemented, low hardness, slightly moist, light gray (N7) to light brownish gray (5YR 6/1), poorly defined bedding

CROSS-BEDDING: N2E, 27NW

fine to medium, light gray (N7)

BEDDING: N18W, 26NE

SILTSTONE: slightly clayey, massive, soft, slightly moist, pale reddish brown (10R 5/4)

SILTY SANDSTONE/SANDY SILTSTONE: very fine, micaceous, weakly cemented, low hardness, slightly moist, light gray (N7)

BEDDING: N30W, 22NE

SILTSTONE: micaceous, some very fine sand, massive, low hardness, moist, pale reddish brown (10R 5/4) to light brownish gray (5YR 6/1)

light seepage

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-03.GPJ FRANKIAN.GDT 11/20/09

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-1-09 (CONTINUED)

JOB NUMBER: 2002-036-03
DATE DRILLED: 7/13/09
EQUIPMENT USED: 24" Rotary Bucket rig with Sleeve sampler. Driving weights - 5952 lbs. (0-30'), 3921 lbs. (30-57'), and 2531 lbs. (57-86')
ELEVATION: 1150'
DRILLING CO.: Tri-Valley
LOGGED BY: TL
BORING DEPTH: 0-84.5'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
40/6"	7.2	117	-	85			

Bottom of Boring at 84.5 feet.
No caving. Light seepage at 72.5'.

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-03.GPJ FRANKIAN.GDT 11/20/09

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-2-09

JOB NUMBER: 2002-036-03
DATE DRILLED: 7/14/09
EQUIPMENT USED: 24" Rotary Bucket rig with Sleeve sampler. Driving weights - 3160 lbs. (0-24'), 2040 lbs. (24-46'), and 1120 lbs. (46-72')
ELEVATION: 1095'
DRILLING CO.: Tri-Valley
LOGGED BY: TL
BORING DEPTH: 0-71.5'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SOIL TYPE	
				0	ML	**LANDSLIDE DEBRIS (Qls)** SANDY SILT: very fine, soft, dry, light brownish gray (10R 5/4)
10	6.3	124	-	10		SILTSTONE: fine to medium sand, soft, dry, light brown (5YR 6/4), no discernible structure 3/4" to 2" thick plastic clay, slightly undulatory, moderate reddish brown (10R 4/6), N70E, 27SE
			-	15		SLIDE PLANE: N15E, 22SE: 1" thick plastic clay, moderate reddish brown (10R 4/6)
12	10.4	121	-	20		**SAUGUS FORMATION (QTs)** SANDSTONE: very fine to medium, weathered, low hardness, moist, light gray (N7) to light brownish gray (10R 5/4) SILTSTONE: micaceous, low hardness, moist, light grayish brown (10R 5/4)
				25		SILTY SANDSTONE: very fine to medium, micaceous, laminated, low hardness, slightly moist, yellowish gray (5Y 7/2), weakly cemented BEDDING: N10W, 14NE PEBBLY SANDSTONE: fine to very coarse, well-cemented, moderately hard, slightly moist, light gray (N7) to yellowish gray (5Y 7/2)
52/9"	1.9	134	-	30		BEDDING: N40W, 14NE INTERBEDDED SANDSTONE and PEBBLY SANDSTONE, weakly cemented to moderately cemented, low hardness, slightly moist, light gray (N7) to yellowish gray (5Y 7/2)
				35		BEDDING: N18W, 11NE: defined by fine laminations in
				40		

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-03.GPJ FRANKIAN.GDT 11/20/09

LOG OF BORING

BORING B-2-09 (CONTINUED)

JOB NUMBER: 2002-036-03
DATE DRILLED: 7/14/09
EQUIPMENT USED: 24" Rotary Bucket rig with Sleeve sampler. Driving weights - 3160 lbs. (0-24'), 2040 lbs. (24-46'), and 1120 lbs. (46-72')
ELEVATION: 1095'
DRILLING CO.: Tri-Valley
LOGGED BY: TL
BORING DEPTH: 0-71.5'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
57/9"	4.7	124	-					sandstone
								BEDDING: N-S, 16E
				45				BEDDING: N18E, 25SE
								SILTSTONE: slightly clayey, micaceous, low hardness, slightly moist, greenish gray (5GY 6/1)
58	10.6	131	-	50				
				55				
62/9"	15.3	117	-					4-6" thick plastic clay bed, dark gray (N3)
62/8"	11.8	123	-	60				unoxidized, medium light gray (N5)
				65				pale yellowish brown (10YR 6/2)
62	15.9	114	-	70				
								Bottom of Boring at 71.5 feet. No groundwater. No caving.
				75				
				80				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-03.GPJ FRANKIAN.GDT 11/20/09

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-3-2009

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/13/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1026'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-72'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
							SM/ML	**LANDSLIDE DEBRIS (Qls)** SILTY SAND/ SANDY SILT: fine, light olive brown (2.5Y 5/3), silty appears as mixture of fine grained sandstone & siltstone
5			-	5				
7/9"			-	10				laminated fine sands, near horizontal slightly clayey
12/10"			-	15				concretionary layer, near horizontal sandy, hard, cemented layer, fractured, olive gray (5Y 5/2)
							ML	CLAYEY SILT: base of Qls near horizontal
14			-	20				**SAUGUS FORMATION (QTs)** SANDSTONE: fine to medium, moderately well sorted, moderately hard, slightly moist BEDDING: N25W, 8NE
27/7"			-	25				BEDDING: N21W, 14NE: coarse sand layer N5W, 16NE
								CONGLOMERATE: coarse sand, pebbly, moderately hard, slightly moist
36/7"			-	30				
24/7"			-	35				BEDDING: N10, 15E: silty layer in pebble conglomerate
				40				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-3-2009 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/13/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1026'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-72'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
39/7"			-				
42/9"			-	45			
42			-	50			
46			-	55			
45/10"			-	60			
68			-	65			
58/9"			-	70			
				75			
				80			

SANDSTONE: fine to medium, well sorted, slightly laminated, very moist to wet, yellowish brown

CONTACT/BEDDING: N10W, 14E: light seepage

SILTSTONE: with clay, massive, moderately hard, moist, bluish gray to dark gray (5Y, 4/1), seepage along fractures from 45'-48'

becomes very clayey, slickensides within clay layer

SANDSTONE: fine to medium, poorly sorted, dense, moist, dark olive gray

Bottom of Boring at 72 feet.
Light seepage at 45'. No caving. Minor sloughing in saturated sand @ 43' to 45'. Slickenslide clay layer at 62'-64'.
Downhole logged to 50'.

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-1-10

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/14/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1260.5'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-72'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)
12	7.4	126	-	5
12/9"	4.2	126	-	10
15	4.6	119	-	15
9	12.1	119	-	20
21/9"	3.3	115	-	25
21/9"	2.9	118	-	30
12/9"	4	123	-	35
				40

SAMPLE LOCATION | GRAPHIC LOG | SOIL TYPE

PICO FORMATION (Tp)

SANDSTONE: medium to coarse, with granules (10%) and occasional pebbles (2-5%), slightly moist, light olive brown (2.5Y 5/4)

fine to medium

BEDDING: N50E, 35SE

drilling slower, rock appears to be more cemented

becomes primarily medium, slightly silty

BEDDING: N70E, 35S

CLAYSTONE/SILTSTONE: massive, dense, olive brown to dark olive brown (2.5Y 4/3)

BEDDING: N40E, 30SE

PEBBLY SANDSTONE: fine to coarse, with gravel (5-10%), poorly sorted, damp, yellowish brown to tan (2.5Y, 6/6)

BEDDING: N80E, 38S (pebble lineation)

BEDDING: N79E, 41S

BEDDING: N70E, 35S
coarse, with granules and pebbles

SHEAR: N50E, 80S
BEDDING: N75E, 33S
with rounded to sub-rounded gravel, occasional cobles to 5"

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 8/19/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-1-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/14/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1260.5'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-72'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
19/6"	3.9	116	-					minor cobbles (5%) to 4"
								CLAYSHEAR: N60W, 61S
23	3.9	119	-	45				BEDDING: N68E, 36S
35/6"	3.7	113	-	50				BEDDING: N60E, 38S (SANDSTONE OVER CLAYSTONE)
								CLAYSTONE: fine to medium, massive to thickly bedded, dense, slightly moist, olive greenish gray (5Y 5/4) to yellowish gray
38/6"	8.1	113	-	55				CLAYEY LAYER: N30E, 38S
								fine, laminated, clayey
47/11"	11.3	118	-	60				BEDDING: N60E, 38S: clay
								CLAYEY SILTSTONE: interlayered, laminated, soft, slightly moist, brown to bluish gray
25	9.2	119	-	65				BEDDING: N70E, 42S BEDDING: N72E, 41S silt and clayey silt and fine sand with bluish gray to reddish brown layers of clayey silt with yellowish brown sandy layers
								becomes olive gray
40/6"	8.9	113	-	70				SANDSTONE: fine to medium, slightly silty, dense, moist, bluish gray (unoxidized)
								Bottom of Boring at 72 feet. No groundwater. No caving.
				75				
				80				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 8/19/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-2-10

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/15/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1300'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-52'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
				0			SM
5	4.6	113	-	10			
7	11	114	-	20			
5	16.4	108	-	25			
			-	30			
8	15.8	108	-	35			
				40			

ARTIFICIAL FILL (af)
SILTY SAND: fine to medium, massive, medium dense, damp, light olive brown (2.5Y, 5/3)

base of fill in clean contact with bedrock and horizontal

PICO FORMATION (Tp)
SILTSTONE: massive, damp, olive gray (5Y, 4/2) to light olive gray (5Y 6/2)

CONTACT: N80E, 38S
BEDDING: N78E, 36S

CLAYSTONE

red with slick dark reddish brown (2.5YR 3/3)

silty, firm, moist, locally slickensided where more clayey

SANDSTONE: fine, massive, dense, damp, light olive gray (5Y 6/2)

contact approximately 70 degrees between sandstone and claystone. Minor shearing along and throughout, but no gouge or fault gouge, appears to be axis of fold
SHEAR: EW, 75N

SHEAR: N86E, 78N

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 8/19/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-2-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/15/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1300'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-52'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
11	9.8	117	-	45				BEDDING/CONTACT: N50W, 65NE; N48W, 68NE CLAYSTONE: fine, massive, dense, damp, red, with slicks very plastic, stiff, no bedding discernable downhole, occasional sandy interlayers, but not laterally extensive, massive
28	4.6	133	-	50				SILTSTONE: fine, dense, damp, light olive gray (5Y 6/2), laminated with claystone interlayers, appears in sample as near vertical, approximately 80 degree dip
				55				Bottom of Boring at 52 feet. No groundwater. No caving.
				60				
				65				
				70				
				75				
				80				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 8/19/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-3-10

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/14/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1376'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-111'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
12/8"	4.9	128	-	10			
19	6.1	134	-	20			
22	3.4	123	-	30			

PICO FORMATION (Tp)

SANDSTONE/ MUDSTONE: fine to coarse, with minor pebbles, poorly sorted, plastic, moist to slightly moist, yellowish red to reddish brown (5YR, 4/4)

becoming coarser with depth and better sorted

SANDSTONE: medium to coarse, slightly silty with minor granules, very hard, very dense, damp to slightly moist, yellowish brown to gray (5YR, 6/1)

BEDDING: N85W, 43N

BEDDING: N89W, 42N

fine to medium, moist, yellowish brown (10YR, 5/4)

BEDDING: N85W, 44N

coarse, with approximately 5% gravel, very hard, well cemented

BEDDING: E-W, 38N

cobble layer (pink quartzite) cobble to 6"

fine

PEBBLE CONGOMERATE: medium to coarse, with minor gravel and cobbles, well cemented, moderately well sorted, light gray

BEDDING: N60W, 47N

increase in moisture and increase in fines, poorly sorted with approximately 5-15% rounded gravel

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 8/19/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-3-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/14/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1376'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-111'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
30/9"	5.1	126	-	45			
31/9"	7.9	121	-	50			
34/9"	7.2	111	-	55			
41/6"	6.5	103	-	60			
				65			
				70			
				75			
				80			

CROSS-BEDDING: N80E, 34N

SANDSTONE: fine to medium, poorly sorted, slightly plastic, medium dense, moist, yellowish brown (10YR, 5/4)

BEDDING: 50W, 36NE

SILTSTONE: slightly plastic, dark brown

SANDSTONE: coarse, with gravel, hard, dense, yellowish brown (10YR, 5/4)

BEDDING: N60W, 37NE

BEDDING: N59W, 39NE

SILTY SANDSTONE: light olive brown (2.5Y, 5/4)

BEDDING: N61W, 37N

MUDSTONE: slightly plastic, moist, dark gray (5Y, 4/1)

SILTSTONE: grayish brown (2.5Y, 5/2)

very hard, well cemented, massive, damp, fractured, concretionary from 69-71'

massive, well sorted, micaceous, dense, moist, olive (5Y, 4/3)

CONTACT: N58W, 37N

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 8/19/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-3-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/14/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1376'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-111'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
29	21.5	109	-					CLAYSTONE: with slickensides, plastic, soft, moist, black
								with bi-valve shells approximately 1%, small white thin clamshells to 1/2" (freshwater), and reed casts to 82'. Grading to clayey siltstone
				85				MUDSTONE: clayey, slightly plastic, moist, olive gray (10YR, 4/3)
38/9"	9.7	116	-	90				SANDSTONE: fine, locally well cemented, dense, slightly moist, brown (10YR, 4/3)
								CLAYSHEAR CONTACT: N40E, 30SE, N35E, 29SE
				95				SILTSTONE: massive, slightly plastic, dense, moist, greenish gray to olive gray (5Y, 4/2), and with minor fine sand (10%)
								BEDDING: N38, 32SE
37/9"	11.9	124	-	100				
				105				SANDSTONE: fine to medium, poorly sorted, with 20-30% silt and 5% clay, damp to slightly moist, yellowish brown (10YR, 5/4)
								becoming better sorted with depth
				110				clean
								Bottom of Boring at 111 feet. No groundwater. No caving.
				115				
				120				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 8/19/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-4-10

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/14/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1405'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-51'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
15/9"	7.7	129	-	10			
15	14.4	120	-	20			
23/11"	15.9	117	-	30			

PICO FORMATION (Tp)

CLAYSTONE/MUDSTONE: massive, slightly plastic, moist, dark yellowish brown (10YR, 4/4)

CLAYEY SANDSTONE: fine, silty (10-20%) with occasional coarse (2%), poorly sorted, dense, damp, yellowish brown (10YR, 5/4)

@12' BEDDING: N40E, 25SE

PEBBLY SANDSTONE: fine to medium, with minor gravel (2-5%), moderately sorted, light brownish gray (10YR, 6/2)

BEDDING: N26E, 24SE

BEDDING: N31E, 22SE
BEDDING: N28E, 26SE
slight change in color to brown (7.5YR, 5/4)
BEDDING: N15E, 26SE

SILTSTONE/MUDSTONE: dark brown (7.5YR, 3/3)

SILTY SANDSTONE: fine to medium, dense, damp, light brownish gray (2.5Y, 6/2)
@ 25'-26': concretionary layer of nodules in sandy clay layer

BEDDING: N21E, 21SE

BEDDING: N18E, 22SE

BEDDING: N39E, 25SE

SILTSTONE: micaceous, slightly laminated, dense, slightly moist, dark olive gray (5Y, 3/2)
BEDDING: N36E, 26SE

BEDDING: N36E, 25SE

BEDDING: N32E, 24SE

SANDSTONE: fine to medium, moderately well sorted, damp, light

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 8/19/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-4-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/14/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1405'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-51'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
35	4.6	113	-	45				brownish gray (2.5Y, 6/2) BEDDING: N27E, 24SE BEDDING: N26E, 25SE BEDDING: N28E, 24SE grading to predominately medium grained
42	6.3	109	-	50				
				55				Bottom of Boring at 51 feet. No groundwater. No caving.
				60				
				65				
				70				
				75				
				80				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 8/19/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-5-10

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/19/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1398'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-71'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
				0			SM	**LANDSLIDE DEBRIS (Qls)** SILTY SAND: fine to meduim, loose, moist, light olive brown (2.5Y, 5/3)
				5				
5	3	102	-	10				fine, loose to medium dense, damp to slightly moist, light yellowish brown (2.5Y, 6.4)
				15				
4	3.1	104	-	20				fine to medium
				25				with pebbles and cobbles, increase in moisture
							ML	CLAYEY SILT: soft to firm, moist, brown @30' SHEAR: N10W, 24W
6	13.4	115	-	30			CL	SILTY CLAY: soft to firm, moist, brown @31' SHEAR: N10W, 12W @31'-32': CLAY/SAND CONTACT: N60E, 20SE @32': BEDDING: N50W, 30SW
							SP	@ 32' SAND: fine, moderately well sorted, micaceous, loose to medium dense, light yellowish brown (2.5Y, 5/3) rock exhibits shearing
				35				SHEAR: N5W, 15E
				40				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 8/19/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-5-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/19/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1398'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-71'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
18	5.6	111	-					@41': SLIDE PLAN CONTACT: N21E, 31SE: Base of landslide/top of bedrock
								PICO FORMATION (Tp)
								SANDSTONE: medium to coarse, with pebbles, dense, slightly moist, yellowish brown (2.5Y, 5/3)
				45				
42/9"			-	50				(Sample fell out)
								BEDDING: N30E, 34SE
								BEDDING: N15E, 29SE
				55				
								BEDDING: N32E, 31SE
								BEDDING: N28E, 29SE
42/9"	7.1	120	-	60				
				65				
								SILTY SANDSTONE: fine, moist, olive (5Y, 5/4)
								light yellowish brown (10YR, 6/4)
35/9"	5.5	111	-	70				
								Bottom of Boring at 71 feet. No groundwater. No caving.
				75				
				80				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 8/19/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-6-10

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/20/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1330'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-76'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
				0			SM
3	7.4	118	-	10			
4	6	117	-	20			
5	7.6	117	-	30			
				40			

ARTIFICIAL FILL (af)
SILTY SAND: fine to medium, loose, moist, light yellowish brown (2.5Y, 6/3)

Note: fill appears relatively "clean" with no organic debris and minimized clay

LANDSLIDE DEBRIS (Qls)
SILTY SANDSTONE: dense, light yellowish brown (2.5Y, 6/3), (clean contact with fill)

fine, very clean, massive

slightly clayey, very hard drilling in concretionary layer

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 8/19/10

LOG OF BORING

BORING B-6-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/20/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1330'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-76'

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
27	2.6	126	-	45			
20	6.8	109	-	50			
21	6.9	104	-	55			
				60			
				65			
12	17.6	102	-	70			
				75			
				80			

PEBBLY CONGLOMERATE: medium to coarse, with granules and pebbles, poorly sorted, dense, damp, light yellowish brown (2.5Y, 6/3), with coarse sand size shell fragments

N59E, 35S: pebble layer

@46'-48': orange layer, olive yellow (2.5Y, 6/8)

BEDDING: N30E, 34SE

BEDDING: N60E, 40S

softer

SANDSTONE: medium to coarse, moderately sorted, dense, damp to slightly moist, light yellowish brown (2.5Y, 6/3)
BEDDING: N10E, 35E
BEDDING: N12E, 33E

BEDDING: N16E, 34SE

SILTSTONE: with clam fossils, micaceous, moist, bluish gray

@68': CLAY SEAM: N50E, 20SE: (landslide plane)

CLAYSTONE: plastic, moist, reddish brown
@69' BEDDING: N52, 18SE

PICO FORMATION (Tp)

MUDSTONE/CLAYEY SILTSTONE: massive, with sand and granules, mottled brown and olive gray

(no discernable bedding)

Bottom of Boring at 76 feet.
No groundwater. Minor caving in sandy fill.

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 8/19/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-7-10

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/21/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1408'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-100'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
16/9"	7.2	112	-	10			
18/9"	4.3	116	-	20			
34/9"	6.1	107	-	30			

PICO FORMATION (Tp)

SANDSTONE: fine to medium, moderately well sorted, dense, damp, light yellowish brown

BEDDING: N75E, 41S

BEDDING: N75E, 42S

BEDDING: N78E, 42S

CONGLOMERATE: with pebbles

SANDSTONE: fine, moderately well sorted, dense, damp, pale yellow (2.5Y, 8/2), with minor pebbles, minimal to no fines

medium to coarse

pebble conglomerate layer: N78E, 44S

BEDDING: N76E, 48S

fine to medium, slightly silty, light gray (2.5Y, 7/1)

medium to coarse, with granules and pebbles, yellow

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

BORING B-7-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/21/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1408'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-100'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION / GRAPHIC LOG / SOIL TYPE	
33/9"			-			
						PEBBLY SANDSTONE: medium to coarse, with granules and pebbles (5%), moderately well sorted (no fines), dense, damp, pale yellow (2.5Y, 7/3)
				45		
						well cemented, (slow drilling)
						BEDDING: N88W, 39S: (pebble layer)
30/4"			-	50		
				55		BEDDING: N80E, 47S
						BEDDING: N80E, 42S
50	6.7	114	-	60		FOSSILIFEROUS SILTSTONE: with numerous shells, dense, slightly moist, olive (5Y, 5/3), concretionary, cemented
						SILTY SANDSTONE: fine to medium, poorly sorted, olive (5Y, 5/3)
				65		
30/9"	10.2	121	-	70		hard cemented zone
						BEDDING: N82E, 43S
				75		
						SANDSTONE: fine, well sorted, dense, moist, pale yellow to olive (5Y, 7/3)
						BEDDING: N78E, 40S
				80		

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BORING B-7-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/21/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1408'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-100'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
34/9"	10.1	113	-	85			
52/9"	6.8	122	-	90			
				95			
				100			
				105			
				110			
				115			
				120			

N83E, 42S

BEDDING: N86W, 39S: (shell layer), slightly silty and concretionary

SANDY SILTSTONE: laminated, locally concretionary, dense, moist, mottled bluish gray and brown

no clay in matrix

BEDDING: N88E, 41S

SILTY SANDSTONE: fine to medium, poorly sorted, dense, slightly moist, olive brown

SANDSTONE: fine, slightly silty, moderately well sorted, light gray (5Y, 7/1)

Bottom of Boring at 100 feet.
No groundwater. No caving.

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-8-10

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/23/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1135'
DRILLING CO.: Tri-Valley
LOGGED BY: TL
BORING DEPTH: 0-101'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
3	2.9	109	-	10			
2	7.9	123	-	20			
7	3.6	118	-	30			

SAUGUS FORMATION (QTs)

SILTSTONE: micaceous, soft, dry, light grayish brown (10YR 5/2)

BEDDING: N72W, 16N

BEDDING: N80W, 12N

CLAYSTONE: moderately soft, dark grayish brown (10YR 4/2)

massive

CLAYEY SANDSTONE: with sand and silt, moderately soft, light reddish brown (5YR 4/3)

BEDDING: N72W, 8N): (top of sandstone)

SANDSTONE: fine, moderately well sorted, micaceous, medium dense, damp, light olive brown (2.5Y, 5/3)

BEDDING: N32W, 12NE: pebble layer cross bed

grading coarser with pebbles

BEDDING: N51W, 19NE

BEDDING: N53W, 12NE

FAULT: N60E, 58S

BEDDING: N85E, 24N

SANDY SILTSTONE: fine sand and trace gravel to 1/2", with fraction of clay, poorly sorted, dense, slightly moist, dark grayish brown (2.5Y 4/2)

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-8-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/23/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1135'
DRILLING CO.: Tri-Valley
LOGGED BY: TL
BORING DEPTH: 0-101'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
12	7.1	118	-	40			
				45			
33	2.8	123	-	50			
				55			
39	4.5	115	-	60			
				65			
28	13.8	113	-	70			
				75			

grading to mudstone

CONGLOMERATE: medium to coarse sand, with pebble to 1" and few cobbles to 6", dark grayish brown (2.5Y, 4/2)

BEDDING: N81W, 9N

OFFSET LITHOLOGY BUT NO SHEARING OBSERVEABLE FAULT: N80E, 68S: (hard drilling)

medium, light bluish gray (2.5Y, 6/2)

silty and well cemented

BEDDING: N86E, 26N

SANDSTONE: fine to medium, laminated, light gray

BEDDING: N55W, 16NE: clean sand layer

SANDY SILTSTONE: damp, olive gray (5Y, 5/2)

SILTSTONE: micaceous, soft, moist, olive gray (5Y, 5/2)

BEDDING: N48W, 24NE: thin clay bed

increasing clay with depth

CLAYSTONE: plastic, firm, moist, dark olive gray

SILTSTONE: with clay, slightly plastic, locally micaceous and laminated, slightly firm to soft, moist, olive gray (5Y, 5/2)
@74': BEDDING: 50W, 22NE

CLAYSTONE: with silt, massive, firm, slightly moist, olive gray (5Y,

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BORING B-8-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/23/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1135'
DRILLING CO.: Tri-Valley
LOGGED BY: TL
BORING DEPTH: 0-101'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
18	16.4	115	-	80			
				85			
42	3.9	124	-	90			
				95			
38/10"	5.3	112	-	100			
				105			
				110			
				115			

5/2)
@79' BEDDING: N60W, 14N: clay seam

SILTSTONE: laminated, soft

SANDSTONE: medium, moderately sorted with small pebble inclusions, hard, light olive gray (5Y 6/2), (cuttings fell out of basket)

CROSS-BEDDING: N20W, 15E

CONGLOMERATE: fine to medium sand, with granules and pebbles, well cemented and poorly sorted, slightly moist, light olive gray (5Y 6/2)
BEDDING: N32W, 13NE: fine sand layer

BEDDING: N36W, 14NE

fine sand, no pebbles, massive, well sorted, light gray

Bottom of Boring at 101 feet.
No groundwater. No caving.

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-9-10

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/27/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1250'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-107'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
				0			
				5			
				10			
7	13	120	-				
				15			
				20			
9/7"	4.2	131	-				
				25			
				30			
20/9"	4	131	-				
				35			
				40			

OLDER LANDSLIDE DEBRIS (Qols)

SILTY SANDSTONE: fine, soft, damp, light olive brown (2.5Y, 5/3), appears jumbled

SANDY SILTSTONE: clean, slightly laminated, soft, olive brown (2.5Y, 4/3)

SILTY SANDSTONE: medium to coarse, with pebbles, poorly sorted, slightly moist, light olive brown (2.5Y, 5/3)

hard zone

CLAYSTONE: with silt, massive, slightly plastic, moist, dark brown (10YR, 3/3), (jumbled)

MUDSTONE: with coarse sand & granules in silty matrix, massive, poorly sorted, slightly plastic, slightly moist, dark brown (10YR, 3/3)

CONTACT: N20W, 17SW

SAUGUS FORMATION (QTs)

SANDSTONE: fine to medium, moderately well sorted, cemented, hard, light gray (2.5Y, 7/2)

BEDDING: N40W, 60NE: (pebble layer)

CONGLOMERATE: coarse sand, with pebbles and cobbles, hard, light gray (2.5Y, 7/2)

BEDDING: N25W, 37NE

medium to coarse sand, no fines

BEDDING: N25W, 31NW: fine sand layer

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-9-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/27/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1250'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-107'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
24/9"	3.9	128	-	45			
38/9"	5.5	108	-	50			
57/9"	4.7	110	-	55			
53	9.6	132	-	60			
				65			
				70			
				75			
				80			

CONTACT/BEDDING: N61W, 53NE

SILTSTONE: with clay, poorly sorted, massive, dense, brown (10YR, 4/3)

SANDSTONE: medium, with granules, hard, olive gray (5Y, 5/2)

BEDDING: N50W, 41NE

PEBBLY SANDSTONE: fine to medium, poorly sorted with granules, grayish brown (2/5Y, 4/2)
BEDDING: N38W, 42NE

SHEAR: N15W, 67NE

BEDDING: N38W, 71NE

SHEAR: N18W, 44NE: (with slicks)
CONTACT: N61W, 43NE: (top of siltstone)

SILTSTONE: with clay, firm, massive, slightly plastic, slightly moist, reddish brown (5YR, 4/4)

SHEAR: N31W, 55NE: (clay slicks)

grades to brown silty sandstone to 72'

very plastic

SILTY SANDSTONE: fine, poorly sorted, massive, dense, yellowish brown (10YR, 5/4)

BEDDING: N51W, 52N

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BORING B-9-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 4/27/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-72'(1120 lbs.). 400 lb stem added each 20' after 72'.
ELEVATION: 1250'
DRILLING CO.: Tri-Valley
LOGGED BY: KGF
BORING DEPTH: 0-107'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
51/9"	10.9	116	-	85				BEDDING: N61W, 58W: (sandy layer)
53/11"	7.1	133	-	90				fine to medium, olive brown (2.5Y, 4/4)
				95				CONGLOMERATE: with pebbles, medium to coarse sand, slightly silty, massive, light brownish gray (2.5Y, 6/2)
								BEDDING: N38W, 43NE
40/10"	3.7	121	-	100				SANDSTONE: fine to medium, clean, well sorted, dense, light gray (2.5Y, 7/2), well indurated
				105				
								Bottom of Boring at 107 feet. No groundwater. No caving.
				110				
				115				
				120				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-10-10

JOB NUMBER: 2002-036-004
DATE DRILLED: 10/7/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-70'(1120 lbs.).
ELEVATION: 1002.5'
DRILLING CO.: Tri-Valley
LOGGED BY: TPL
BORING DEPTH: 0-70'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
				0			ML
				5			
				10			
				15			
				20			
				25			
				30			
				35			
				40			

ALLUVIUM (Qal)
SANDY SILT: very fine sand, soft, slightly moist, grayish brown (10YR 5/2)

minor caliche veins

trace cobbles, medium stiff

angular sandstone cobble; 8" long, 3" wide

siltstone rip up clasts

SAUGUS FORMATION (QTs)
SANDY SILTSTONE: very fine sand, micaceous, some caliche pods, soft, slightly moist, yellowish gray (5Y 7/2)
slight orangish brown mottling

BEDDING: N10E, 20SE: defined by 1/4" thick caliche at contact

SILTY SANDSTONE: very fine, trace pebbles, some siltstone interbeds up to 6" thick, friable, slightly moist, yellowish gray (5Y 7/2)
very fine to medium with cross bedding
BEDDING: N27E, 17SE

SANDY SILTSTONE: very fine to fine sand, low hardness, slightly moist, yellowish gray (5Y 7/2)

SANDSTONE: fine to coarse, minor amount of pebbles, moderately hard, slightly moist, yellowish gray (5Y 7/2)

CROSS-BEDDING: N57E, 15SE: moderately well cemented

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-10-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 10/7/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-70'(1120 lbs.).
ELEVATION: 1002.5'
DRILLING CO.: Tri-Valley
LOGGED BY: TPL
BORING DEPTH: 0-70'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE

BEDDING: N5E, 17SE

PEBBLY SANDSTONE: fine to very coarse, moderately cemented, moderately hard, moist, yellowish gray (5Y 7/2), light seepage

45

moderate seepage

50

CONTACT: N10W, 15NE

SANDY SILTSTONE: very fine to fine sand, weakly cemented, micaceous, low hardness, moist, light olive gray (5Y 5/2)
thin very fine sandstone interbed @ 52'

1" thick siltstone; 4" thick very fine sandstone

55

SILTSTONE: moderately indurated, moderately hard, slightly moist, medium dark gray (N4)

60

65

light olive gray (5Y 5/2)

dark yellowish brown (10YR 4/2)

70

Bottom of Boring at 70 feet.
Light seepage at 44', moderate seepage at 47 '. No caving.

75

80

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-11-10

JOB NUMBER: 2002-036-004
DATE DRILLED: 10/7/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-70'(1120 lbs.).
ELEVATION: 1145.5'
DRILLING CO.: Tri-Valley
LOGGED BY: TPL
BORING DEPTH: 0-70'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
				5			ML
				10			
				15			
				20			
				25			
				30			
				35			
				40			

RESIDUAL SOIL

SANDY SILT: very fine to fine sand, minor caliche, soft, slightly moist, dark yellowish brown (10YR 4/2)

yellowish brown (10YR 5/4)

SAUGUS FORMATION (QTs)

SANDY SILTSTONE: very fine sand, micaceous, soft, dry, yellowish gray (5Y 7/2)
BEDDING: N20E, 10SE
BEDDING: N40E, 10SE: some siltstone interbeds, 1" to 2" thick

SILTSTONE: moderately indurated, low hardness, slightly moist, light olive gray (5Y 5/2)

SILTY SANDSTONE: very fine to fine, micaceous, soft, slightly moist, yellowish gray (5Y 7/2)

SILTSTONE: moderately indurated, low hardness, slightly moist, light olive gray (5Y 5/2)

SANDSTONE: very fine to fine, low hardness, slightly moist, light olive gray (5Y 6/1), laminated bedding defined by aligned mafic minerals

SANDY SILTSTONE: very fine sand, micaceous, soft, slightly moist, yellowish gray (5Y 7/2)

SANDSTONE: very fine to medium, weakly cemented, slightly micaceous, soft, dry, yellowish gray (5Y 7/2), laminated

trace pebbles
BEDDING: N-S, 12E
some cross bedding

BEDDING: N10E, 8SE

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

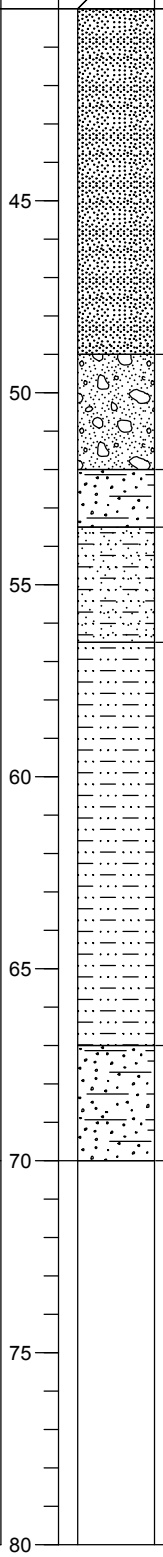
LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-11-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 10/7/10
EQUIPMENT USED: 24" Bucket auger with heavy duty sampler. 0-24' (3160 lbs.), 24-46'(2040 lbs.), 46-70'(1120 lbs.).
ELEVATION: 1145.5'
DRILLING CO.: Tri-Valley
LOGGED BY: TPL
BORING DEPTH: 0-70'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE



BEDDING: N15E, 10SE

PEBBLY SANDSTONE: fine to coarse, trace cobbles, weakly cemented, low hardness, dry, yellowish gray (5Y 7/2)

SILTY SANDSTONE: very fine to fine, micaceous, soft, slightly moist, light olive gray (5Y 5/2)

SANDY SILTSTONE: very fine sand, micaceous, soft, slightly moist, light olive gray (5Y 5/2)
BEDDING: N11E, 15SE: 2" thick siltstone interbed

SILTSTONE: micaceous, moderately hard, slightly moist, moderate olive brown (5Y 4/4), some very fine to fine sandstone interbeds
dark yellowish brown (10YR 4/2)

massive
olive gray (5Y 4/1)

minor very fine sand, caliche coating on fracture surfaces

medium bluish gray (5B 5/1)

SILTY SANDSTONE: fine to coarse, trace pebbles, moderately hard, slightly moist, light olive gray (5Y 5/2)

Bottom of Boring at 70 feet.
No groundwater. No caving.

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-1-11

JOB NUMBER: 2002-036-006
DATE DRILLED: 11/22/11
EQUIPMENT USED: 24" diameter bucket rig #7 with triple scope weights of 3160 lbs. (0-24'), 2040 lbs. (24-46'), 1120 lbs. (46-72')
ELEVATION: 1025'
DRILLING CO.: Tri-Valley
LOGGED BY: BKP
BORING DEPTH: 0-61'
SURFACE CONDITIONS: Dirt Access Road

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SOIL TYPE	
					ML	**TERRACE DEPOSITS (Qt)** SANDY SILT: fine, moderately firm, moist, medium brown
P	5.8	95	-			grades occasional small gravel, less moist, grayish brown
P	6.5	101	-	5		grades more sandy, occasional gravel and cobbles
P	7.9	104	-			grades more firm, slightly porous
P	7.6	106	-	10	ML/SM	SILTY SAND: fine, grades more sandy
1	8.2	106	-	15	SM	SILTY SAND: fine, gravel, dense, moist, medium brown to grayish brown
1	8.1	107	-	20		grades less silty grades light brown
2	5.7	111	-	25		less silty, fine to medium, occasional coarse sand, dense, damp to moist, light grayish brown
						grades less silty, light gray
5	16.3	105	-	30		silty, dense to very dense, moist, mottled light gray and olive gray
						occasional rounded cobbles
6	7	109	-	35		**SAUGUS FORMATION (QTs)** SILTY SANDSTONE: very fine, friable, damp moist, olive gray
				40		

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

LOG OF BORING

BORING B-1-11 (CONTINUED)

JOB NUMBER: 2002-036-006
DATE DRILLED: 11/22/11
EQUIPMENT USED: 24" diameter bucket rig #7 with triple scope weights of 3160 lbs. (0-24'), 2040 lbs. (24-46'), 1120 lbs. (46-72')
ELEVATION: 1025'
DRILLING CO.: Tri-Valley
LOGGED BY: BKP
BORING DEPTH: 0-61'
SURFACE CONDITIONS: Dirt Access Road

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
5	8.2	108	-					grades more moist
								large cobble (10"+/-)
6	7.9	111	-	45				BEDDING: N30E, 10SE
								some gravel and small cobbles
10	4.5	107	-	50				SANDSTONE: fine to coarse, slightly silty, friable, damp to moist, light gray
								fine, silty, occasional gravel, light olive gray
10	5.3	111	-	55				
								SANDY SILTSTONE: fine, soft, moist, olive gray
13	9.5	113	-	60				
								Bottom of Boring at 61 feet. No water. No caving.
				65				
				70				
				75				
				80				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-2-11

JOB NUMBER: 2002-036-006
DATE DRILLED: 11/21/11
EQUIPMENT USED: 24" diameter bucket rig #7 with triple scope weights of 3160 lbs. (0-24'), 2040 lbs. (24-46'), 1120 lbs. (46-72')
ELEVATION: 948'
DRILLING CO.: Tri-Valley
LOGGED BY: BKP
BORING DEPTH: 0-24.5'
SURFACE CONDITIONS: Grass Field

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SOIL TYPE	
					ML	**ALLUVIUM (Qal)** CLAYEY SILT: moderately firm, moist, medium brown
P	6.2	95	-		ML	SANDY SILT: fine, less moist, lighter medium brown
P&T	4.8	96	-	5	SM	SILTY SAND: fine to coarse, damp, tan
P&T	9.8	90	-			fine, medium dense to dense, grayish brown
1	8	91	-	10		lens of sandy silt grades less silty
2	11.9	95	-			alternating layers of moist to very moist clayey silt and damp, clean, fine to coarse sand, dense
2	1.8	103	-	15	SP	SAND: fine to coarse, dense, dry to damp, buff to white
					ML	CLAYEY SILT: very moist to wet, dark brown
3	3	115	-	20	SP-GP	GRAVELLY SAND: medium to coarse with occasional fine, abundant gravel with occasional small cobble, dense, damp, grayish brown difficult drilling; clean damp sand with abundant gravel & cobbles, moderate caving
				25		Bottom of Boring at 24.5 feet. No water. Moderate caving below 22'
				30		
				35		
				40		

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-3-11

JOB NUMBER: 2002-036-006
DATE DRILLED: 11/21/11
EQUIPMENT USED: 24" diameter bucket rig #7 with triple scope weights of 3160 lbs. (0-24'), 2040 lbs. (24-46'), 1120 lbs. (46-72')
ELEVATION: 948'
DRILLING CO.: Tri-Valley
LOGGED BY: BKP
BORING DEPTH: 0-29'
SURFACE CONDITIONS: Open Field

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SOIL TYPE	
					SM/SP	**ALLUVIUM (Qal)** SILTY SAND: fine to medium, with occasional coarse sand, occasional gravel, medium dense to dense, damp to moist, tan to light brown
1	2.5	107	-			lens of clean and damp sand
						grades more clayey
2	15.4	107	-	5	CL	SILTY CLAY: approaching clayey silt, moderately firm, moist to very moist, medium brown
					SM	SILTY SAND: fine, medium dense to dense, moist, light to medium brown
2	14.7	101	-			
10*	14	100	-	10	ML	SANDY SILT: firm, very moist, olive gray
5	5.2	109	-		SP	CLEAN SAND: fine to medium, with occasional coarse sand, occasional gravel, damp, light reddish brown
1	5.9	93	-	15		dry to damp
					ML	SANDY SILT: moderately firm, moist, mottled rust brown and olive gray
					SP	CLEAN SAND: fine to coarse, dry to damp, buff
2	2.9	93	-	20		difficult drilling - soil not staying in bucket (too sandy, too dry) grades to clean fine sand
					CL	SILTY CLAY: very moist to wet, dark grayish brown
6	20.6	100	-	25		lens of silt and sand (sample sleeve wet)
					SM/GP	SILTY SAND: fine to coarse, with abundant gravel, cobbles, damp to moist, tan to light brown
				30		Bottom of Boring at 29 feet. No water. No caving.
				35		
				40		

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-4-11

JOB NUMBER: 2002-036-006
DATE DRILLED: 11/22/11
EQUIPMENT USED: 24" diameter bucket rig #7 with triple scope weights of 3160 lbs. (0-24'), 2040 lbs. (24-46'), 1120 lbs. (46-72')
ELEVATION: 952'
DRILLING CO.: Tri-Valley
LOGGED BY: BKP
BORING DEPTH: 0-25'
SURFACE CONDITIONS: Grass Field

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	SOIL TYPE	
				ML	**ALLUVIUM (Qal)** SANDY SILT: fine, occasional coarse sand, occasional small gravel, firm, damp to moist, grayish brown
1+T	5.2	110	-		
				SP-SM	SILTY SAND: fine to coarse, medium dense, damp, grayish tan
P	2.4	103	-		
				ML	SANDY SILT: firm, moist, grayish brown
P	15.1	92	-		
9	24	90.3	13		
				SM-SP	SILTY SAND: fine to coarse, occasional gravel and cobble, damp, tan, some slight caving
1	2.4	103	-		
				ML	SANDY SILT: fine, moist, medium brown
2	1.8	104	-	SP	SAND: fine to coarse, medium dense to dense, damp to moist, mottled light gray and rust brown alternating layers of silt and sand
				SM	SILTY SAND: occasional gravel, damp, tannish yellow
1	2.3	106	-		
				SP	SAND: fine to coarse, dense, damp, light gray
				ML	CLAYEY SILT: very moist, medium to dark brown
1	13	98	-	SP/SM	SILTY SAND: fine to medium, dense, damp to moist, mottled light gray and rust brown

Bottom of Boring at 25 feet.
No water. Some slight caving at 11'.

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-5-11

JOB NUMBER: 2002-036-006
DATE DRILLED: 11/21/11
EQUIPMENT USED: 24" diameter bucket rig #7 with triple scope weights of 3160 lbs. (0-24'), 2040 lbs. (24-46'), 1120 lbs. (46-72')
ELEVATION: 967'
DRILLING CO.: Tri-Valley
LOGGED BY: BKP
BORING DEPTH: 0-49'
SURFACE CONDITIONS: Grass Field

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SOIL TYPE	
			-		SM-SP	**ALLUVIUM (Qal)**
1	2.5	106	-			SILTY SAND: fine to medium, with occasional coarse sand, slightly silty, medium dense, moist, light to medium brown
						grades fine to coarse, occasional small gravel, medium dense to dense, damp to moist, light grayish brown
3	3.9	110	-	5		lens of fine silty sand
						abundant cobbles
1	7.9	107	-	10	SM	SILTY SAND: fine to medium, with occasional coarse sand, occasional cobbles, dense, moist, light grayish brown
5	11.3	111	-			no coarse sand, very silty, moist to very moist, medium grayish brown
3	22	105	-	15		grades less silty, fine, moist
						fine to coarse, abundant gravel, dense to very dense, grayish brown
						abundant cobbles
2	24.5	97	-	20	SM-SP	SILTY SAND: fine to medium with occasional coarse sand, occasional gravel, slightly silty, moist, light brown
4	24.4	97	-	25	SM	SILTY SAND: fine to medium, dense, moist, grayish brown
3	13.3	107	-	30		more fines, more moist
5	24.4	97	-	35	SM-SP	SILTY SAND: fine, with occasional coarse sand, slightly silty, dense, moist, mottled light gray and rust brown
					ML	CLAYEY SILT: moist to very moist, dark gray
				40	SP-GP	SAND: fine to coarse, with abundant gravel, almost clean, very dense, damp to moist, light brown

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING B-5-11 (CONTINUED)

JOB NUMBER: 2002-036-006
DATE DRILLED: 11/21/11
EQUIPMENT USED: 24" diameter bucket rig #7 with triple scope weights of 3160 lbs. (0-24'), 2040 lbs. (24-46'), 1120 lbs. (46-72')
ELEVATION: 967'
DRILLING CO.: Tri-Valley
LOGGED BY: BKP
BORING DEPTH: 0-49'
SURFACE CONDITIONS: Grass Field

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
12	13.3	107	-				SP-GP	abundant cobbles
15			-	45				(sample disturbed)
							ML	SANDY SILT: fine, moist to very moist, greenish gray
				▽				grades wet
				50				Bottom of Boring at 49 feet. Water at 49'. Moderate ravelling below 36'
				55				
				60				
				65				
				70				
				75				
				80				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING HS-1-10

JOB NUMBER: 2002-036-004
DATE DRILLED: 5/10/10
EQUIPMENT USED: Hollow Stem Auger CME 95 with heavy duty sampler and SPT sampler
ELEVATION: 1248'
DRILLING CO.: WDC
LOGGED BY: KGF
BORING DEPTH: 0-112'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SOIL TYPE	
				0	SM	**ARTIFICIAL FILL (af)** SILTY SAND: medium to coarse, loose, moist, light brown (2.5Y, 5/4)
22	9.9	111	-	5		
-			18	10		fine to medium, olive brown (2.5Y, 5/4)
32	13.6	117	-	15		has red clayey inclusions, shows compaction layering
-			27	20		fine to medium, poorly sorted, small shell fragments, slightly plastic, olive brown (2.5Y, 4/3)
59	10.4	118	-	25		
-			38	30		increase in moisture, slightly clayey (5-10%) in matrix
67	10.5	125	-	35		medium to coarse, trace pebbles
				40		

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BORING HS-1-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 5/10/10
EQUIPMENT USED: Hollow Stem Auger CME 95 with heavy duty sampler and SPT sampler
ELEVATION: 1248'
DRILLING CO.: WDC
LOGGED BY: KGF
BORING DEPTH: 0-112'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SOIL TYPE	
-			32		SM	slightly clayey
41	6.1	120	-	45		fine to medium, with gravel, moderately to poorly sorted, olive brown (2.5Y, 4/3)
						with abundant fossil shell fragments
-			50/3"	50		**PICO FORMATION (Tp)**
						SANDSTONE: medium to coarse, moderately well sorted, well cemented, hard, dark yellowish brown (10YR, 4/4)
50/4"	8.3	107	-	55		(hard drilling)
						PEBBLY SANDSTONE: medium, well cemented, light yellowish brown (10YR, 6/4), poorly sorted with granules (10%) and pebbles (5-10%)
-			65/3"	60		(sampler bouncing)
70/4"			-	65		(sampler bouncing)
						medium to coarse, moderately well sorted, well cemented, damp
-			65/5"	70		(bouncing after 5")
						(very hard drilling, adding water to cool bit)
						hard, with localized olive brown fine clayey mottling
75/5"	8.1	123	-	75		
						becomes coarser with pebbles
				80		

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BORING HS-1-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 5/10/10
EQUIPMENT USED: Hollow Stem Auger CME 95 with heavy duty sampler and SPT sampler
ELEVATION: 1248'
DRILLING CO.: WDC
LOGGED BY: KGF
BORING DEPTH: 0-112'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
-			30/1"				
80/4"			-	85			
-				90			
68/5"			-	95			
-			50/6"	100			
				105			
				110			
				115			
				120			

coarse, (bouncing after 6")

(bouncing after 4")

▽ groundwater at 87.08 feet 7/1/10

(bouncing after 5")

medium to coarse

▽ groundwater at 97.5 feet 5/14/10

MUDSTONE: dark gray, mixture of sand (25%), silt (50%), and clay (25%)

Bottom of Boring at 112 feet.
Very slight groundwater seep noted at about 100'

Installed temporary piezometer of 2" schedule 80 PVC with bottom at 108'; 0.020" machine-slotted screen from 108-88'; blank PVC to surface. Backfilled with #3 sand up to 85', and sealed with medium bentonite chips to 81'. Destroyed piezometer on July 14, 2010 by removing PVC casing and backfilling to surface with cement grout and 5% bentonite.

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING HS-2-10

JOB NUMBER: 2002-036-004
DATE DRILLED: 5/11/10
EQUIPMENT USED: Hollow Stem Auger CME 95 with heavy duty sampler and SPT sampler
ELEVATION: 1333'
DRILLING CO.: WDC
LOGGED BY: KGF
BORING DEPTH: 0-199'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
							SM	**ARTIFICIAL FILL (af)** SILTY SAND: fine to medium, slightly moist, light brown to pale yellow (2.5Y, 7/3)
44	5.4	110	-	5				
								fine, poorly graded, light olive brown(2.5Y, 5/3) to light gray
-			12	10				
23	13.3	112	-	15			ML	CLAYEY SILT: well graded with some sand in localized layers, moist, dark reddish brown (7.5YR, 5/3), interlayered soils
-			16	20				
28	11	109	-	25			SM	SILTY SAND: fine, moist, light olive brown, locally with clayey silt matrix
							ML	CLAYEY SILT: sandy, slightly plastic, stiff, moist, brown to reddish brown
-			24	30				
30	11.1	124	-	35			CL	SILTY CLAY: plastic, moist, reddish brown to brown, locally mottled with greenish gray silt and sand
								very stiff
-			39	40				locally sandy but mostly in reddish brown clay matrix
								(difficult drilling)
				45			ML	SANDY SILT: well graded, clayey, stiff, slightly plastic, reddish brown

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING HS-2-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 5/11/10
EQUIPMENT USED: Hollow Stem Auger CME 95 with heavy duty sampler and SPT sampler
ELEVATION: 1333'
DRILLING CO.: WDC
LOGGED BY: KGF
BORING DEPTH: 0-199'

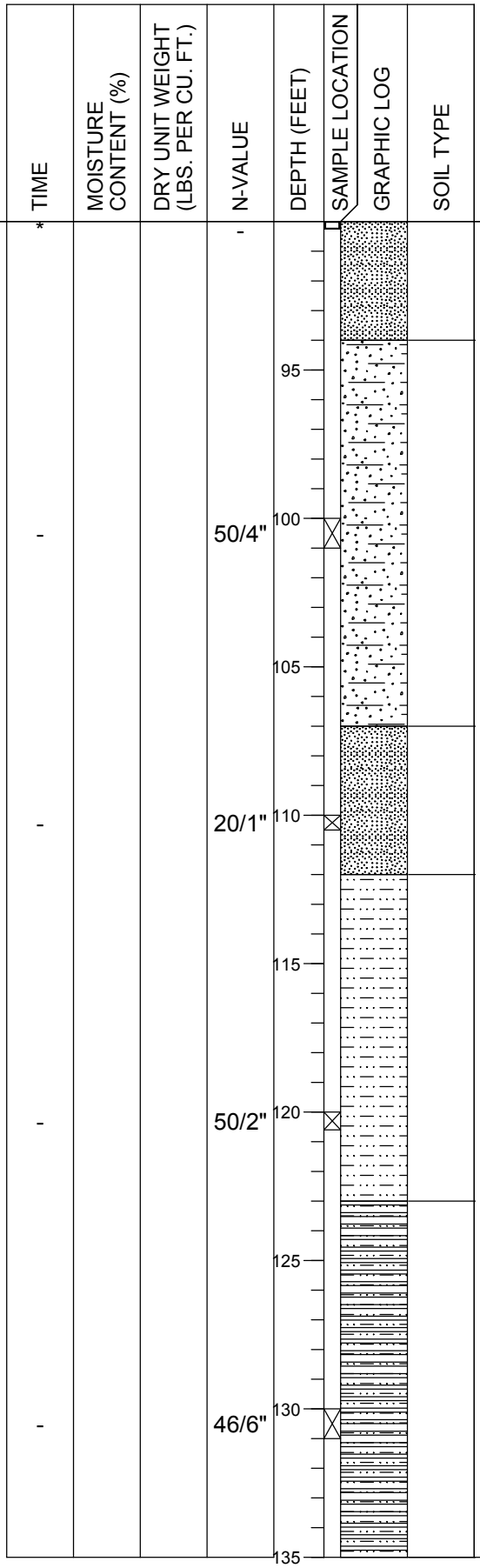
TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
132/11"	12.1	117	-				ML	to brown (adding water during drilling)
-			97/9"	50				
							SM	SILTY SAND: fine to medium, dense, slightly moist, brown to light reddish brown
129/9"	9.5	117	-	55				
-			78/6"	60				
								SAUGUS FORMATION (QTs) SANDSTONE: fine to medium, dense, grayish brown
100/6"			-	65				Note: fine grained clean sandy residue left in sampler tip medium to coarse
-			50/3"	70				fine to coarse, clean with granules and pebbles
								CLAYSTONE: plastic, very stiff, moist, natural brown to reddish brown
100/11"	14.1	112	-	75				
								SILTY SANDSTONE: fine, moderately well sorted, grayish brown
*			-	80				(* Sampler bouncing after first 5")
				85				
								SANDSTONE: medium to coarse with granules and few gravel, moderately sorted, massive, dense, damp, brown
				90				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BORING HS-2-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 5/11/10
EQUIPMENT USED: Hollow Stem Auger CME 95 with heavy duty sampler and SPT sampler
ELEVATION: 1333'
DRILLING CO.: WDC
LOGGED BY: KGF
BORING DEPTH: 0-199'



(* Sampler bouncing after first 3")

SILTY SANDSTONE: fine, poorly sorted, dark olive gray

becomes clayey siltstone @99-100'

SANDSTONE: fine, moderately sorted, dense, damp, light brownish gray

SILTSTONE: massive (without lamination), dense, moist, brown

MUDSTONE: plastic, massive, moist, dark yellowish brown, clayey silt with few sand (5-10%)

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING HS-2-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 5/11/10
EQUIPMENT USED: Hollow Stem Auger CME 95 with heavy duty sampler and SPT sampler
ELEVATION: 1333'
DRILLING CO.: WDC
LOGGED BY: KGF
BORING DEPTH: 0-199'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
								SILTSTONE: well cemented, gray
								MUDSTONE
-			*	140				* sub-parallel partings in core tube appear to have ~10-15 degree dip
								SILTSTONE: fine sand, damp, dark grayish brown, locally very hard and well cemented
				145				
								fine sand
				150				
				155				becoming slightly clayey
-			50/5"	160				
								very plastic (30% clay), moist, dark gray to dark olive
				165				
				170				Squeezing Hole
								very dark/black, very sticky
				175				
				180				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

BORING HS-2-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 5/11/10
EQUIPMENT USED: Hollow Stem Auger CME 95 with heavy duty sampler and SPT sampler
ELEVATION: 1333'
DRILLING CO.: WDC
LOGGED BY: KGF
BORING DEPTH: 0-199'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
				185				dark olive MUDSTONE: fine to medium sand, trace clayey silt, olive gray
				190				slight increase in sand content, but still clayey silt matrix
				195				
				200				Bottom of Boring at 199 feet. No groundwater in boring or in temporary piezometer monitored 5/17/10 to 6/25/10. Installed temporary piezometer of 2" schedule 80 PVC with bottom at 190'; 0.020" machine-slotted screen from 190-180'; blank PVC to surface. Backfilled with #3 sand up to 178', and sealed with medium bentonite chips to 176'. Destroyed piezometer on July 14, 2010 by removing PVC casing and backfilling to surface with cement grout and 5% bentonite.
				205				
				210				
				215				
				220				
				225				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING HS-3-10

JOB NUMBER: 2002-036-004
DATE DRILLED: 5/13/10
EQUIPMENT USED: Hollow Stem Auger CME 95 with heavy duty sampler and SPT sampler
ELEVATION: 1102'
DRILLING CO.: WDC
LOGGED BY: KGF
BORING DEPTH: 0-41'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SOIL TYPE	
					SM	**ALLUVIUM (Qal)** SILTY SAND: soft, moist, light brown to olive brown (2.5Y, 4/3)
12	13.8	115	-	5	ML	CLAYEY SILT: soft, moist, dark brown (10YR, 3/3)
-			12			some fine to coarse sand (10-15%), well graded, light brown to yellowish brown
62			-	10	SM	SILTY SAND: fine to medium, well graded, clayey (plastic), slightly moist, dark brown (10YR, 3/3)
-			13			
					SP/SM	SILTY SAND: poorly graded, loose, damp, yellowish brown (10YR, 5/4)
18	8.1	117	-	15		
-			8			
					SM	SILTY SAND: medium to coarse, with gravel, loose, damp, yellowish brown (10YR, 5/4)
18	8.5	109	-	20		
-			8			
25	4.2	118	-	25		
-			14			
-			44	30		**SAUGUS FORMATION (QTs)** SANDSTONE: fine to medium, locally laminated, well cemented, dense, damp, light olive brown (2.5Y, 4/3)
90/10"	8.7	130	-	35		CLAYSTONE: massive, dense, moist, reddish brown
				40		

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BORING HS-3-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 5/13/10
EQUIPMENT USED: Hollow Stem Auger CME 95 with heavy duty sampler and SPT sampler
ELEVATION: 1102'
DRILLING CO.: WDC
LOGGED BY: KGF
BORING DEPTH: 0-41'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
75/6"	6.8	120	-				

Bottom of Boring at 41 feet.
No groundwater. No caving.

45
50
55
60
65
70
75
80

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING HS-4-10

JOB NUMBER: 2002-036-004
DATE DRILLED: 5/14/10
EQUIPMENT USED: Hollow Stem Auger CME 95 with heavy duty sampler and SPT sampler
ELEVATION: 1099'
DRILLING CO.: WDC
LOGGED BY: KGF
BORING DEPTH: 0-41.5'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SOIL TYPE	
					SM	**ALLUVIUM (Qal)** SILTY SAND: fine to medium with few coarse, localized gravel, dry to damp, light olive brown (2.5Y, 5/3)
-			19			
53/10"	10.8	119	-	5	ML	SANDY SILT: fine to medium sand, well graded, slightly plastic, damp, brown to dark brown (10YR, 3/3)
-			45			
					SM	SILTY SAND: fine to medium, moderately well graded, slightly moist, light olive brown (2/5Y, 5/3)
-			27	10		
55	8.7	125	-			increase in fines
-			30	15		
						becomes dark brown
						brown (10YR, 4/3)
-			8	20		
20	5.8	112	-			with gravel (5%)
-			16	25		
					SP/SM	SILTY SAND: fine, poorly graded, damp, light yellowish brown (10YR, 6/4)
-			30	30		
						SAUGUS FORMATION (QTs)
47	11.4	108	-	35		SILTSTONE: massive, poorly indurated (soft), damp, light olive gray (5Y, 6/2)
				40		

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

BORING HS-4-10 (CONTINUED)

JOB NUMBER: 2002-036-004
DATE DRILLED: 5/14/10
EQUIPMENT USED: Hollow Stem Auger CME 95 with heavy duty sampler and SPT sampler
ELEVATION: 1099'
DRILLING CO.: WDC
LOGGED BY: KGF
BORING DEPTH: 0-41.5'

TIME	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE
-			55				

Bottom of Boring at 41.5 feet.
No groundwater. No caving.

45
50
55
60
65
70
75
80

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-004.GPJ FRANKIAN.GDT 11/16/10

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING WB-1

JOB NUMBER: 2002-036-03
DATE DRILLED: 7/13/09
EQUIPMENT USED: Rotary wash rig with Sleeve and SPT samplers.
ELEVATION: 1000'
DRILLING CO.: WDC
LOGGED BY: KGF
BORING DEPTH: 0-21.5'
HAMMER WEIGHT: 140lbs; DROP: 30"

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
							SM	**ARTIFICIAL FILL (af)** SILTY SAND: fine to medium, well graded, dense, slightly moist, dark brown
61	9.2	116	-					minor inert debris (glass & concrete)
-			23	5				
28	14.6	109	-					minor concrete, moist
-			12	10			SP	**ALLUVIUM (Qal)** SAND: medium, poorly graded, loose, slightly moist, light brown to grayish brown
102	11	119	-					**SAUGUS FORMATION (QTs)** SANDSTONE: coarse, with gravel, dense, damp to slightly moist, tan to gray
-			63	15				medium to coarse, silty, slightly moist, light brown to tan
119	13.01 11.6	120.02 119	94 -	20				medium, light brown to reddish brown
-			44					
								Bottom of Boring at 21.5 feet.
				25				
				30				
				35				
				40				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

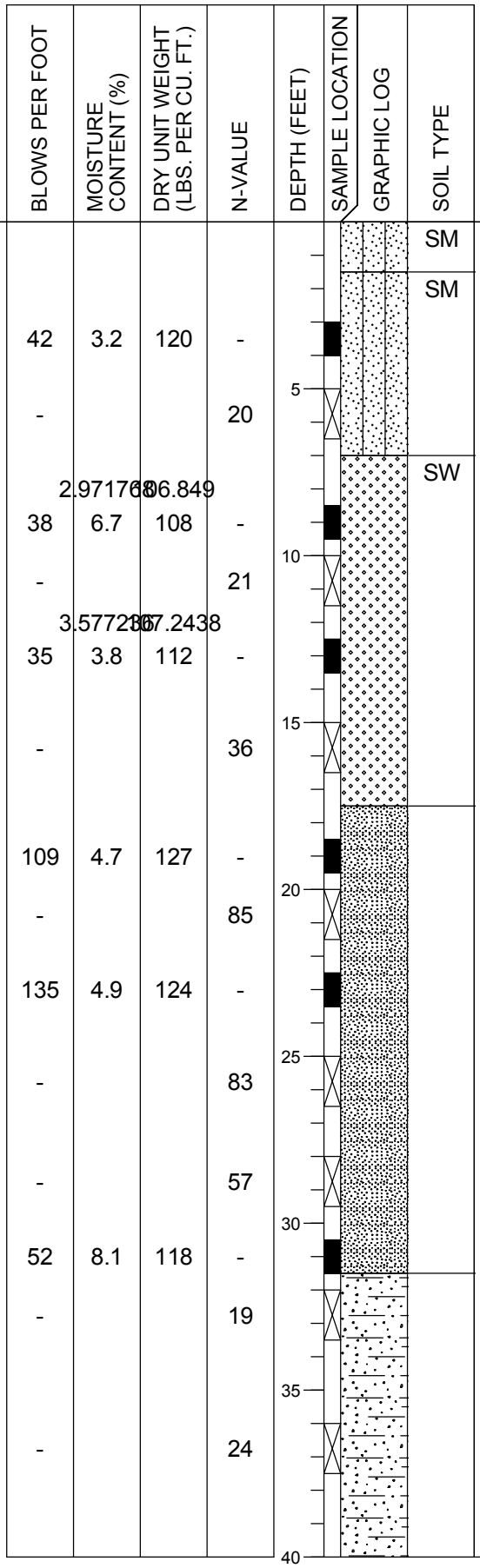
BOREHOLE LOG 2002-036-03.GPJ FRANKIAN.GDT 11/20/09

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING WB-2

JOB NUMBER: 2002-036-03
DATE DRILLED: 7/14/09
EQUIPMENT USED: Rotary wash rig with Sleeve and SPT samplers.
ELEVATION: 996'
DRILLING CO.: WDC
LOGGED BY: KGF
BORING DEPTH: 0-51'
HAMMER WEIGHT: 140lbs; DROP: 30"



ARTIFICIAL FILL (af)
SILTY SAND: fine to medium, well graded, medium dense, slightly moist, brown to dark brown

ALLUVIUM (Qal)
SILTY SAND: fine to medium, loose to medium dense, moist, dark brown to brown

SAND: medium to coarse, massive to poorly layered, loose to medium dense, slightly moist, light brown to tan

poorly graded, yellowish brown

SAUGUS FORMATION (QTs)
SANDSTONE: medium to coarse, with minor gravel, massive, dense, gray

coarse, appears slightly cemented, very tight

tan to light brown

small gravel 2-5%

fine to medium, massive, medium dense, slightly moist, light brown

SILTY SANDSTONE: fine to medium, slightly laminated, loose, moist, light brown

light brown to dark olive brown

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-03.GPJ FRANKIAN.GDT 11/20/09

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING WB-2 (CONTINUED)

JOB NUMBER: 2002-036-03
DATE DRILLED: 7/14/09
EQUIPMENT USED: Rotary wash rig with Sleeve and SPT samplers.
ELEVATION: 996'
DRILLING CO.: WDC
LOGGED BY: KGF
BORING DEPTH: 0-51'
HAMMER WEIGHT: 140lbs; DROP: 30"

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
-			20					
-			100/12"	45				SANDSTONE: coarse, with gravel (5%), massive, low hardness, slightly moist, grayish orange (10YR 7/4) to light gray (N7)
-			100/12"					poorly bedded, light brown to tan, bedding observed (distorted) in sampler at about 25 to 35 degree dip
175/8"	10	124	-	50				Bottom of Boring at 51 feet.

55
60
65
70
75
80

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-03.GPJ FRANKIAN.GDT 11/20/09

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING WB-3

JOB NUMBER: 2002-036-03
DATE DRILLED: 7/15/09
EQUIPMENT USED: Rotary wash rig with Sleeve and SPT samplers.
ELEVATION: 976'
DRILLING CO.: WDC
LOGGED BY: BKP
BORING DEPTH: 0-50.2'
HAMMER WEIGHT: 140lbs; DROP: 30"
SURFACE CONDITIONS: dry grass adjacent to asphalt road

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SOIL TYPE	
				0	SM	**CERTIFIED ENGINEERED FILL (cef)** SILTY SAND: fine to coarse, compact, moist, mottled light grayish brown and medium dark brown
99/8"	6.2	129	-			
-			30	5		occasional layer of dark to medium gray silty sand
118/8"	12.8	123	-			fine to medium, occasional small gravel, very compact, more moist, dark grayish brown
-			40	10		
	7.692307	110.5975			SM	**ALLUVIUM (Qal)** SILTY SAND: fine to coarse, occasional gravel, medium dense, damp, light grayish brown
21	8.3	115	-			fine to medium, with occasional coarse sand, medium dense to dense, damp to moist
-			11	15		fine, occasional thin lens of sandy silt, loose to medium dense
	11.52815	113.9889				
23	11.7	121	-			fine to medium, with occasional coarse sand, more silty
-			19	20		
145	2.4	124	-			**SAUGUS FORMATION (QTs)** SANDSTONE: fine to coarse, with some silt, occasional small gravel, low hardness, damp, light brownish gray (5YR 6/1)
-			19	25		
-			27			moist, occasional thin lens of pale reddish brown (10R 5/4) fine sandy siltstone
132	4.7	138	-	30		fine to very coarse, pebbly, low hardness, slightly moist, light brownish gray (5YR 6/1)
-			96/9"			occasional thin lens of light gray (N7) sandstone, damp, low hardness, occasional small gravel
-			65	35		
				40		

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

(CONTINUED ON THE FOLLOWING FIGURE)

BOREHOLE LOG 2002-036-03.GPJ FRANKIAN.GDT 11/20/09

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING WB-3 (CONTINUED)

JOB NUMBER: 2002-036-03
DATE DRILLED: 7/15/09
EQUIPMENT USED: Rotary wash rig with Sleeve and SPT samplers.
ELEVATION: 976'
DRILLING CO.: WDC
LOGGED BY: BKP
BORING DEPTH: 0-50.2'
HAMMER WEIGHT: 140lbs; DROP: 30"
SURFACE CONDITIONS: dry grass adjacent to asphalt road

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
-			84					fine to coarse, slightly silty, damp to moist, light gray (N7) to medium brownish gray (5YR 6/1)
-			22	45				SANDY SILTSTONE: fine, soft to low hardness, moist, pale reddish brown (10R 5/4)
-			96					SILTSTONE: low hardness, moist, light gray (N7) to medium light gray (N5)
100/2"			-	50				Bottom of Boring at 50.2 feet.
				55				
				60				
				65				
				70				
				75				
				80				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2002-036-03.GPJ FRANKIAN.GDT 11/20/09

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

Chiquita Canyon Landfill
January 27, 2012
2002-036-004

APPENDIX C

LABORATORY TESTING

GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

APPENDIX C

LABORATORY TESTING

Laboratory tests were performed on selected samples obtained from the borings to aid in the classification of the soils and to determine their engineering properties.

The field moisture content and dry density of the soils encountered were determined by performing tests on the undisturbed samples. The results of the tests are shown to the left of the boring logs in Appendix B.

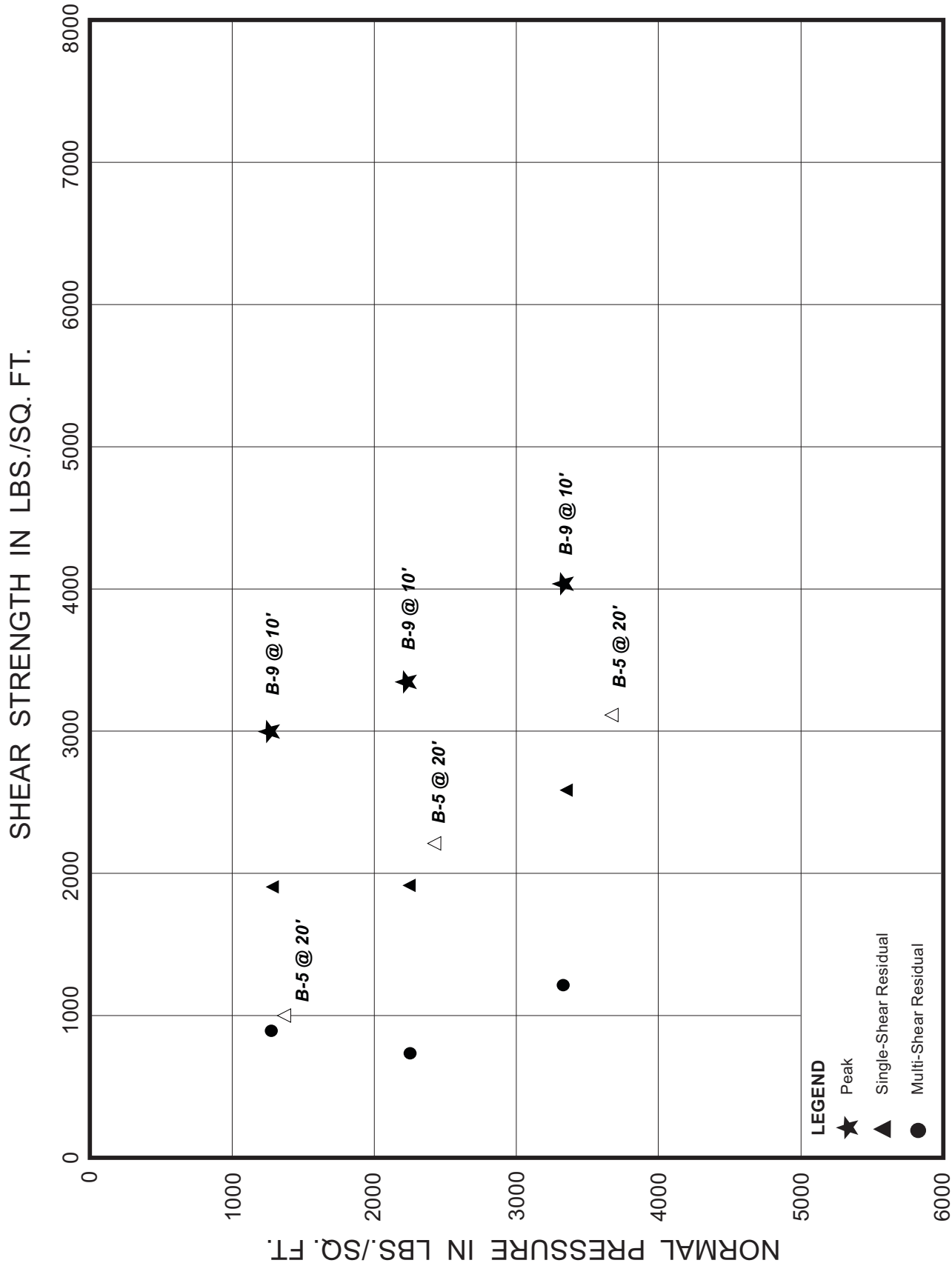
Direct shear tests were performed on selected undisturbed samples to determine the strength of the soils. The tests were performed after soaking the samples to near-saturated moisture content and at various surcharge pressures. The ultimate strength values determined from the direct shear tests are presented on the Shear Test Data page.

Confined consolidation tests were performed on four undisturbed samples. Water was added during the tests to each of the samples to illustrate the effect of moisture on the compressibility. The results of the tests are presented on the Consolidation Test Data pages.

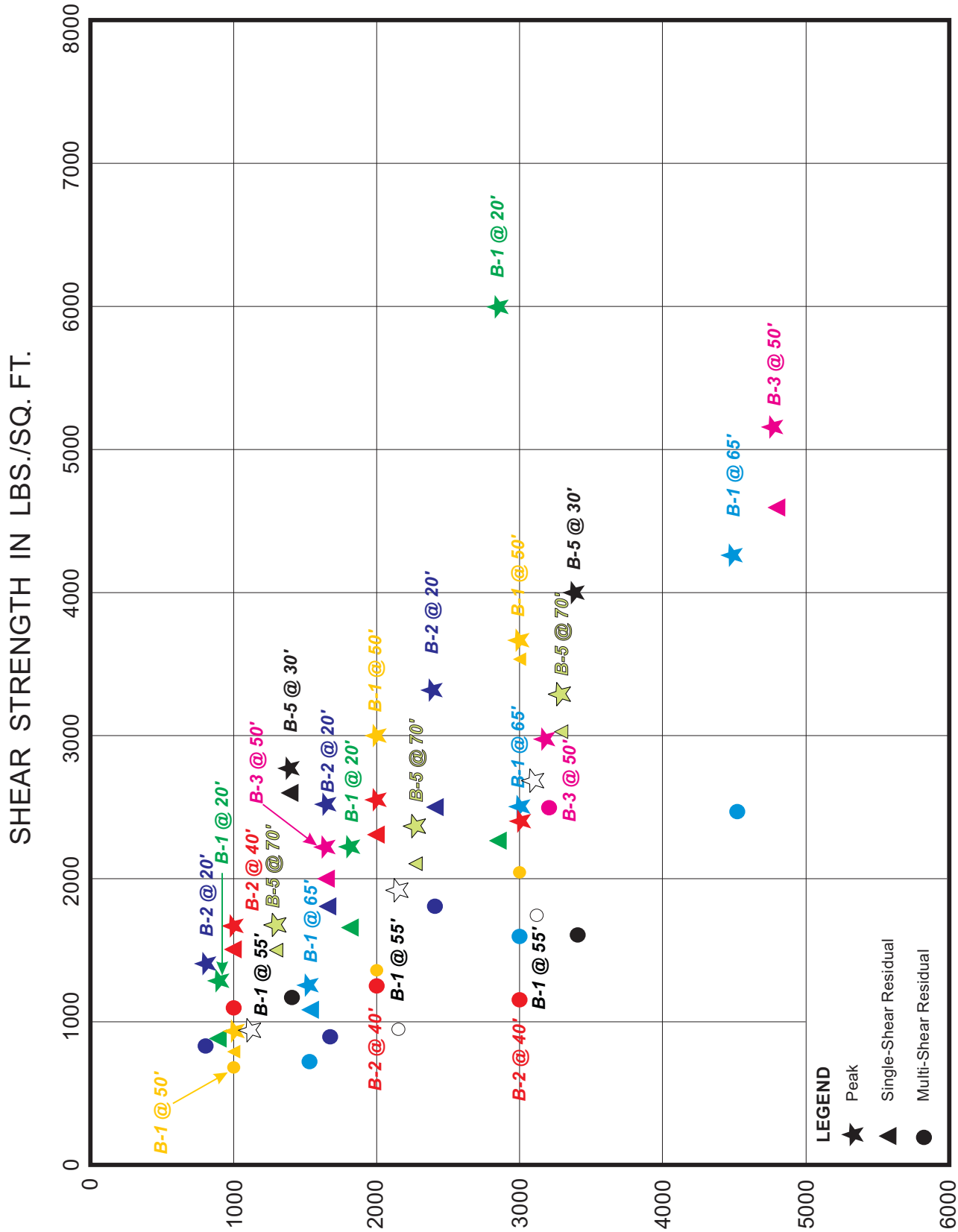
Atterberg limits (liquid and plastic limit) tests were conducted on selected samples to aid in classifying the soils and determining index properties. Test results are presented on the attached graphic, "Atterberg Limit's Test Data."

The gradation of selected samples was determined by performing sieve analyses. Hydrometer tests were performed on some of the sieve analyses samples. The results of the tests are presented on Gradation Test Data pages.

SUMMARY OF SHEAR TEST DATA



SUMMARY OF SHEAR TEST DATA



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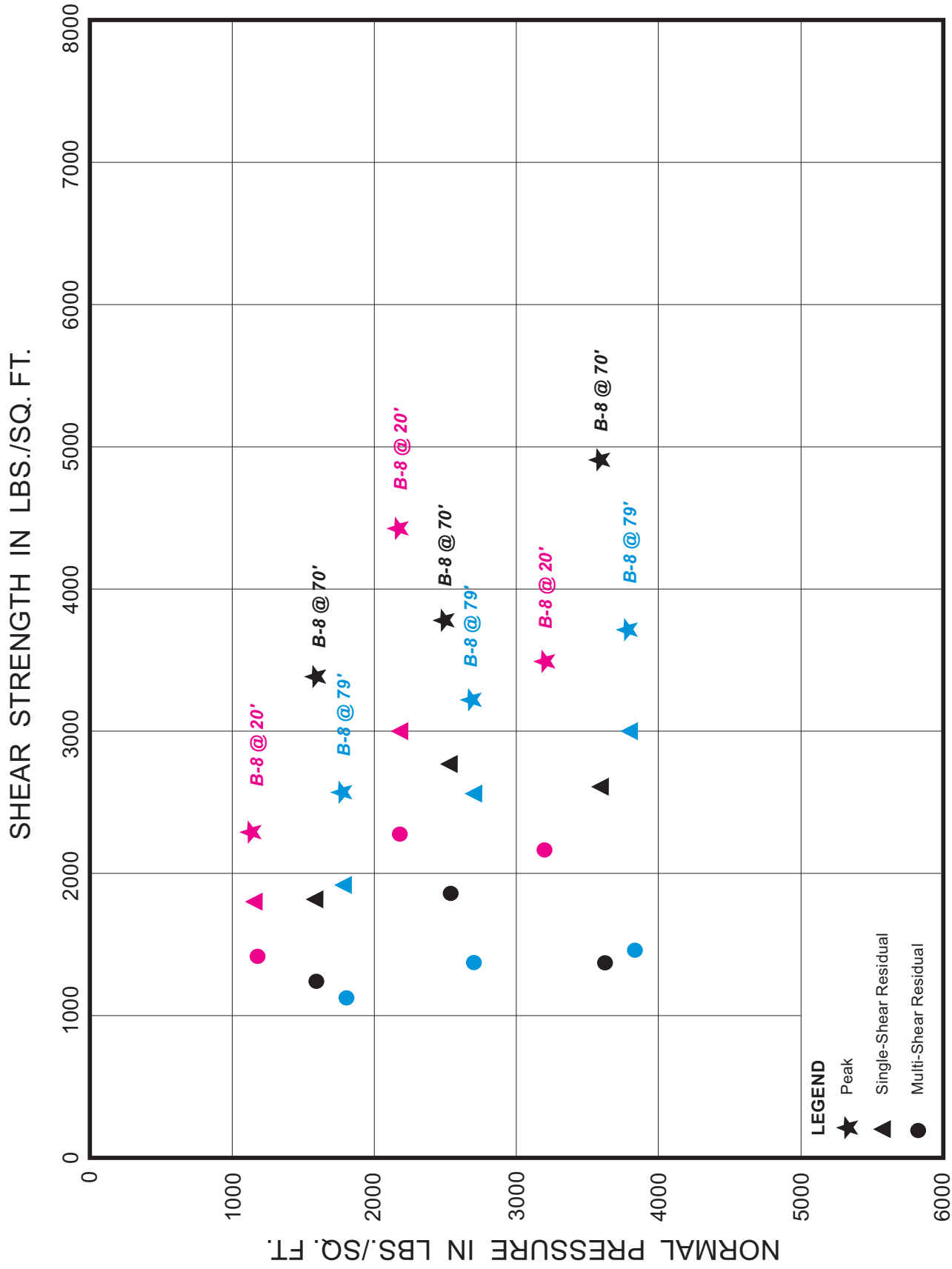
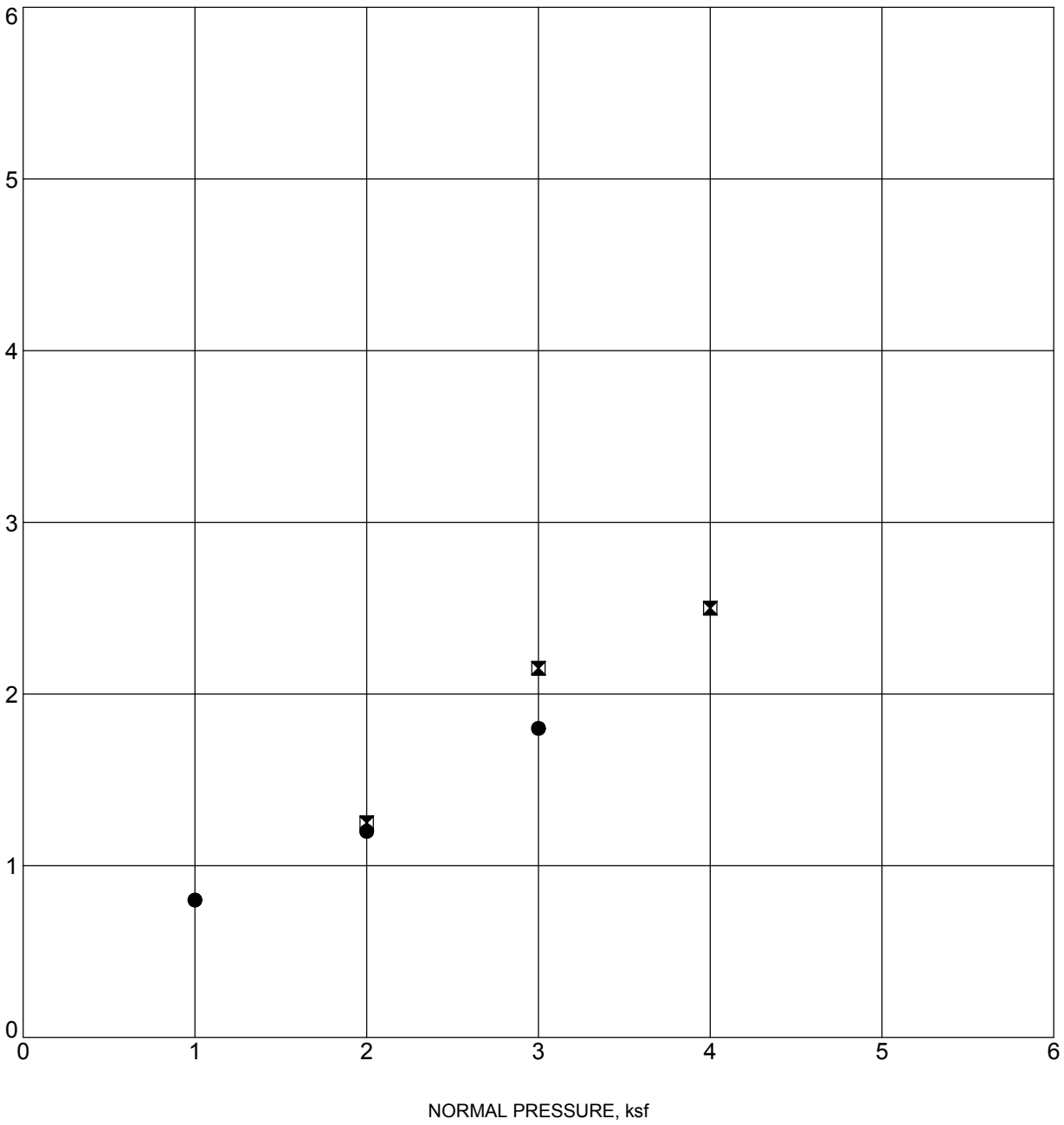




Specimen Identification		Classification				
●	**B-1-11 11.0'**					
⊠	**B-1-11 45.0'**					

R. T. Frankian & Associates
1329 Scott Road
Burbank, Ca 91504
Telephone: (818) 531-1501
Fax: (818) 531-1511

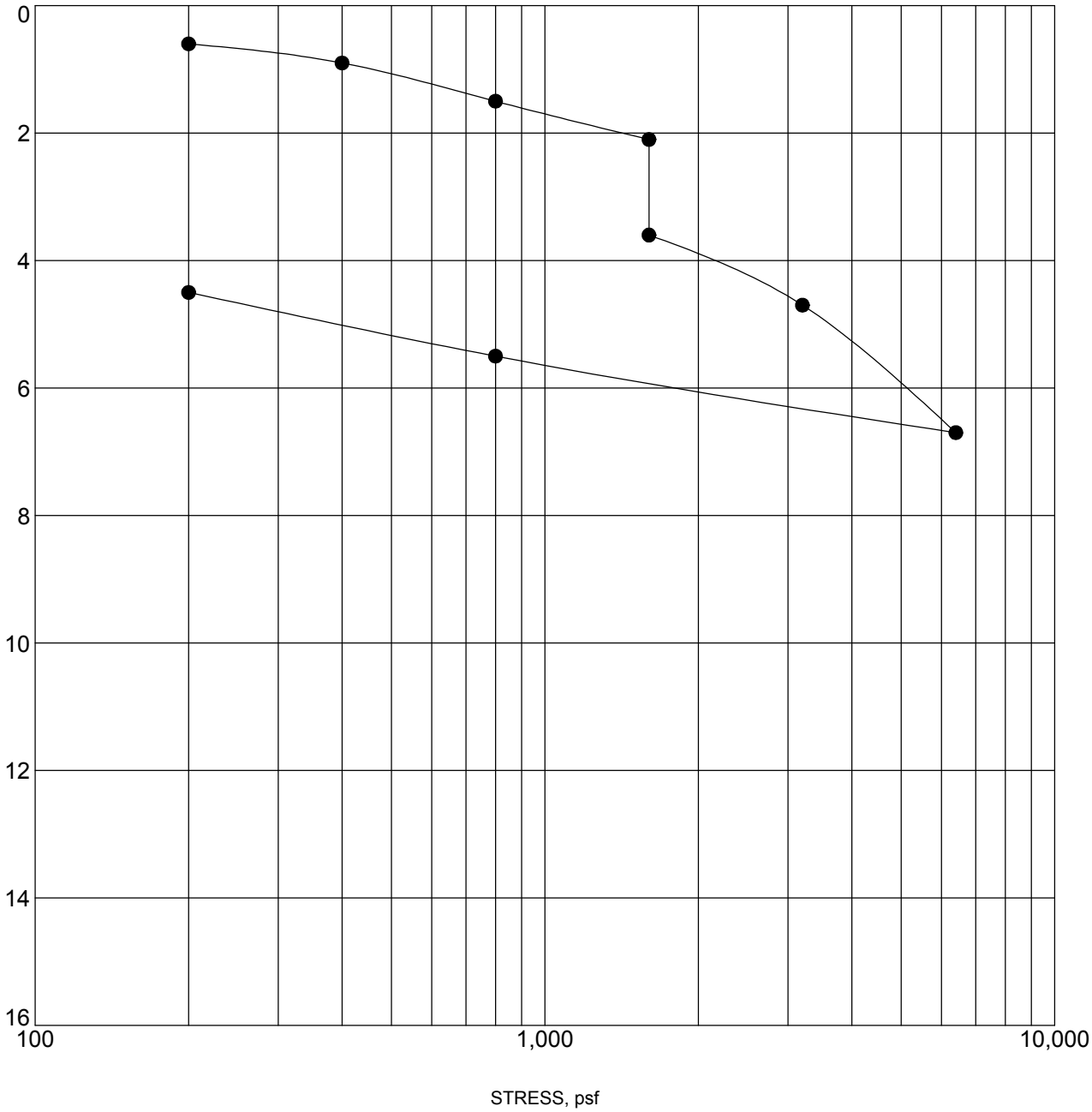
DIRECT SHEAR TEST

JOB NUMBER: 2002-036-006

REPORT DATED: 01-13-2012

US DIRECT SHEAR 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



Water added at 1600 psf

	Specimen Identification		Classification		
●	**B-2-10**	**10.0'**			

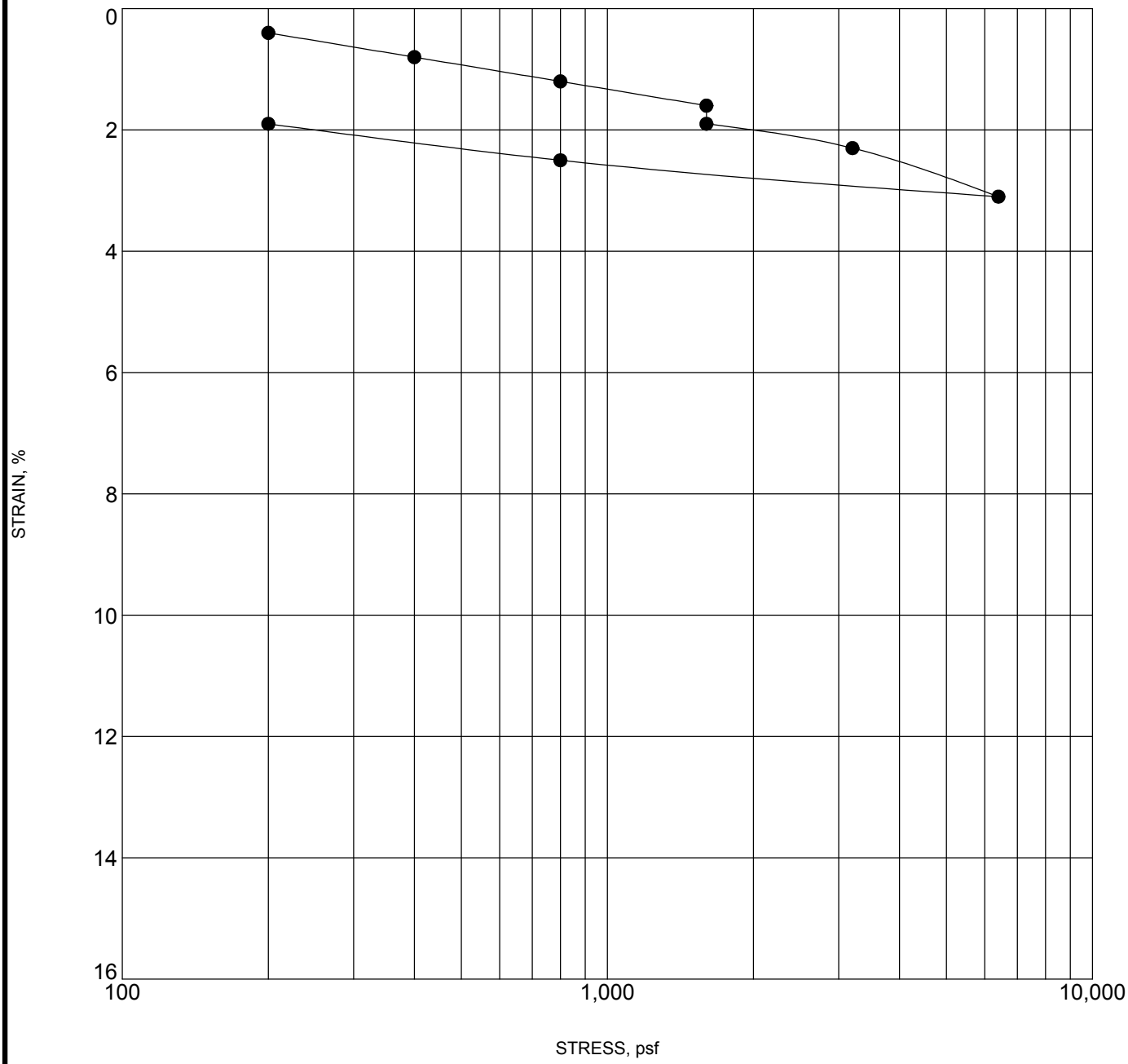
R. T. Frankian & Associates
1329 Scott Road
Burbank, Ca 91504
Telephone: (818) 531-1501
Fax: (818) 531-1511

CONSOLIDATION TEST

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

US CONSOL STRAIN 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11



Water added at 1600 psf

Specimen Identification		Classification		
●	**B-6-10 10.0'**			

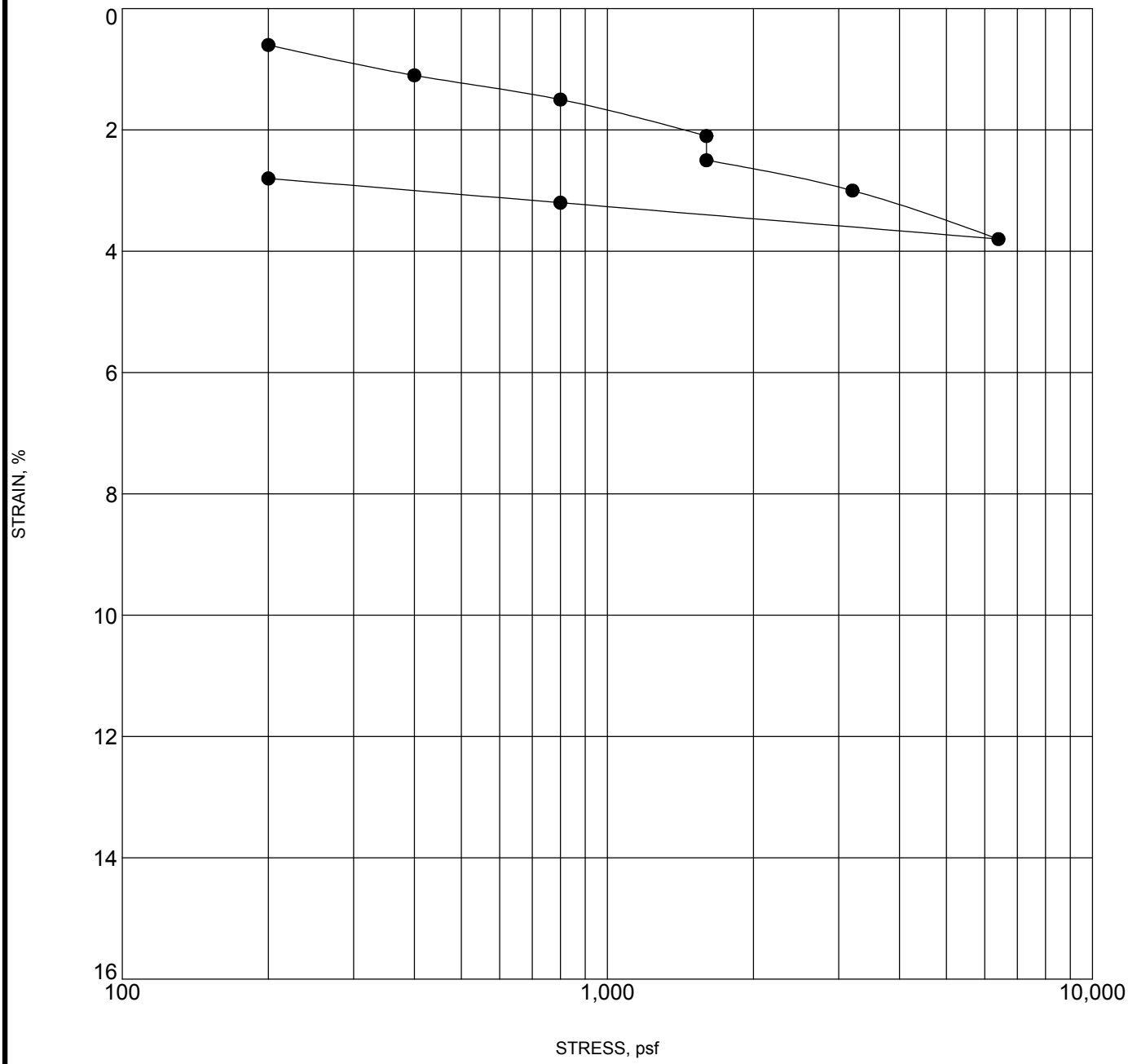
R. T. Frankian & Associates
1329 Scott Road
Burbank, Ca 91504
Telephone: (818) 531-1501
Fax: (818) 531-1511

CONSOLIDATION TEST

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

US CONSOL STRAIN 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11



Water added at 1600 psf

	Specimen Identification		Classification		
●	**B-6-10**	**20.0'**			

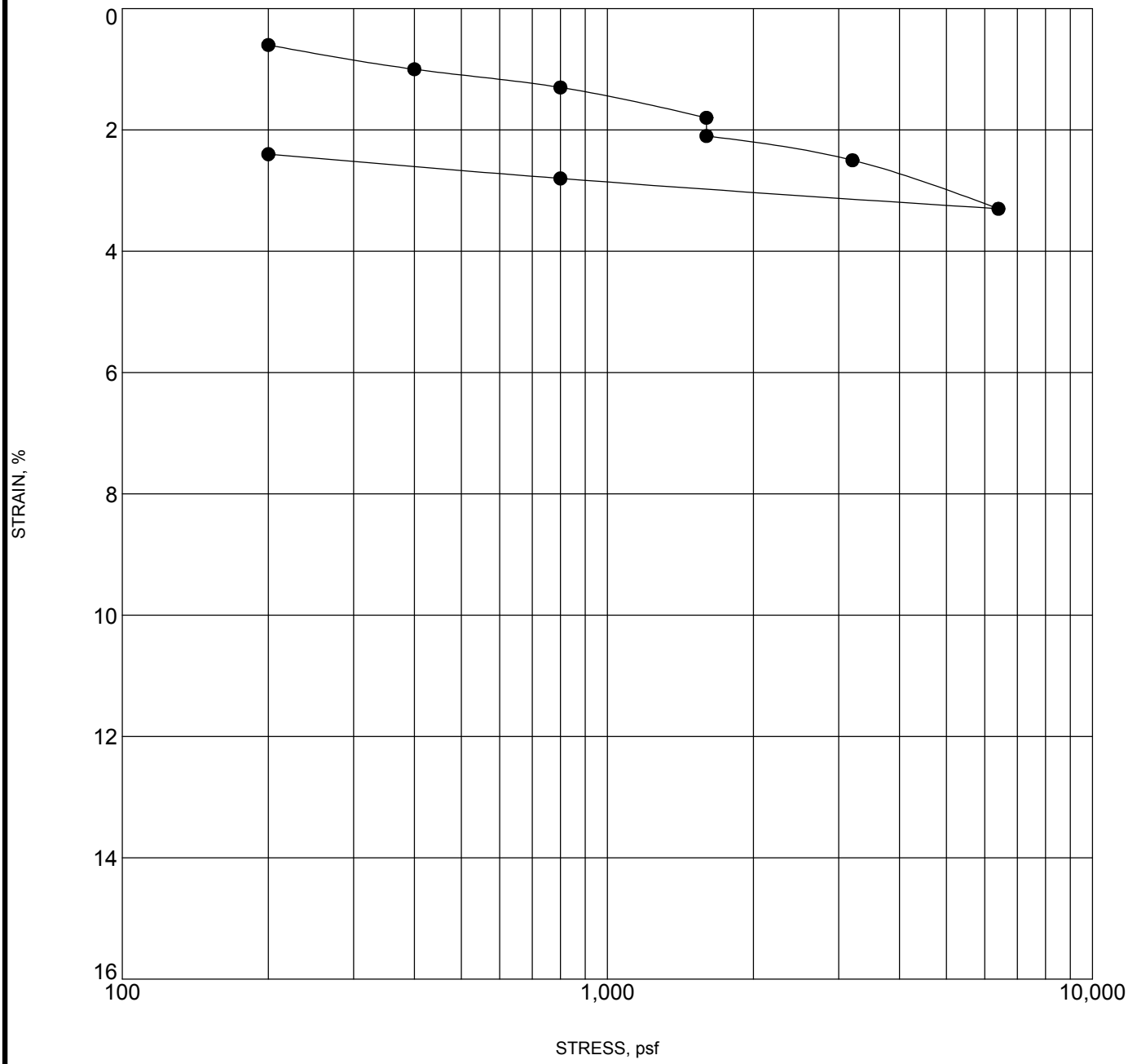
R. T. Frankian & Associates
1329 Scott Road
Burbank, Ca 91504
Telephone: (818) 531-1501
Fax: (818) 531-1511

CONSOLIDATION TEST

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

US CONSOL STRAIN 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11



Water added at 1600 psf

Specimen Identification		Classification		
●	**B-6-10 30.0'**			

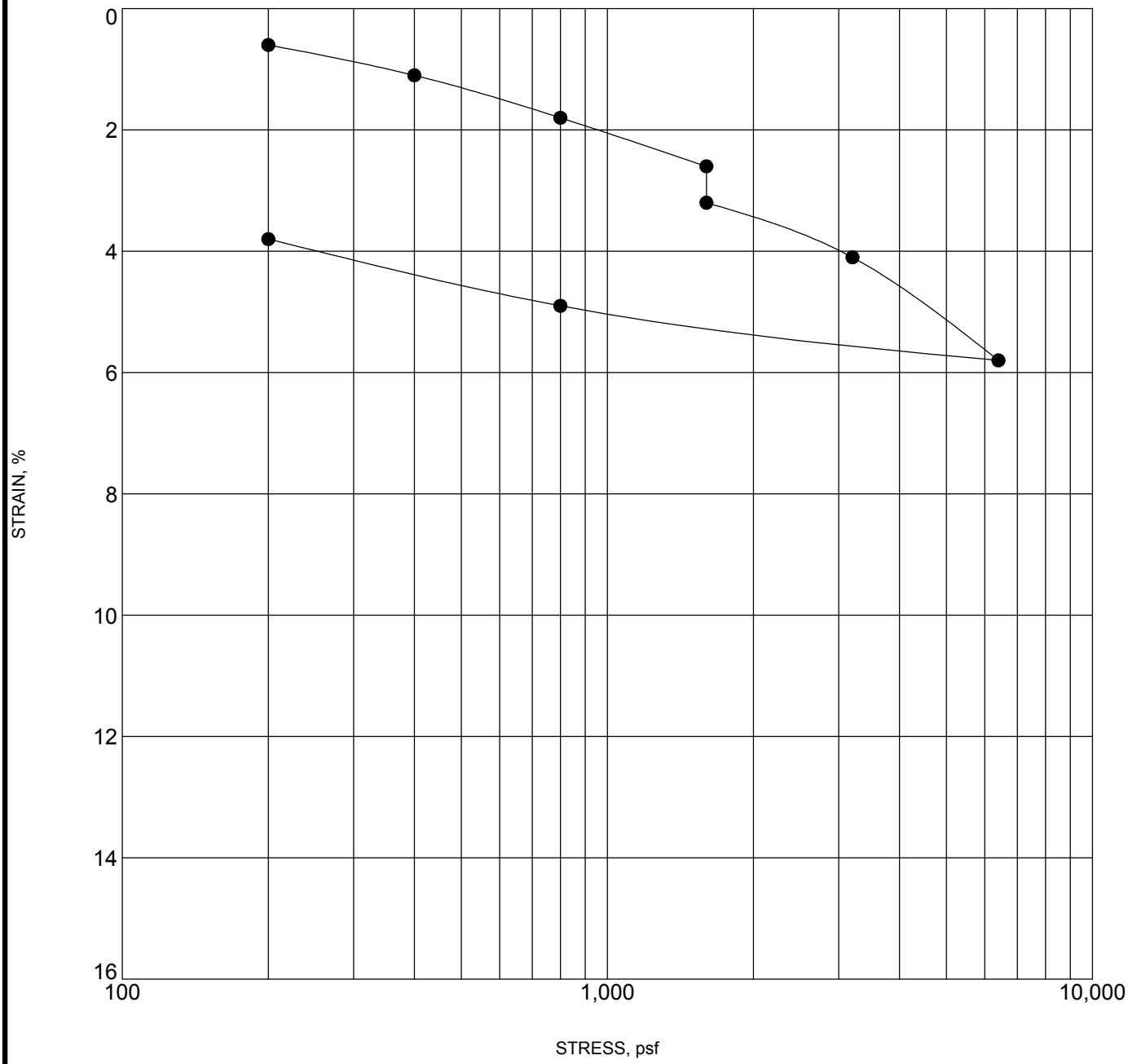
R. T. Frankian & Associates
1329 Scott Road
Burbank, Ca 91504
Telephone: (818) 531-1501
Fax: (818) 531-1511

CONSOLIDATION TEST

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

US CONSOL STRAIN 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11



Water added at 1600 psf

	Specimen Identification		Classification		
●	**HS-1-10**	**5.0'**			

R. T. Frankian & Associates
1329 Scott Road
Burbank, Ca 91504
Telephone: (818) 531-1501
Fax: (818) 531-1511

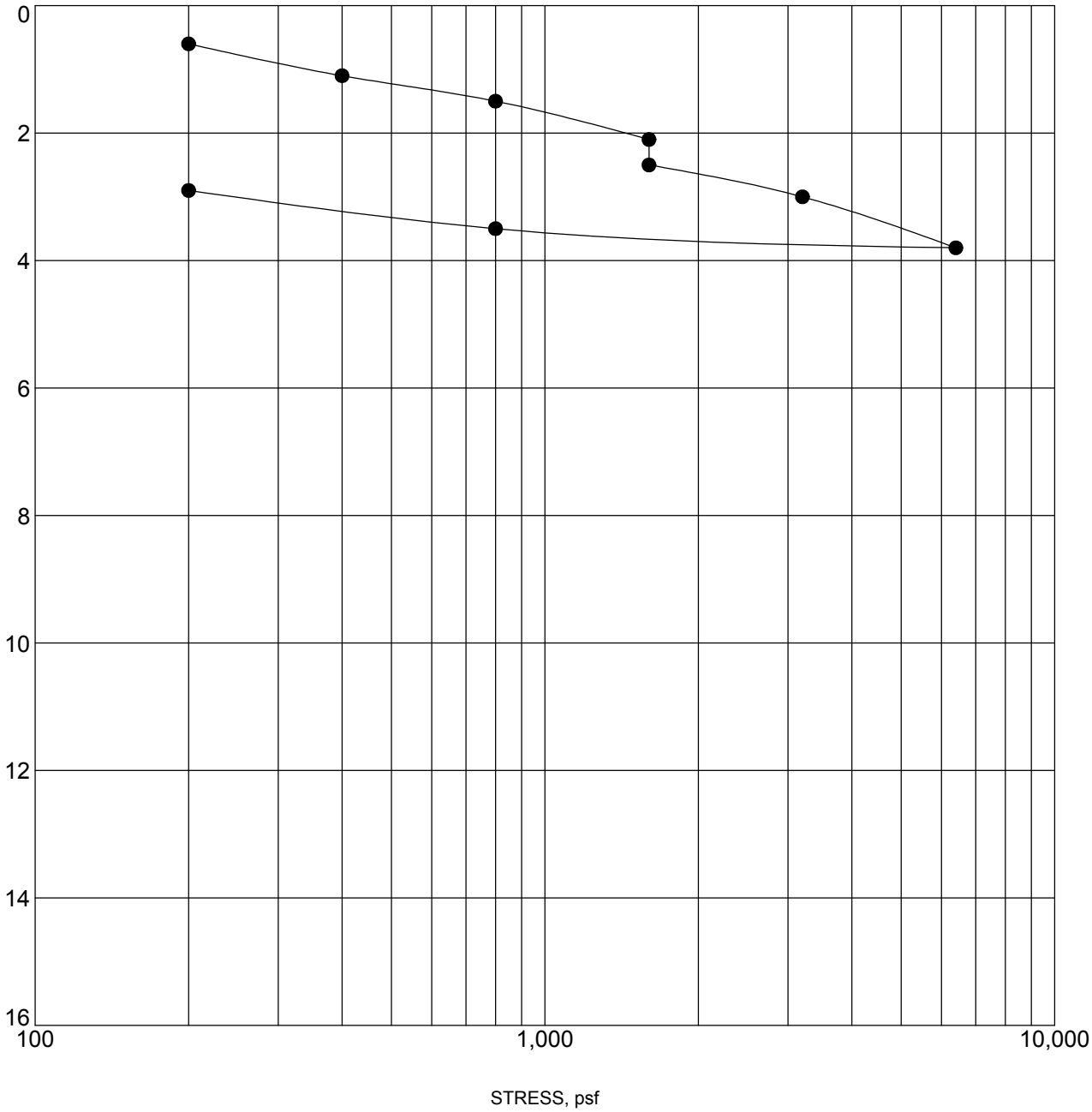
CONSOLIDATION TEST

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

US CONSOL STRAIN 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



Water added at 1600 psf

	Specimen Identification		Classification		
●	**HS-1-10**	**15.0'**			

R. T. Frankian & Associates
1329 Scott Road
Burbank, Ca 91504
Telephone: (818) 531-1501
Fax: (818) 531-1511

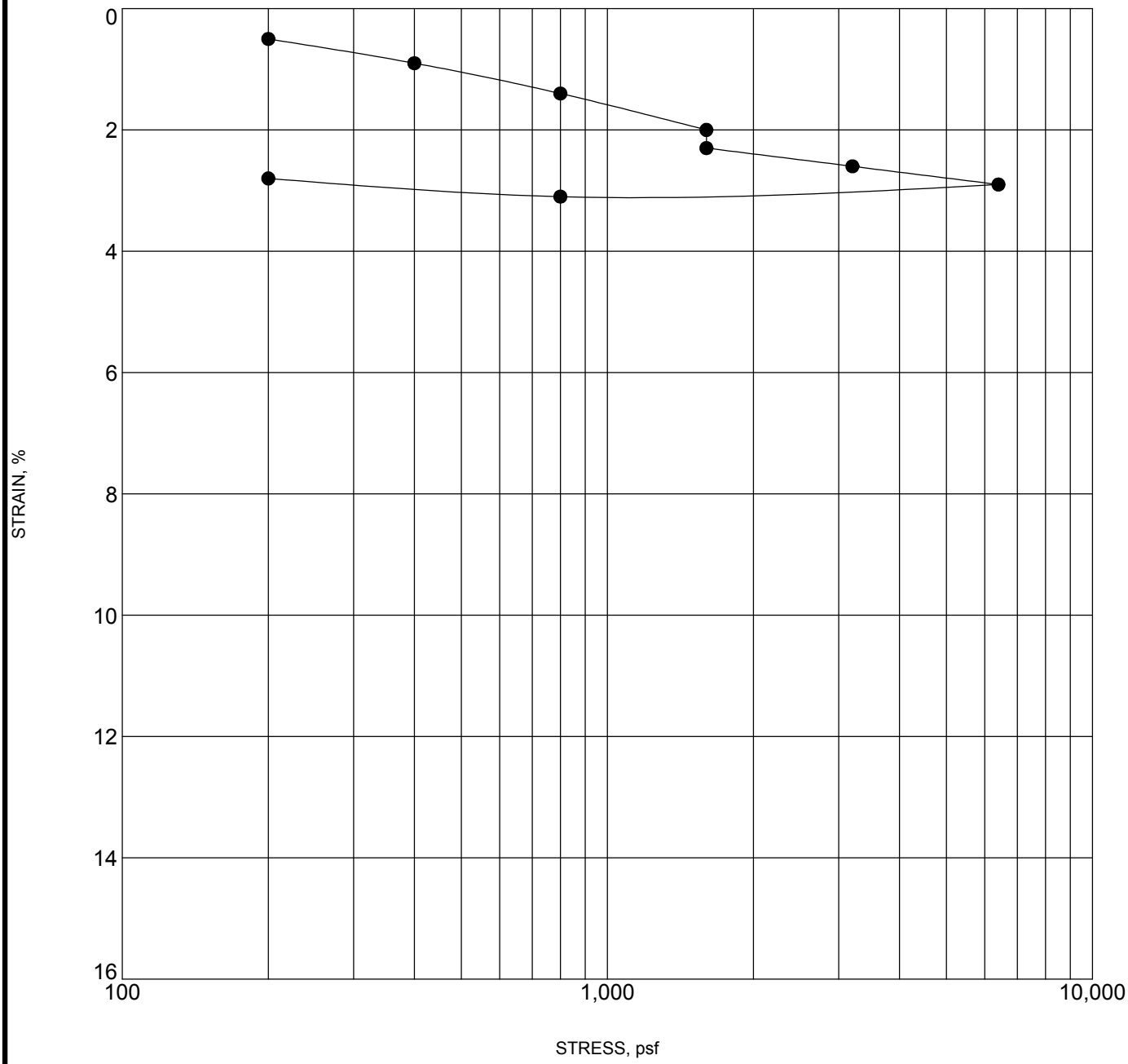
CONSOLIDATION TEST

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

US CONSOL STRAIN 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



Water added at 1600 psf

	Specimen Identification		Classification		
●	**HS-1-10**	**25.0'**			

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1329 Scott Road
Burbank, Ca 91504
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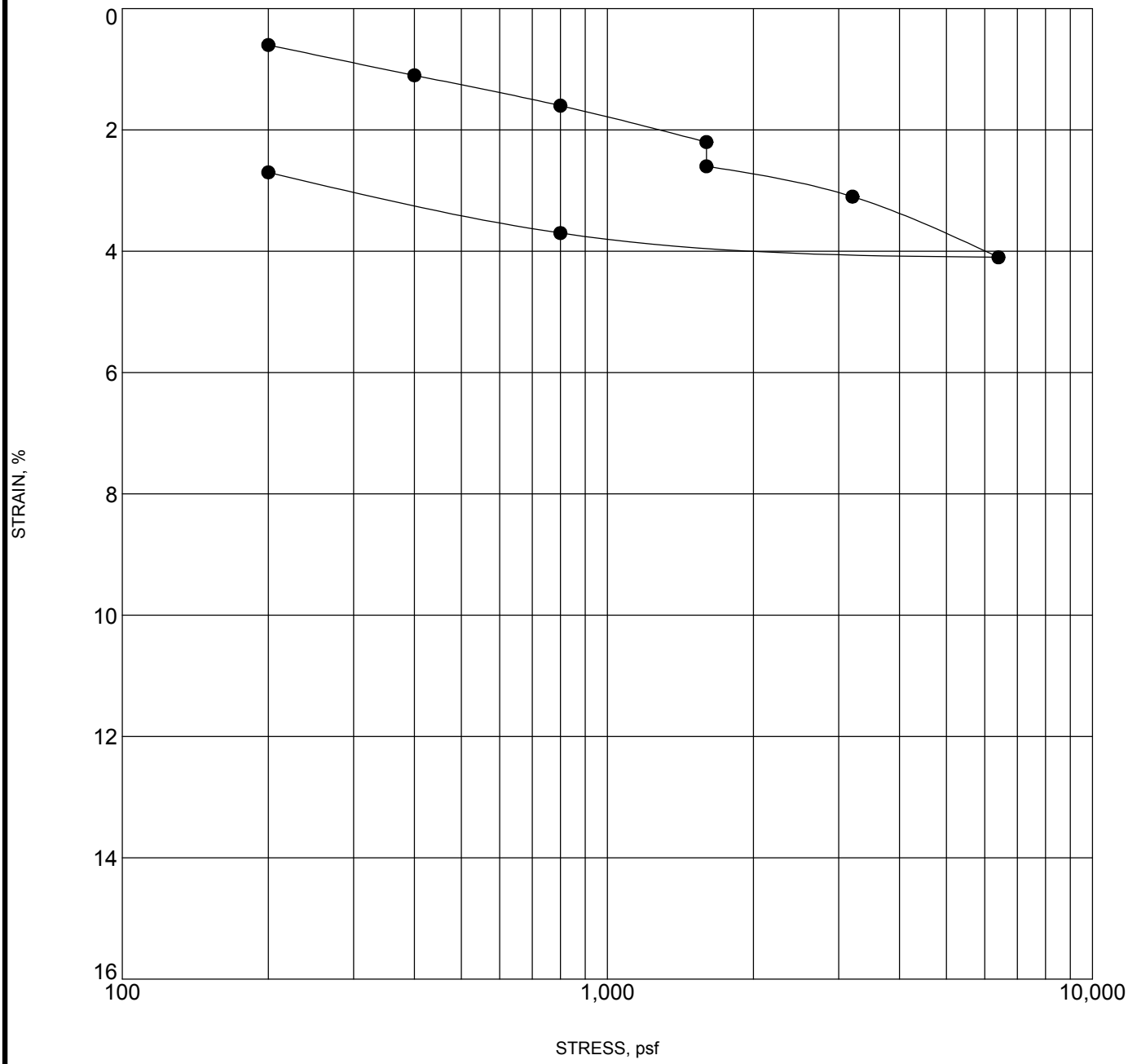
CONSOLIDATION TEST

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

US CONSOL STRAIN 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11



Water added at 1600 psf

	Specimen Identification		Classification		
●	**HS-1-10**	**35.0'**			

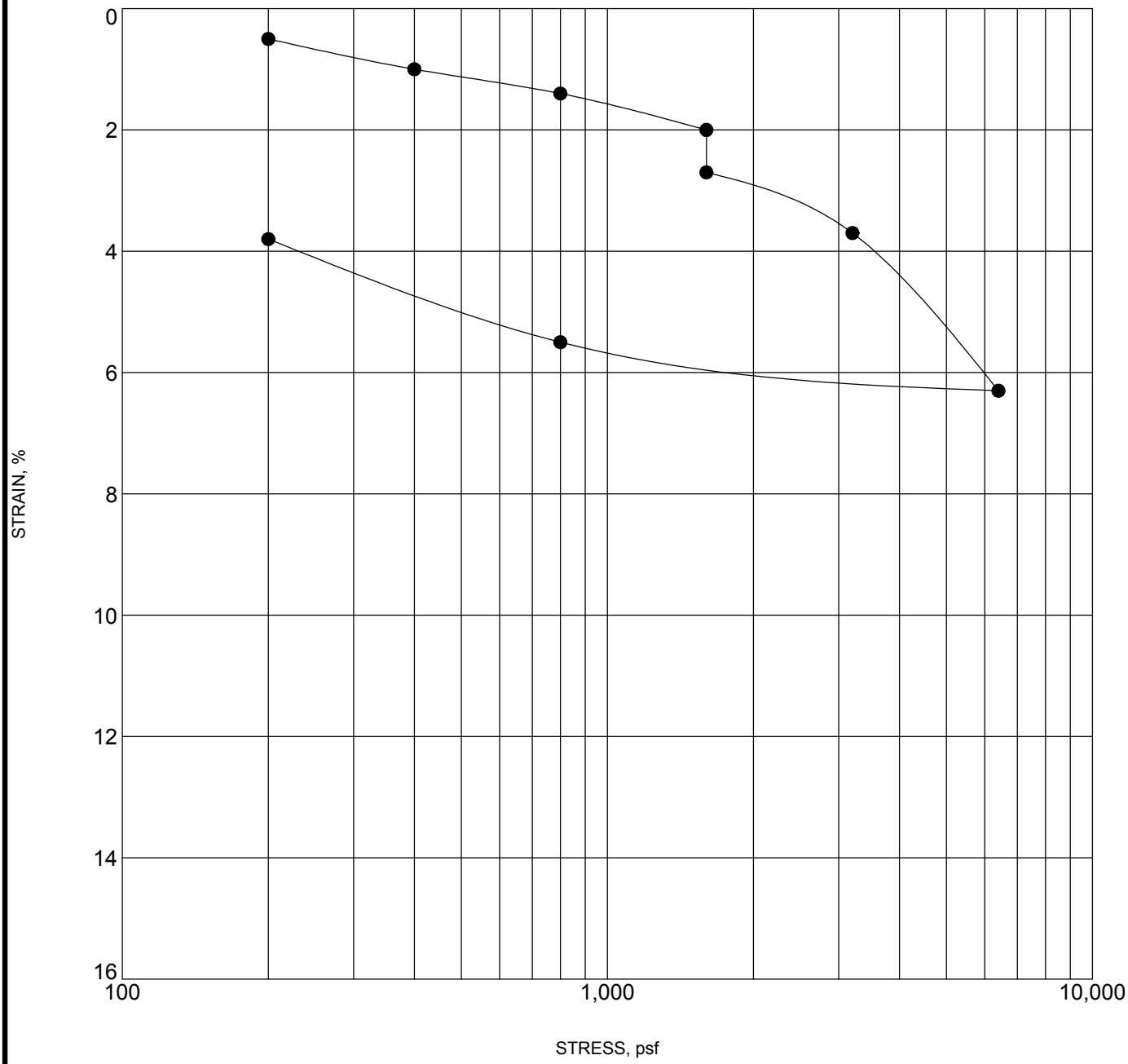
R. T. Frankian & Associates
1329 Scott Road
Burbank, Ca 91504
Telephone: (818) 531-1501
Fax: (818) 531-1511

CONSOLIDATION TEST

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

US CONSOL STRAIN 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11



Water added at 1600 psf

	Specimen Identification		Classification		
●	**HS-2-10**	**5.0'**			

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1329 Scott Road
Burbank, Ca 91504
Telephone: (818) 531-1501
Fax: (818) 531-1511

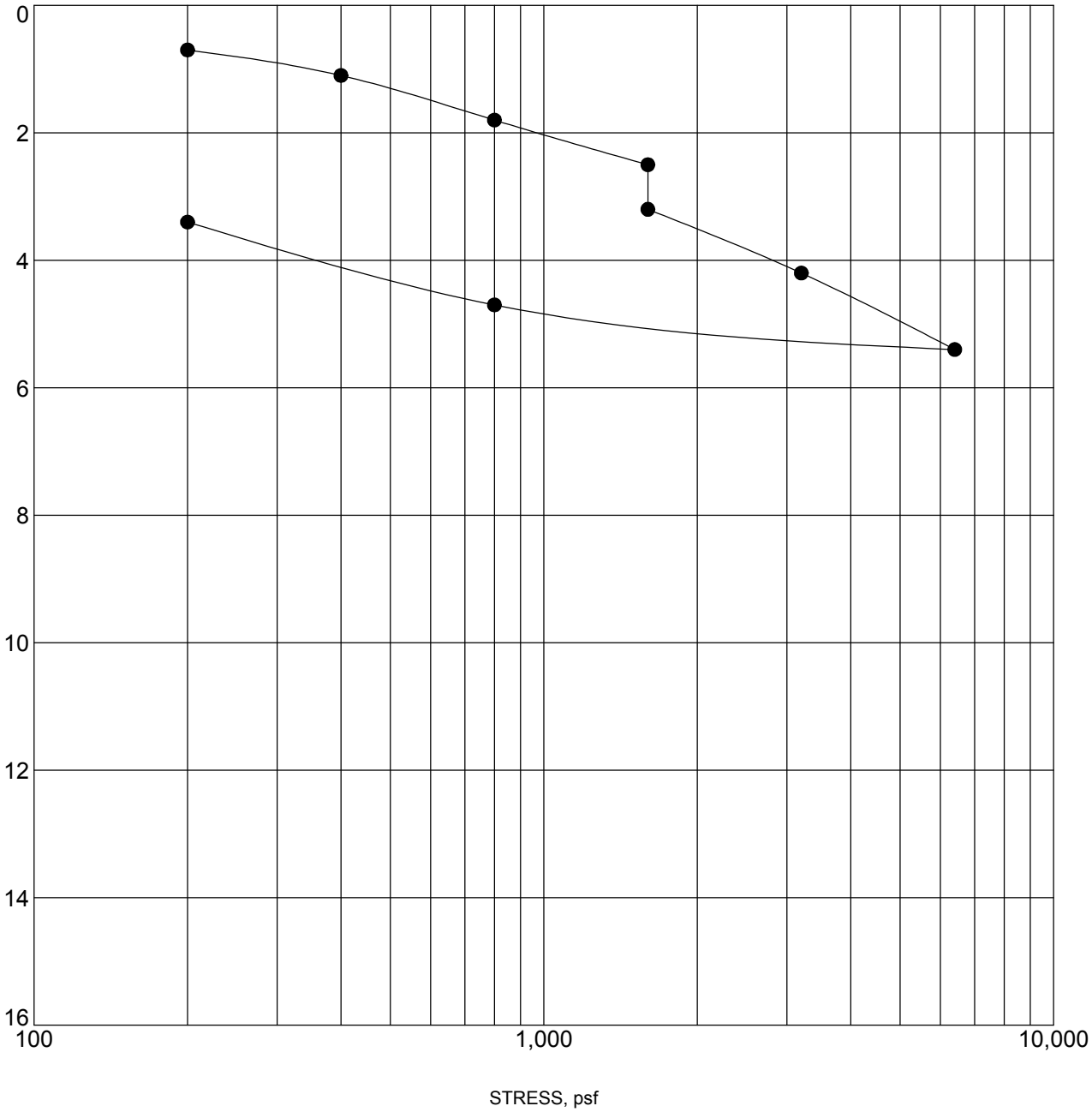
CONSOLIDATION TEST

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

US CONSOL STRAIN 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



Water added at 1600 psf

Specimen Identification		Classification		
●	**B-2-11 5.0'**			

R. T. Frankian & Associates
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Burbank, Ca 91504
Telephone: (818) 531-1501
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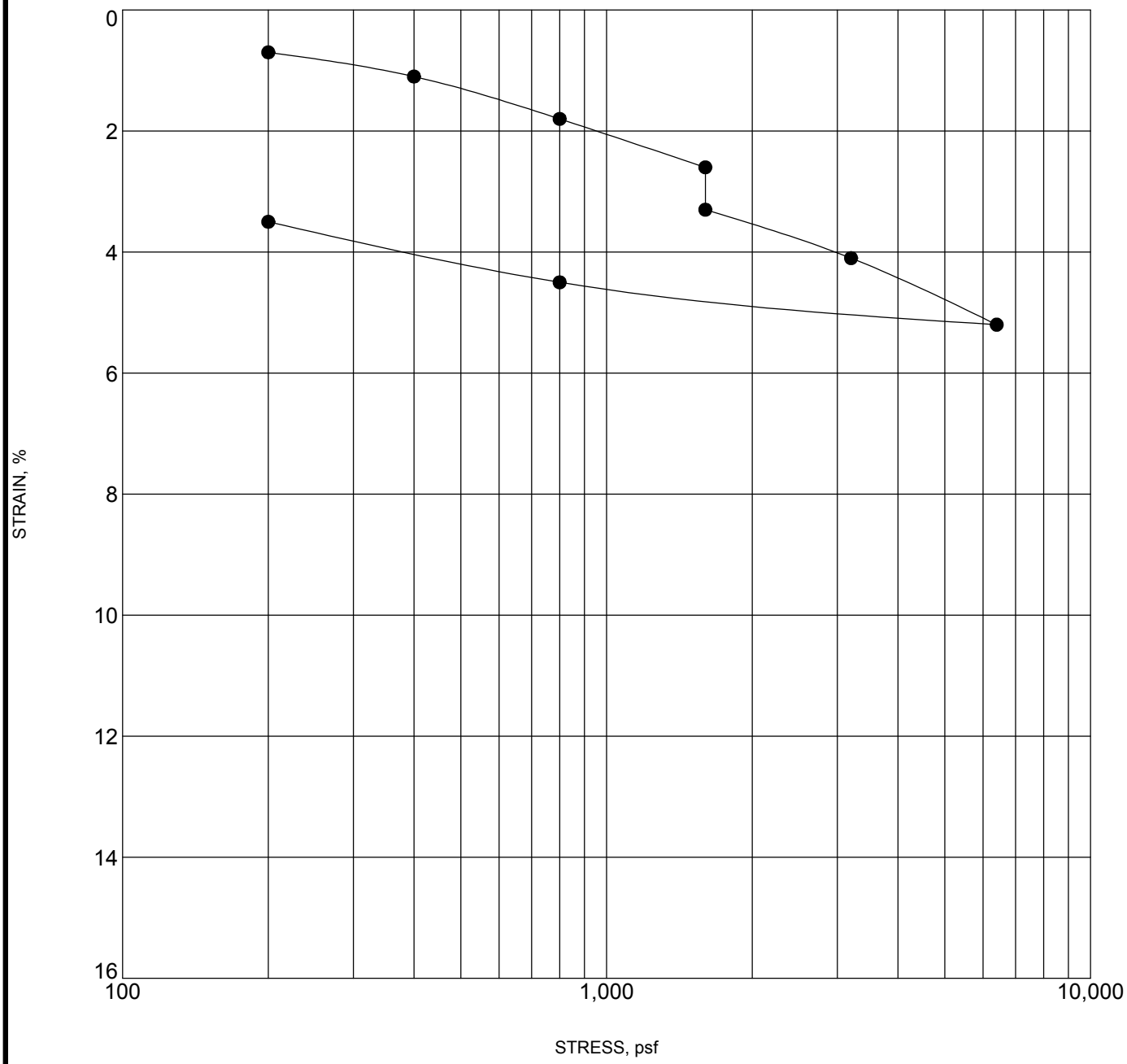
CONSOLIDATION TEST

JOB NUMBER: 2002-036-006

REPORT DATED: 01-13-2012

US CONSOL STRAIN 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



Water added at 1600 psf

Specimen Identification		Classification		
●	**B-2-11 10.5'**			

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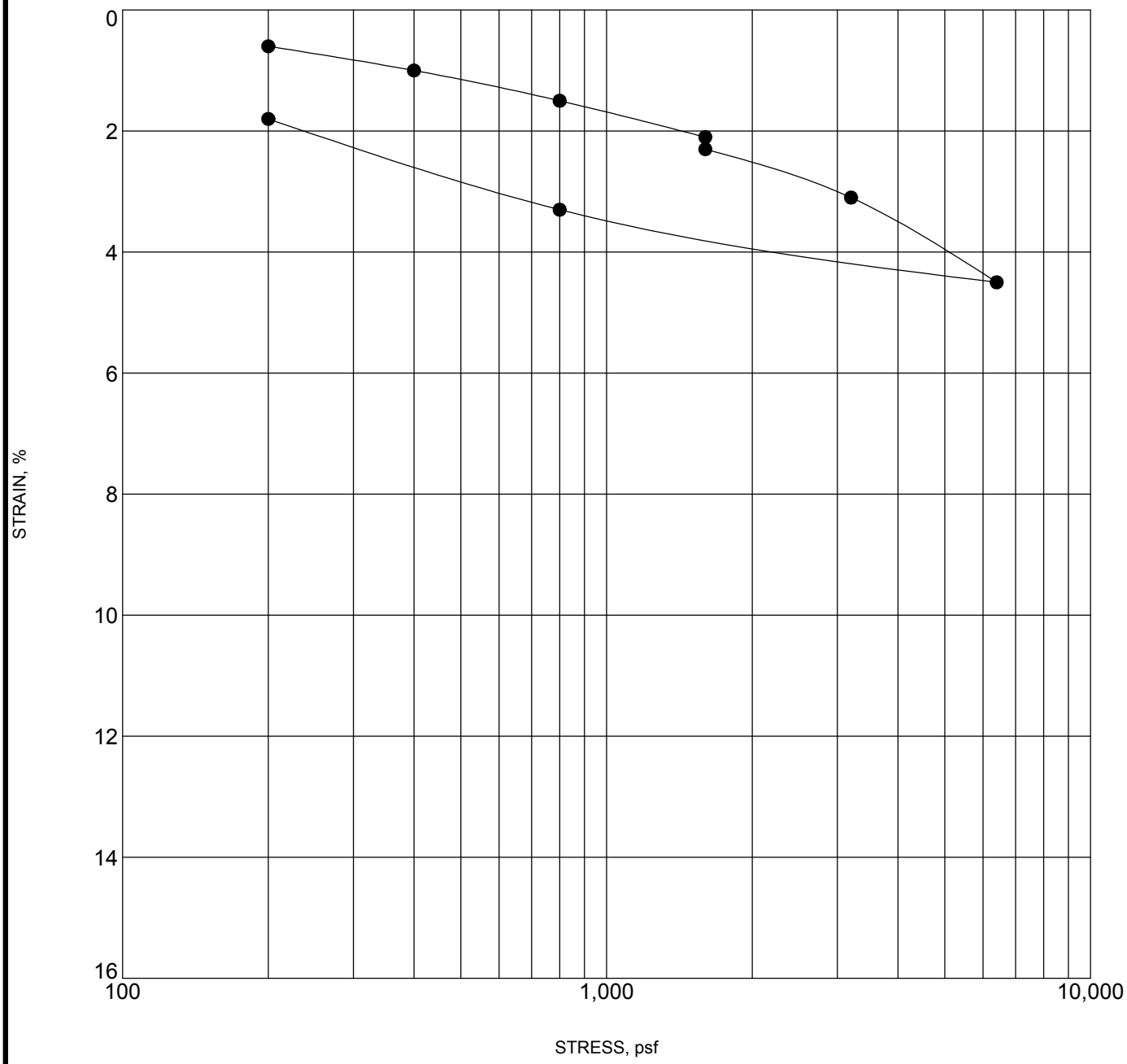
CONSOLIDATION TEST

JOB NUMBER: 2002-036-006

REPORT DATED: 01-13-2012

US CONSOL STRAIN 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



Water added at 1600 psf

Specimen Identification		Classification		
●	**B-3-11 5.0'**			

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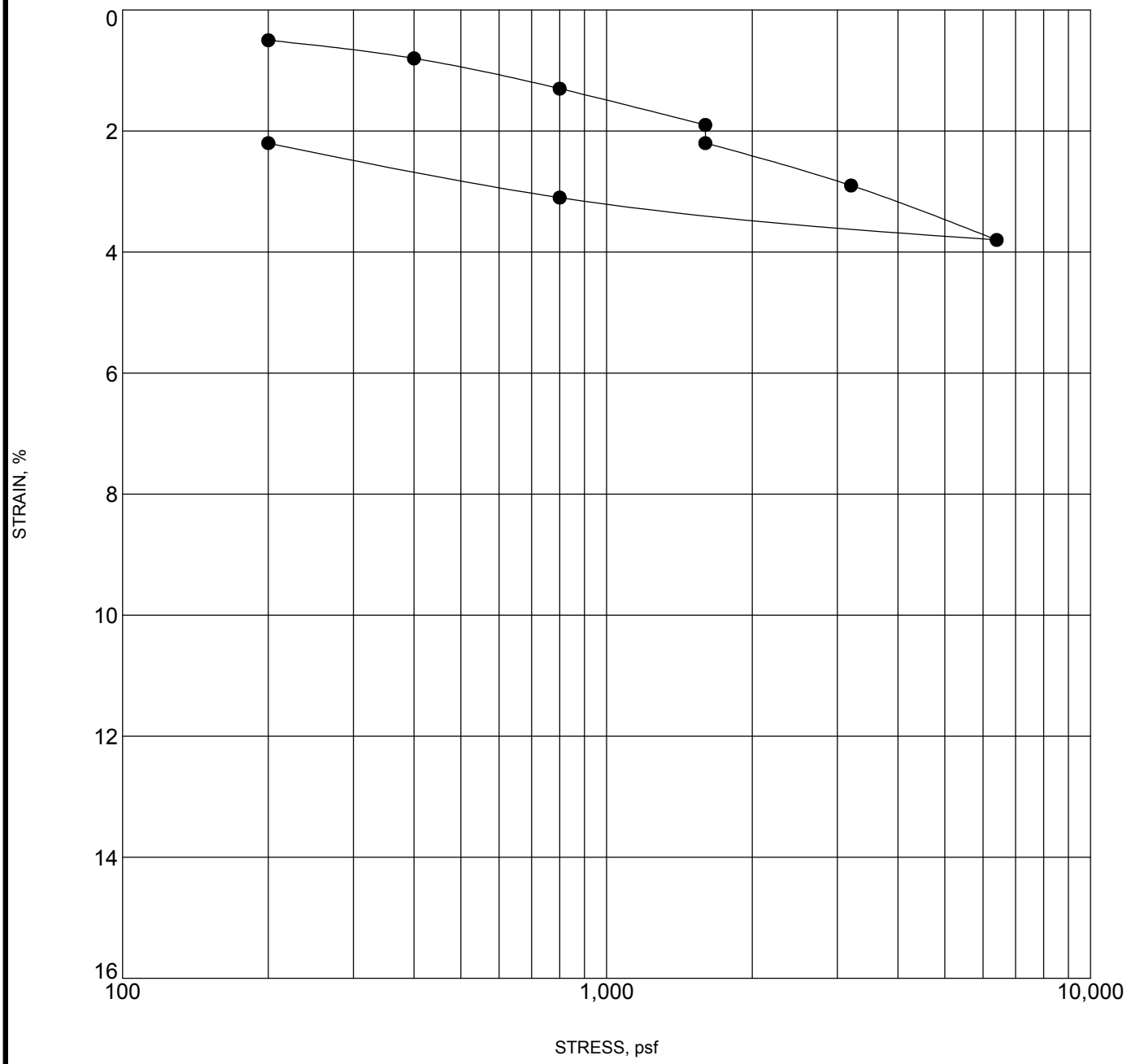
CONSOLIDATION TEST

JOB NUMBER: 2002-036-006

REPORT DATED: 01-13-2012

US CONSOL STRAIN 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



Water added at 1600 psf

Specimen Identification		Classification		
●	**B-3-11 8.0'**			

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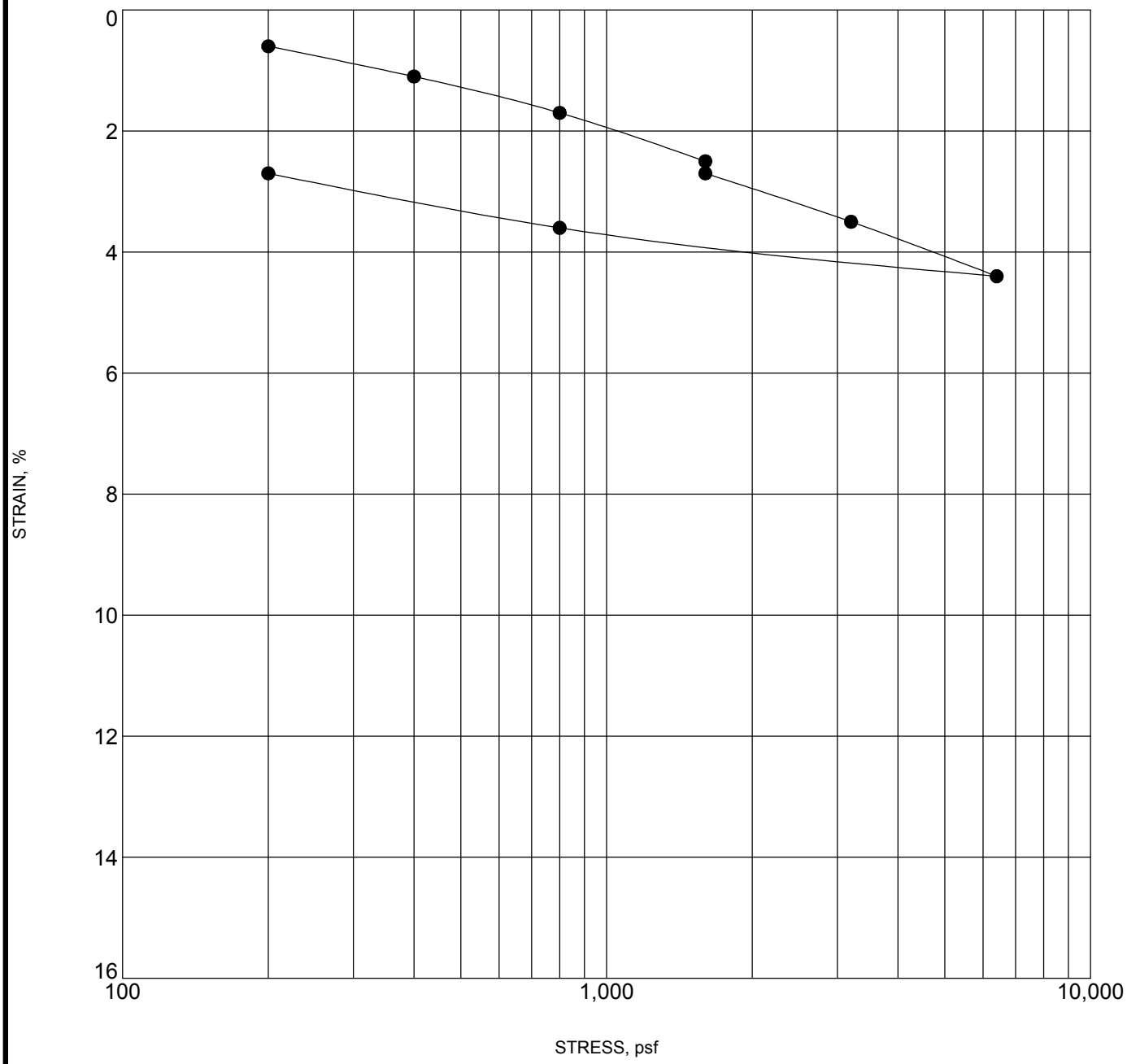
REPORT DATED: 01-13-2012

US CONSOL STRAIN 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



Water added at 1600 psf

Specimen Identification		Classification		
●	**B-3-11 10.0'**			

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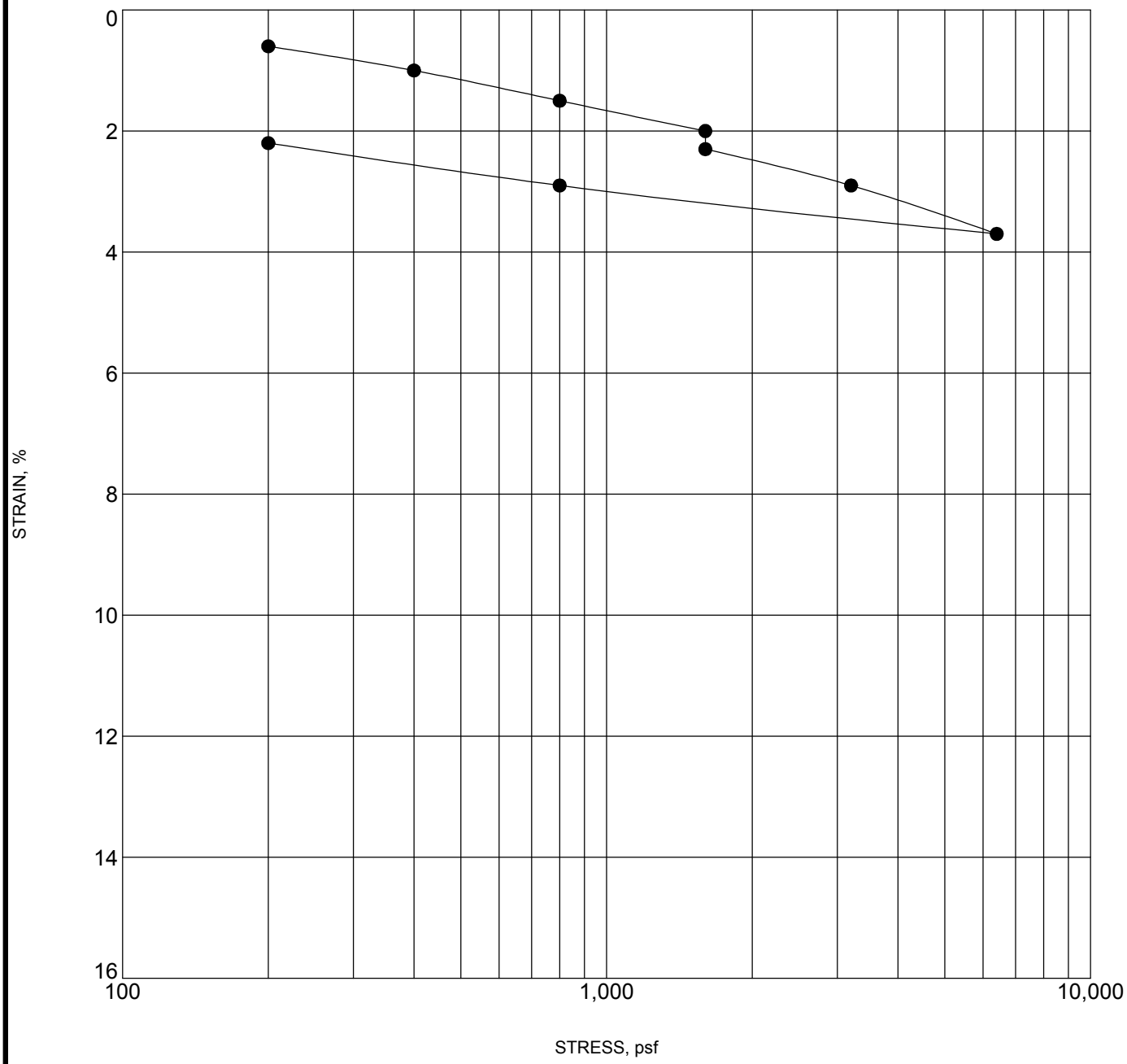
US CONSOL STRAIN 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



Water added at 1600 psf

Specimen Identification		Classification		
●	**B-3-11 15.0'**			

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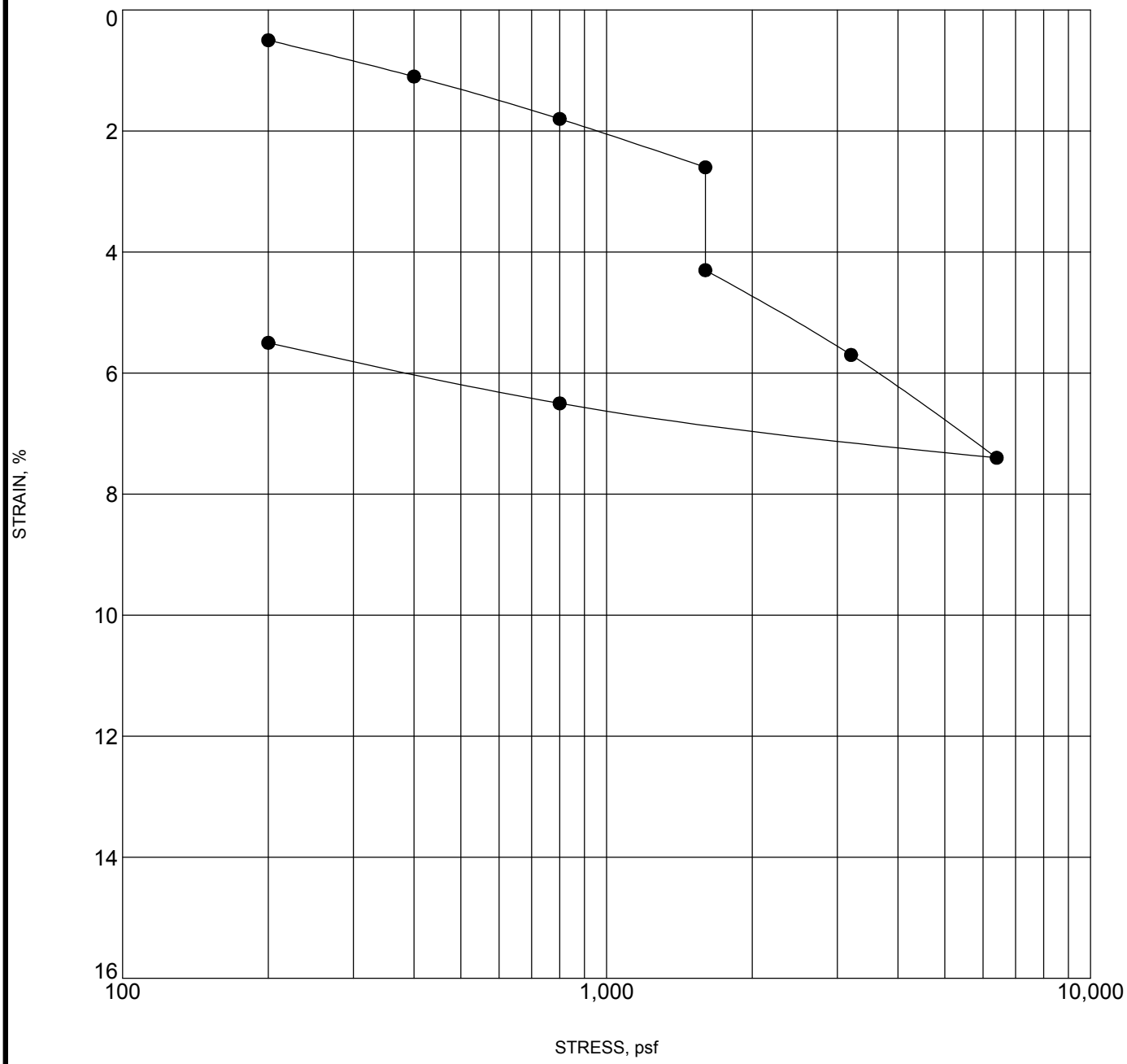
US CONSOL STRAIN 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



Water added at 1600 psf

Specimen Identification		Classification		
●	**B-4-11 5.0'**			

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CONSOLIDATION TEST

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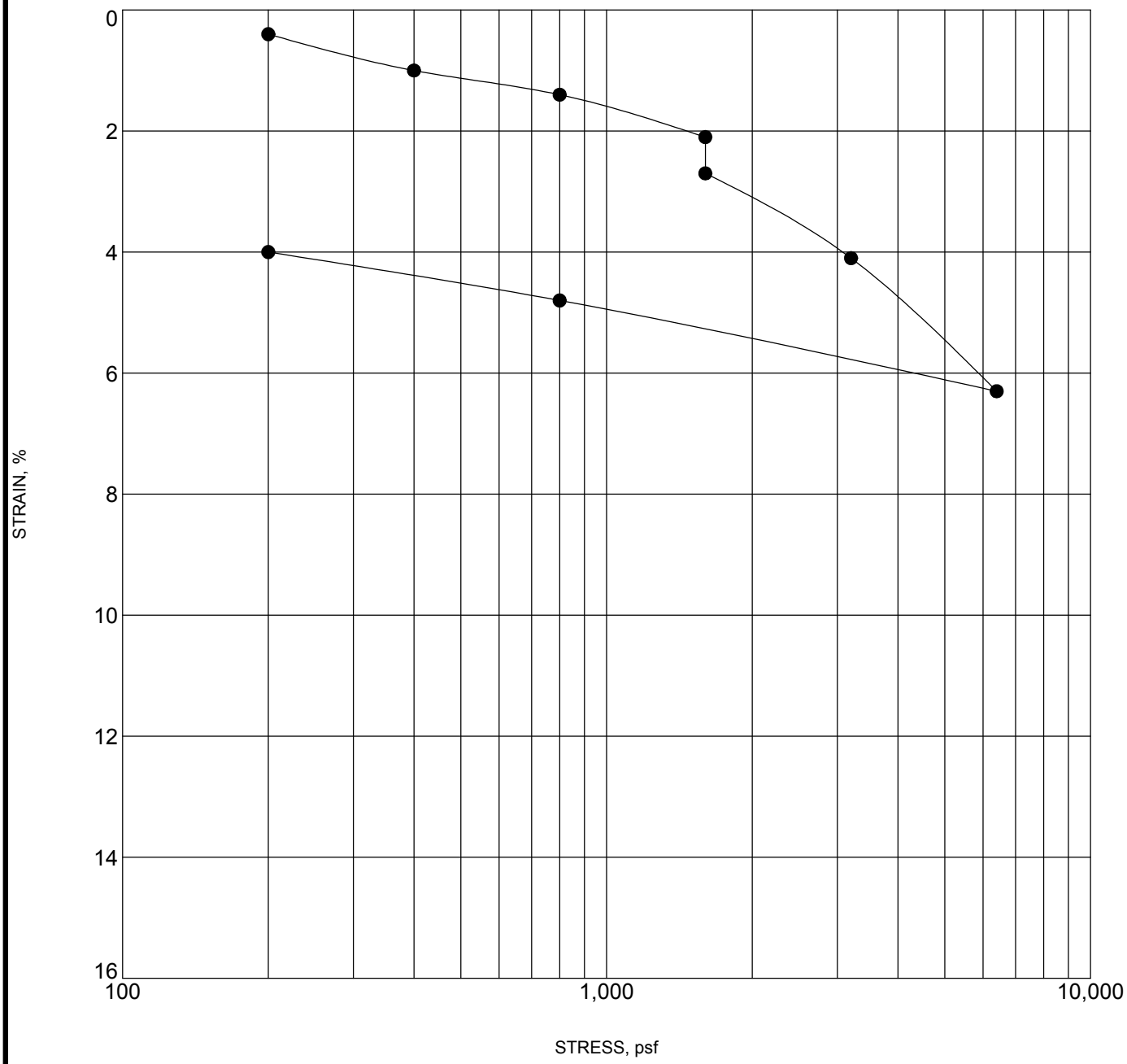
REPORT DATED: 01-13-2012

US CONSOL STRAIN 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



Water added at 1600 psf

Specimen Identification		Classification		
●	**B-4-11 9.0'**			

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CONSOLIDATION TEST

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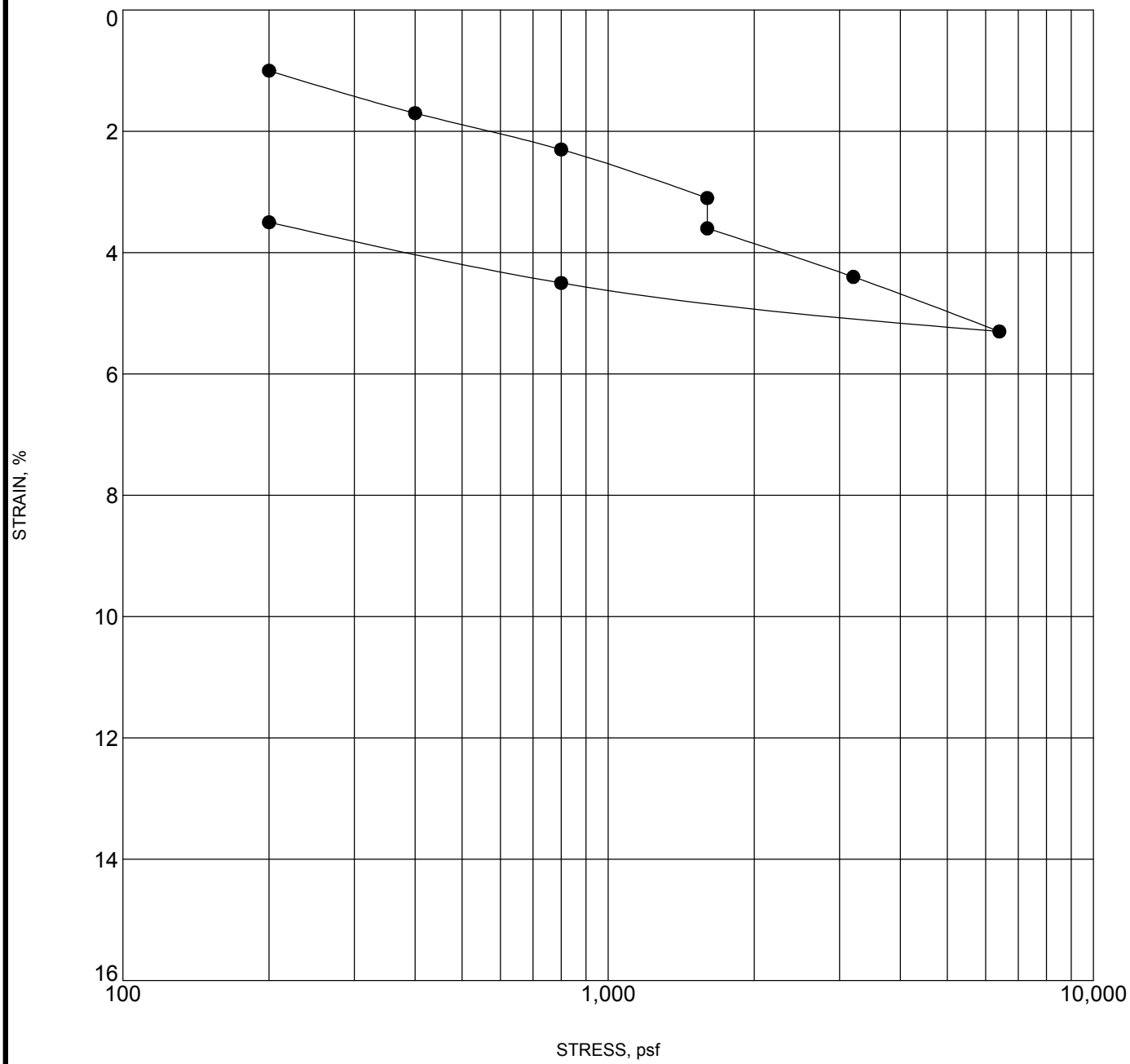
US CONSOL STRAIN 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



Water added at 1600 psf

Specimen Identification		Classification		
●	**B-4-11 12.5'**			

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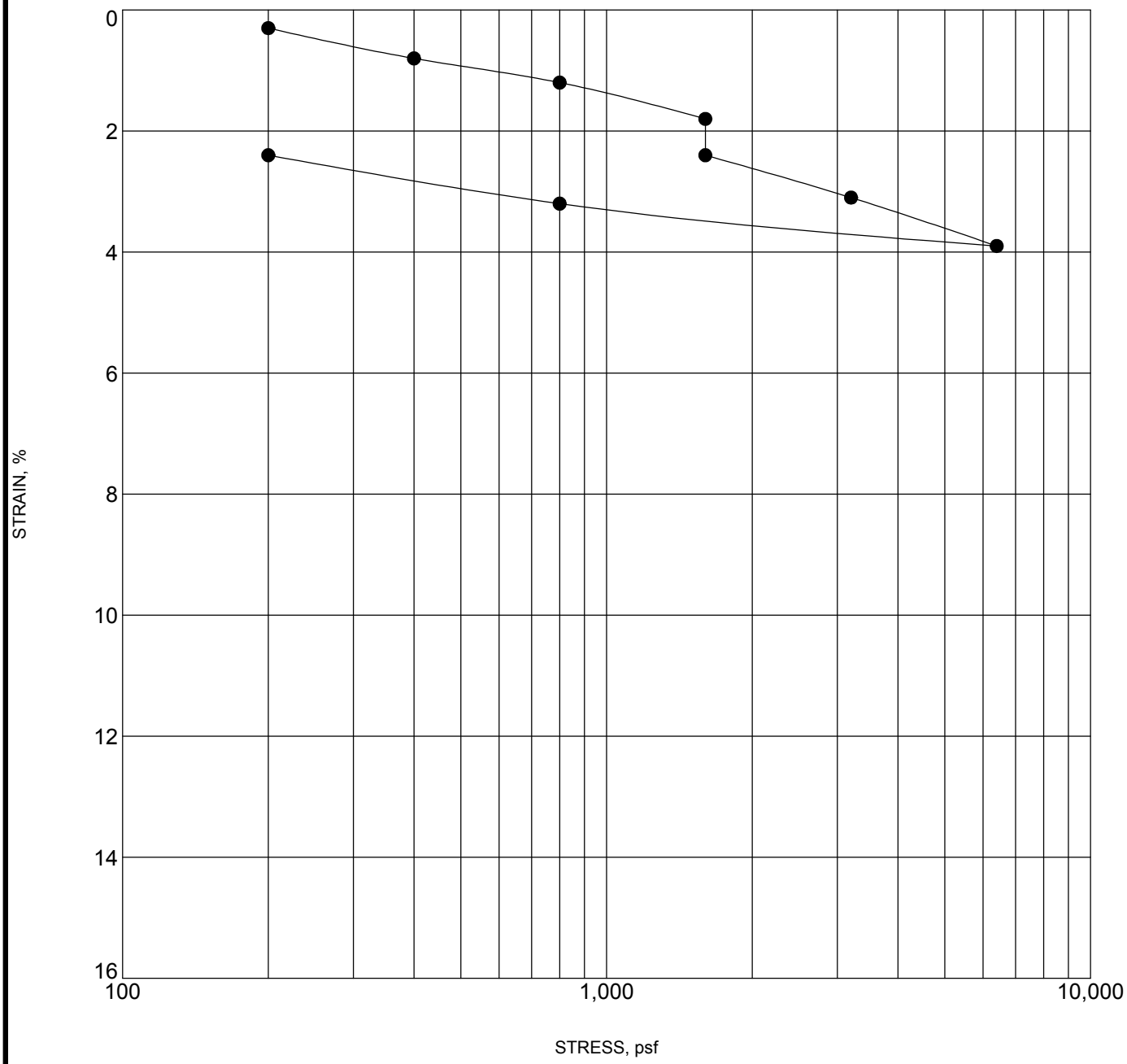
CONSOLIDATION TEST

JOB NUMBER: 2002-036-006

REPORT DATED: 01-13-2012

US CONSOL STRAIN 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



Water added at 1600 psf

Specimen Identification		Classification		
●	**B-5-11 5.0'**			

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CONSOLIDATION TEST

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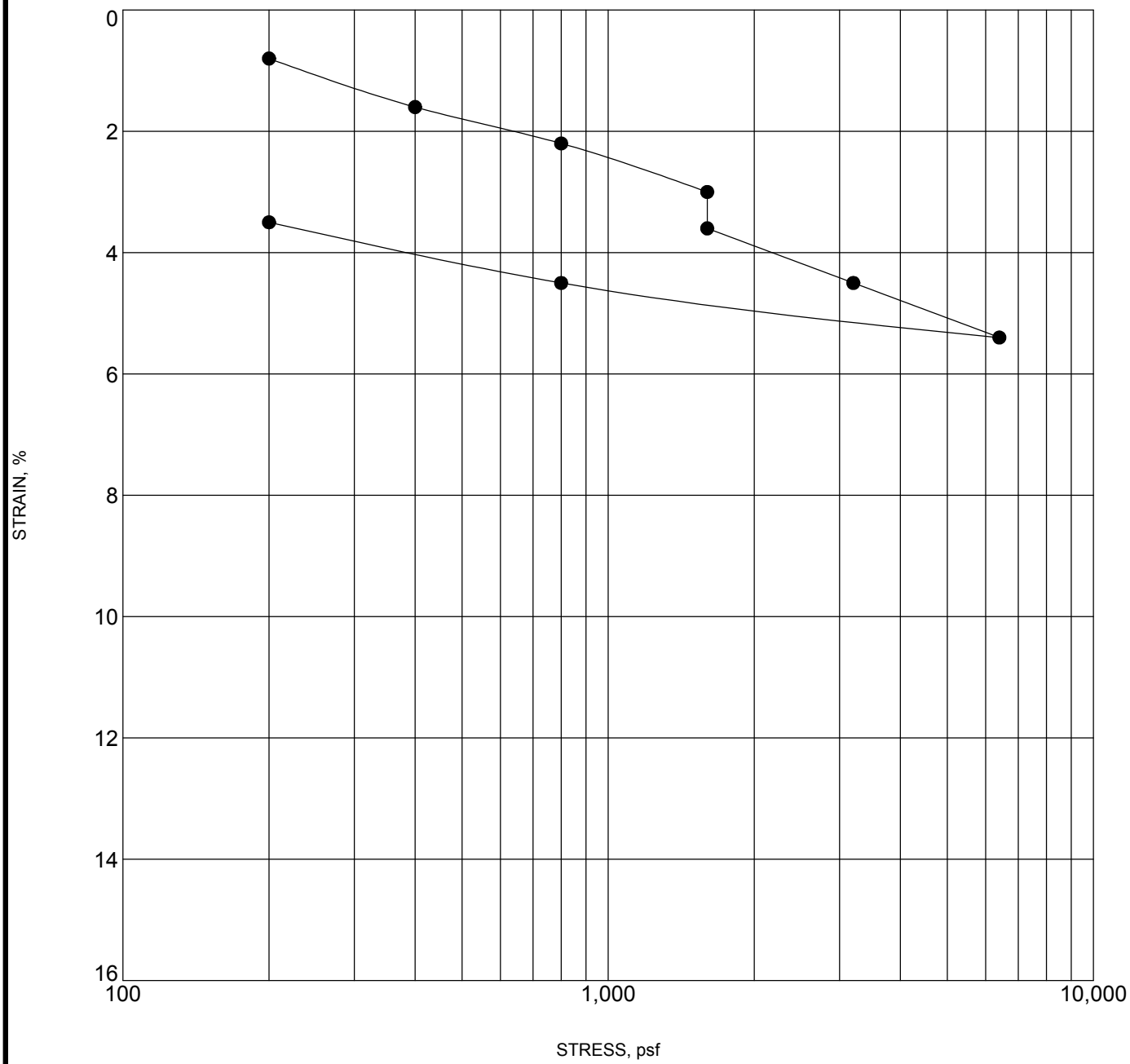
REPORT DATED: 01-13-2012

US CONSOL STRAIN 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



Water added at 1600 psf

Specimen Identification		Classification		
●	**B-5-11 9.0'**			

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CONSOLIDATION TEST

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US CONSOL STRAIN 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

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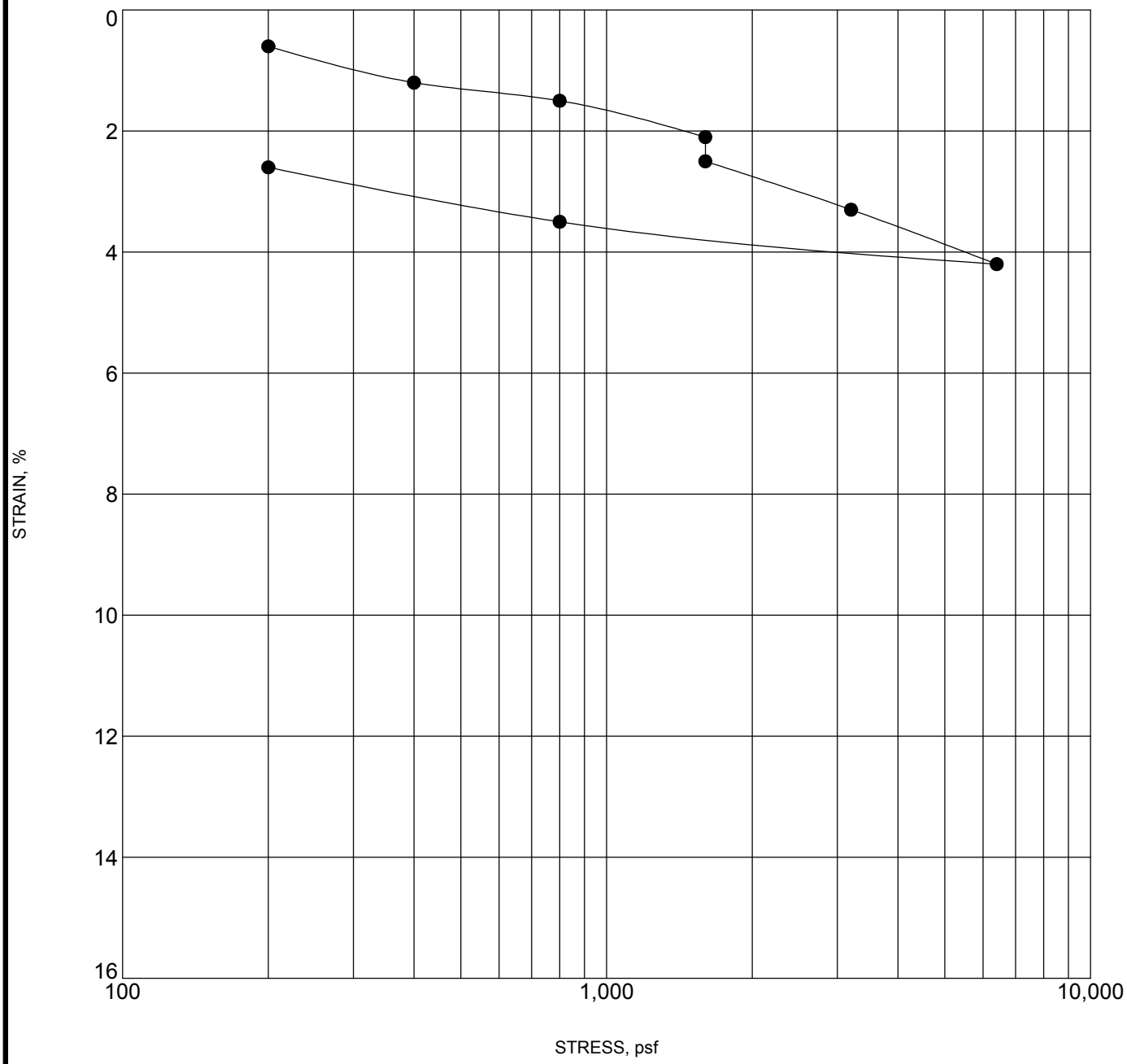

Water added at 1600 psf

Specimen Identification		Classification		
●	**B-5-11 12.0'**			

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CONSOLIDATION TEST

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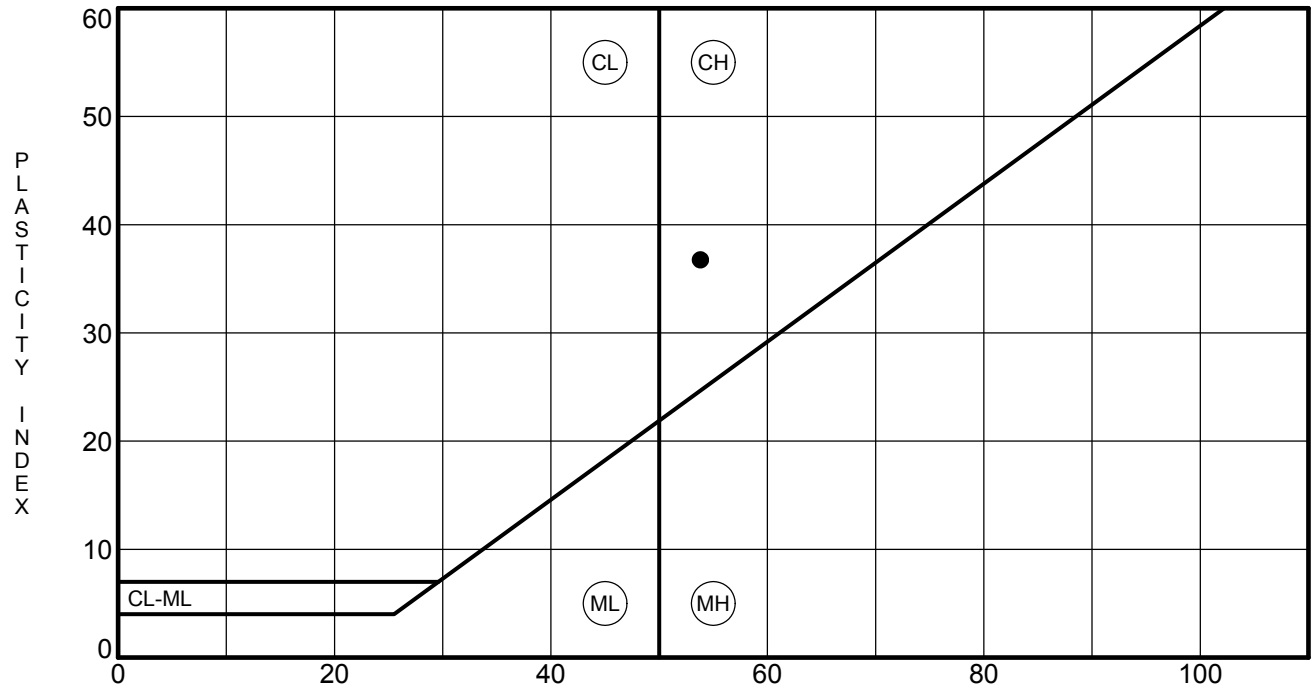
US CONSOL STRAIN 2002-036-006.GPJ FRANKIAN.GDT 1/11/12

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**B-1-10**	**65.0**	**54**	**17**	**37**	**82**	**FAT CLAY with SAND(CH)**

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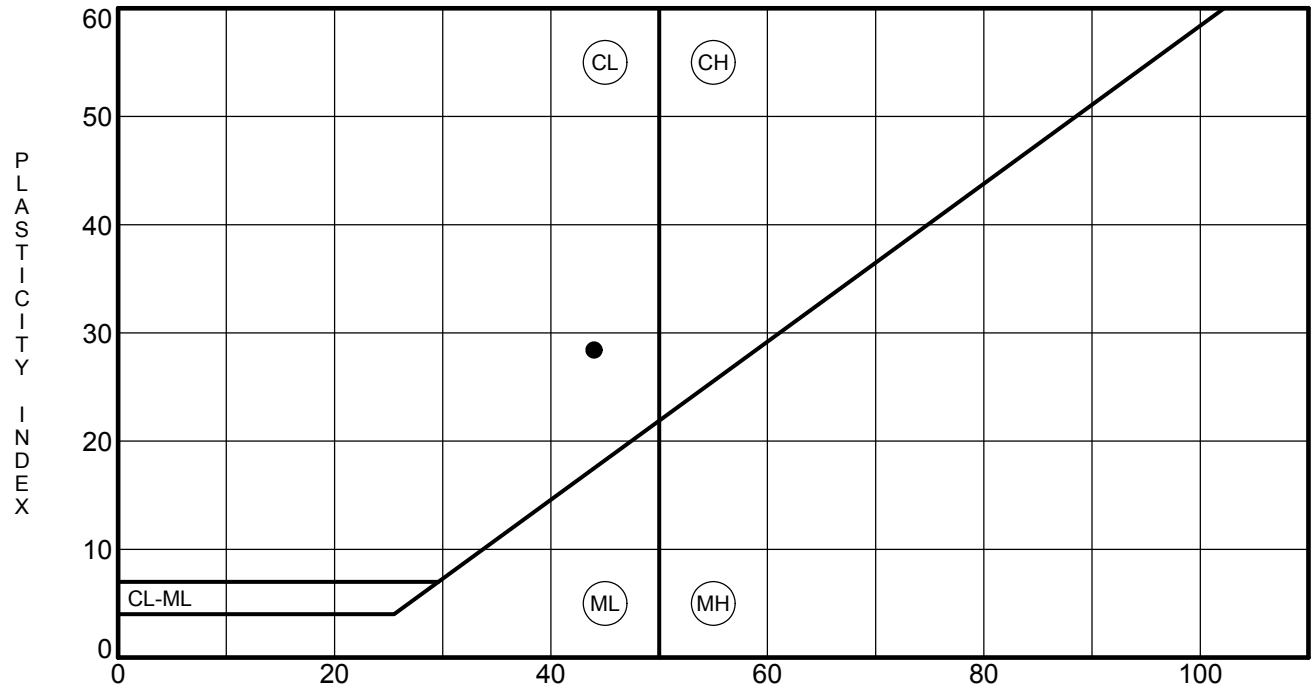
Telephone: (818) 531-1501
Fax: (818) 531-1511

ATTERBERG LIMITS' RESULTS

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

US ATTERBERG LIMITS 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**HS-2-10**	**20.0**	**44**	**16**	**28**	**72**	**LEAN CLAY with SAND(CL)**

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Burbank, Ca 91504
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Fax: (818) 531-1511

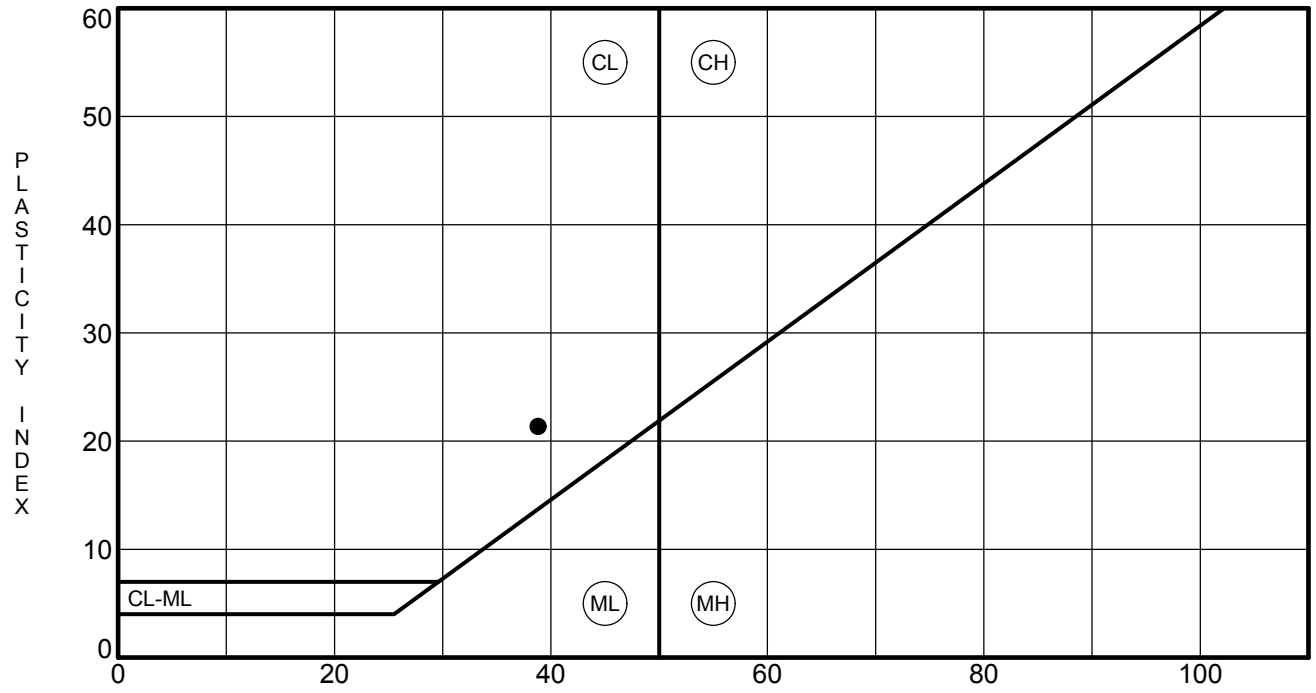
ATTERBERG LIMITS' RESULTS

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

US ATTERBERG LIMITS 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**HS-2-10**	**30.0**	**39**	**17**	**22**	**63**	**SANDY LEAN CLAY(CL)**

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1329 Scott Road
Burbank, Ca 91504
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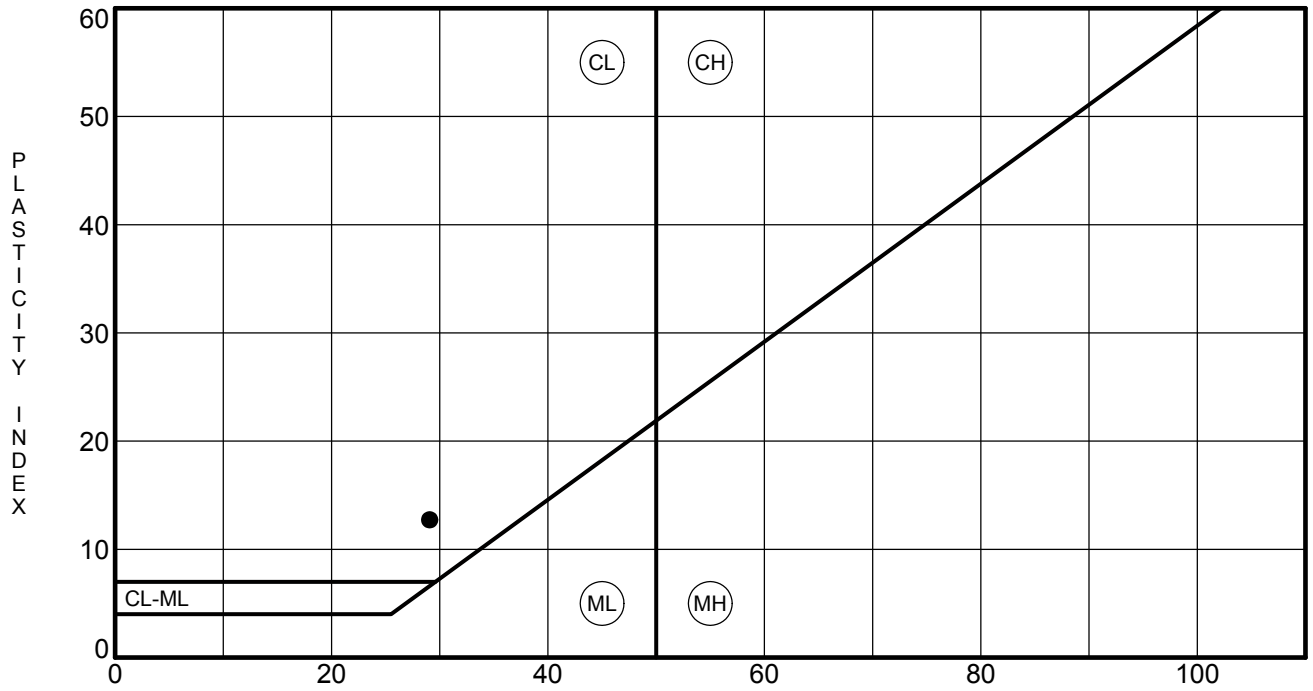
ATTERBERG LIMITS' RESULTS

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

US ATTERBERG LIMITS 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**HS-4-10**	**25.0**	**29**	**16**	**13**	**50**	**CLAYEY SAND(SC)**

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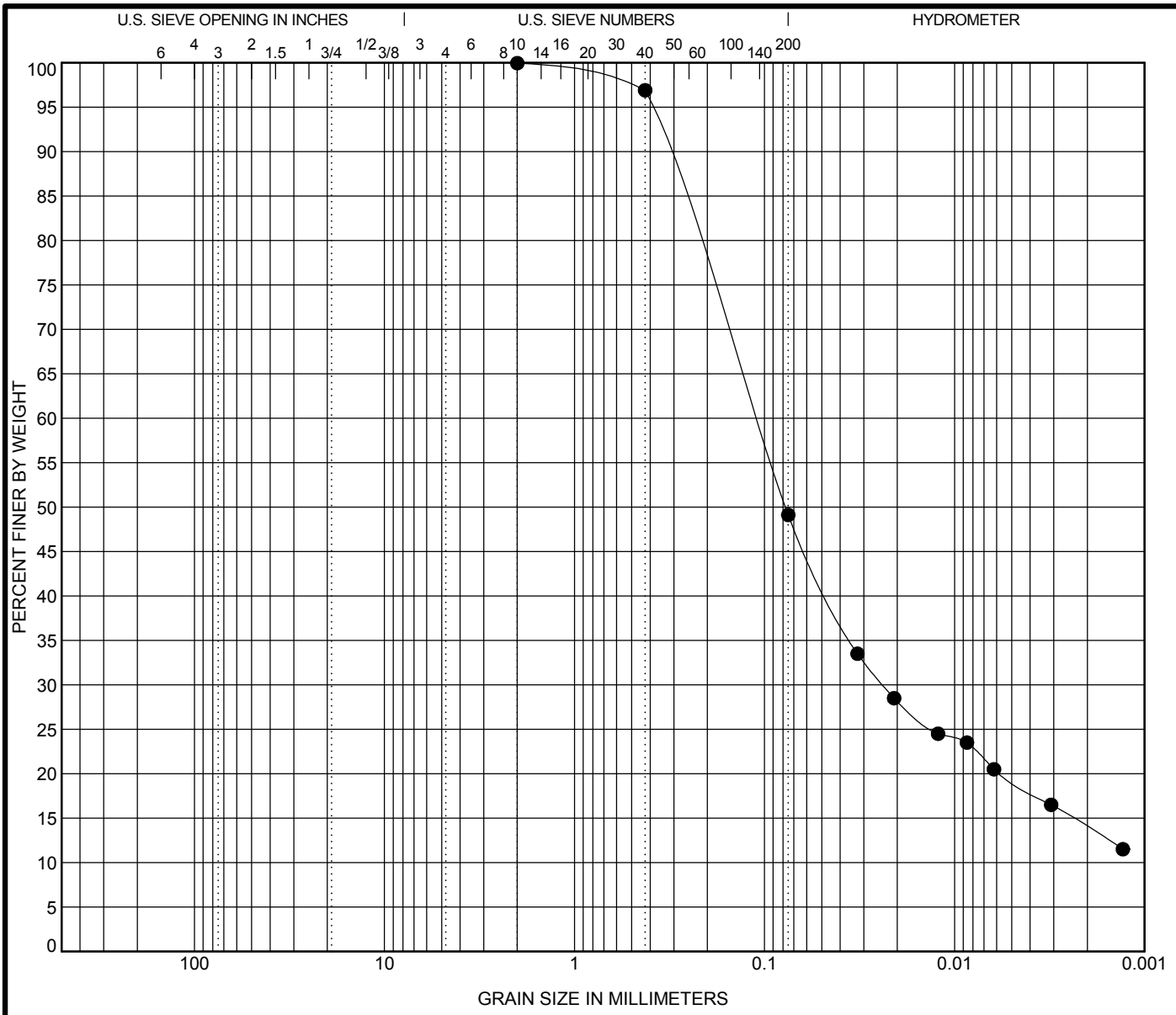
ATTERBERG LIMITS' RESULTS

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

US ATTERBERG LIMITS 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**B-1-10**						

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay

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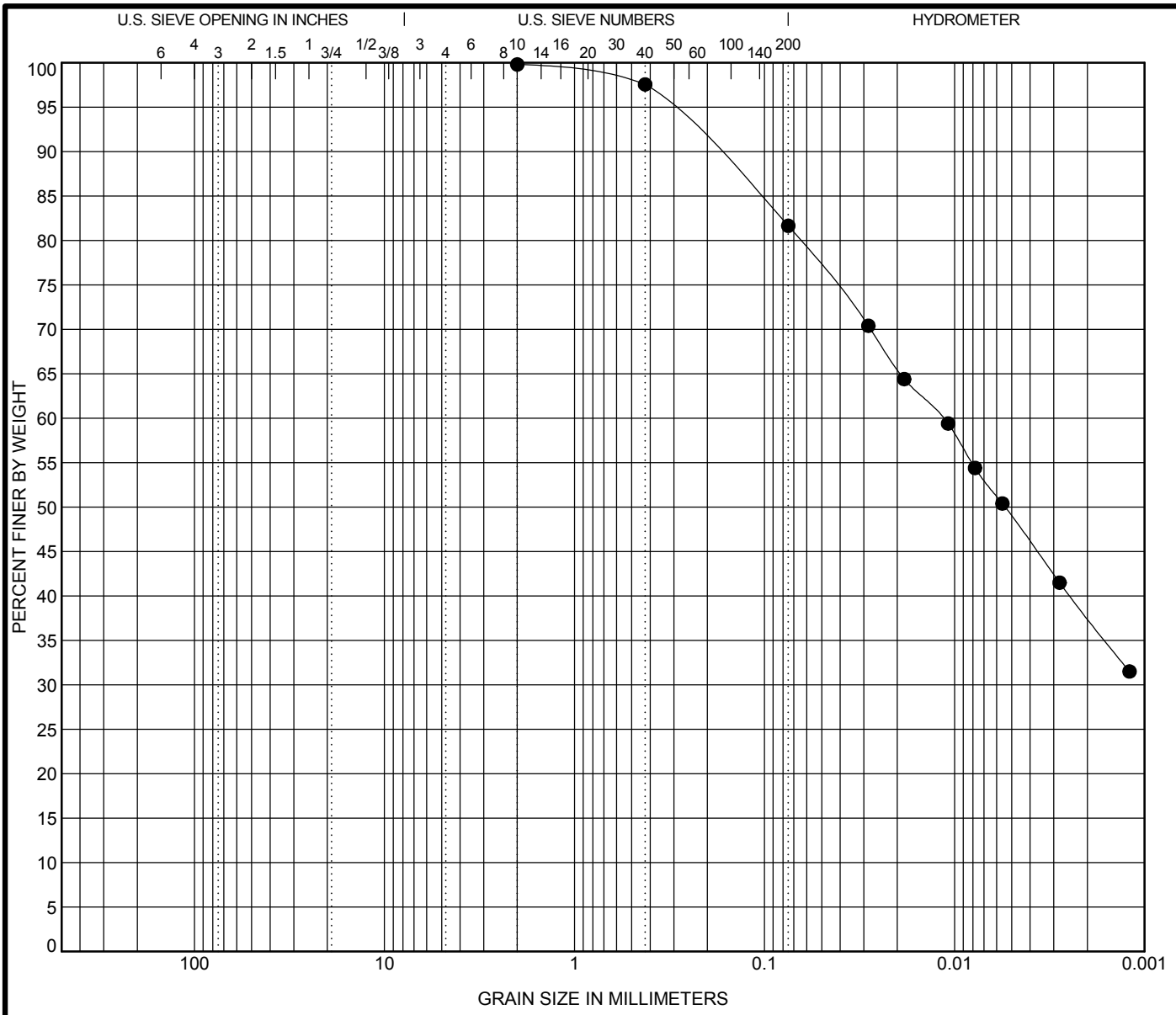
GRAIN SIZE DISTRIBUTION

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

RTF GRAIN SIZE 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**B-1-10**	**FAT CLAY with SAND(CH)**					

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay

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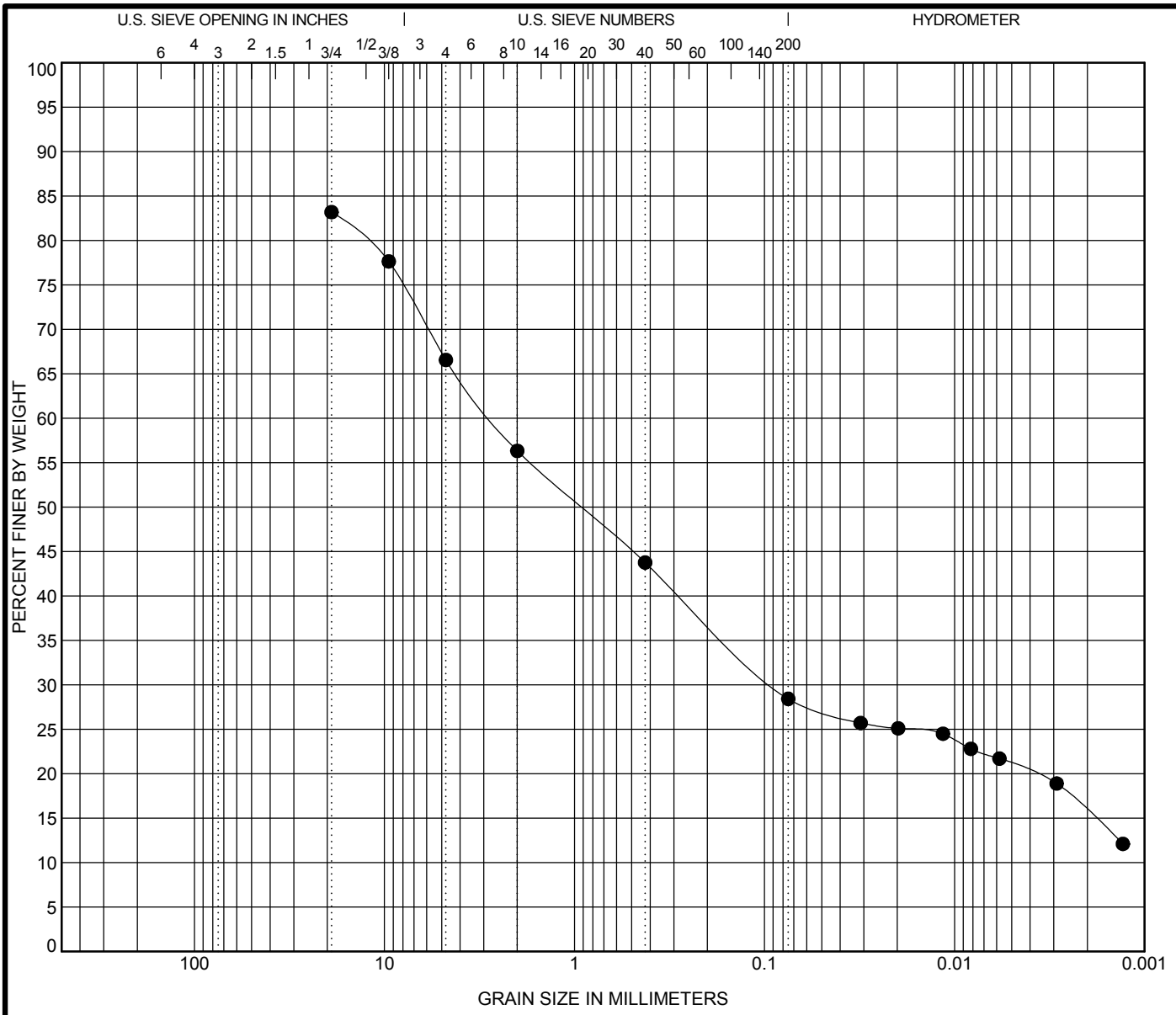
GRAIN SIZE DISTRIBUTION

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

RTF GRAIN SIZE 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**B-2-10**						

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay

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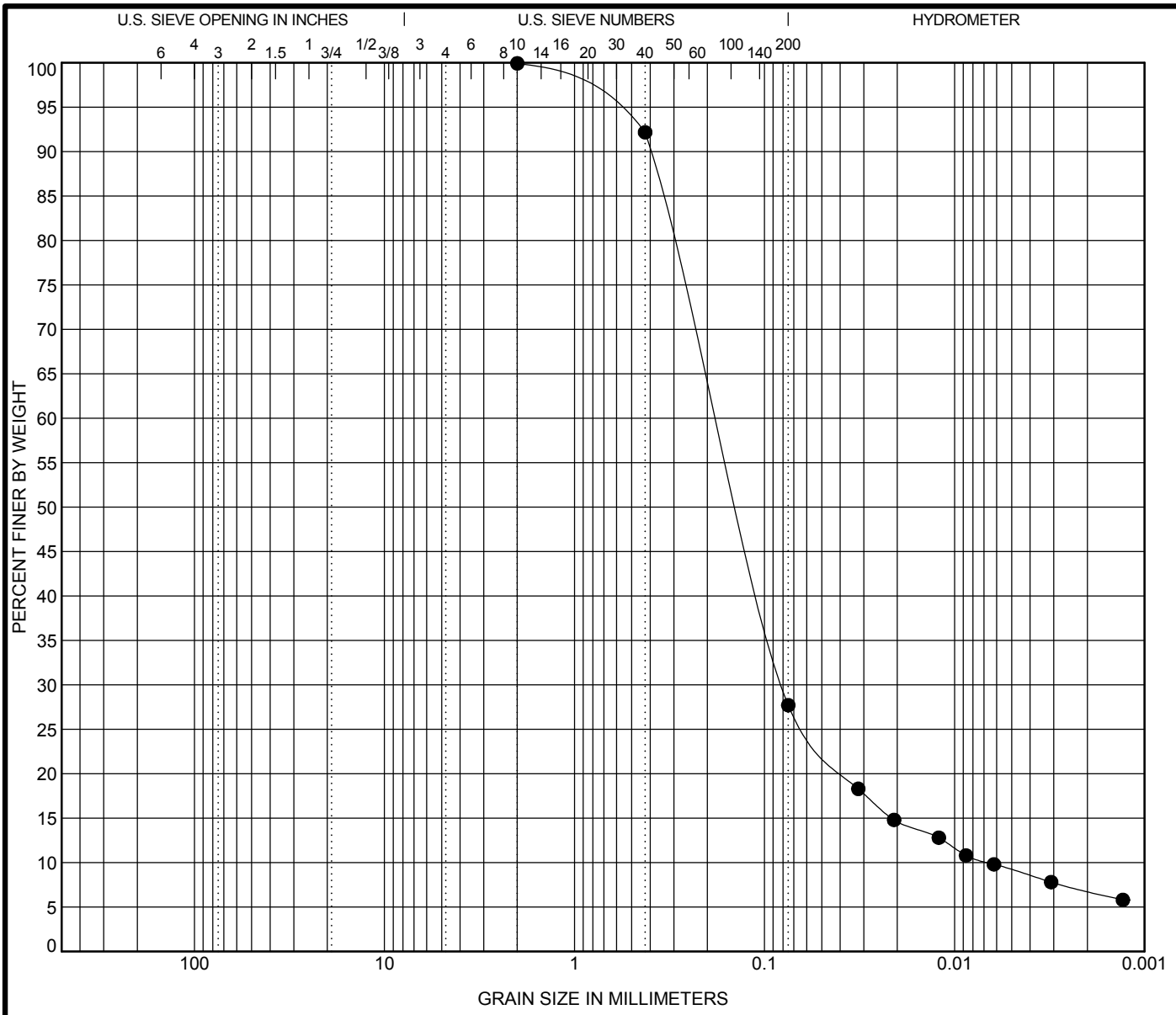
GRAIN SIZE DISTRIBUTION

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

RTF GRAIN SIZE 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**B-3-10**						

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay

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GRAIN SIZE DISTRIBUTION

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

RTF GRAIN SIZE 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11

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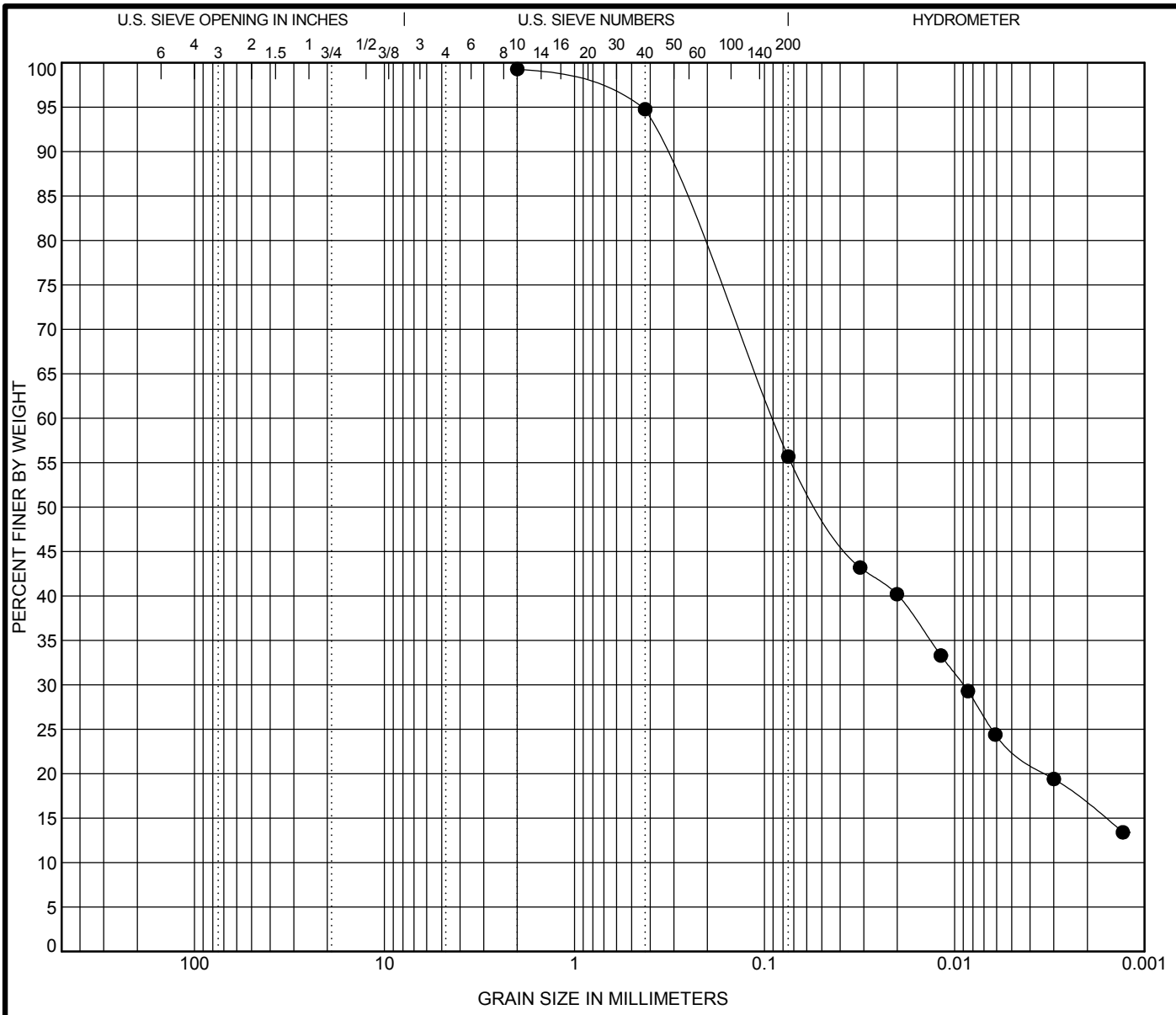

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**B-8-10**						

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay

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GRAIN SIZE DISTRIBUTION

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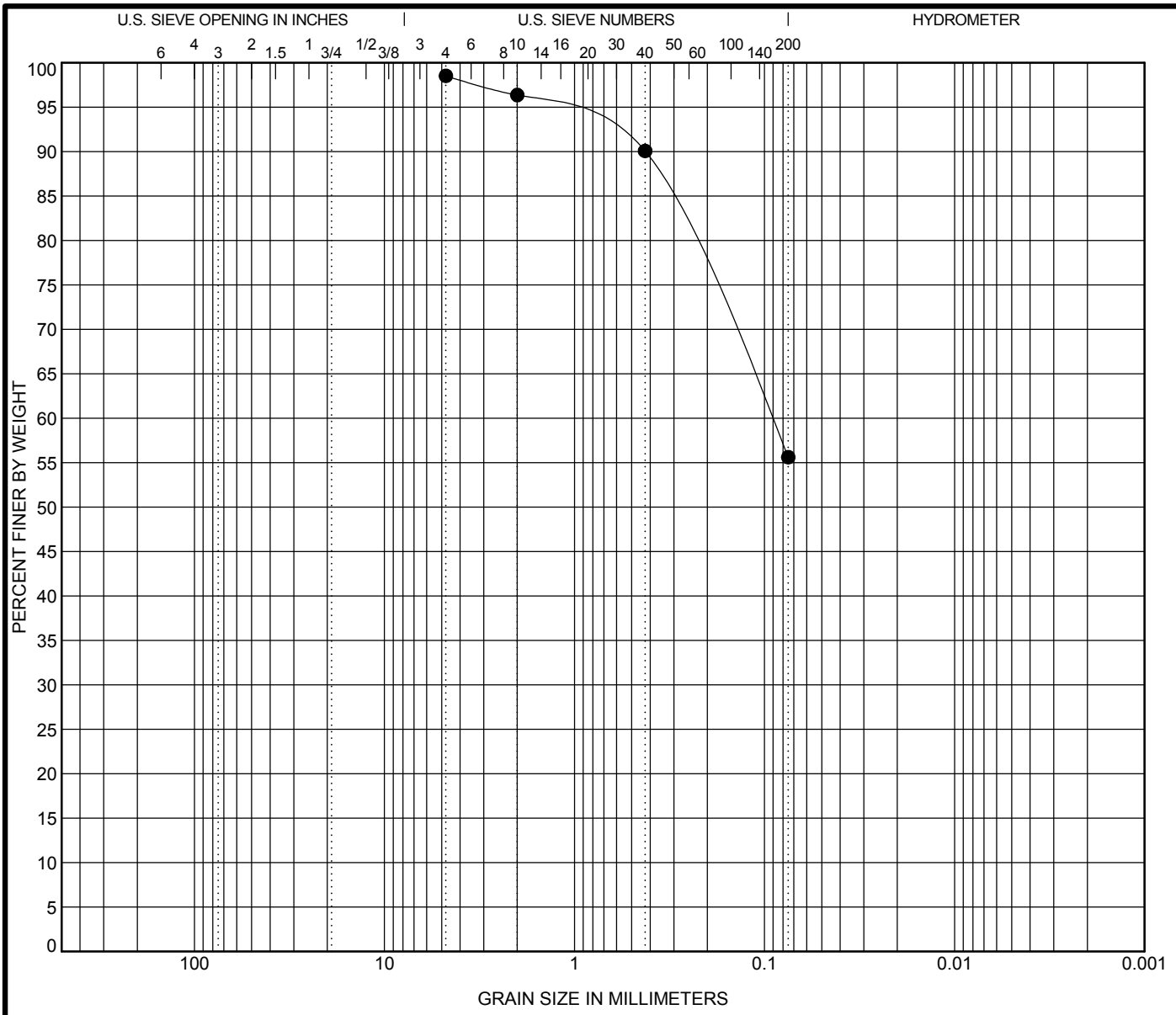
RTF GRAIN SIZE 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**HS-1-10**						

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay

R. T. Frankian & Associates
1329 Scott Road
Burbank, Ca 91504
Telephone: (818) 531-1501
Fax: (818) 531-1511

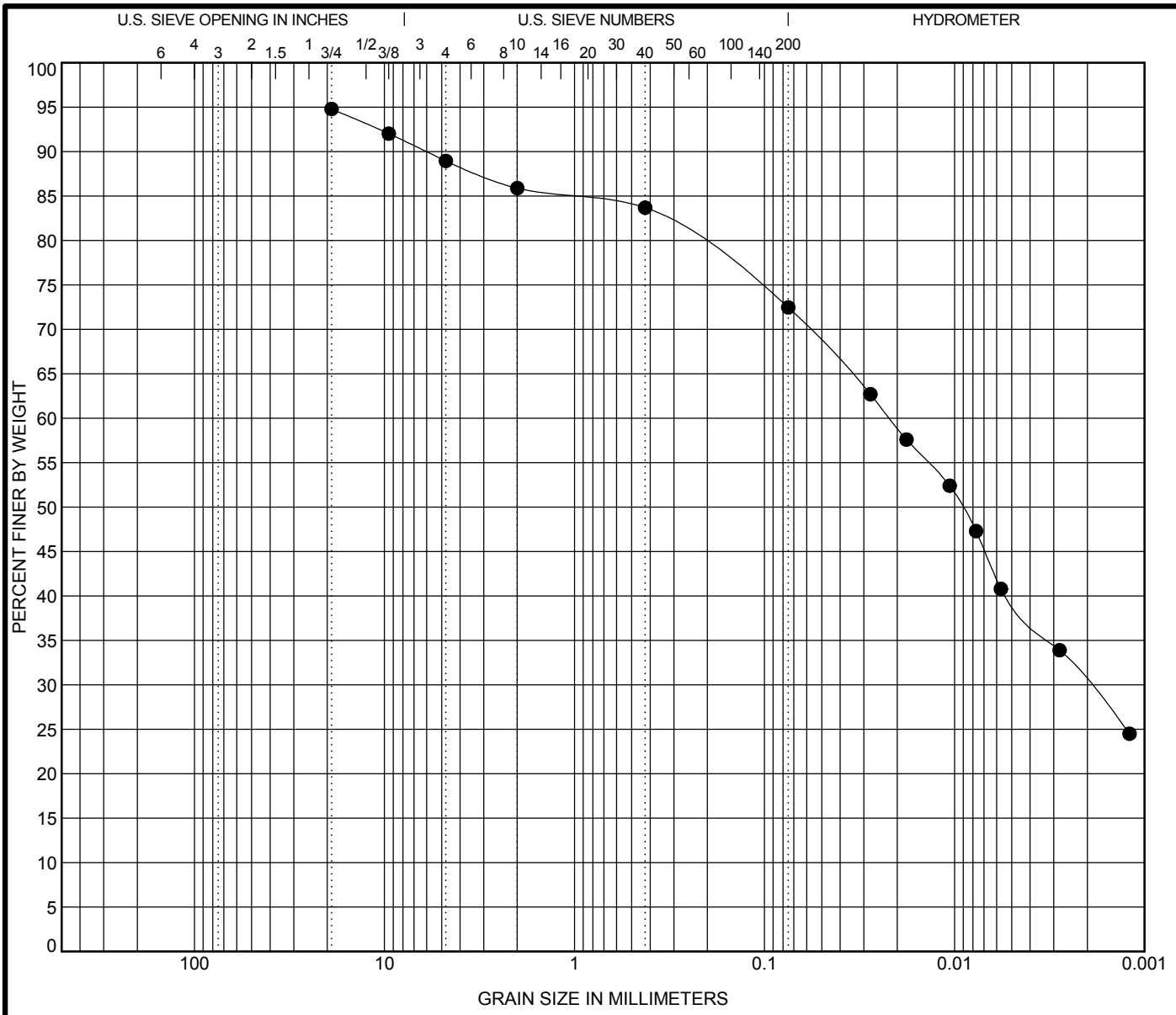
GRAIN SIZE DISTRIBUTION

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

RTF GRAIN SIZE 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**HS-2-10**	**LEAN CLAY with SAND(CL)**					

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay

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1329 Scott Road
Burbank, Ca 91504
Telephone: (818) 531-1501
Fax: (818) 531-1511

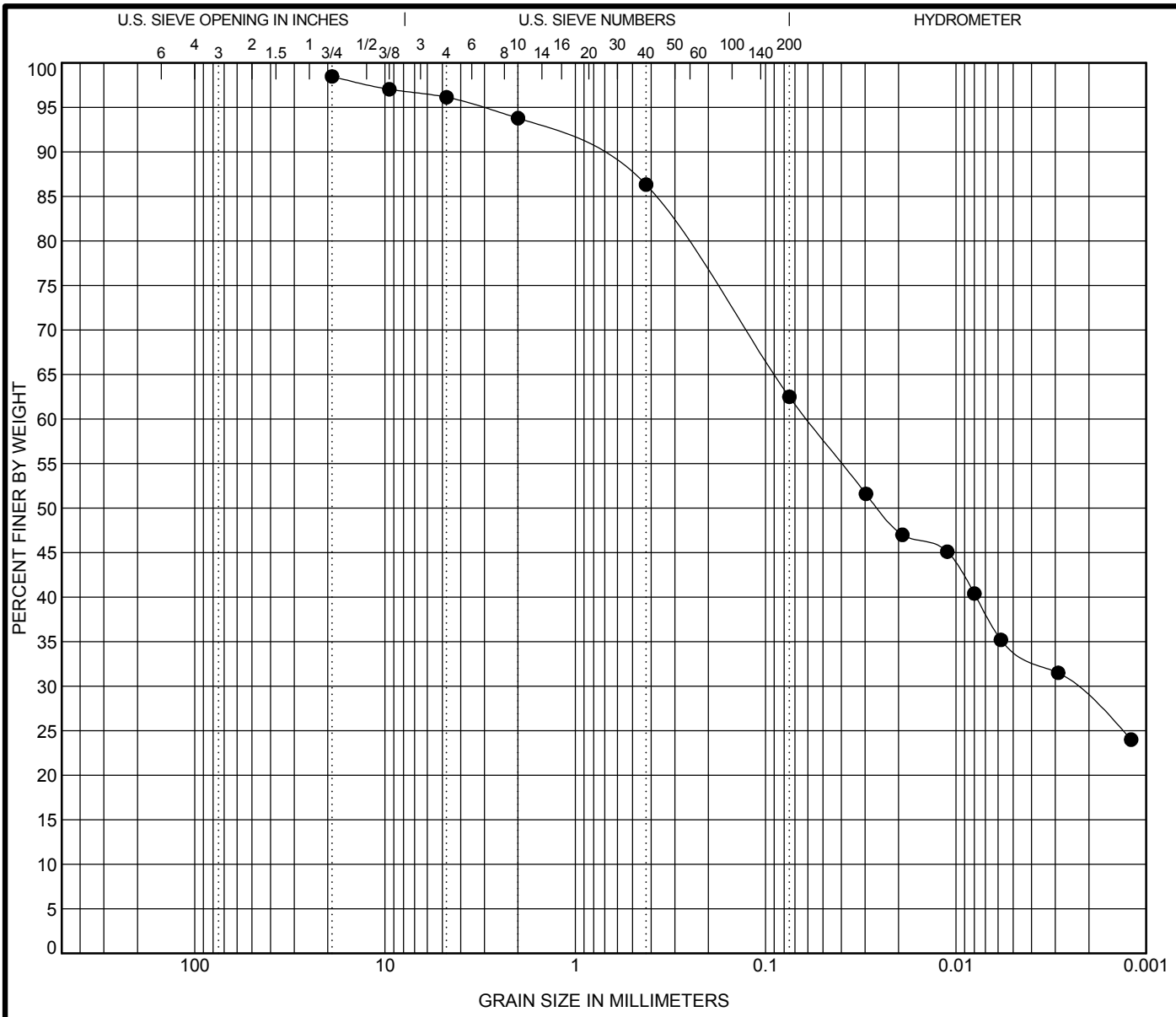
GRAIN SIZE DISTRIBUTION

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

RTF GRAIN SIZE 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**HS-2-10**	**SANDY LEAN CLAY(CL)**					

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay

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Burbank, Ca 91504
Telephone: (818) 531-1501
Fax: (818) 531-1511

GRAIN SIZE DISTRIBUTION

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

RTF GRAIN SIZE 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11

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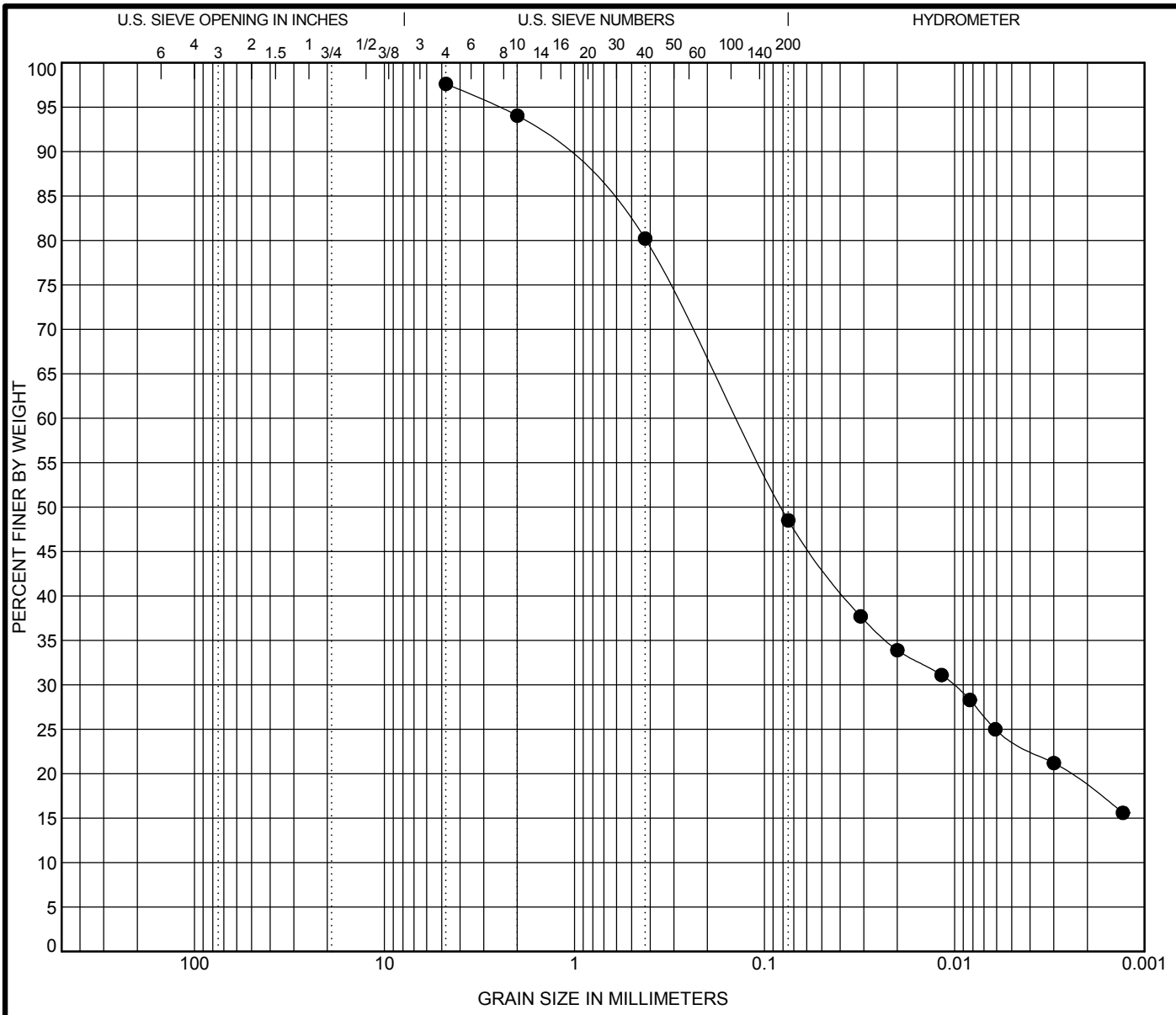

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**HS-3-10**						

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay

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Burbank, Ca 91504
Telephone: (818) 531-1501
Fax: (818) 531-1511

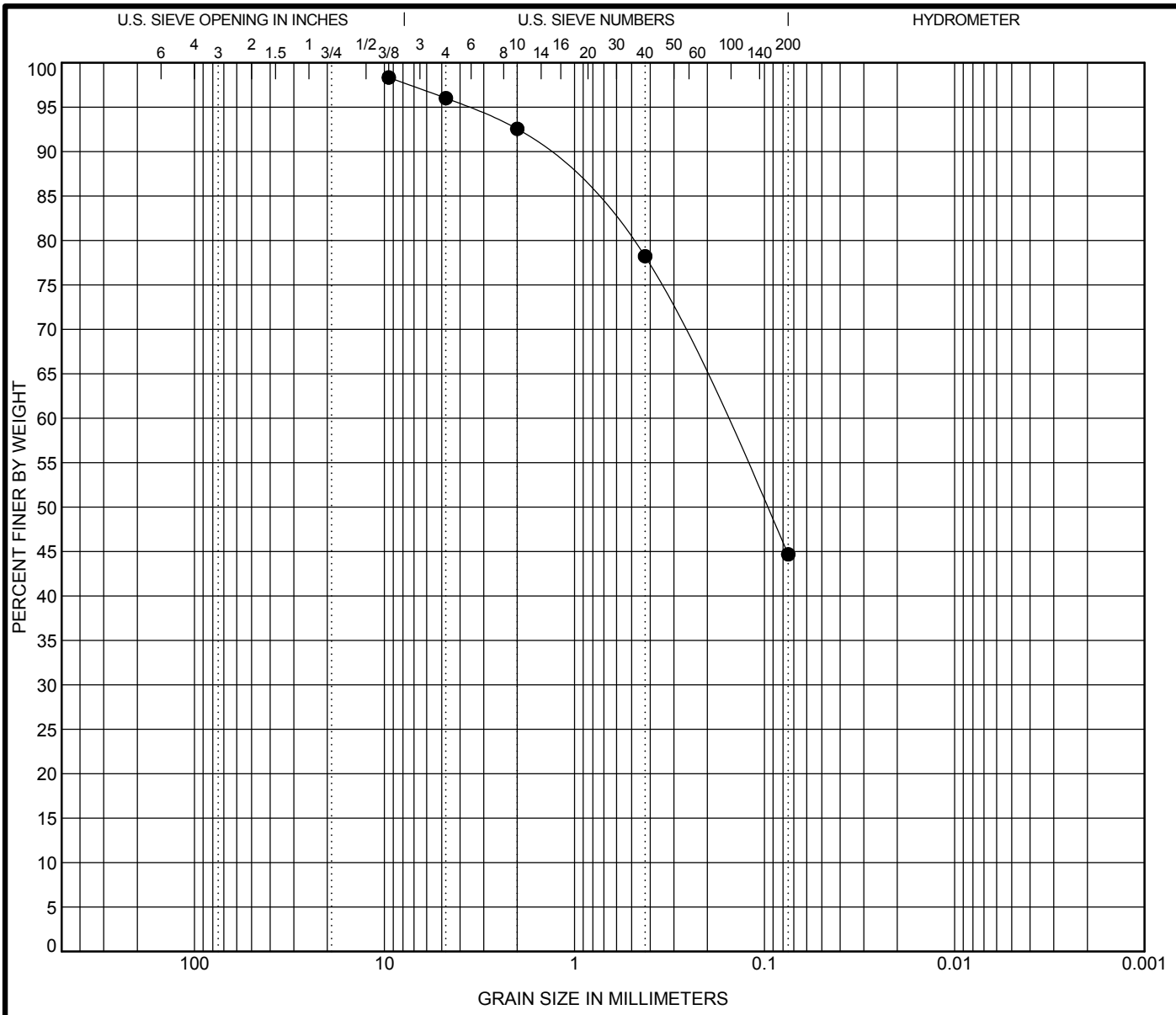
GRAIN SIZE DISTRIBUTION

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

RTF GRAIN SIZE 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**HS-3-10**						

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay

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Fax: (818) 531-1511

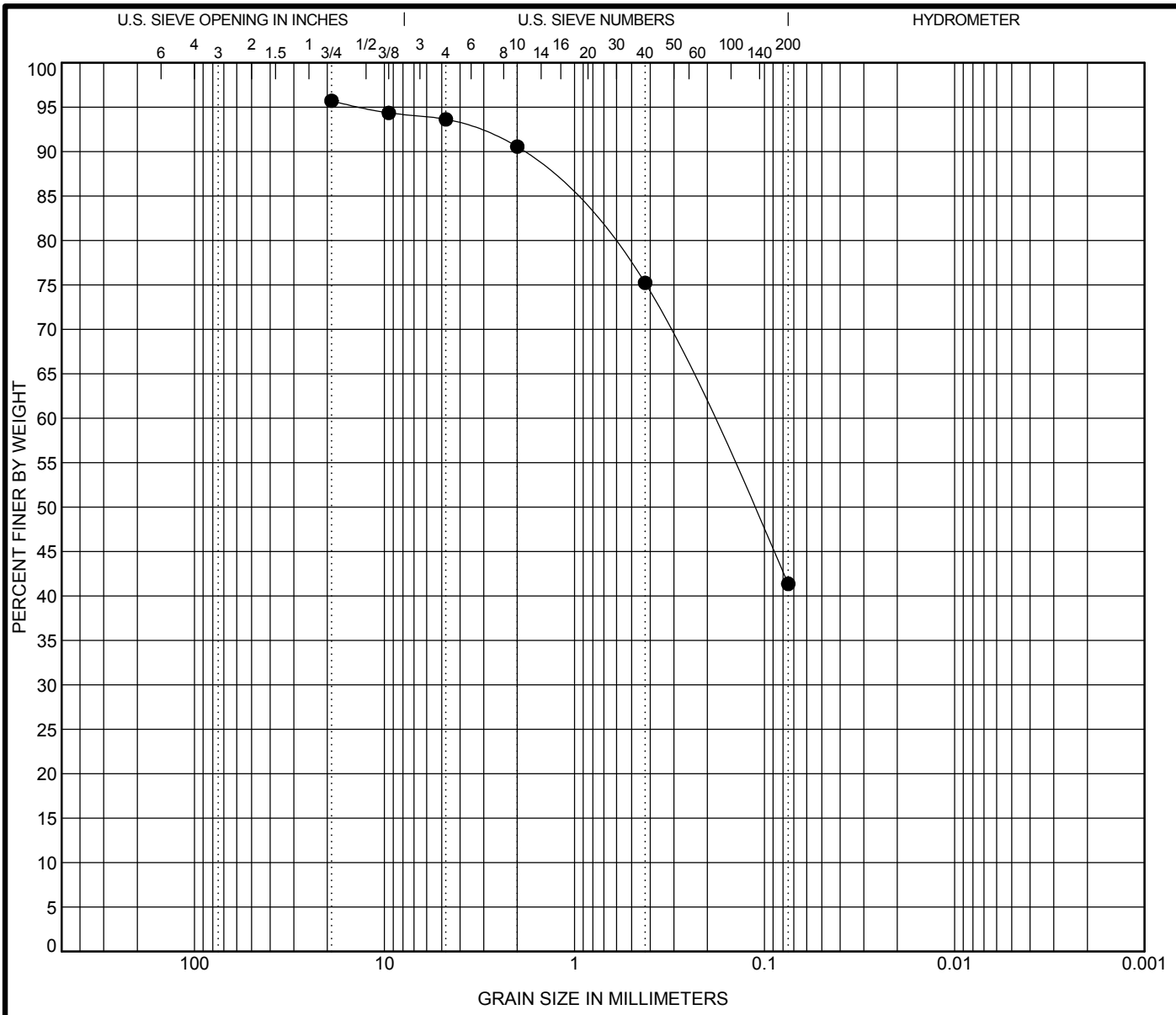
GRAIN SIZE DISTRIBUTION

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

RTF GRAIN SIZE 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**HS-3-10**						

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay

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Burbank, Ca 91504
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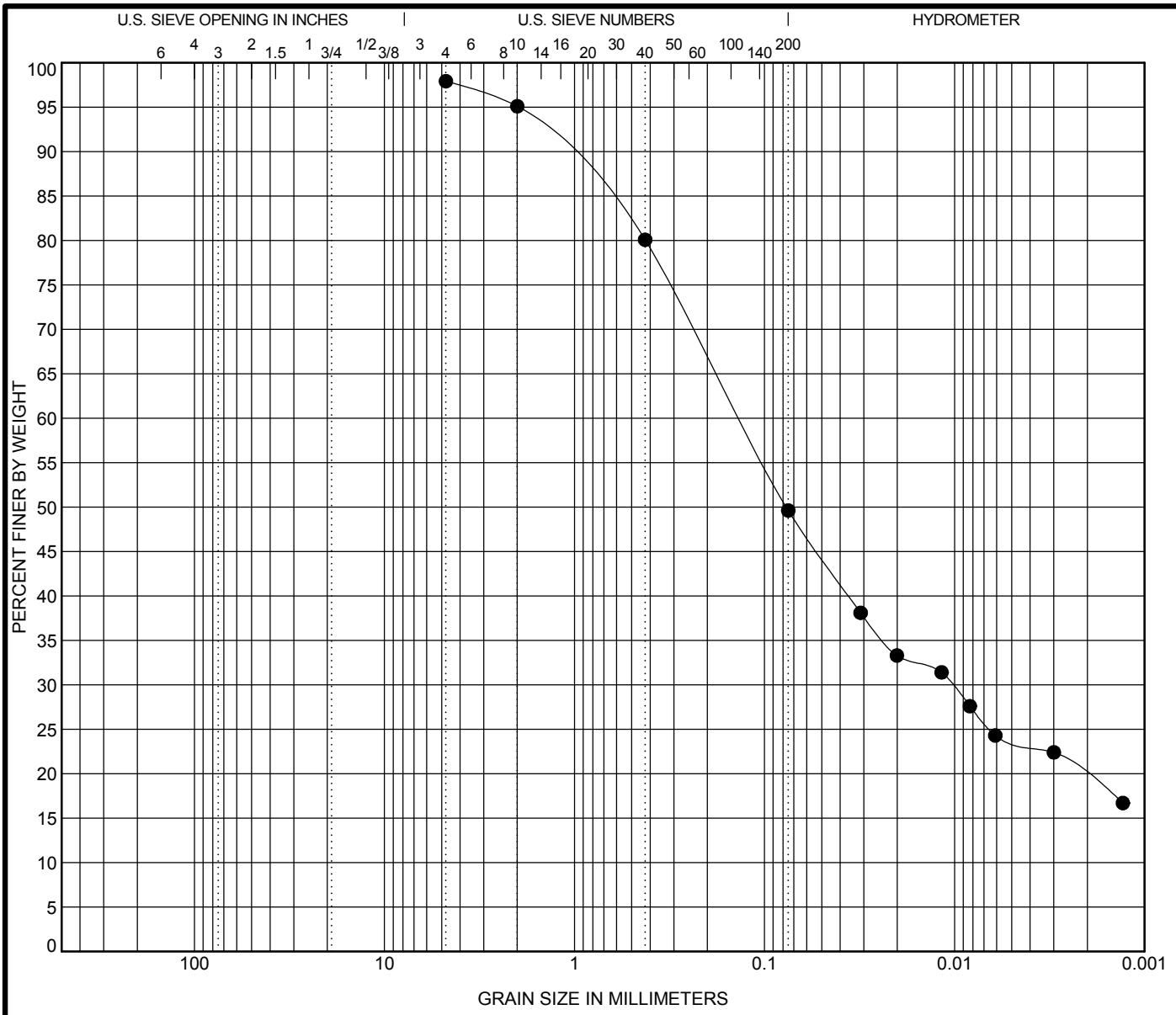
GRAIN SIZE DISTRIBUTION

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

RTF GRAIN SIZE 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	LL	PL	PI	Cc	Cu
●	**HS-4-10**	**CLAYEY SAND(SC)**					

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay

R. T. Frankian & Associates
1329 Scott Road
Burbank, Ca 91504
Telephone: (818) 531-1501
Fax: (818) 531-1511

GRAIN SIZE DISTRIBUTION

JOB NUMBER: 2002-036-004

REPORT DATED: 01-19-2011

RTF GRAIN SIZE 2002-036-004-7-24-2010.GPJ FRANKIAN.GDT 1/28/11

FOR USE WITH RTF&A 2002-036-004 REPORT DATED 1-27-2012

Chiquita Canyon Landfill
January 27, 2012
2002-036-004

APPENDIX D

SLOPE STABILITY CALCULATIONS

RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

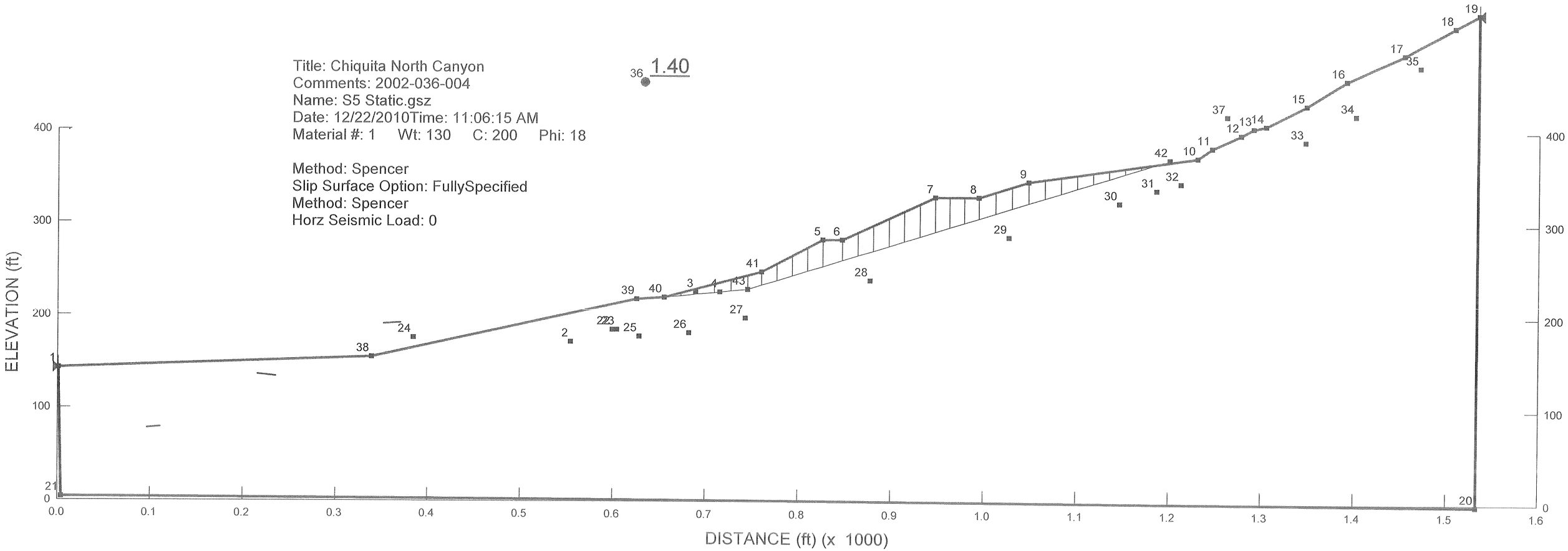
Summary of Slope Stability Calculations

Section	Case	File	Factor of Safety	Condition
S5	Static	S5 Static.gsz	1.4	Bedding through 1st bench
S5	Static	S5 Static.gsz	1.43	Bedding between toe & 1st bench
S11	Static	S11 Static.gsz	1.63	Tp Cross Bedding Failure
S11	Seismic	S11 Seismic.gsz	1.16	Tp Cross Bedding Failure
S15	Static	S15 Static.gsz	2.35	Failure along bedding
S17	Static	S17 Static.gsz	1.31	Bedding above first bench
S17	Static	S17 Static.gsz	1.41	Bedding near toe
S17	Static	S17 Static.gsz	1.42	Bedding below 1st bench
S19	Static	Section S19 Static.gsz	1.58	Bedding above first bench
S19	Static	Section S19 Static.gsz	1.32	Bedding between 1st and 2nd bench
S19	Static	Section S19 Static.gsz	1.29	Bedding above 2nd Bench
S20	Static	S20 Static.gsz	1.34	Bedding near toe
S23	Static	S23 Static.gsz	1.5	Bedding near toe
S25	Static	S25 Static.gsz	1.25	Bedding below 2nd bench
N/A	Static	130' Fill Slope Static.gsz	1.56	130' High 2:1 Slope
N/A	Seismic	130' Fill Slope Static.gsz	1.14	130' High 2:1 Slope

Title: Chiquita North Canyon
Comments: 2002-036-004
Name: S5 Static.gsz
Date: 12/22/2010Time: 11:06:15 AM
Material #: 1 Wt: 130 C: 200 Phi: 18

Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0

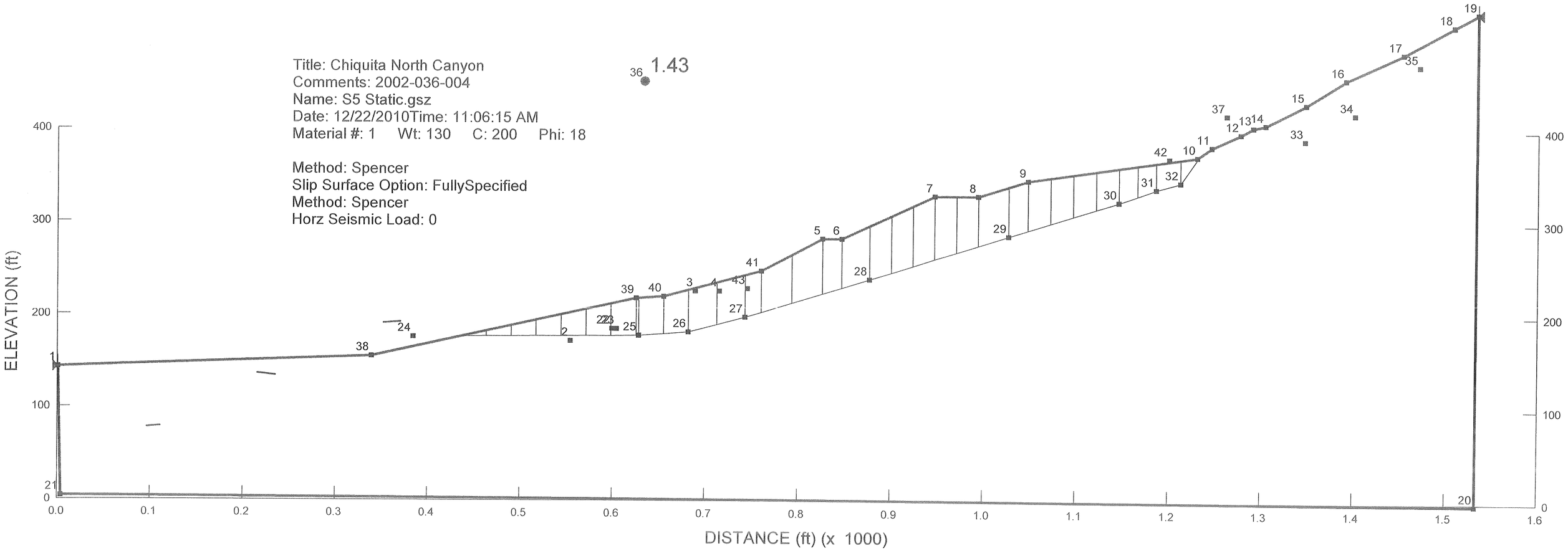
36 1.40

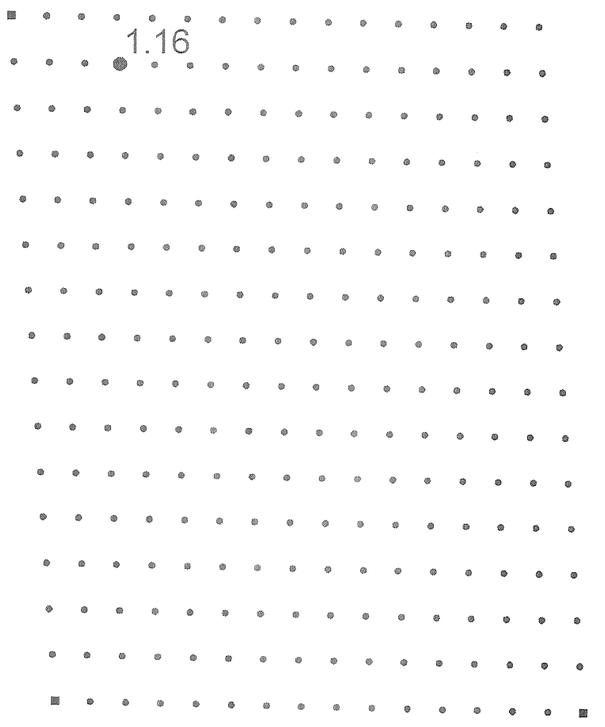


Title: Chiquita North Canyon
Comments: 2002-036-004
Name: S5 Static.gsz
Date: 12/22/2010Time: 11:06:15 AM
Material #: 1 Wt: 130 C: 200 Phi: 18

Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0

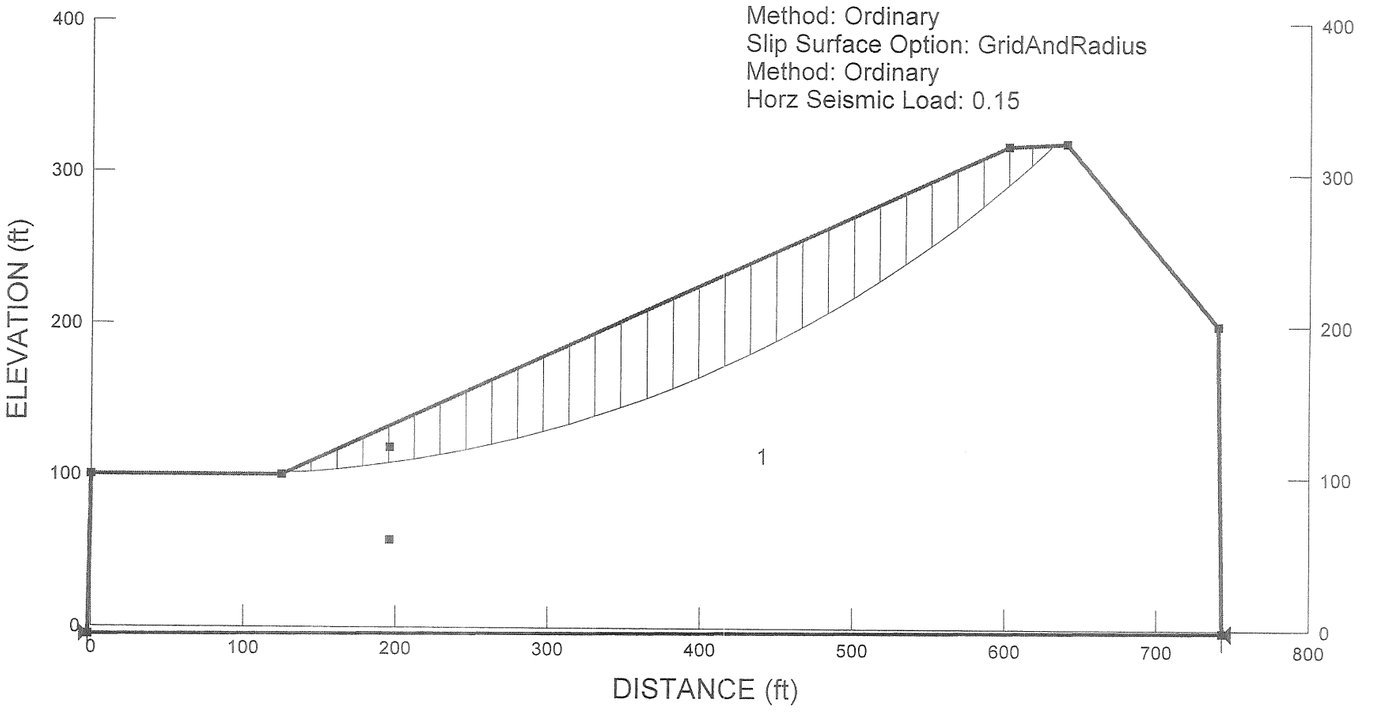
36 1.43

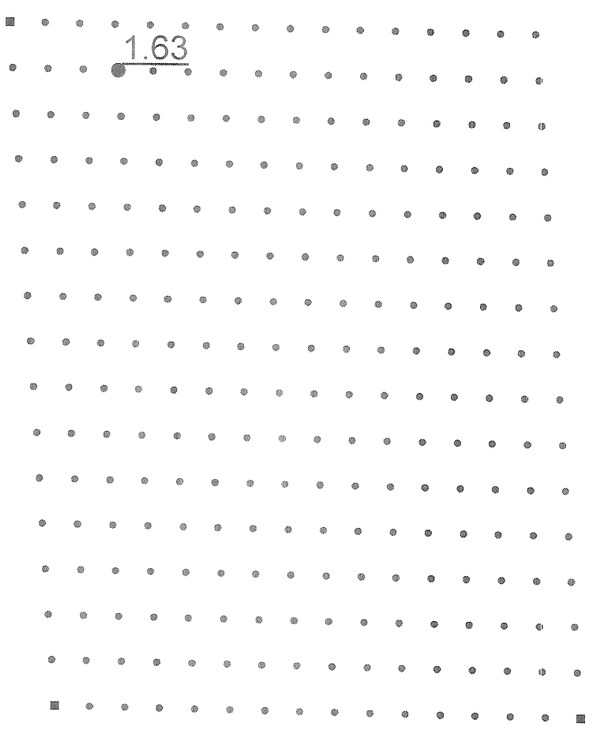




Title: Chiquita North Canyon
Comments: 2002-036-004
Name: Section S11 Seismic.gsz
Date: 1/18/2011Time: 10:21:32 AM
Material #: 1 Wt: 130 C: 500 Phi: 30 Model: MohrCoulomb

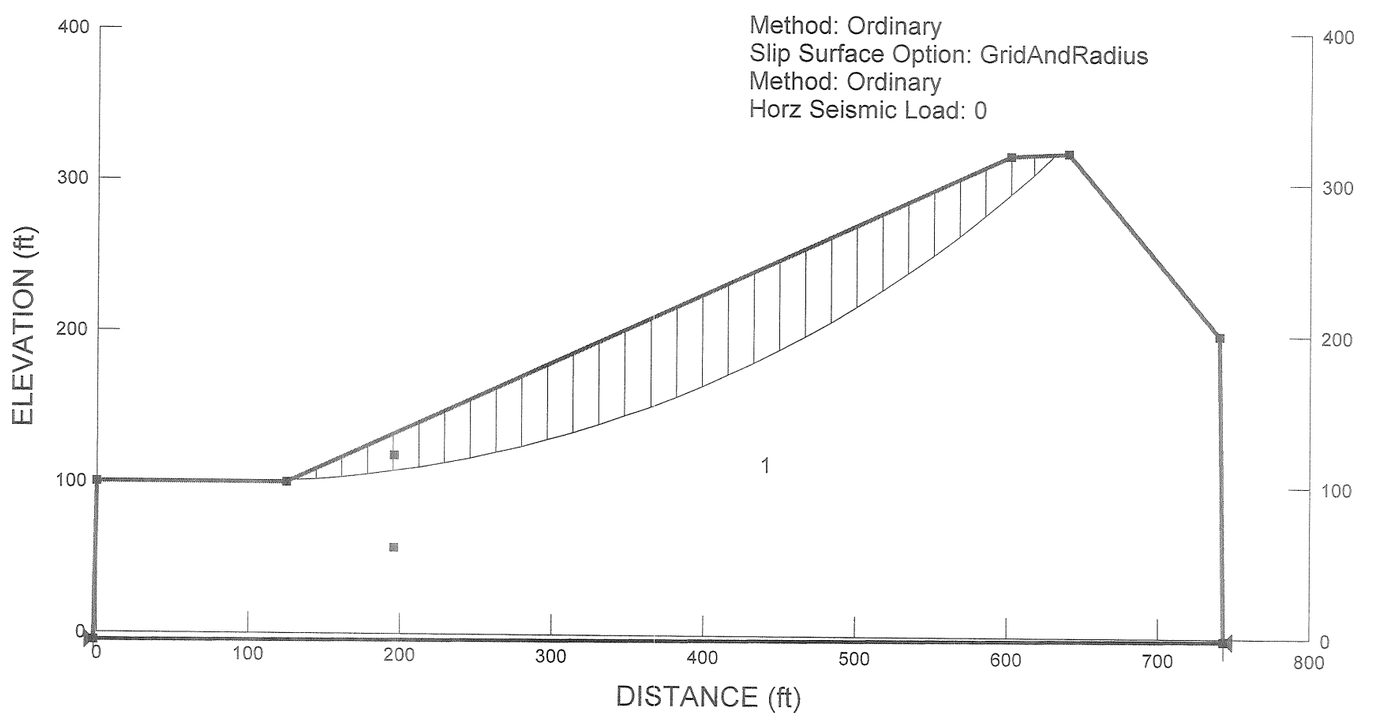
Method: Ordinary
Slip Surface Option: GridAndRadius
Method: Ordinary
Horz Seismic Load: 0.15





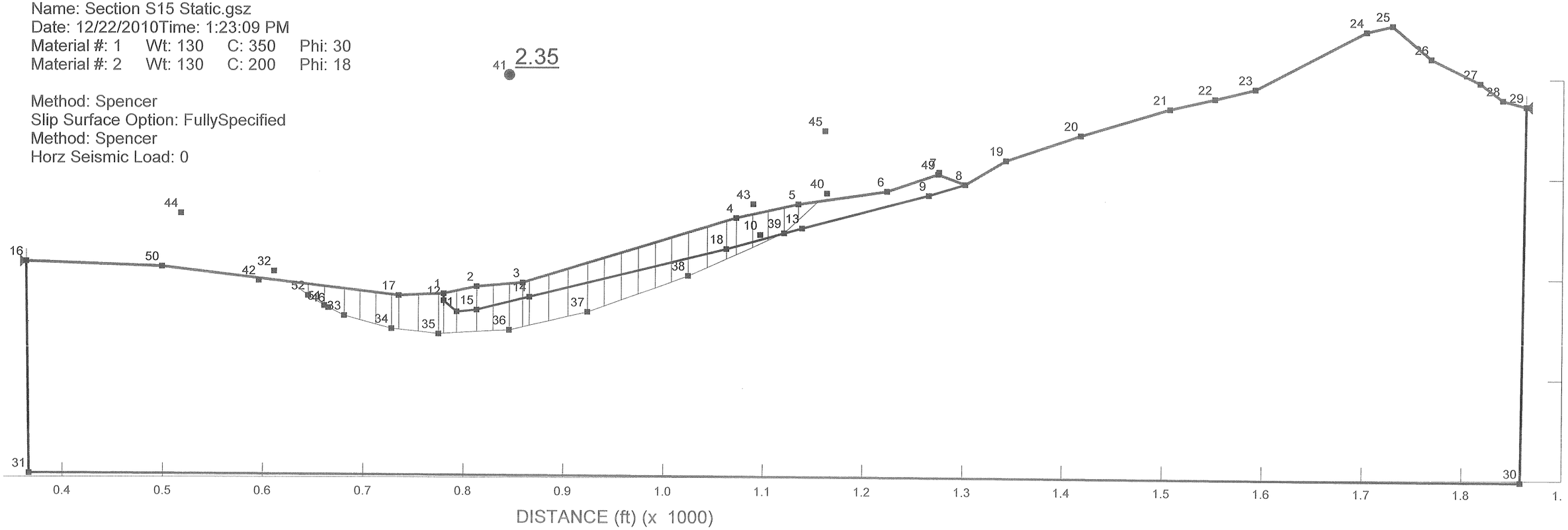
Title: Chiquita North Canyon
Comments: 2002-036-004
Name: Section S11 Static.gsz
Date: 1/18/2011Time: 9:37:43 AM
Material #: 1 Wt: 130 C: 500 Phi: 30 Model: MohrCoulomb

Method: Ordinary
Slip Surface Option: GridAndRadius
Method: Ordinary
Horz Seismic Load: 0



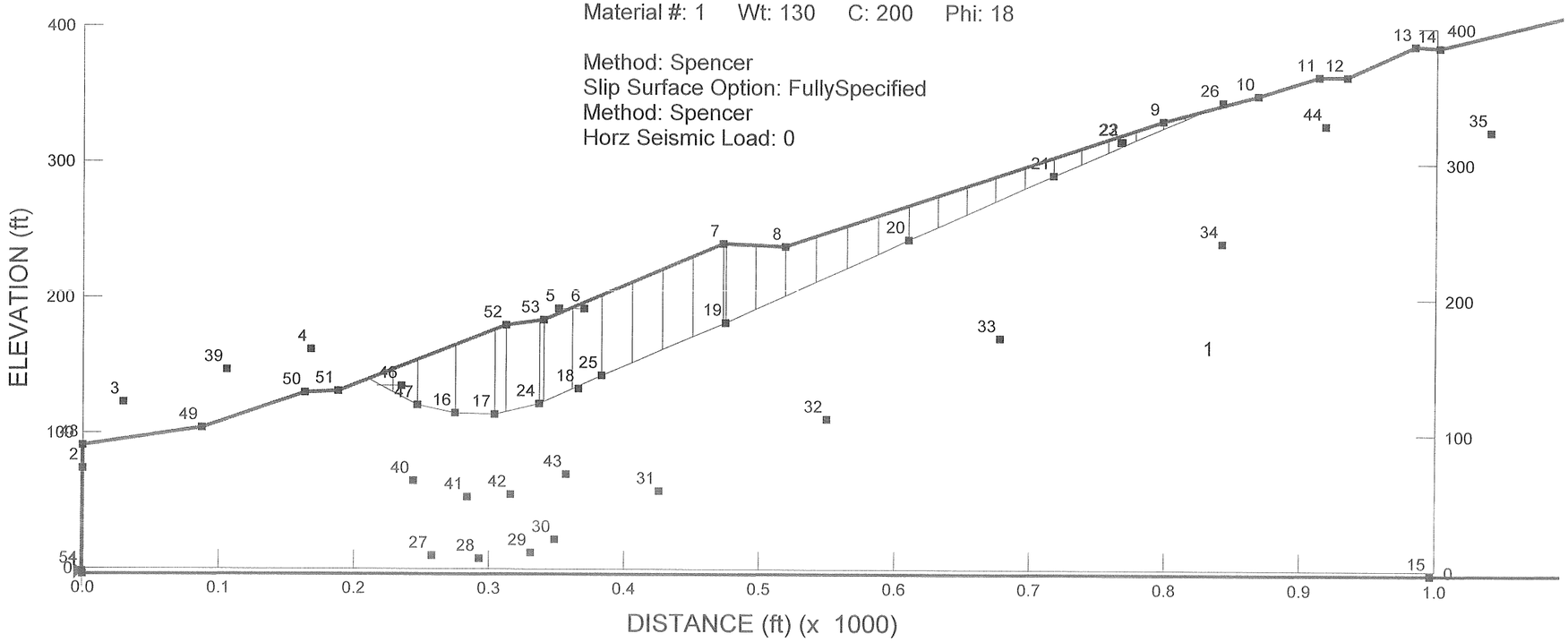
Title: Chiquita North Canyon
Comments: 2002-036-004
Name: Section S15 Static.gsz
Date: 12/22/2010Time: 1:23:09 PM
Material #: 1 Wt: 130 C: 350 Phi: 30
Material #: 2 Wt: 130 C: 200 Phi: 18

Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0



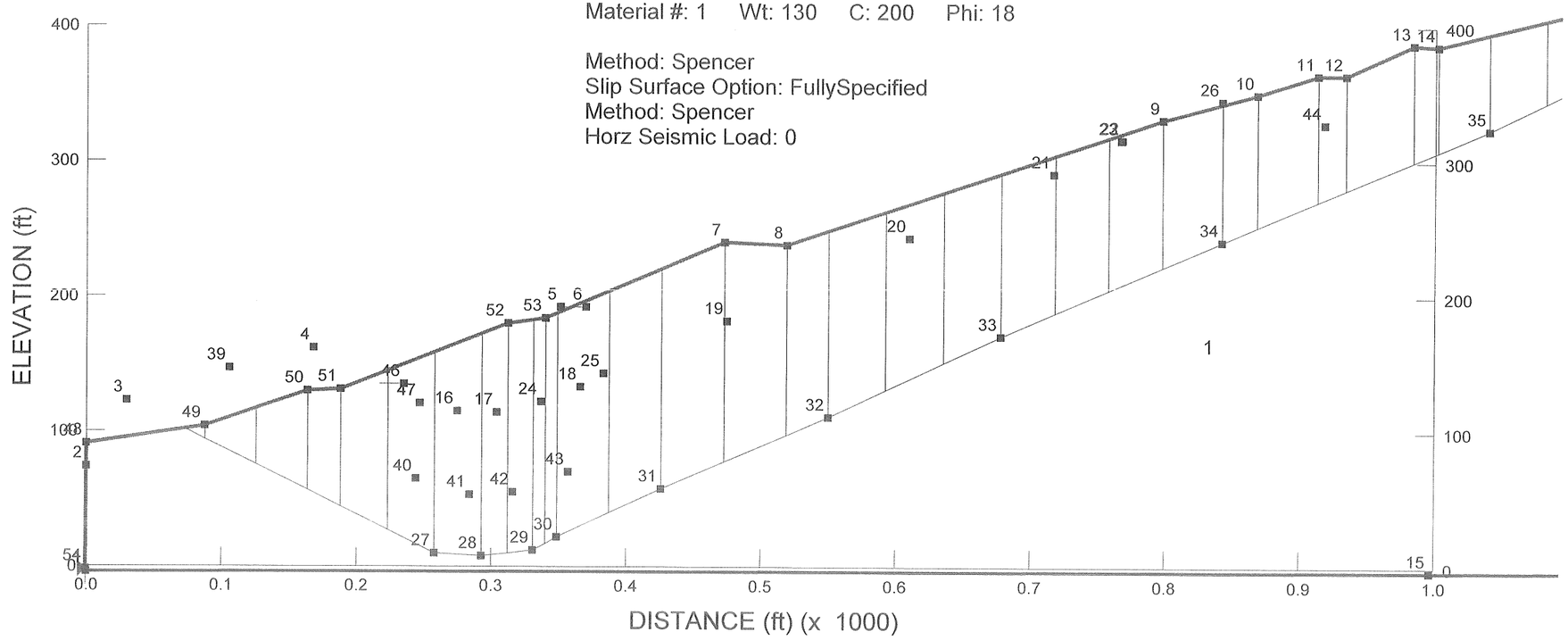
Title: Chiquita North Canyon
Comments: SECTION S17 Bedding
Name: S17 Static.gsz
Date: 12/22/2010Time: 1:47:19 PM
Material #: 1 Wt: 130 C: 200 Phi: 18

Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0



Title: Chiquita North Canyon
Comments: SECTION S17 Bedding
Name: S17 Static.gsz
Date: 12/22/2010Time: 1:47:19 PM
Material #: 1 Wt: 130 C: 200 Phi: 18

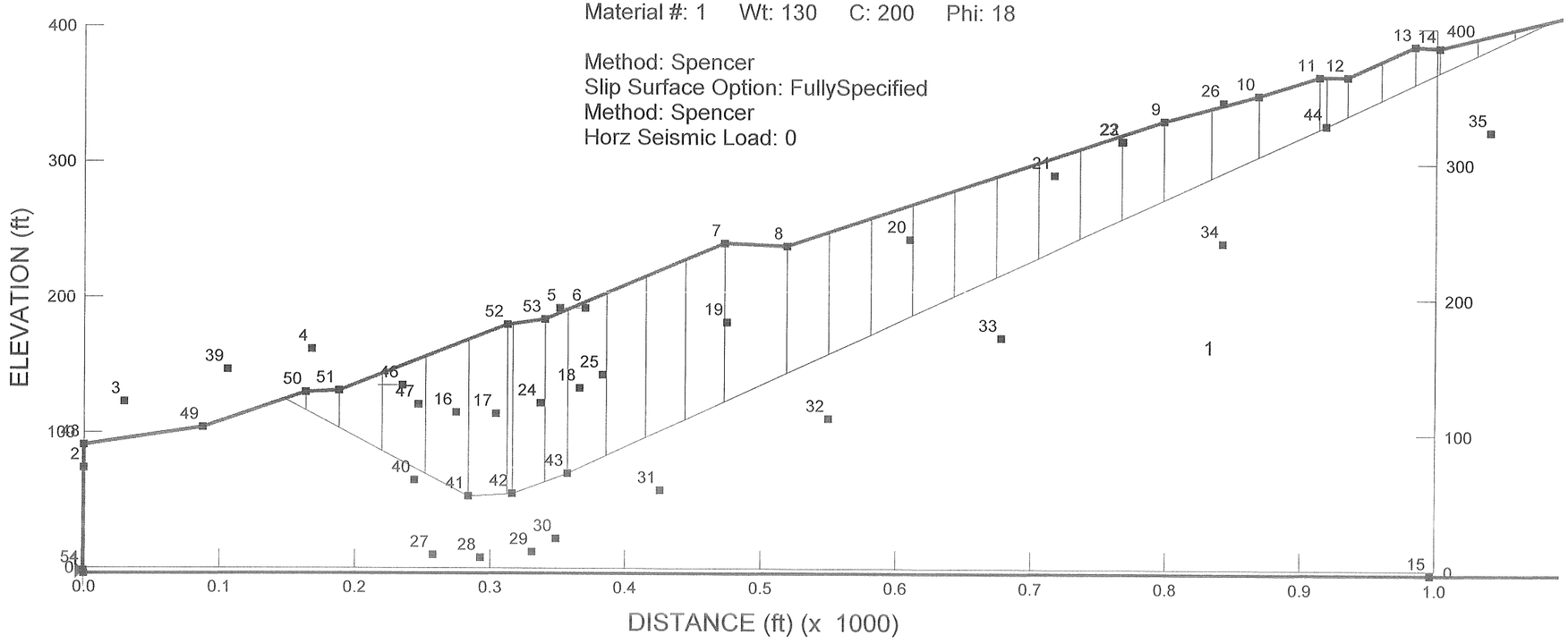
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0



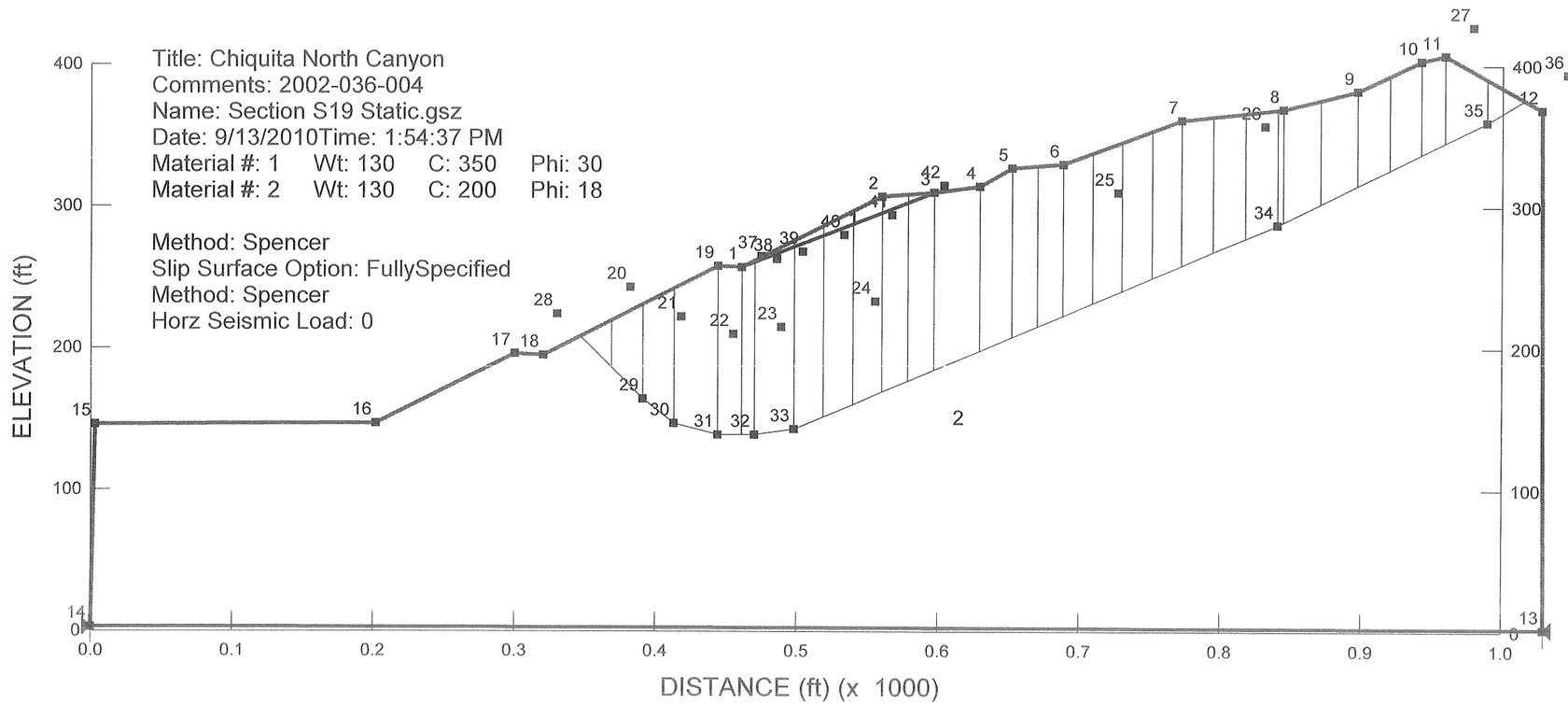
1.42

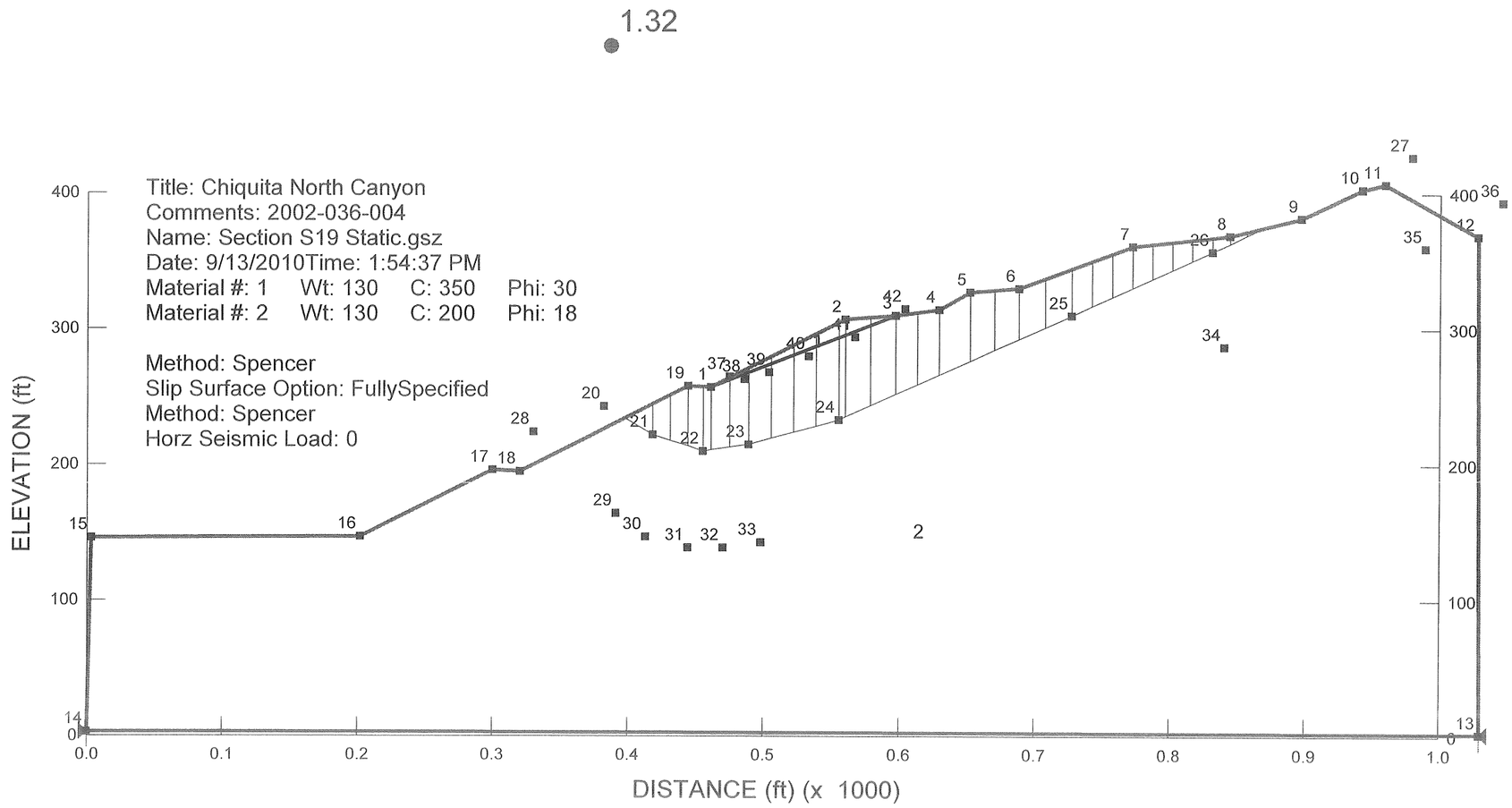
Title: Chiquita North Canyon
Comments: SECTION S17 Bedding
Name: S17 Static.gsz
Date: 12/22/2010Time: 1:47:19 PM
Material #: 1 Wt: 130 C: 200 Phi: 18

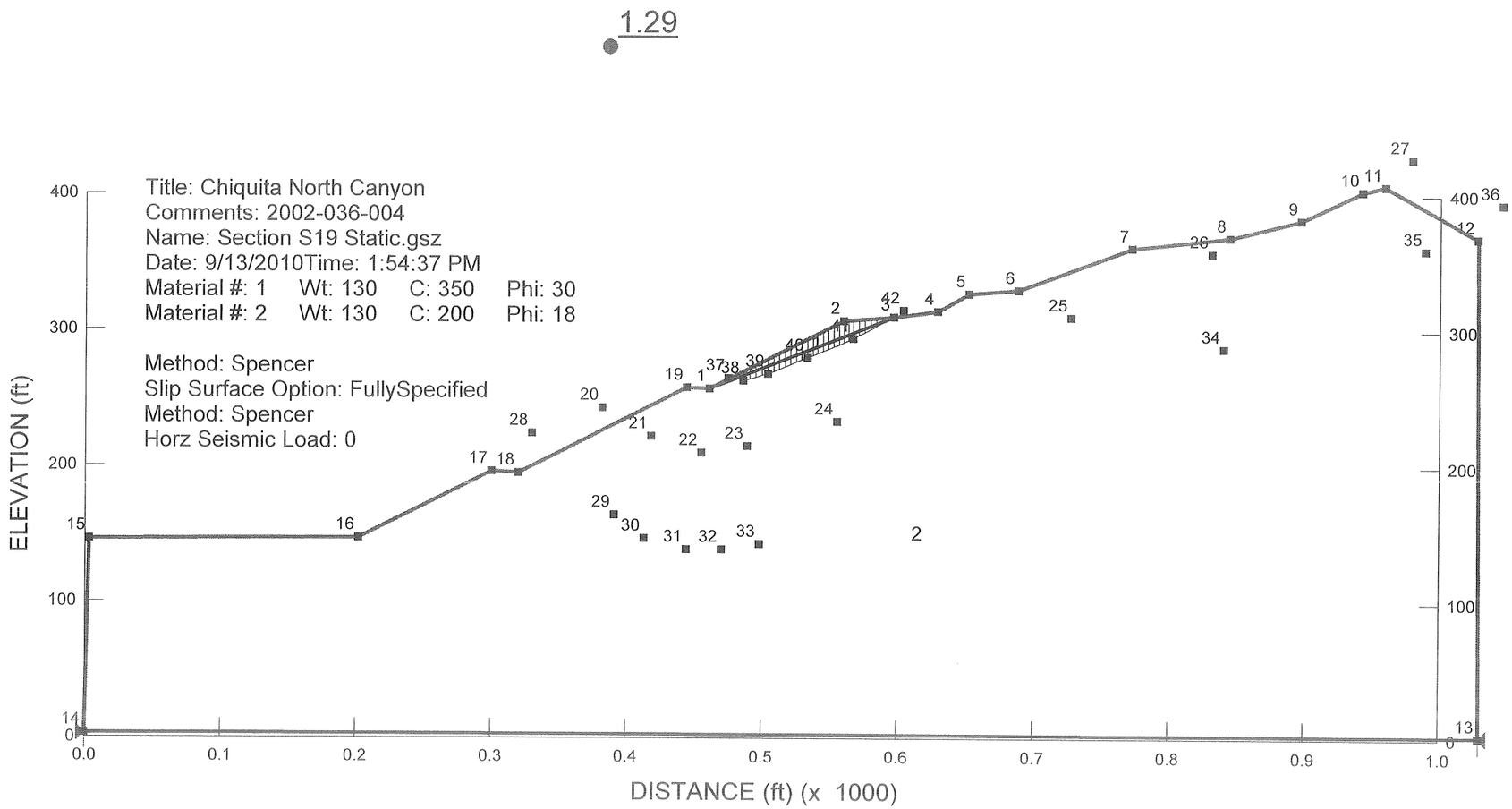
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0



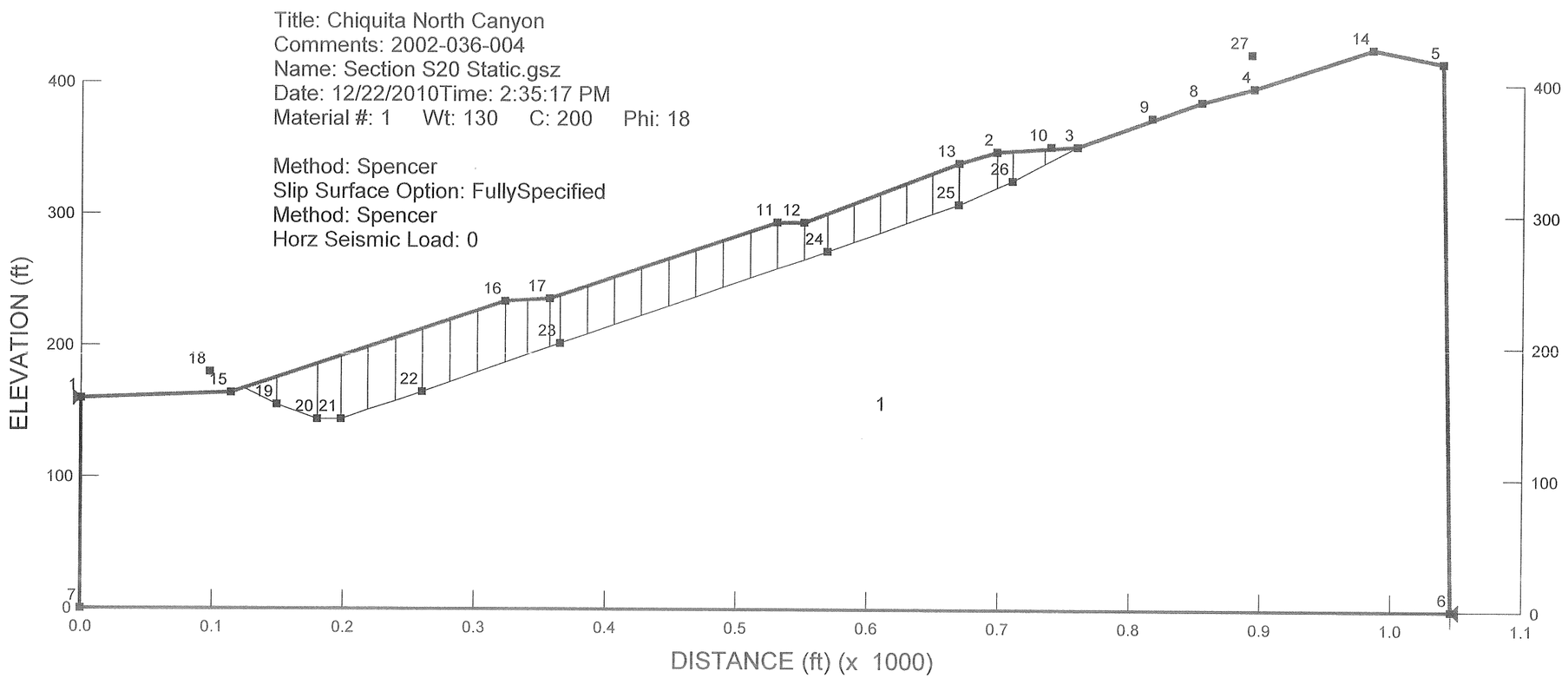
1.58


Title: Chiquita North Canyon
Comments: 2002-036-004
Name: Section S19 Static.gsz
Date: 9/13/2010Time: 1:54:37 PM
Material #: 1 Wt: 130 C: 350 Phi: 30
Material #: 2 Wt: 130 C: 200 Phi: 18
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0
ELEVATION (ft)
DISTANCE (ft) (x 1000)
400
300
200
100
0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2


1.32
Title: Chiquita North Canyon
Comments: 2002-036-004
Name: Section S19 Static.gsz
Date: 9/13/2010Time: 1:54:37 PM
Material #: 1 Wt: 130 C: 350 Phi: 30
Material #: 2 Wt: 130 C: 200 Phi: 18
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0
ELEVATION (ft)
DISTANCE (ft) (x 1000)
400
300
200
100
0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2

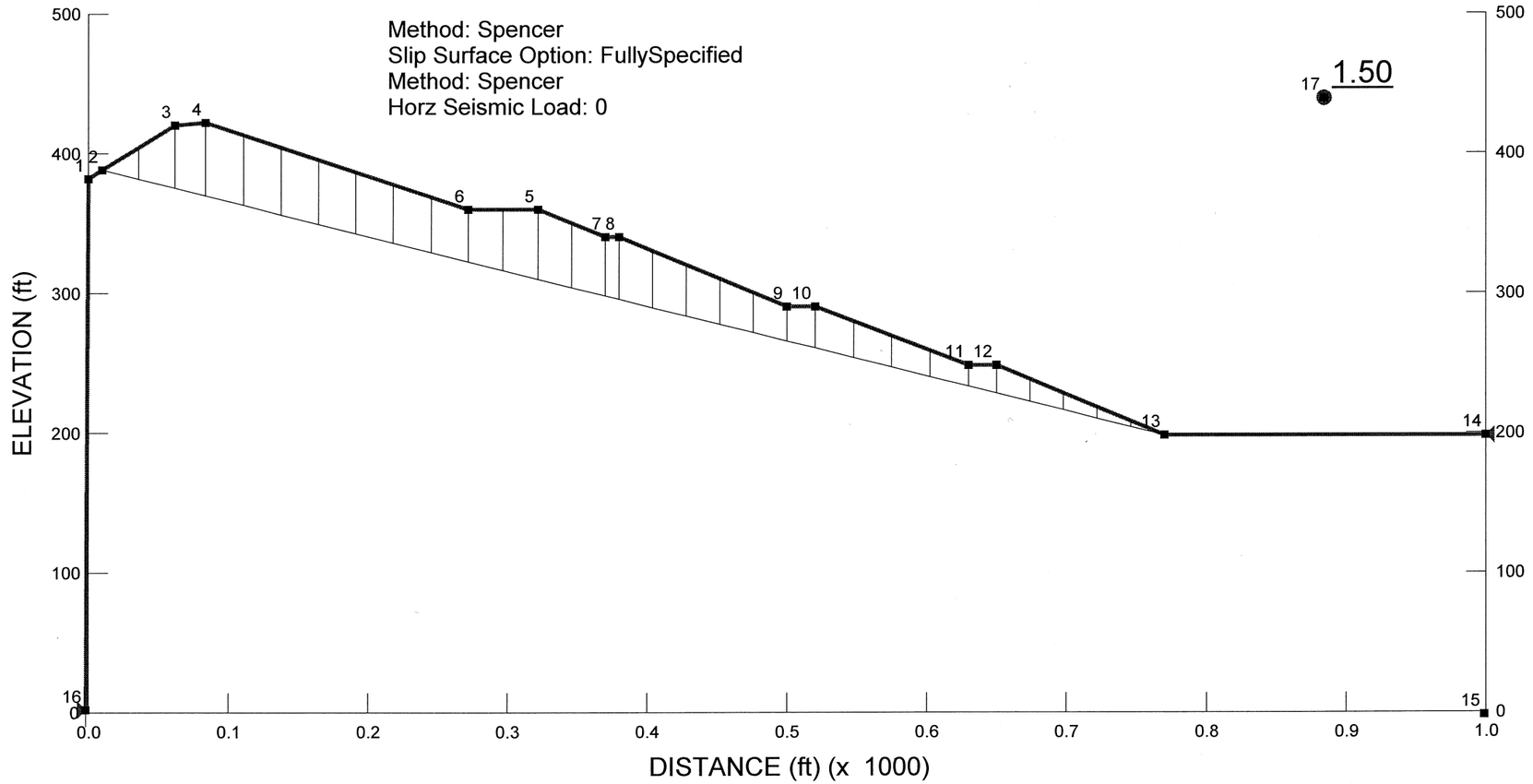

1.29
Title: Chiquita North Canyon
Comments: 2002-036-004
Name: Section S19 Static.gsz
Date: 9/13/2010Time: 1:54:37 PM
Material #: 1 Wt: 130 C: 350 Phi: 30
Material #: 2 Wt: 130 C: 200 Phi: 18
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0
ELEVATION (ft)
DISTANCE (ft) (x 1000)
400
300
200
100
0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0

1.34

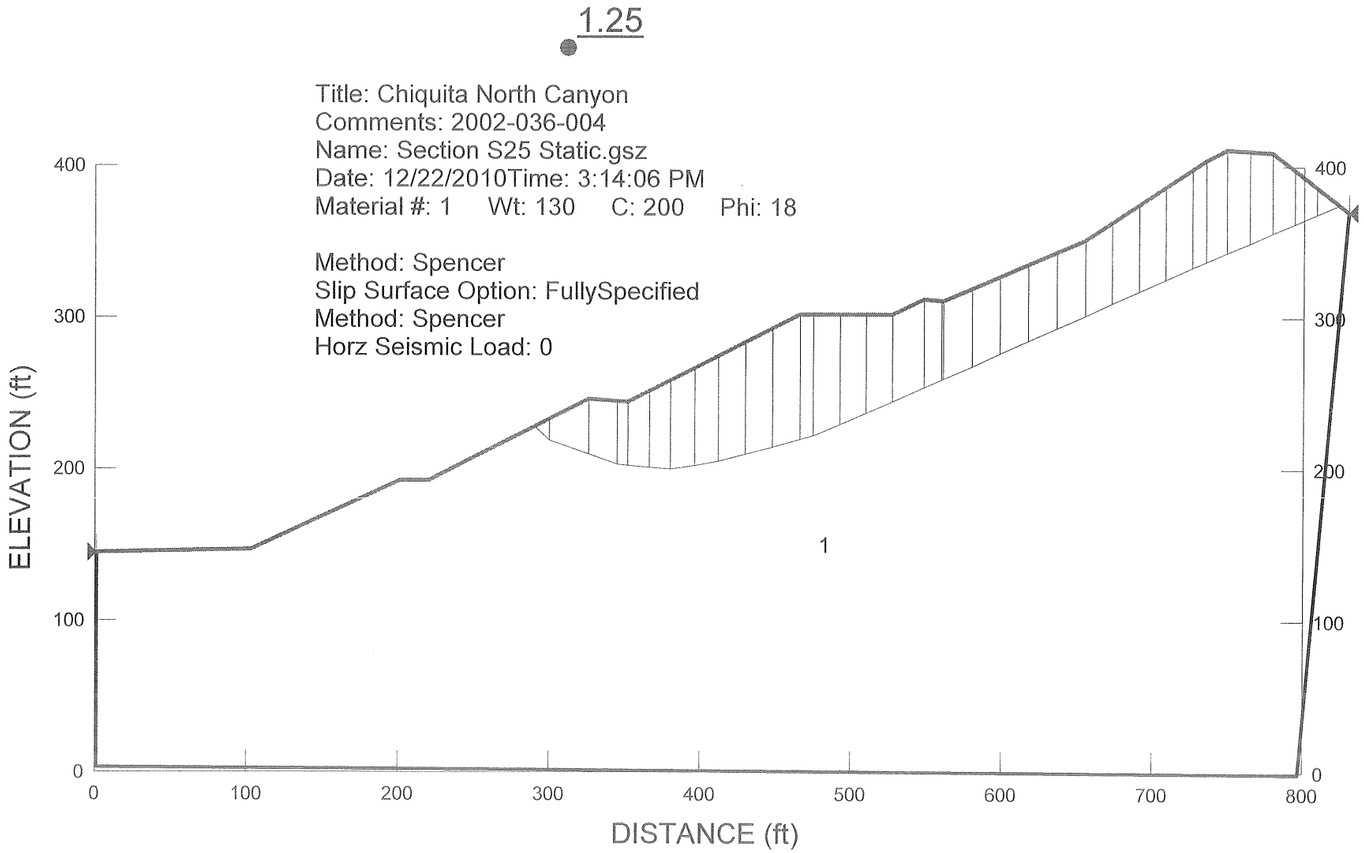

Title: Chiquita North Canyon
Comments: 2002-036-004
Name: Section S20 Static.gsz
Date: 12/22/2010Time: 2:35:17 PM
Material #: 1 Wt: 130 C: 200 Phi: 18
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0
ELEVATION (ft)
DISTANCE (ft) (x 1000)
0
100
200
300
400
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1

Title: Chiquita
Comments: 2002-036-004
Name: S23 Static.gsz
Date: 11/23/2011Time: 12:21:28 PM
Material #: 1 Wt: 130 C: 200 Phi: 18

Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0

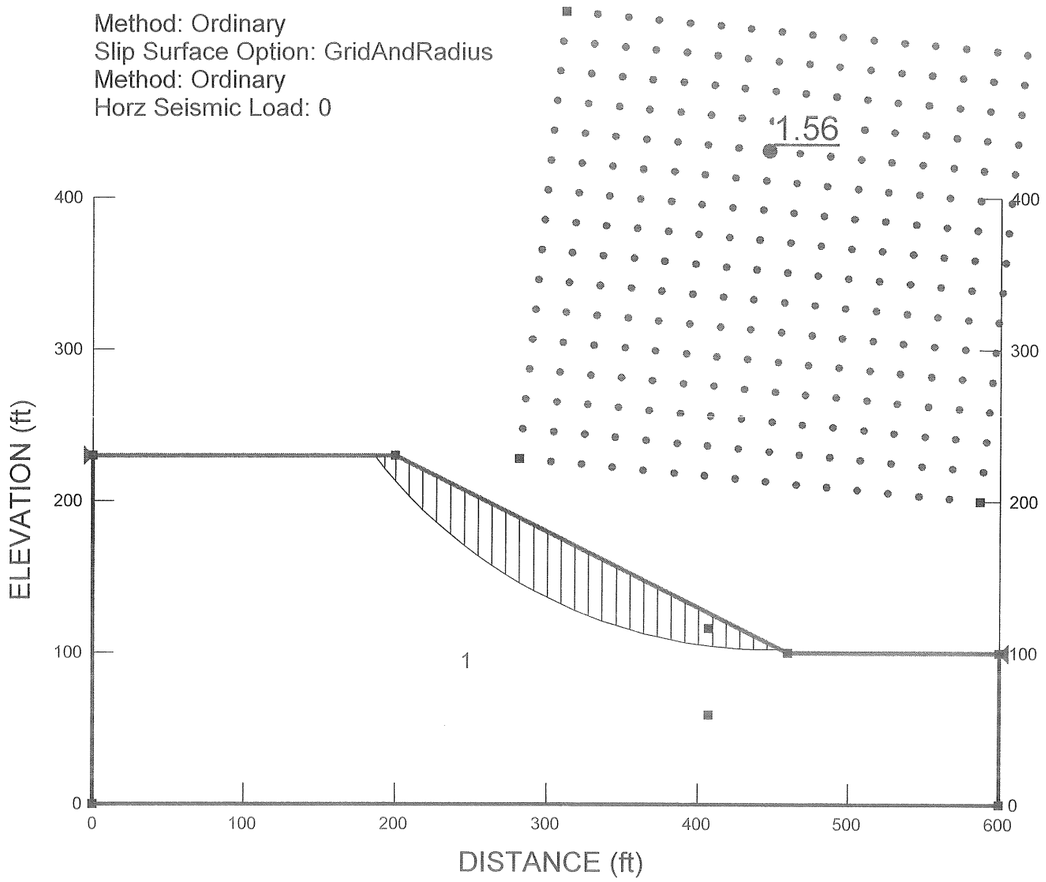


RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY


1.25
Title: Chiquita North Canyon
Comments: 2002-036-004
Name: Section S25 Static.gsz
Date: 12/22/2010Time: 3:14:06 PM
Material #: 1 Wt: 130 C: 200 Phi: 18
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0
1
ELEVATION (ft)
DISTANCE (ft)
0
100
200
300
400
500
600
700
800

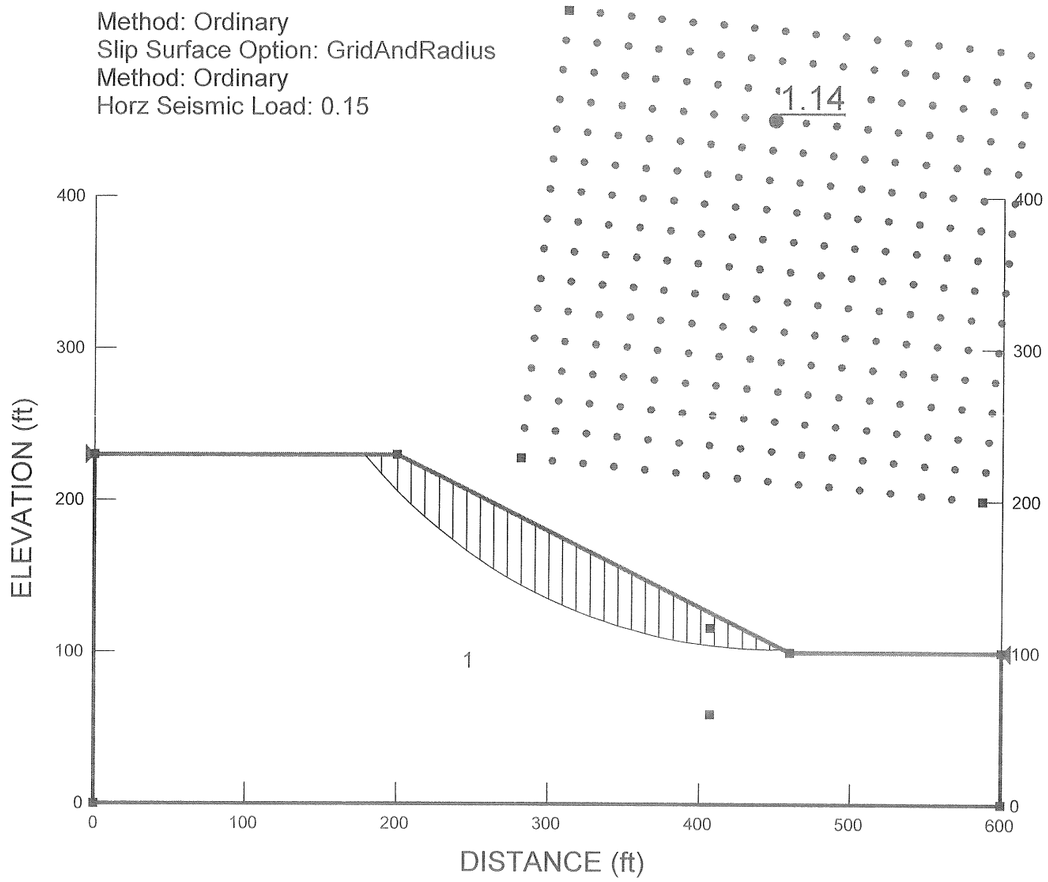
Title: Chiquita North Canyon
Comments: 130' High, 2:1 Compacted Fill Slope
Name: 130' Fill Slope Static.gsz
Date: 1/18/2011Time: 10:15:23 AM
Material #: 1 Wt: 130 C: 350 Phi: 30 Model: MohrCoulomb

Method: Ordinary
Slip Surface Option: GridAndRadius
Method: Ordinary
Horz Seismic Load: 0



Title: Chiquita North Canyon
Comments: 130' High, 2:1 Compacted Fill Slope
Name: 130' Fill Slope Seismic.gsz
Date: 1/18/2011Time: 10:14:07 AM
Material #: 1 Wt: 130 C: 350 Phi: 30 Model: MohrCoulomb

Method: Ordinary
Slip Surface Option: GridAndRadius
Method: Ordinary
Horz Seismic Load: 0.15



Appendix D-2
Geotechnical Evaluation of Updated Excavation Plan

RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

May 23, 2014

Chiquita Canyon Landfill
29201 Henry Mayo Drive
Castaic, California 91384

Job No. 2002-036-004

Attention: Mr. Michael Dean
Division Vice President

Subject: Geotechnical Evaluation of Updated Excavation Plan
Master Plan Revision
Chiquita Canyon Landfill
29201 Henry Mayo Drive
Castaic, California

Gentlemen:

This letter summarizes the findings from R. T. Frankian & Associates' (RTF&A) geotechnical evaluation of the updated Chiquita Canyon Landfill (CCL) *Proposed Project Excavation Plan* (herein referred to as the 2014 Excavation Plan) for the Master Plan Revision (MPR). The 2014 Excavation Plan, prepared by Golder Associates (Golder) and dated April 30, 2014, supersedes the December 2011 Golder *Excavation Plan* presented in our January 27, 2012 MPR geotechnical investigation report (RTF&A, 2012c).

Since the completion of our 2012 MPR report, RTF&A has provided additional geotechnical services for CCL. These have included construction observation services during development of Cell 5 (RTF&A, 2012d and 2012e) and a geotechnical investigation for future Cell 6 (RTF&A, 2014). Geologic and geotechnical data developed for this additional work have been incorporated into this geotechnical evaluation.

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SUMMARY OF 2014 EXCAVATION PLAN REVISIONS

The 2014 Excavation Plan revisions are primarily associated with the future landfill entrance facility and the Future Potential Conversion Technology Set-Aside Area (herein referred to as the "Set-Aside Area"). The landfill entrance facility will be located in the southwest corner of the CCL site, northwest of the intersection of California State Highway 126 (also known as Henry Mayo Drive in the vicinity of CCL) and Wolcott Way. It will include a new entrance road, scales, gatehouse, and administration building. The new entrance road alignment will extend westerly from the current intersection of Franklin Parkway and Wolcott Way, extending west-southwesterly toward the current landfill entrance. The 2011 Excavation Plan indicated the grading of two cut slopes at the west end of the entrance facility. Revisions to the entrance facility, as depicted on the 2014 Excavation Plan, indicate two additional cut slopes, and modification of one of the previously proposed cut slopes.

The Set-Aside Area will be located within a southerly-draining steep-walled canyon (herein referred to as "Wolcott Canyon") located immediately north of the intersection of Wolcott Way and Franklin Parkway. Potential grading for the Set-Aside Area will include construction of a near-level pad at approximate elevation 1025 feet above mean sea level (msl), with associated cut and fill slopes surrounding the pad. The Set-Aside Area pad will be accessible by way of road extending from the north end of Wolcott Way to the southwest corner of the graded pad.

The 2011 Excavation Plan indicated Potential Borrow Area cut slopes along the northern and northwestern walls of Wolcott Canyon. The 2014 Excavation Plan includes an additional Potential Borrow Area cut slope and pad southwest of the Set-Aside Area pad.

The grading associated with the 2014 Excavation Plan is indicated on our Geotechnical Map, presented as Figures 1.1 and 1.2. The 2014 Excavation Plan is included as Figure 2.

GEOTECHNICAL EVALUATION

The geotechnical evaluation was performed to provide additional temporary slope stability calculations for Cut Slope CS-7 and to assess the impact of the site geologic and geotechnical conditions relative to the revised MPR development at CCL, as depicted on the 2014 Excavation Plan. This included RTF&A evaluating the stability of proposed new cut slopes. The geologic conditions within the site are shown on the Geotechnical Map (Figures 1.1 and 1.2). The geologic data presented in our 2012 MPR report (RTF&A, 2012c) have been slightly modified to reflect new findings from studies post-dating our 2012 report, changed geologic interpretations, and/or corrections. Specifically, we have revised the depiction of the inactive faulting identified in East Canyon, based on our 2006 fault study (RTF&A, 2006b) and adjusted geologic contacts in the areas of Cell 5 and future Cell 6, based on additional geotechnical work (RTF&A, 2012d, 2012e, and 2014). The adjusted geologic contacts were mapped using the March 12, 2013 aerial survey prepared by Cooper Aerial Survey Co.

From a geotechnical standpoint, the most significant plan revisions relate to the grading proposed along the north side of the landfill entrance facility in which two new cut slopes (designated as Cut Slopes CS-26 and CS-27) are proposed, and a previously planned cut slope (Cut Slope CS-20) will be relocated and reduced in height. The three cut slopes are indicated on the Geotechnical Map (Figure 1.2). Data specific to the three cut slopes, including slope height, gradient, and underlying geologic conditions, are summarized in Table 1, Summary of Cut Slopes. The stability of the three cut slopes is addressed below. Additionally, we are providing a preliminary evaluation of the potential grading of the Set-Aside Area and Potential Borrow Area slopes.

We also received feedback from Los Angeles County Department of Public Works Geotechnical Materials and Engineering Division (GMED) relative to factor of safety requirements for the proposed temporary excavation slopes that have the potential to exist for an extended period of time. GMED indicated that a temporary factor of safety of 1.25 is acceptable for the proposed excavation slopes within the Chiquita Canyon Landfill property boundary.

However, any potential failure planes that daylight off property that have the potential to exist in an unmodified condition for an extended period of time will need to meet the GMED static factor of safety requirements of 1.5 for permanent slopes.

We have reviewed the numerous proposed cut slopes for the 2012 MPR Report and have determined that only proposed Cut Slope CS-7, depicted on Geotechnical Section S5-S5' (Figure 3 of this report), has the potential to exist unmodified for an extended period of time and has a failure plane that extends off-site that will have a factor of safety of less than 1.5. In addition to the revised geotechnical evaluation for plan revisions presented in this report, we also performed additional slope stability calculations for Cut Slope CS-7 as presented below. Table 1 from our MPR Report has been updated based on the slope stability evaluations and is re-presented in this report.

CUT SLOPE CS-7

Cut Slope CS-7 (Figure 1.1) will be graded as a southeast- to southwest-facing, 2:1 to 3:1 slope. The total slope height is approximately 205 feet high, with the upper (permanent) portion of the cut slope approximately 35 feet high and the lower (lined) portion of the slope 170 feet high. The cut slope will encounter Saugus Formation units and landslides Qls G through Qls I, and Qls L. Bedding in the underlying Saugus Formation strikes from north-south to northeast, with easterly dips between 20 and 40 degrees. As indicated on Geotechnical Section S5-S5' (Figure 3), a daylighted bedding component of 17 degrees will be exposed in the cut slope (RTF&A, 2012c). It is anticipated that grading of Cut Slope CS-7 will remove landslides Qls G through Qls I, and Qls L. If any landslide debris remains after completion of the cut slope, the debris should be removed and certified engineered fill placed to restore grade.

Cut Slope CS-7 has the potential to exist for an extended period of time and has a potential bedding plane that extends beyond the Chiquita Canyon Landfill property limit. Accordingly, a static factor of safety of 1.5 will be required. As presented in the MRP report (RTF&A, 2012c), the static factor of safety is greater than 1.25, but is less than 1.5. Slope

stability calculations were performed for a buttress shear key design that meets the GMED slope stability static factor of safety requirements of 1.5. The slope stability calculations were performed using the below listed shear strength parameters and the computer program Slope/W. The slope stability calculations are presented in the Appendix of this report. The proposed buttress shear key and the slope stability results that exceed a static factor of safety of 1.5 are shown on Geotechnical Section S5-S5'.

The recommended shear strength parameters are based on the results of the direct shear test results (RTF&A, 2012c). In addition, we also reviewed shear strength parameters presented in the referenced report for the subject site and nearby vicinity. Presented in the following table are the selected bedding plane shear strengths, as well as the cross-bedding and compacted fill shear strengths recommended for slope stability evaluation at the site.

MATERIAL	COHESION (psf)	ANGLE OF SHEARING RESISTANCE (degrees)
Landslide Failure Plane (MSR)	100	10
QTs & Tp Bedding Plane (MSR)	200	18
Seismic Bedding Plane (SSR)	300	26
QTs Cross Bedding (SSR)	600	36
Tp Cross Bedding (SSR)	500	30
Compacted Fill (SSR)	350	30

Mitigation to obtain a permanent factor of safety of 1.5 for Cut Slope CS-7 will consist of excavating a 40-foot-wide buttress shear key at approximate elevation of 1,300 feet, downgradient from the proposed perimeter road, as depicted on Figure 1.1 and attached Geotechnical Section S5-S5'. Construction of the recommended buttress shear key provides the required factor of safety of 1.5 for static slope stability conditions, as presented in Figure 3 and the Appendix.

CUT SLOPE CS-20

Cut Slope CS-20 will be graded as a southeast-facing, 2:1 (horizontal:vertical) slope, to a height of approximately 30 feet. The cut slope will be graded for a debris basin along the north

side of the project. The upper portion of the cut slope will expose Saugus Formation units; Pleistocene terrace deposits could be encountered in the lower portion of CS-20. Bedding in the Saugus Formation strikes northwest and dips 15 degrees to the northeast, with an apparent bedding of 6 degrees dipping into the proposed cut slope. The Saugus Formation bedding orientation is favorable with respect to the southeast-facing cut slope. Bedding within the terrace deposits is essentially flat-lying and is grossly stable. Accordingly, Cut Slope CS-20 is considered grossly stable from a geologic standpoint.

CUT SLOPE CS-26

Cut Slope CS-26 is proposed as an 85-foot-high, southwest-facing, 2:1 slope. The cut slope will expose Saugus Formation units in which the underlying bedding strikes northwest and dips 12 degrees towards the northeast. This bedding orientation is favorable with respect to southwest-facing cut slope, and Cut Slope CS-26 is considered grossly stable from a geologic standpoint.

CUT SLOPE CS-27

Cut Slope CS-27 will consist of a 75-foot-high, south- to southwest-facing, 2:1 slope. The cut slope is underlain by Saugus Formation units in which the bedding strikes northwest, dipping 15 to 25 degrees towards the northeast. This bedding orientation is favorable with respect to Cut Slope CS-27, and the cut slope is considered grossly stable from a geologic standpoint.

POTENTIAL SET-ASIDE AREA AND BORROW AREA SLOPES

The 2014 Excavation Plan includes grading for potential improvements in the Set-Aside Area and three Potential Borrow Areas, as depicted with green elevation contours on Figure 1.2. As shown on Figure 1.2, perimeter cut slopes would be created for any grading associated with the Set-Aside Area pad, including slopes on the north and east sides of the pad, as well as a

borrow area slope along the northwest side. These slopes would range from 100 feet on the north and east to approximately 125 feet for the northwest borrow area slope. The proposed pad elevation of the Set-Aside Area would be established at an elevation of approximately 1025 feet msl. Additionally, borrow area slopes would be graded along the western and northern walls of Wolcott Canyon. The maximum proposed heights for these slopes range from 100 feet to 225 feet.

The cut slopes will encounter sedimentary bedrock units of the Saugus Formation, with the underlying bedding striking northwest and dipping approximately 20 to 40 degrees towards the northeast. Based on the orientation of bedding relative to cut slopes, there is a potential for adversely dipping, or "daylighted," bedding for the easterly-facing cut slopes along the western side of Wolcott Canyon. Potential daylighted bedding may require some type of stabilization, such as buttresses, retaining walls, or flattening of the cut slope gradient.

Landslides would likely be encountered in the 160-foot-high borrow area cut slope in the southwest corner of the Set-Aside Area, and in the borrow area cut slope along the north wall of Wolcott Canyon. Both landslides would require complete removal to establish a stable slope configuration if the potential grading depicted on the 2014 Excavation Plan is implemented. If the cut slopes do not effectively remove the landslides, additional excavation deeper than the proposed cut grades would be necessary to remove the slide debris, and the slope grades restored with engineered fill.

The floor of the Set-Aside Area is mantled by Holocene alluvial deposits. These materials may be susceptible to liquefaction and/or hydroconsolidation. If grading of the Set-Aside Area is performed, alluvial deposits determined to be susceptible to liquefaction or hydroconsolidation would need to be removed and replaced with engineered fill materials.

Once site-specific grading plans are developed for the Set-Aside Area and the Potential Borrow Area slopes, geotechnical investigations will need to be performed to refine the geotechnical mitigation measures and recommendations addressed above.

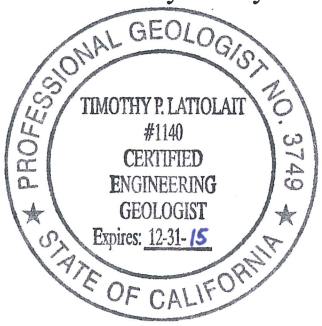
SECTION 111 STATEMENT

Based on our review of the 2014 Excavation Plan and the referenced reports, it is our professional opinion that the proposed MPR development will be safe from hazard of landslide, settlement, or slippage and will not adversely affect the geotechnical conditions of off-site properties, provided our recommendations and the requirements of the Los Angeles County Building Code are followed.

Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report has been prepared for CCL and their design consultants, to be used solely for planning and design of the MPR and associated grading.

The following are attached and complete this report.

- Table 1 – Summary of Cut Slopes
- Geotechnical Map – Figures 1.1 and 1.2
- 2014 Excavation Plan, titled "Proposed Project Excavation Plan" – Figure 2
- Geotechnical Section S5-S5' – Figure 3
- Appendix – Stability Analyses



Respectfully submitted,

R. T. FRANKIAN & ASSOCIATES

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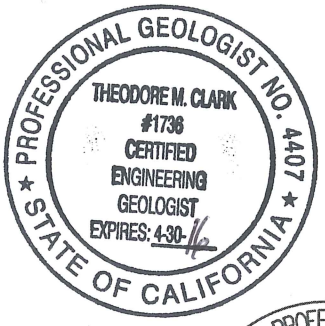
Principal Engineering Geologist



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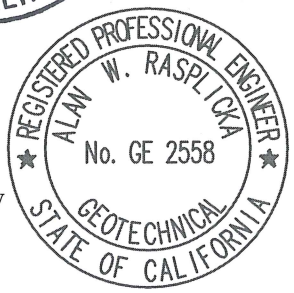

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TPL/TMC/AWR/eaw

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Attn: Mr. Scott Gordon
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Attn: Mr. Rich Haughey

RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

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TABLE 1

SUMMARY OF CUT SLOPES
North Canyon Expansion

CUT SLOPE	FIGURE NO.	SLOPE GRADIENT	SLOPE HEIGHT (total/permanent)	SLOPE FACE DIRECTION	GEOLOGIC MATERIALS	GEOLOGIC SECTION	GEOLOGIC STABILITY	ADDITIONAL RECOMMENDED GRADING
CS-1	1.1	2:1	300'/200'	S to SE	Tp	S11-S11'	Bedding dipping steeper than slope gradient; grossly stable	None
CS-2	1.1	2:1	150'/80'	SSE	Tp	S12-S12'	Bedding dipping steeper than slope gradient; grossly stable	None
CS-3a	1.1	2:1	220'/175'	ESE	Tp	S13-S13', S26-S26'	Bedding dipping parallel to or steeper than slope gradient; grossly stable	None
CS-3b	1.1	2:1	75'/0	ESE	Tp	S26-S26'	Bedding dipping steeper than slope gradient; grossly stable	None
CS-4	1.1	2:1 to 4:1	210'/120'	SE	Tp, Qls E, Qls F, af	S16-S16'	Bedding dipping parallel to or steeper than slope gradient; grossly stable	Qls E & Qls F and af to be removed during grading
CS-5	1.1	2:1 to 3:1	120'/30'	SE to S	Tp, Qls F, af	S15-S15', S24-S24'	Daylighted bedding; stable by analyses	Remove Qls F and af below elevation 1400 feet; reconstruct as stability fill to restore grade
CS-6	1.1	2½:1 to 3:1	290'/95'	SSE	Tp, QTs, Qls H-J	S17-S17', S20-S20'	Daylighted bedding; stable by analyses	Remove Qls H through Qls J during grading
CS-7	1.1	2:1 to 3:1	205'/35'	SE to SW	QTs, Qls G - I, & L, af	S5-S5'	Daylighted bedding; stable by analyses	Construct 40 feet wide shear key at approximate elevation 1300 feet. Shear key should extend through QTs units and 5 feet into Tp units.
CS-8	1.1	2:1	225'/75'	SW	QTs	---	Favorable bedding; grossly stable	None
CS-9	1.1	2:1	150'/0	S	QTs, Qols A, Qls N, Qls O	S19-S19', S25-S25'	Daylighted bedding; slope stable by analyses	Qols A, Qls N & Qls O to be removed during grading. Restore existing grades above MPR grading footprint with engineered fill.
CS-10	1.1	2:1	185'/75'	SW	QTs	S2-S2'	Favorable bedding; grossly stable	None
CS-11	1.1	2:1	150'/65'	WSW	QTs	S1-S1'	Favorable bedding; grossly stable	None
CS-12	1.1	2:1	100'/100'	NW and SE	QTs, Qls P	S21-S21'	Favorable bedding; grossly stable	None
CS-13	1.1	2:1	50'/50'	SW	QTs	---	Favorable bedding; grossly stable	None
CS-14	1.1	2:1	20'/20'	SW	QTs	---	Favorable bedding; grossly stable	None
CS-15	1.1	2:1	50'/50'	SW	QTs	---	Favorable bedding; grossly stable	None

TABLE 1

SUMMARY OF CUT SLOPES
North Canyon Expansion

CUT SLOPE	FIGURE NO.	SLOPE GRADIENT	SLOPE HEIGHT (total/permanent)	SLOPE FACE DIRECTION	GEOLOGIC MATERIALS	GEOLOGIC SECTION	GEOLOGIC STABILITY	ADDITIONAL RECOMMENDED GRADING
CS-16	1.1	2:1	110'/0	NW	QTs	---	Favorable bedding; grossly stable	None
CS-17	1.2	2:1	160'/160'	S	QTs, Qt	S22-S22', S27-S27'	Favorable bedding; grossly stable	Construct stability fill slopes above and below entrance to control erosion
CS-18	1.2	2:1	200'/200'	E	QTs, Qls A	S23-S23'	Daylighted bedding; stable by analyses	Qls A to be removed during grading; if needed place engineered fill to restore slope grades
CS-19	1.1	2:1	50'/50'	WSW	QTs	---	Favorable bedding; grossly stable	None
CS-20	1.2	2:1	30'/30'	SE	QTs, Qt	---	Favorable bedding; grossly stable	None
CS-21	1.2	2:1	85'/85'	W	QTs	---	Favorable bedding; grossly stable	None
CS-22	1.2	2:1	100'/100'	SSE	QTs	---	Favorable bedding; grossly stable	None
CS-23	1.1	2:1	85'/0	ENE to E	Tp, QTs	---	Favorable bedding; grossly stable	None
CS-24	1.2	2-1/2:1	235'/60'	E to N	QTs, afs	---	Bedding dipping steeper than slope gradient; grossly stable	Remove "afs" and reconstruct as engineered fill slope
CS-25	1.1	2:1	35'/35'	SE	Tp	---	Bedding dipping steeper than slope gradient; grossly stable	None
CS-26	1.2	2:1	85'/85'	SW	QTs	---	Favorable bedding; grossly stable	None
CS-27	1.2	2:1	75'/75'	SW	QTs	---	Favorable bedding; grossly stable	None

Remove Qls F below Elevation 1400 feet

Portion of Qls F to remain in place (Above Elevation 1400 feet)

Recommended Shear Key 40' Wide

15'-WIDE DRAINAGE BENCH (TYP.)

Perimeter Road

LEACHATE COLLECTION DRAIN (TYP.)

LEACHATE STORAGE / TREATMENT / LOADOUT FACILITY

STORMWATER BASIN

Qal R=8'-15'

EXPLANATION

- GEOLOGIC CONTACT; QUERIED WHERE UNCERTAIN OR INFERRED; DOTTED WHERE CONCEALED
- GRADATIONAL GEOLOGIC CONTACT
- ANTICLINAL FOLD; APPROXIMATELY LOCATED, QUERIED WHERE UNCERTAIN, DOTTED WHERE CONCEALED
- SYNCLINAL FOLD; APPROXIMATELY LOCATED QUERIED WHERE UNCERTAIN, DOTTED WHERE CONCEALED
- STRIKE AND DIP OF BEDDING
- STRIKE AND DIP OF CONCEALED BEDDING
- STRIKE AND DIP OF SLIDE PLANE
- STRIKE AND DIP OF JOINT
- SILTSTONE BED
- SANDSTONE BED
- FOSSIL BED
- RIDGE-FORMING COQUINA
- SURFICIAL FAILURE
- af — ARTIFICIAL FILL
- afr — ARTIFICIAL FILL, REFUSE - FILLED AND COMPACTED SOLID WASTE
- afs — ARTIFICIAL FILL STOCKPILE
- cef — CERTIFIED ENGINEERED FILL
- Qal — ALLUVIUM
- Qd — DEBRIS FLOW
- Qls — LANDSLIDE DEBRIS
- Qols — OLDER LANDSLIDE DEBRIS
- Qoa — OLDER ALLUVIUM
- QT — TERRACE DEPOSITS
- QTs — SAUGUS FORMATION
- Tp — PICO FORMATION

- B-2-10 — EXPLORATORY BORING
- DW-24/PZ-3 — GROUNDWATER MONITORING WELL
- SW-1 — VADOSE ZONE MONITORING WELL
- GP-14 — VADOSE GAS PROBE
- LP-2 — VACUUM PRESSURE LYSIMETER
- A — A' — GEOLOGIC SECTION LINE
- CR — COMPLETE REMOVAL OF Qls
- PR — PARTIAL REMOVAL OF Qls
- R=8'-12' — RECOMMENDED REMOVAL DEPTH PRIOR TO PLACING FILL

B-1-10 · B-2-10 · B-3-10 · B-4-10 · B-5-10 · B-6-10 · B-7-10 · B-9-10

Geotechnical Map

PREPARED FOR: Chiquita Canyon Landfill

PROJECT LOCATION: North and East Canyon Excavation Area, Master Plan Revision, Castaic, California

SCALE	DRAWN BY	CHECKED BY
1"=100'	JH	TPL/TMC
DATE	Figure 1.1	PROJECT NO.
5-23-2014		2002-036-004

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B-1-09 (63) (12) (30) (35) 27 (52) (64) 63 22 14 9 (65) 26 22 DW-2

B-2-09 (12) (17) (27) 27 22 14 (33) 14 11 (39) (42) 16 (45) 25

B-3-09 8 (21) 14 (24) 16 (28) 15 (34) 12 (42) 14 (45) 60

B-8-10 (14) (32) 16 (23) 14 (25) 12 (27) (37) 58 (44) (96) 68 (48) (60) (55) 26 18 (74) (67) 25 (79) 17 (94) (98)

B-10-10 20 (24.5) 17 (27.5) (32.5) 15 17 (40) 15 (51)

B-11-10 10 (17.5) 10 (18.5) 2 (33) 8 (37)

QTs Qd Qls Qal Tp af afr afs cef af/afr Qt

(Canyon A) (Canyon D) (Primary Canyon)

EXISTING LANDFILL GAS TO ENERGY PLANT

EXISTING LANDFILL GAS BLOWER/FLARE STATION

PROPOSED ALTERNATIVE 1 FACILITIES LOCATION

PROPOSED ALTERNATIVE 2 FACILITIES LOCATION

POTENTIAL BORROW AREA

FUTURE POTENTIAL CONVERSION TECHNOLOGY SET-ASIDE AREA

LEACHATE STORAGE/ TREATMENT/ LOADOUT FACILITY

RETAINING WALL

SCREENING BERM

NEW SCALES & GATEHOUSES

NEW ENTRANCE FACILITIES AREA

ADMINISTRATION BLDG.

PUBLIC DROP-OFF

WASH PIT

TRUCK WASH

CS-18 CS-20 CS-21 CS-22 CS-26 CS-27

S22 S22' S23 S23' S26 S27 S27' S28 S28'

FRANKLIN PARKWAY WOLCOTT WAY HENRY MAYO DRIVE

BRUSH TANK

See Explanation on Figure 1.1

Geotechnical Map

PREPARED FOR: Chiquita Canyon Landfill

PROJECT NAME: South Main Canyon and Entrance Road Master Plan Revision Castaic, California

SCALE	DESIGN BY	DRAWN BY	CHECKED BY
1"=100'	JH	TPL/TMC	
DATE		FIGURE	PROJECT NO.
5-23-2014		Figure 1.2	2002-036-004

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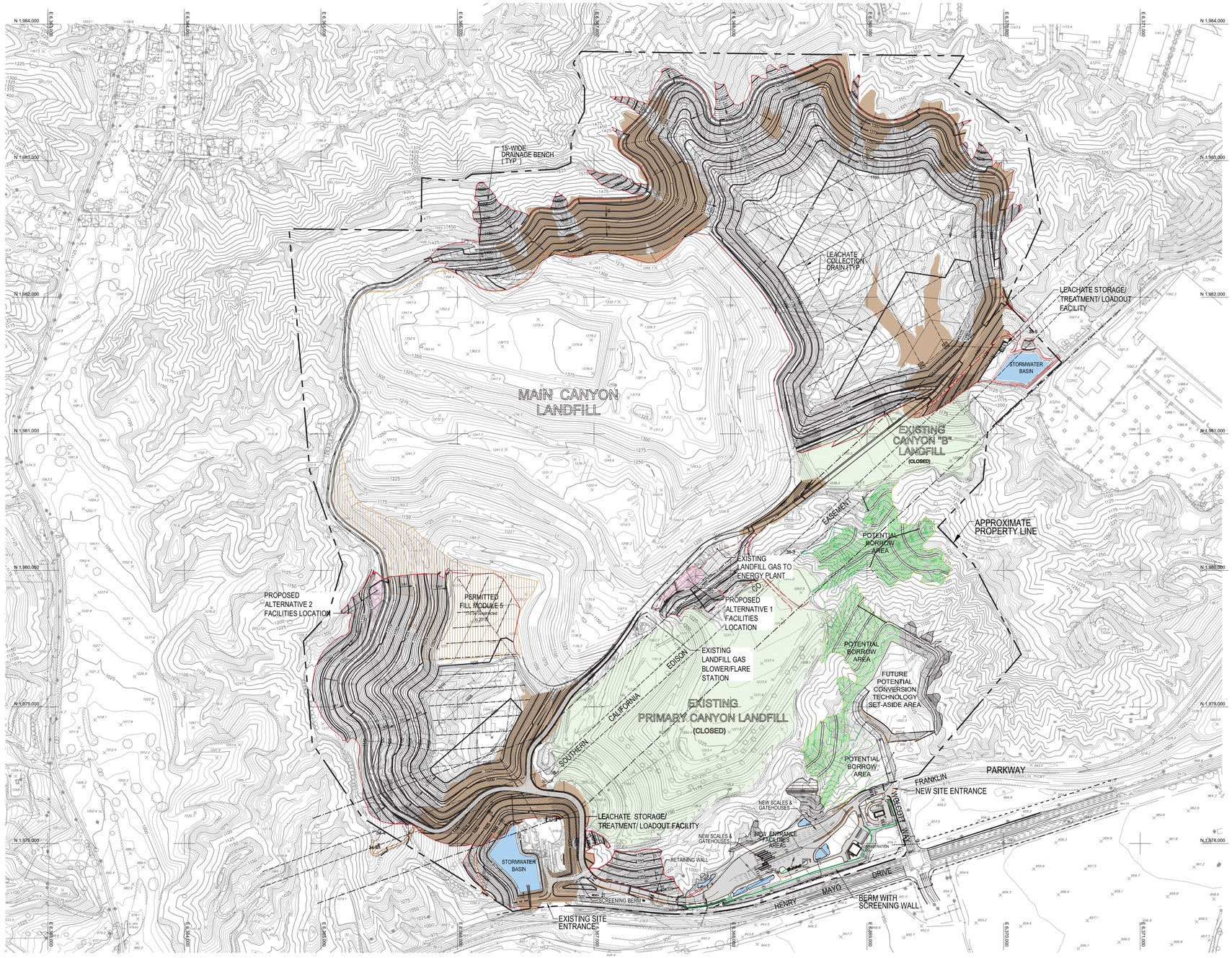
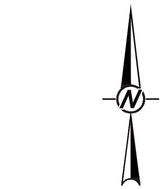
RTFA ENVIRONMENTAL MANAGEMENT & ENGINEERING





0 400 800 1200
FEET

LEGEND

- EXISTING LIMIT OF LANDFILL
- CLOSED PERMITTED LANDFILL AREA
- POTENTIAL BORROW AREA
- EARTHFILL
- ALTERNATIVE EQUIPMENT/MAINTENANCE AREA

NOTES

1. BASE COMPILED BY PHOTOGRAMMETRIC METHODS BY DON READ CORPORATION, BREA, CA. DATE OF PHOTOGRAPHY: OCTOBER 17, 2012

CLIENT
WASTE CONNECTIONS INC.

PROJECT
CHIQUITA CANYON LANDFILL
LOS ANGELES COUNTY, CALIFORNIA

TITLE
PROPOSED PROJECT EXCAVATION PLAN

CONSULTANT
Golder Associates

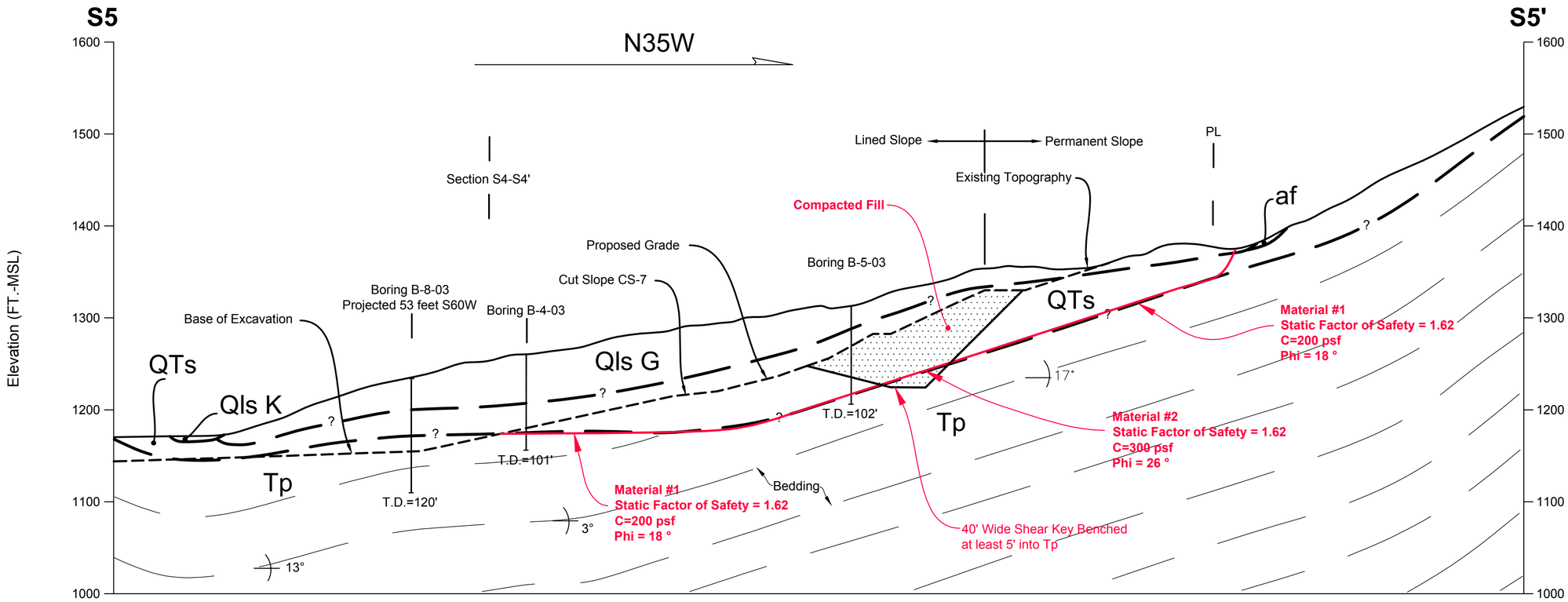
YYYY-MM-DD	2014-04-30
PREPARED	KLT
DESIGN	SER
REVIEW	RDH
APPROVED	RDH

PROJECT No. 0939747303
Rev.
FIGURE 2-3

RTF&A JOB NO. 2002-036-004 REPORT DATED 5-23-2014

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D
0 1 in

Path: G:\CAD\VAULT_CAD\Chiquita Canyon LF\99_PROJECTS\0939747303_ChiquitaCanyon\0101_MasterPlan\Rev\02_PRODUCTION\DWG\2014_04_29_EntranceUpdate | File Name: Optimized EXC-300_APR_2014.dwg



Geotechnical Section

PREPARED FOR

Chiquita Canyon Landfill

Project Location

Tract No. 53901-01
Valencia, California

SCALE	DRAWN BY	CHECKED BY
1" = 100'	JH	TPL/AWR
DATE		JOB NO.
5-23-2014	Figure 3	2002-036-004

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GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

Chiquita Canyon Landfill
May 23, 2014
2002-036-004

APPENDIX

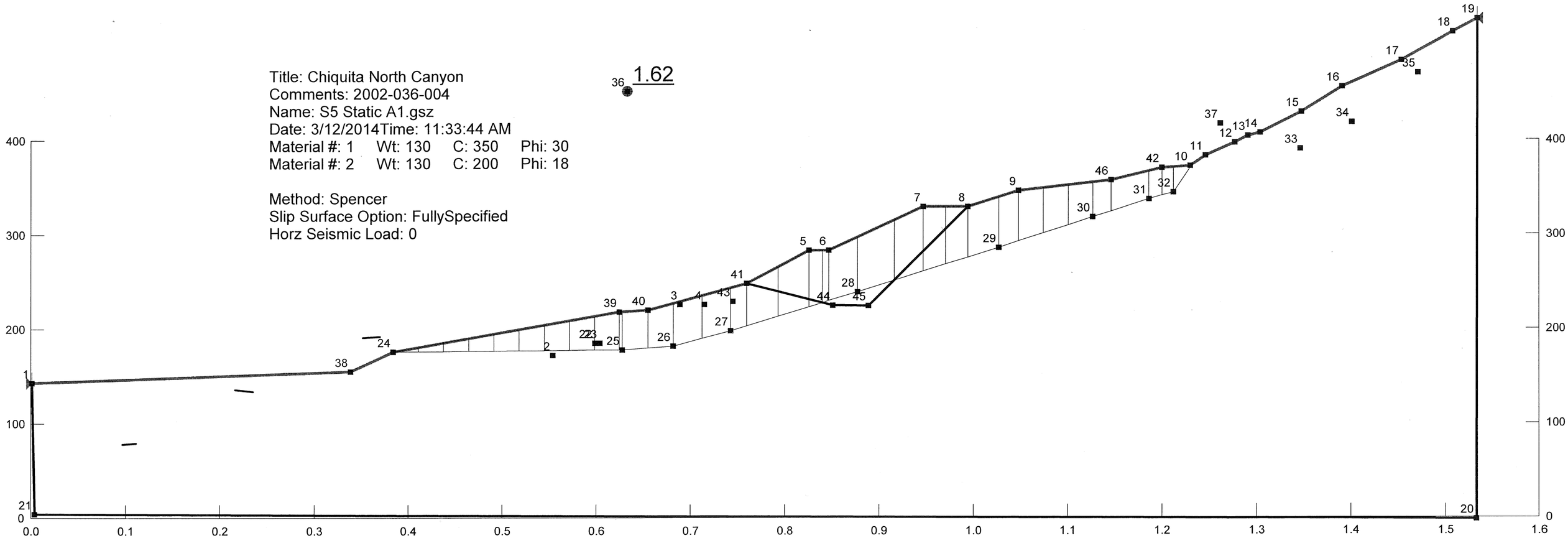
STABILITY ANALYSES

GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

Title: Chiquita North Canyon
Comments: 2002-036-004
Name: S5 Static A1.gsz
Date: 3/12/2014Time: 11:33:44 AM
Material #: 1 Wt: 130 C: 350 Phi: 30
Material #: 2 Wt: 130 C: 200 Phi: 18

Method: Spencer
Slip Surface Option: FullySpecified
Horz Seismic Load: 0

36 1.62



Appendix D-3
Classification of Geotechnical Issues

GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

September 10, 2014

Chiquita Canyon Landfill
29201 Henry Mayo Drive
Castaic, California 91384

Job No. 2002-036-004

Attention: Mr. Michael Dean
Division Vice President

Subject: Clarification of Geotechnical Issues
Master Plan Revision
Chiquita Canyon Landfill
29201 Henry Mayo Drive
Castaic, California

Reference: See Attached References

Gentlemen:

This submittal provides clarification of geotechnical issues discussed with the County of Los Angeles Department of Public Works, Geotechnical and Materials Engineering Division (GMED). The information provided was requested by GMED personnel in a phone conversation on September 3, 2014, to address issues related to GMED's review of the Chiquita Canyon Landfill (CCL) Master Plan Revision (MPR) Draft Environmental Impact Report. The geotechnical information presented in this letter is based on the CCL *Proposed Project Excavation Plan* for the MPR, prepared by Golder Associates (Golder) and dated April 30, 2014, and clarifies previous data included in the referenced R. T. Frankian & Associates (RTF&A) 2012 and 2014 geotechnical reports and provides additional requested evaluation.

The geotechnical issues requiring clarification relate to: 1) liquefaction potential beneath Alternative 1 and 2 Facilities; 2) the stability of proposed Cut Slope CS-7 (as depicted on

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Geotechnical Section S5-S5') under seismic conditions; 3) the stability of proposed Cut Slope CS-18 (as depicted on Geotechnical Section S23-S23') under seismic conditions; and 4) surficial stability of cut slopes exposing Pico Formation bedrock materials, Saugus Formation bedrock materials, and compacted fill materials.

Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report has been prepared for CCL and their design consultants, to be used solely for planning and design of the MPR and associated grading.

LIQUEFACTION POTENTIAL

The California Geological Survey (formerly California Division of Mines and Geology) has published maps showing potential liquefaction areas that must be evaluated prior to development for habitable structures. Alternative 1 Facilities is located on Saugus Formation bedrock units, and Alternative 2 Facilities is located on engineered fill underlain by Saugus Formation bedrock. No alluvial materials, or other materials historically susceptible to liquefaction potential, underlie either site. Therefore, the potential for liquefaction occurring beneath Alternative 1 and 2 Facilities is considered very low.

CUT SLOPE CS- 7 SEISMIC STABILITY

Cut Slope CS-7 will be graded as a southeast- to southwest-facing, 2:1 to 3:1 slope. The total slope height is approximately 205 feet, with the upper (permanent) portion of the cut slope approximately 35 feet high and the lower (lined) portion of the slope 170 feet high. The cut slope will encounter Saugus Formation units and landslides Qls G through Qls I, and Qls L. Bedding in the underlying Saugus Formation strikes from north-south to northeast, with easterly dips between 20 and 40 degrees. As indicated on Geotechnical Section S5-S5' (Figure 1), a

daylighted bedding component of 17 degrees will be exposed in the cut slope. It is anticipated that grading of Cut Slope CS-7 will remove landslides Qls G through Qls I, and Qls L. If any landslide debris remains after completion of the cut slope, the debris should be removed and certified engineered fill placed to restore grade.

Cut Slope CS-7 has the potential to exist for an extended period of time and has a potential bedding plane that extends beyond the Chiquita Canyon Landfill property limit. Accordingly, a static factor of safety of 1.5 and a seismic factor of safety of 1.1 are required by GMED. As presented in the MRP report (RTF&A, 2012b), the static factor of safety is greater than 1.25, but is less than 1.5. Slope stability calculations were performed for a buttress shear key design that meets the GMED slope stability static factor of safety requirements of 1.5 as presented in the referenced 2014 Geotechnical Report. As recently requested, we performed seismic slope stability analysis using Bishop's Method for Cut Slope CS-7 after construction of the recommended shear key. The slope stability calculations were performed using the shear strength parameters presented in the referenced reports and the computer program Slope/W. The proposed buttress shear key and the slope stability results that exceed a static factor of safety of 1.5 for static conditions and 1.1 for pseudostatic conditions are shown on Geotechnical Section S5-S5', and the static and seismic slope stability calculations are presented in the Appendix.

CUT SLOPE CS-18 SEISMIC STABILITY

Cut Slope CS-18 is planned as a 200-foot-high, east-facing, permanent, 2½:1 slope on the west side of the proposed South Main Canyon stormwater basin. The cut slope is underlain by Saugus Formation units in which the underlying bedding strikes northwest to northeast and dips 9 to 32 degrees to the east. As depicted on Geotechnical Section S23-S23', easterly-dipping bedding ranging from 10 to 17 degrees will be exposed in the planned 2½:1 cut slope. A portion of landslide Qls A will encroach into CS-18. The landslide should be removed and replaced with compacted fill, as necessary, to obtain proposed slope grades. Stability analyses performed for potential failure along the adversely-dipping bedding indicate that proposed Cut Slope CS-18

meets the GMED static and pseudostatic factor of safety requirements of 1.5 and 1.1, respectively. Static and seismic slope stability calculation for three potential failure planes are presented in the Appendix.

SURFICIAL SLOPE STABILITY

Surficial slope stability calculations were performed for 2:1 compacted fill, Saugus Formation (QTs) slopes, and Pico Formation (Tp) slopes, and are in excess of a factor of safety of 1.5 with a saturation depth of 4 feet as required by GMED. The surficial slope stability calculations are presented in the Appendix.

SECTION 111 STATEMENT

Based on our review of the 2014 MPR Project Excavation Plan and the referenced reports, it is our professional opinion that the proposed MPR development will be safe from hazard of landslide, settlement, or slippage and will not adversely affect the geotechnical conditions of off-site properties, provided our recommendations and the requirements of the Los Angeles County Building Code are followed.

-o0o-

The following are attached and complete this report.

- Table A – Summary of Slope Stability Calculations
- Geotechnical Sections, Figure 1
- Appendix – Slope Stability Calculations

PROFESSIONAL GEOLOGIST NO. 3749
TIMOTHY P. LATIOLAIT
#1140
CERTIFIED
ENGINEERING
GEOLOGIST
Expires: 12-31-15
STATE OF CALIFORNIA

Respectfully submitted,

R. T. FRANKIAN & ASSOCIATES

by: Timothy P. Latiolait
Principal Engineering Geologist

REGISTERED PROFESSIONAL ENGINEER
ALAN W. RASPLICKA
No. GE 2558
GEOTECHNICAL
STATE OF CALIFORNIA

and: Alan W. Rasplicka
Principal Geotechnical Engineer

TPL/AWR/eaw

Distribution: (2) Chiquita Canyon Landfill (plus PDF via email and CD)
1 - Attn: Mr. Michael Dean
1 - Attn: Mr. Steve Cassulo
(1) Law Offices of Scott Gordon (PDF via email)
Attn: Mr. Scott Gordon
(2) CH2M Hill (plus PDF via email and CD)
Attn: Ms. Colleen Bredensteiner
Attn: Ms. Brenda Eells

RTFA
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

REFERENCES

California Division of Mines and Geology, 1997, "Seismic Hazard Zone Report for the Newhall 7.5-Minute Quadrangle, Los Angeles County, California."

California Geological Survey, 2002, "Seismic Hazard Zone Report for the Val Verde 7.5-Minute Quadrangle, Los Angeles and Ventura Counties, California," Seismic Hazard Zone Report 076.

Frankian, R. T., & Associates, 2012a, "Geotechnical Investigation, Landfill Entrance Road, Chiquita Canyon Landfill, 29201 Henry Mayo Drive, Castaic, California," for Chiquita Canyon Landfill, dated January 13, 2012, Job No. 2002-036-006.

Frankian, R. T., & Associates, 2012b, "Geotechnical Investigation, Master Plan Revision, Chiquita Canyon Landfill, Castaic, California," for Chiquita Canyon Landfill, dated January 27, 2012, Job No. 2002-036-004.

Frankian, R. T., & Associates, 2014, "Geotechnical Evaluation of Updated Excavation Plan, Master Plan Revision, Chiquita Canyon Landfill, 29201 Henry Mayo Drive, Castaic, California," for Chiquita Canyon Landfill, dated May 23, 2014, Job No. 2002-036-004.

TABLE A

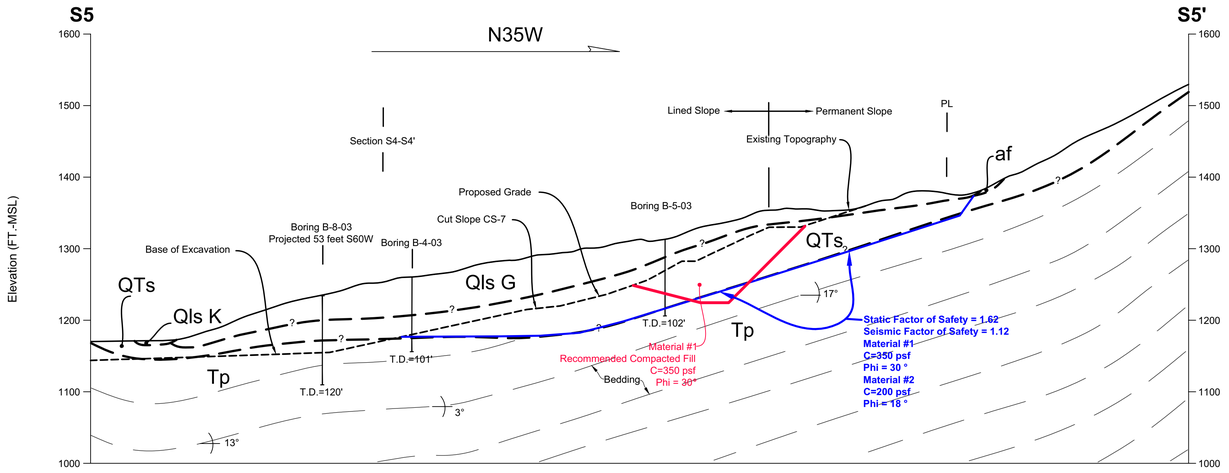
SUMMARY OF SLOPE STABILITY CALCULATIONS
Master Plan Revision

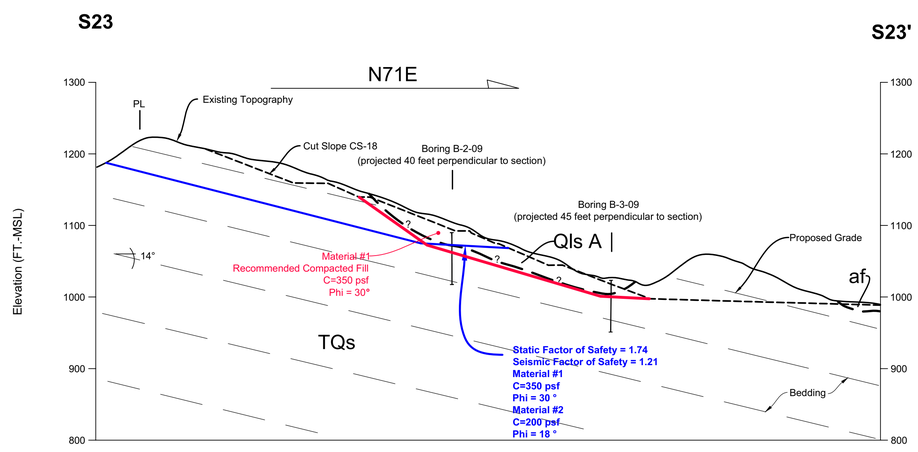
CUT SLOPE	FIGURE NO.	SLOPE GRADIENT	SLOPE HEIGHT (total/permanent)	SLOPE FACE DIRECTION	GEOLOGIC MATERIALS	GEOLOGIC SECTION	GEOLOGIC STABILITY	FACTOR OF SAFETY (Static/Seismic)
CS-1	1.1	2:1	300'/200'	S to SE	Tp	S11-S11'	Bedding dipping steeper than slope gradient; grossly stable	Static = 1.63, Seismic = 1.16
CS-2	1.1	2:1	150'/80'	SSE	Tp	S12-S12'	Bedding dipping steeper than slope gradient; grossly stable	Slope stable; analyses not performed
CS-3a	1.1	2:1	220'/175'	ESE	Tp	S13-S13', S26-S26'	Bedding dipping parallel to or steeper than slope gradient; grossly stable	Slope stable; analyses not performed
CS-3b	1.1	2:1	75'/0	ESE	Tp	S26-S26'	Bedding dipping steeper than slope gradient; grossly stable	Slope stable; analyses not performed
CS-4	1.1	2:1 to 4:1	210'/120'	SE	Tp, Qls E, Qls F, af	S16-S16'	Bedding dipping parallel to or steeper than slope gradient; grossly stable	Slope stable; analyses not performed
CS-5	1.1	2:1 to 3:1	120'/30'	SE to S	Tp, Qls F, af	S15-S15', S24-S24'	Daylighted bedding; stable by analyses	Static = 2.35 (See 1-27-12 Report)
CS-6	1.1	2½:1 to 3:1	290'/95'	SSE	Tp, QTs, Qls H-J	S17-S17', S20-S20'	Daylighted bedding; stable by analyses	Section S17 Static = 1.31, S20 Static = 1.34 (See 1-27-12 Report)
CS-7	1.1	2:1 to 3:1	205'/35'	SE to SW	QTs, Qls G - I, & L, af	S5-S5'	Daylighted bedding; stable by analyses	Static = 1.62, Seismic = 1.12 after shear key construction
CS-8	1.1	2:1	225'/75'	SW	QTs	---	Favorable bedding; grossly stable	Slope stable; analyses not performed
CS-9	1.1	2:1	150'/0	S	QTs, Qols A, Qls N, Qls O	S19-S19'	Daylighted bedding; slope stable by analyses	Section S19 Static = 1.29 (See 1-27-12 Report)
CS-10	1.1	2:1	185'/75'	SW	QTs	S2-S2'	Favorable bedding; grossly stable	Slope stable; analyses not performed
CS-11	1.1	2:1	150'/65'	WSW	QTs	S1-S1'	Favorable bedding; grossly stable	Slope stable; analyses not performed
CS-12	1.1	2:1	100'/100'	NW and SE	QTs, Qls P	S21-S21'	Favorable bedding; grossly stable	Slope stable; analyses not performed
CS-13	1.1	2:1	50'/50'	SW	QTs	---	Favorable bedding; grossly stable	Slope stable; analyses not performed
CS-14	1.1	2:1	20'/20'	SW	QTs	---	Favorable bedding; grossly stable	Slope stable; analyses not performed
CS-15	1.1	2:1	50'/50'	SW	QTs	---	Favorable bedding; grossly stable	Slope stable; analyses not performed

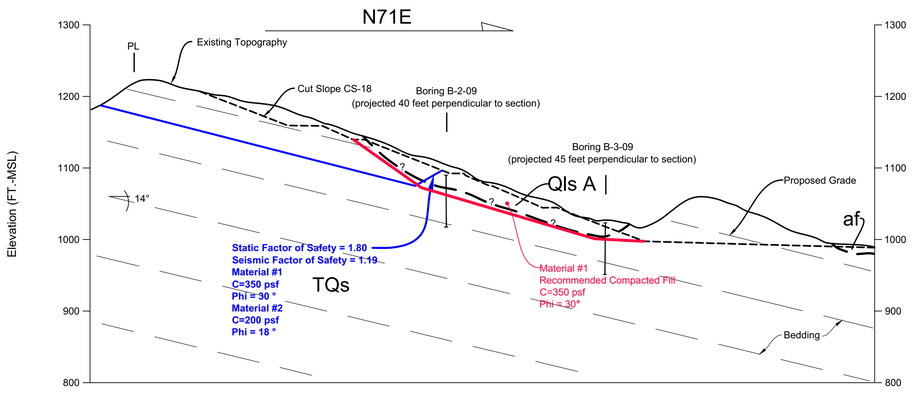
TABLE A

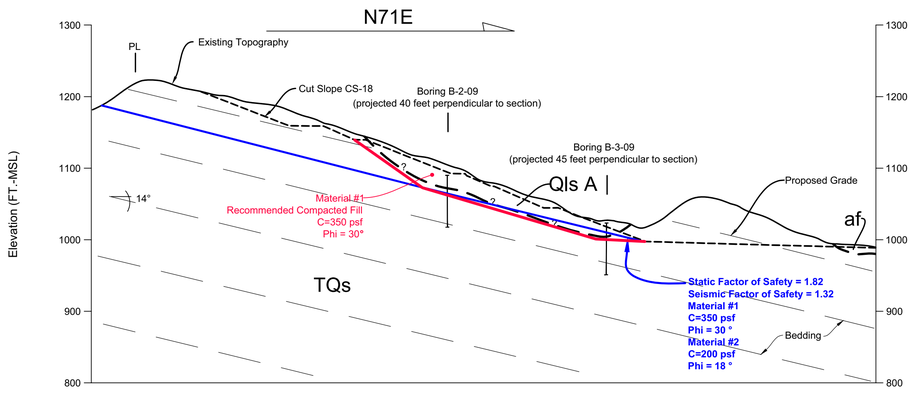
SUMMARY OF SLOPE STABILITY CALCULATIONS
Master Plan Revision

CUT SLOPE	FIGURE NO.	SLOPE GRADIENT	SLOPE HEIGHT (total/permanent)	SLOPE FACE DIRECTION	GEOLOGIC MATERIALS	GEOLOGIC SECTION	GEOLOGIC STABILITY	FACTOR OF SAFETY (Static/Seismic)
CS-16	1.1	2:1	110'/0	NW	QTs	---	Favorable bedding; grossly stable	Slope stable; analyses not performed
CS-17	1.2	2:1	160'/160'	S	QTs, Qt	S22-S22', S27-S27'	Favorable bedding; grossly stable	Slope stable; analyses not performed
CS-18	1.2	2:1	200'/200'	E	QTs, Qls A	S23-S23'	Daylighted bedding; stable by analyses	Lowest Static = 1.74, Lowest Seismic = 1.19 (See this report)
CS-19	1.1	2:1	50'/50'	WSW	QTs	---	Favorable bedding; grossly stable	Slope stable; analyses not performed
CS-20	1.2	2:1	30'/30'	SE	QTs, Qt	---	Favorable bedding; grossly stable	Slope stable; analyses not performed
CS-21	1.2	2:1	85'/85'	W	QTs	---	Favorable bedding; grossly stable	Slope stable; analyses not performed
CS-22	1.2	2:1	100'/100'	SSE	QTs	---	Favorable bedding; grossly stable	Slope stable; analyses not performed
CS-23	1.1	2:1	85'/0	ENE to E	Tp, QTs	---	Favorable bedding; grossly stable	Slope stable; analyses not performed
CS-24	1.2	2-1/2:1	235'/60'	E to N	QTs, afs	---	Bedding dipping steeper than slope gradient; grossly stable	Slope stable; analyses not performed
CS-25	1.1	2:1	35'/35'	SE	Tp	---	Bedding dipping steeper than slope gradient; grossly stable	Slope stable; analyses not performed
CS-26	1.2	2:1	85'/85'	SW	QTs	---	Favorable bedding; grossly stable	Slope stable; analyses not performed
CS-27	1.2	2:1	75'/75'	SW	QTs	---	Favorable bedding; grossly stable	Slope stable; analyses not performed
Fill Slope	1.2	2:1	130'	E	cef	---	N/A	Static = 1.56, Seismic = 1.14 (See 1-27-12 Report)
Fill Slope (surficial)	N/A	2:1	N/A	N/A	cef	---	N/A	Factor of Safety at 4' Saturation Depth = 2.30
Cut Slope (surficial)	N/A	2:1	N/A	N/A	Tp	---	N/A	Factor of Safety at 4' Saturation Depth = 3.04
Cut Slope (surficial)	N/A	2:1	N/A	N/A	QTs	---	N/A	Factor of Safety at 4' Saturation Depth = 3.68









Geotechnical Sections

PREPARED FOR
Chiquita Canyon Landfill

Project Location
Master Plan Revision
Castaic, California

SCALE	DRAWN BY	CHECKED BY
AS SHOWN	JH	TPL
DATE		JOB NO.
9-10-2014	Figure 1	2002-036-004

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Chiquita Canyon Landfill
September 10, 2014
2002-036-004

APPENDIX

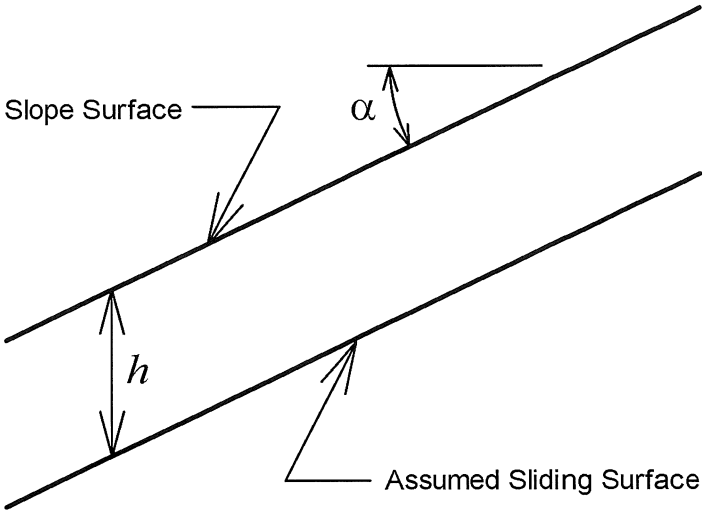
SLOPE STABILITY CALCULATIONS

RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

Client: Chiquita Canyon Landfill
Job No.: 2002-036

By: AWR
Date: 09/09/14 Time: 14:43:40

Subject: Surficial Slope Stability Compacted Fill



$$f.s. = \frac{C + h\left(\gamma_t - \gamma_w\right)\left(\cos^2\alpha\right)\left(\tan\phi\right)}{\gamma_t h\left(\sin\alpha\right)\left(\cos\alpha\right)}$$

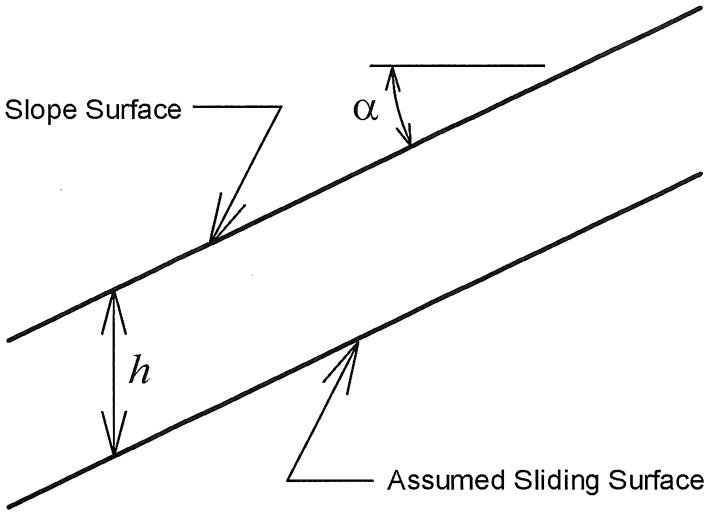
$\alpha =$	27 degrees	0.471 radians		$\gamma =$	125 pcf (total)
$C =$	350 psf			$\gamma =$	62.4 pcf (water)
$\phi =$	30.0 degrees	0.524 radians			

	Depth of Saturation h (feet)	Factor of Safety $f.s.$	
	1	7.49	
	2	4.03	
	3	2.87	
>>>>>>	4	2.30	<<<<<<

Client: Chiquita Canyon Landfill
Job No.: 2002-036

By: AWR
Date: 09/09/14 Time: 14:02:02

Subject: Surficial Slope Stability Compacted QTs



$$f.s. = \frac{C + h\left(\gamma_t - \gamma_w\right)\left(\cos^2\alpha\right)\left(\tan\phi\right)}{\gamma_t h\left(\sin\alpha\right)\left(\cos\alpha\right)}$$

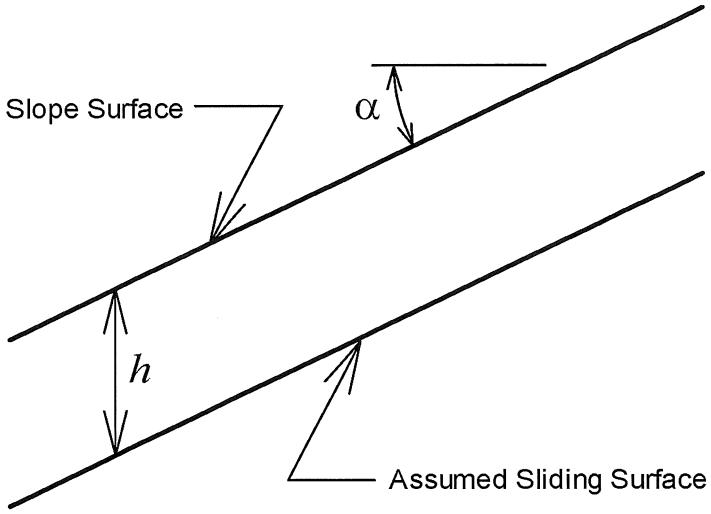
$\alpha =$	27 degrees	0.471 radians		$\gamma =$	125 pcf (total)
$C =$	600 psf			$\gamma =$	62.4 pcf (water)
$\phi =$	36.0 degrees	0.628 radians			

	Depth of Saturation h (feet)	Factor of Safety $f.s.$	
	1	12.58	
	2	6.65	
	3	4.67	
>>>>>>	4	3.68	<<<<<<

Client: Chiquita Canyon Landfill
Job No.: 2002-036

By: AWR
Date: 09/09/14 Time: 14:04:51

Subject: Surficial Slope Stability Tp



$$f.s. = \frac{C + h\left(\gamma_t - \gamma_w\right)\left(\cos^2\alpha\right)\left(\tan\phi\right)}{\gamma_t h\left(\sin\alpha\right)\left(\cos\alpha\right)}$$

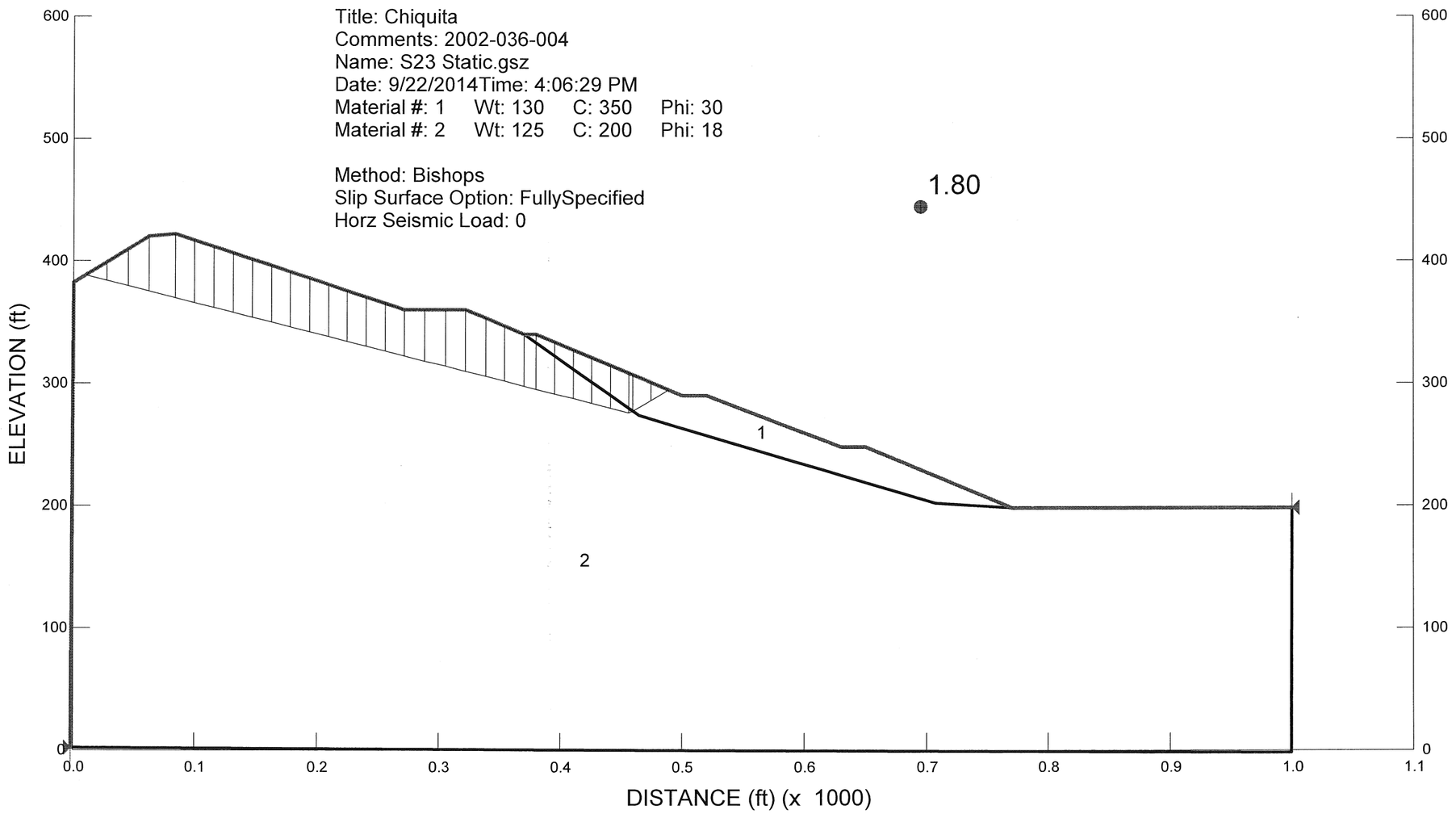
$\alpha =$	27 degrees	0.471 radians		$\gamma =$	125 pcf (total)
$C =$	500 psf			$\gamma =$	62.4 pcf (water)
$\phi =$	30.0 degrees	0.524 radians			

	Depth of Saturation h (feet)	Factor of Safety $f.s.$	
	1	10.46	
	2	5.51	
	3	3.86	
>>>>>>	4	3.04	<<<<<<

Title: Chiquita
Comments: 2002-036-004
Name: S23 Static.gsz
Date: 9/22/2014Time: 4:06:29 PM
Material #: 1 Wt: 130 C: 350 Phi: 30
Material #: 2 Wt: 125 C: 200 Phi: 18

Method: Bishops
Slip Surface Option: FullySpecified
Horz Seismic Load: 0

1.80



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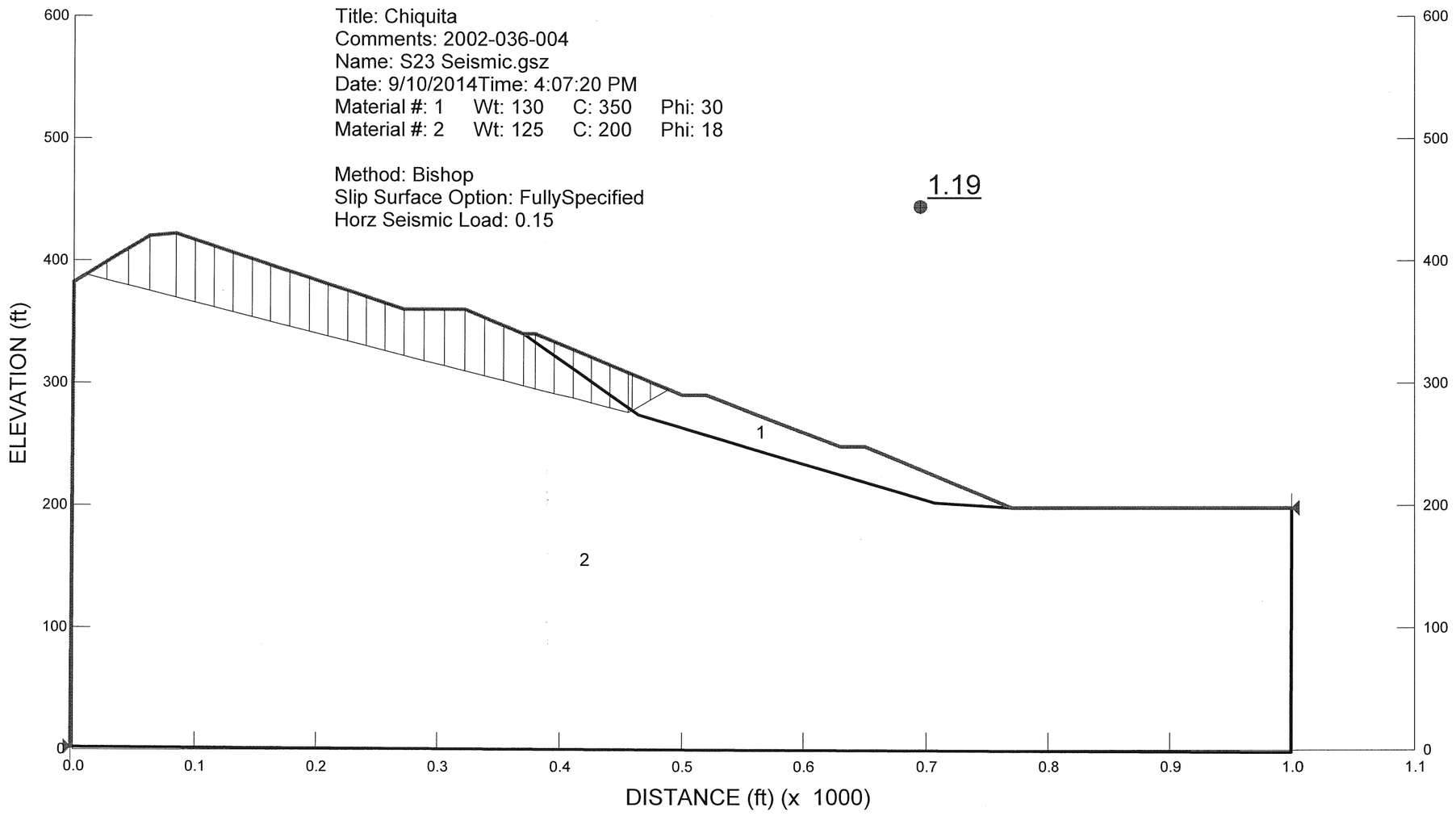
Material #: 2 Wt: 125 C: 200 Phi: 18

Method: Bishop
Slip Surface Option: FullySpecified
Horz Seismic Load: 0.15

1.19



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Method: Bishops
Slip Surface Option: FullySpecified
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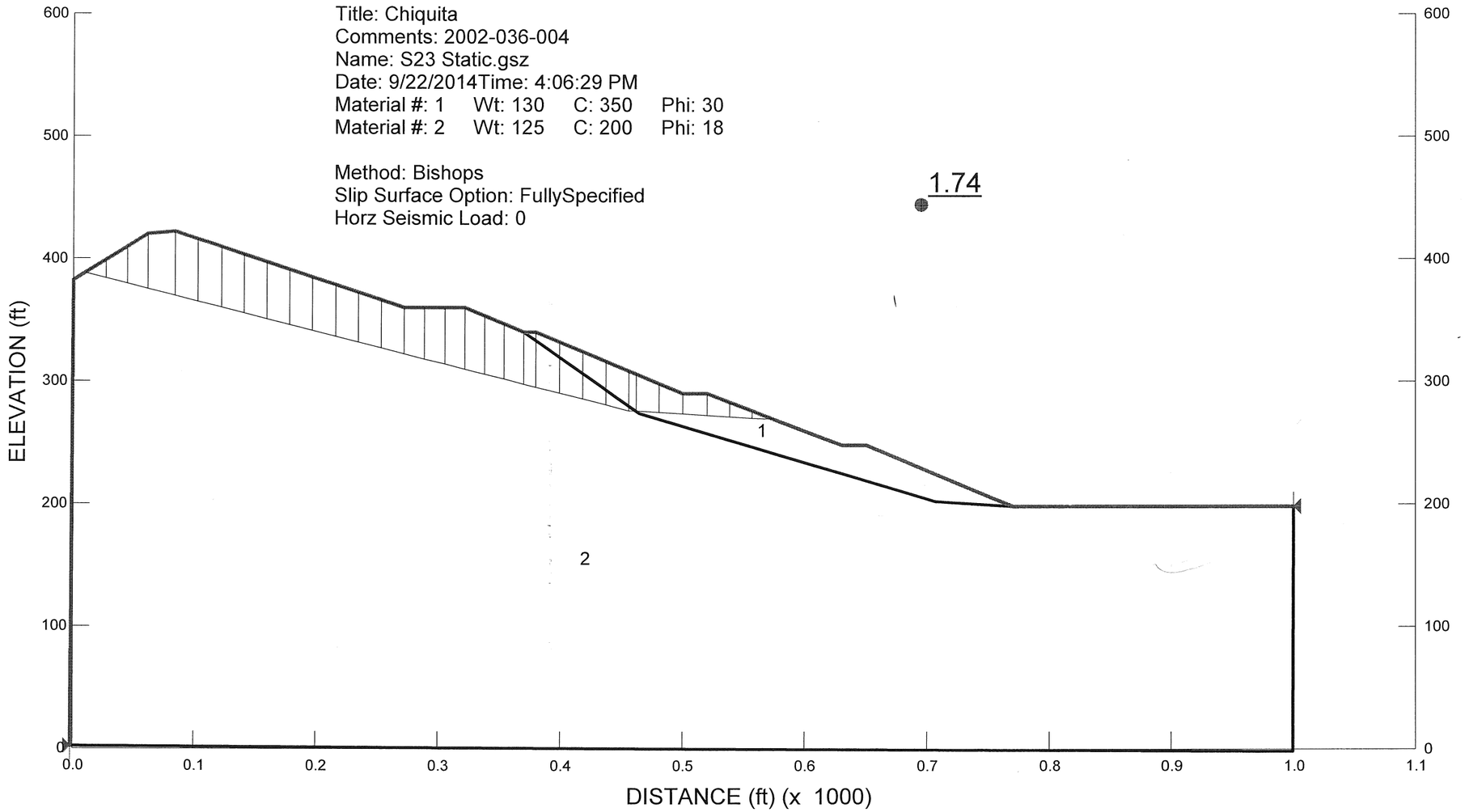
1.74



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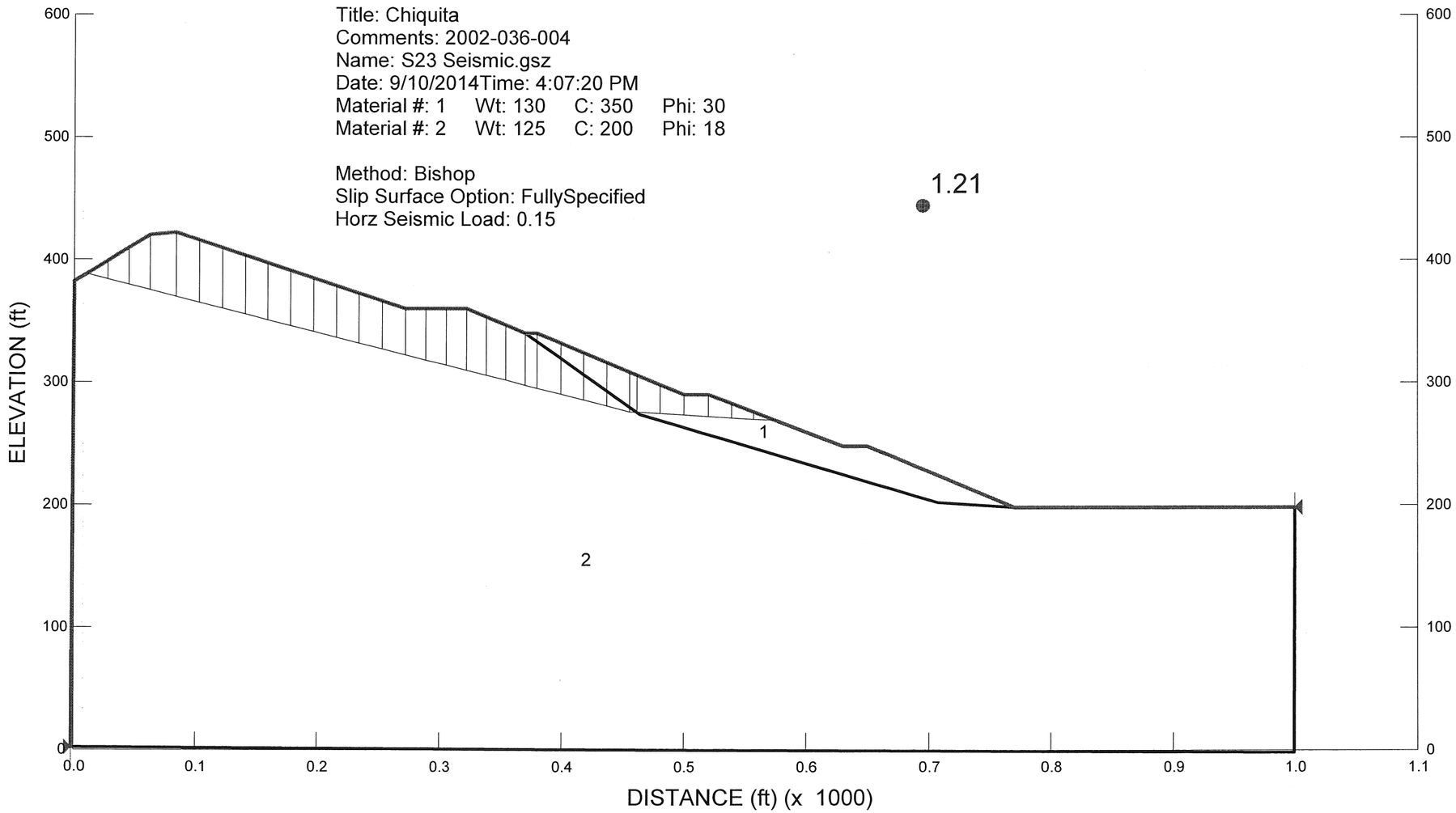
1.21



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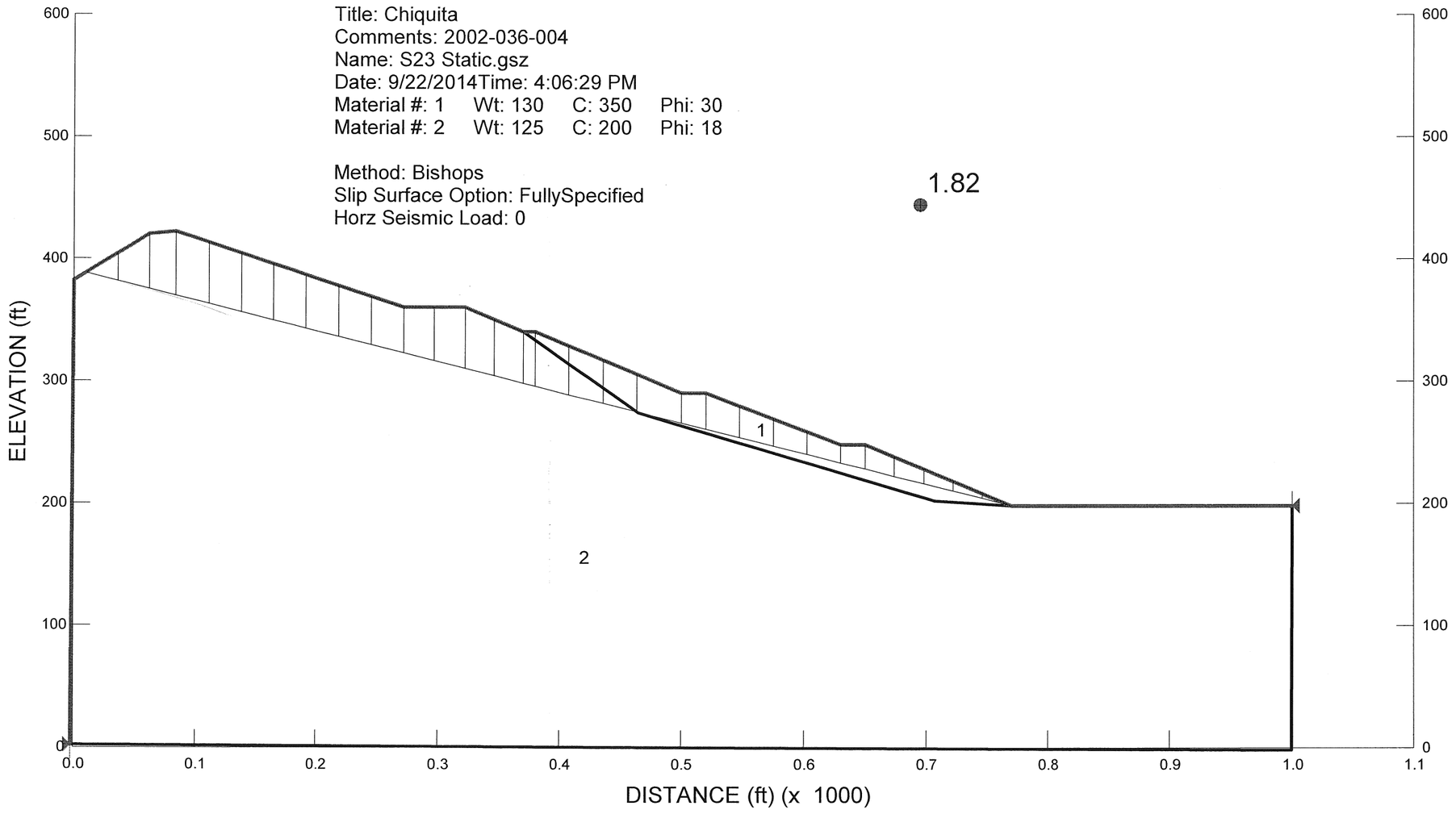
Slip Surface Option: FullySpecified
Horz Seismic Load: 0

1.82



JOB NO. 2002-036-004
REPORT DATED 9-10-2014

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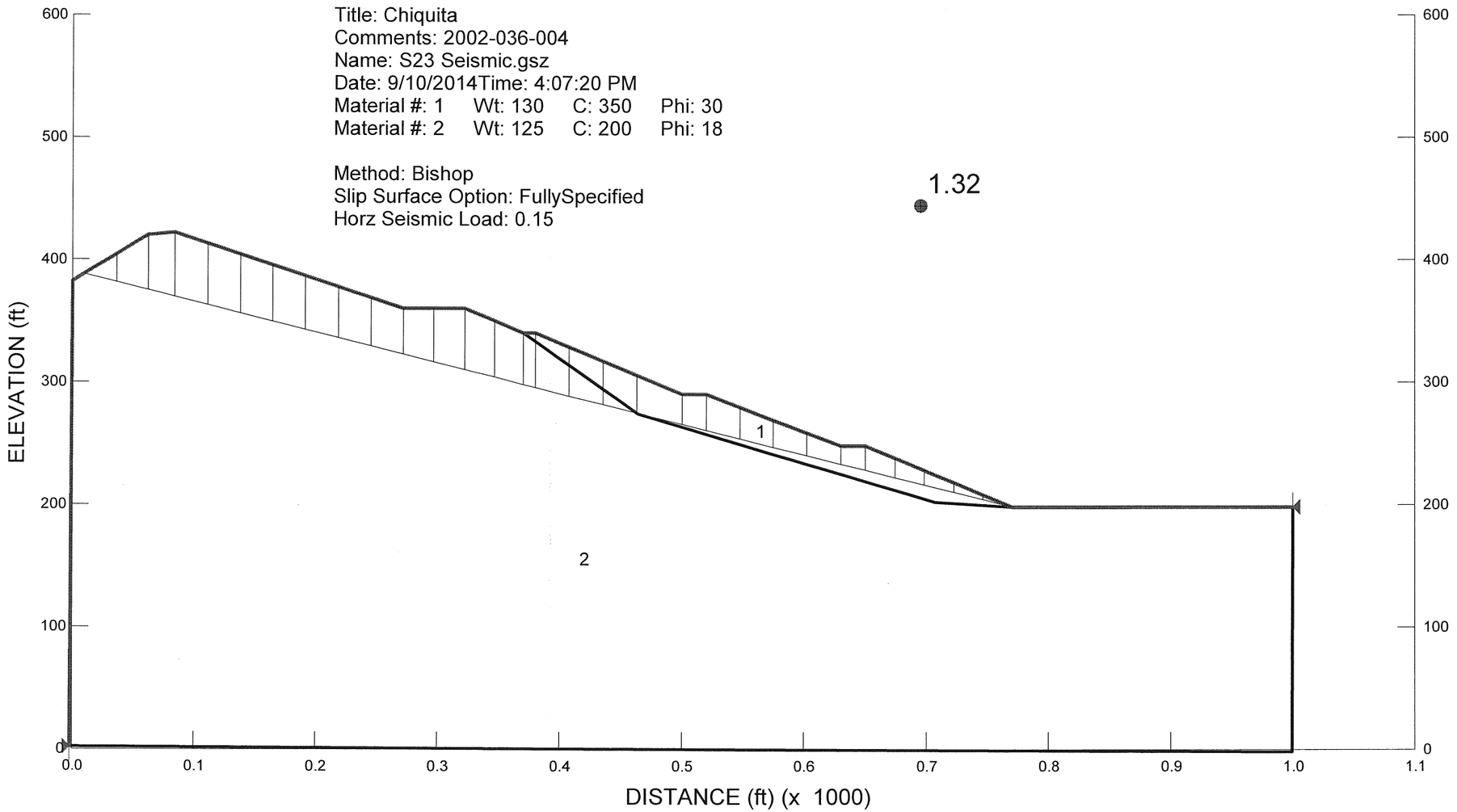

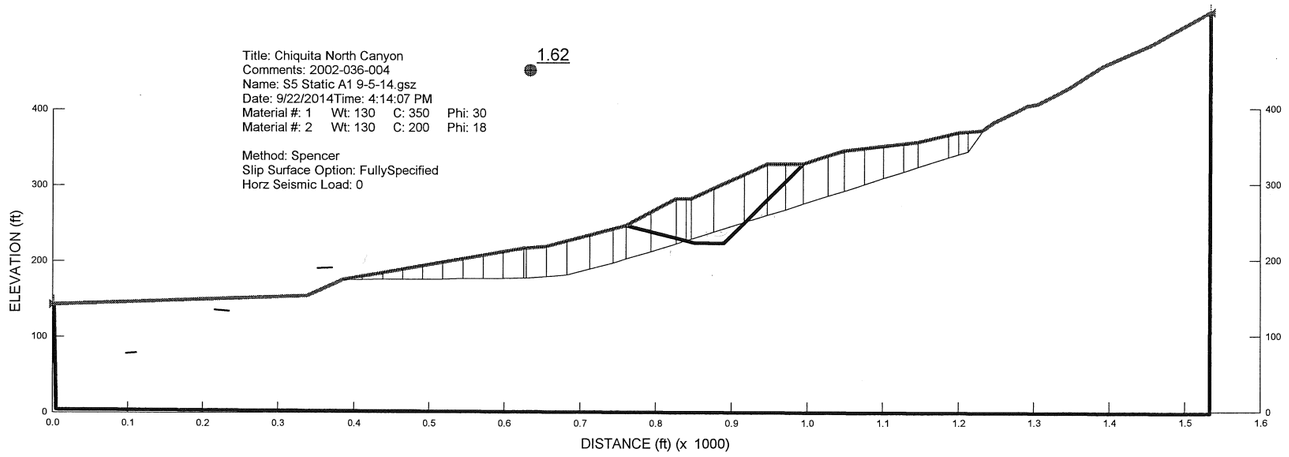
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Slip Surface Option: FullySpecified
Horz Seismic Load: 0
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200
300
400
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0.2
0.3
0.4
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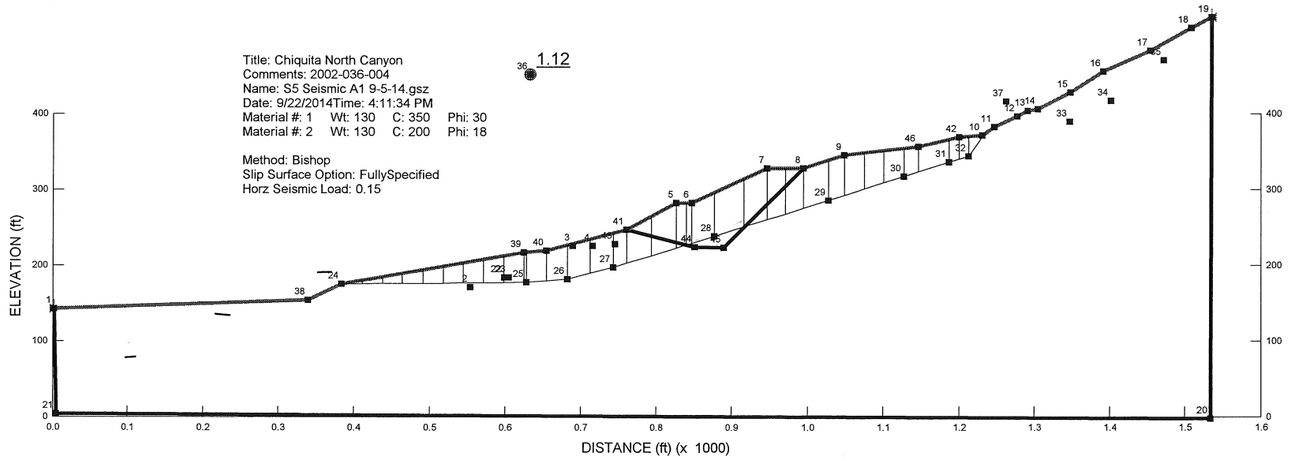
1.1
1.2
1.3
1.4
1.5
1.6



JOB NO. 2002-036-004
REPORT DATED 9-10-2014

Appendix E
Biological Resources

Appendix E1
Biota Report

Summary of Biological Surveys Conducted at Chiquita Canyon Landfill

PREPARED FOR: Chiquita Canyon Landfill

PREPARED BY: CH2M HILL

DATE: October 2016

This technical memorandum outlines the biological surveys and associated results that have been conducted at Chiquita Canyon Landfill (CCL) Master Plan Revision (Proposed Project), which is located on the north side of State Route 126 (SR-126), west of Interstate 5 (I-5) in the Santa Clarita Valley area of Los Angeles County.

Biological Surveys

A comprehensive list of biological sampling that was conducted at the Project site is provided in Table 1-1.

Table 1-1. Comprehensive List of Sampling Performed at the Project Site

Biologist Affiliation	Sampling Purpose	Sampling Dates
CH2M HILL	Avian Surveys	April 3, 2002
CH2M HILL	Amphibian Surveys	April 3, May 14, and 24, 2002
CH2M HILL	Reptile Surveys	April 3 and May 26, 2002
CH2M HILL	California Gnatcatcher Surveys	May 16, 31, June 6, 13, 20, and 27, 2002
CH2M HILL	Bat Surveys	May 14 and 24, 2002
CH2M HILL	Special-Status Plant Survey	May 24, 31, and June 28, 2002
CH2M HILL	Vegetation Mapping	June 28, 2002
CH2M HILL	Vegetation Monitoring	December 21-22, 2004
CH2M HILL	Vegetation Mapping	September 28, 2005
CH2M HILL	Vegetation Monitoring	July 27, 2007
CH2M HILL	Surface Waters Delineation	December 3-5, 2007
CH2M HILL	Vegetation Monitoring	December 3-4, 2007
CH2M HILL	Vegetation Monitoring	October 13-14, 2008
CH2M HILL	Vegetation Monitoring	September 1-2, 2009
CH2M HILL	Vegetation Mapping	June 9, 2010
CH2M HILL	Vegetation Monitoring	November 15-16, 2010
CH2M HILL	Vegetation Monitoring	September 26-28, 2011
CH2M HILL	Vegetation Assessment	August 4-5 and October 14, 2011
CH2M HILL	Vegetation Monitoring	September 25-26, 2012
CH2M HILL	Sediment Basin Survey	September 30, 2013

Table 1-1. Comprehensive List of Sampling Performed at the Project Site

Biologist Affiliation	Sampling Purpose	Sampling Dates
CH2M HILL	Reconnaissance Species Survey and Vegetation Mapping	April 14, 2015
CH2M HILL	Sediment Basin Survey	September 10, 2015
CH2M HILL	Vegetation Mapping	January 11 - February 4, 2016
DMEC	Rare Plant Surveys	April 12-19, 2016
DMEC	Rare Plant Surveys	July 18-21, 2016
CH2M HILL	Sediment Basin Survey	September 13, 2016

Observed Species within the Project Boundary

A comprehensive list of observed wildlife species is provided in Table 1-2 and plant species document within the Project area are shown in Table 1-3.

Table 1-2. List of Wildlife Species Observed at the Project Site

Common Name	Scientific Name
Birds	
Cooper's hawk	*Accipiter cooperii*
White-throated swift	*Aeronautes saxatalis*
Tricolored Blackbird	*Agelaius tricolor*
Rufous-crowned sparrow	*Aimophila ruficeps*
Western scrub-jay	*Aphelocoma californica*
Short-Eared Owl	*Asio flammeus*
Great horned owl	*Bubo virginianus*
Red-tailed hawk	*Buteo jamaicensis*
California quail	*Callipepla californica*
Anna's hummingbird	*Calypte anna*
Costa's hummingbird	*Calypte costae*
Lesser goldfinch	*Carduelis psaltria*
House finch	*Carpodacus mexicanus*
Turkey vulture	*Cathartes aura*
Wrentit	*Chamaea fasciata*
Lark sparrow	*Chondestes grammacus*
Common raven	*Corvus corax*
Horned lark	*Eremophila alpestris*
California horned lark	*Eremophila alpestris actia*
Prairie falcon	*Falco mexicanus*
Bullock's oriole	*Icterus bullockii*
Loggerhead Shrike	*Lanius ludovicianus*
Gull	*Larus* sp.

Table 1-2. List of Wildlife Species Observed at the Project Site

Common Name	Scientific Name
Northern mockingbird	*Mimus polyglottos*
Ash-throated flycatcher	*Myiarchus cinerascens*
Cliff swallow	*Petrochelidon pyrrhonata*
Phainopepla	*Phainopepla nitens*
Nuttall's woodpecker	*Picoides nuttallii*
California towhee	*Pipilo crissalis*
Spotted towhee	*Pipilo maculatus*
Bushtit	*Psaltriparus minimus*
Rock wren	*Salpinctes obsoletus*
Black phoebe	*Sayornis nigricans*
Northern rough-winged swallow	*Stelgidopteryx serripennis*
Bewick's wren	*Thryomanes bewickii*
California thrasher	*Toxostoma redivivum*
Western kingbird	*Tyrannus verticalis*
Mourning dove	*Zenaida macroura*
Mammals	
Coyote	*Canis latrans*
Bobcat	*Lynx rufus*
Dusky-footed woodrat	*Neotoma fuscipes*
Mule deer	*Odocoileus hemionus*
Deer mouse	*Peromyscus maniculatus*
Raccoon	*Procyon lotor*
Desert cottontail	*Sylvilagus audubonii*
Brush rabbit	*Sylvilagus bachmani*
Botta’s pocket gopher	*Thomomys bottae*
Gray fox	*Urocyon cinereoargenteus*
Amphibians	
Western spadefoot	*Spea hammondii*
Reptiles	
Western rattlesnake	*Crotalus viridis*
Western whiptail	*Cnemidophorus tigris*
Western diamondback rattlesnake	*Crotalus atrox*
Coachwhip	*Masticophus flagellum*
San Diego gopher snake	*Pituophis melanoleucus annectens*
Western fence lizard	*Sceloporus occidentalis*
Side-blotched lizard	*Uta stansburiana*

Table 1-2. List of Wildlife Species Observed at the Project Site

Common Name	Scientific Name
Invertebrates	
Behr's metalmark	*Apodemia virgulti*
Checkered-skipper	*Pyrgus communis*

Table 1-3. List of Plant Species Observed at the Project Site

Scientific Name	Common Name
Abutilon theophrasti	Velvet leaf
Achyrachaena mollis	Blow wives
Acmispon glaber var. *glaber*	Deerweed
Acmispon wrangelianus	Chilie lotus
Acourtia microcephala	Sacapellote
Adenostoma fasciculatum var. *f.*	Chamise
Ailanthus altissima	Tree-of-Heaven
Ambrosia acanthicarpa	Annual burweed
Ambrosia psilostachya	Western ragweed
Amsinckia intermedia	Rancher's fire
Amsinckia menziesii var. *menziesii*	Common fiddleneck
Amsinckia tessellata var. *tessellata*	Devil's lettuce
Antirrhinum sp.	Snapdragon
Apiastrum angustifolium	Wild celery
Artemisia californica	California sagebrush
Artemisia douglasiana	Mugwort
Artemisia dracunculus	Tarragon
Artemisia tridentate ssp. *tridentata*	Great basin sagebrush
Asclepias fascicularis	Narrowleaf milkweed
Aster spp.	Aster
Astragalus cf. oxyphysus	Stanislaus milkvetch
Astragalus trichopodus	Locoweed
Astragalus trichopodus var. *phoxus*	Antisell three-pod milkvetch
Astragalus trichopodus var. *trichopodus*	Three-pod milkvetch
Atriplex canescens var. *canenscens*	Four wing saltbush
Atriplex lentiformis	Quail bush
Atriplex lentiformis var. *breweri*	Brewer's saltbrush
Amsinckia sp.	Fiddleneck
Atriplex semibaccata	Australian saltbush
Avena barbata	Slender wild oats
Avena fatua	Wild oats

Table 1-3. List of Plant Species Observed at the Project Site

Scientific Name	Common Name
Avena spp.	Wild oat
Baccharis pilularis ssp. *consanguinea*	Coyote bush
Baccharis salicifolia	Mulefat
Bassia hyssopifolia	Five-hook
Brassica nigra	Black mustard
Brickellia nevinii	Nevin's brickellbush
Bromus diandrus ssp. *diandrus*	Ripgut brome
Bromus carinatus var. *carinatus*	California brome
Bromus hordeaceus	Soft chess
Bromus madritensis ssp. *rubens*	Red brome
Bromus tectorum	Cheat grass
Calochortus clavatus var. *clavatus*	Club-haired mariposa lily
Calochortus clavatus var. *gracilis*	Slender mariposa lily
Calochortus weedii	Weed's mariposa lily
Calystegia macrostegia var. *cyclostegia*	Coastal scrub morning-glory
Calystegia peirsonii	Peirson's morning glory
Camissonia sp.	Suncups
Carduus pycnocephalus ssp. *P.*	Italian thistle
Castilleja affinis ssp. *affinis*	Lay-and-Collie's Indian paintbrush
Castilleja exserta ssp. *exserta*	Purple owl's clover
Ceanothus pauciflorus [C. vestitus]	Few-flowered ceanothus
Centaurea melitensis	Tocalote
Cercocarpus betuloides	Mountain mahogany
Cercocarpus betuloides var. *betuloides*	Birchleaf mountain mahogany
Chaenactis glabriuscula var. *glabriuscula*	Yellow pincushion
Chaenactis glabriuscula var. *megacephala*	Common yellow pincushion
Chamaesyce albomarginata	Rattlesnake spurge
Chamaesyce polycarpa var. *polycarpa*	Golondrina
Chenopodium spp.	Chenopodium
Chenopodium album var. *album*	Lambsquarters
Chenopodium californicum	California goosefoot
Chilopsis linearis ssp. *arcuata*	Desert willow
Chorizanthe staticoides var. *staticoides*	Turkish rugging
Cirsium occidentale var. *occidentale*	Cobweb thistle
Clarkia unguiculata	Woodland clarkia
Corethroygyne filaginifolia	California cudweed-aster
Cortaderia selloana	Pampas grass
Croton setiger	Dove weed

Table 1-3. List of Plant Species Observed at the Project Site

Scientific Name	Common Name
Cryptantha decipiens	Gravel forget-me-not
Cryptantha intermedia var. *intermedia*	Common forget-me-not
Cryptantha microstachys	Tejon forget-me-not
Cryptantha muricata var. *jonesii*	Jones' forget-me-not
Cryptantha muricata var. *muricata*	Prickly forget-me-not
Cryptantha sp.	a forget-me-not w/large fls
Cucurbita foetidissima	Coyote melon
Cuscuta californica var. *californica*	California dodder
Cuscuta sp.	Dodder
Datura wrightii	Jimson weed
Daucus pusillus	Rattlesnake weed
Deinandra fasciculata	Clustered tarplant
Delphinium parryi ssp. *parryi*	Parry larkspur
Descurainia pinnata var.	Tansy mustard
Dichelostemma capitatum ssp. *Capitatum*	Blue dicks
Diplacus longiflorus	Sticky bush monkeyflower
Dudleay lanceolate	Lanceleaf live-forever
Elymys condensatus	Giant wild rye
Emmenanthe penduliflora var. *p.*	Whispering bells
Encelia californica	California bush sunflower
Encelia farinosa	Brittlebush
Encelia virginensis	Virgin river brittlebush
Eremocarpus setigerus	Doveweed
Ericameria palmeri var. *pachylepis*	Palmer goldenbush
Ericameria pinifolia	Pine bush
Erigeron foliolosus var. *foliolosus*	Slender fleabane
Eriodictyon crassifolium var. *nigrescens*	Thickleaf yerba santa
Eriogonum elongatum	Long-stem buckwheat
Eriogonum fasciculatum	Buckwheat
Eriogonum fasciculatum var. *foliolosum*	Leafy Calif. wild buckwheat
Eriophyllum confertiflorum var. *c.*	Golden yarrow
Erodium cicutarium	Redstem filaree
Eucalyptus camaldulensis	River red gum
Eucalyptus sp.	Eucalyptus
Eucrypta chrysanthemifolia	Common eucrypta
Eulobus californicus	California mustard primrose
Galium angustifolium ssp. *Angustifolium*	Chaparral bedstraw
Gilia ahilleifolia ssp. *Multicaulis*	Many-stemmed Calif. gilia

Table 1-3. List of Plant Species Observed at the Project Site

Scientific Name	Common Name
Gilia angelensis	Chaparral gilia
Gilia capitate ssp. *abrotanifolia*	Blue Field gilia
Hazardia squarrosus var. *squarrosa*	Sawtooth goldenbush
Helianthus c.f. californicus	California sunflower
Heliotropium curassavicum	Alkali heliotrop
Hesperoyucca whipplei var. *cespitosa*	Clumping Our Lord's Candle
Heteromeles arbutifolia	Toyon
Heterotheca grandiflora	Telegraph weed
Heterotheca sessiliflora ssp. *echioides*	Bristly golden-aster
Heterotheca sessiliflora ssp. *fastigiata*	Erect golden-aster
Heterotheca sessiliflora ssp. *latifolia*	False golden-aster
Hyptis emoryi	Desert lavendar
Hirschfeldia incana	Summer mustard
Hordeum murinum ssp. *glaucum*	Summer barley
Hordeum murinum ssp. *leporinum*	Hare barley
Hordeum murinum	Hare barley
Isocoma menziesii var. *menziesii*	Coastal goldenbush
Isocoma menziesii var. *vernonioides*	Coastal goldenbush
Isocoma sp.	Goldenbush
Keckiella cordifolia	Heartleaf penstemon
Lactuca serriola	Prickly wild lettuce
Lepidospartum squamatum	Scalebroom
Lessingia filaginifolia	Cudweed aster
Leymus condensatus	Giant wild rye
Linanthus californicus	Prickly phlox
Logfia filaginoides	California cottonrose
Logfia gallica	Daggerleaf cottonrose
Lolium sp.	Rye grass
Lupinus bicolor	Sky lupine
Lupinus microcarpus var. *densiflorus*	Chick lupine
Lupinus spp.	Lupine
Lupinus succulentus	Fleshy lupine
Lupinus truncatus	Truncated-leaved lupine
Malacothamnus fasciculatus var. *f.*	Chaparral bushmallow
Malacothrix saxatilis var. *commutata*	Cliff desert dandelion
Malacothrix saxatilis var. *tenuifolia*	Tenuated cliff Desert dandelion
Malosma laurina	Laurel sumac
Malva parviflora	Cheeseweed

Table 1-3. List of Plant Species Observed at the Project Site

Scientific Name	Common Name
Marah fabacea	California man-root
Marah macrocarpa	Chilicothe
Marah macrocarpus	Wild cucumber
Marrubium vulgare	White horehound
Medicago polymorpha	Bur-clover
Melica imperfecta	Coast melic grass
Melilotus albus	White sweetclover
Melilotus indicus	Yellow sweetclover
Mentzelia montana	Montane stickleaf
Mimulus sp.	Monkey flower
Mirabilis laevis var. *crassifolius*	California wishbone bush
Muhlenbergia microsperma	Littleseed muhly
Nicotiana glauca	Tree tobacco
Opuntia basilaris var. *basilaris*	Beavertail cactus
Opuntia littoralis	Coastal prickly-pear
Papaver heterophyllum	Wind poppy
Parkinsonia aculeate	Palo verde
Pectocarya cf. penicillata	Winged combseed
Pellaea andromedifolia	Coffe fern
Pertoma arborea var. *arborea*	Bladderpod
Persicaria lapathifolia	Willow water-weed
Phacelia cf. cicutaria	Caterpillar phacelia
Phacelia distans	Common phacelia
Phacelia ramosissima	Branching phacelia
Phacelia tanacetifolia	Tansy phacelia
Phacelia viscida var. *viscida*	Sticky phacelia
Phacelia sp.	Phacelia
Pinus halepensis	Aleppo pine
Pinus spp.	Pine
Plagiobothrys canescens	Canescent popcornflower
Plantago erecta	California plantain
Plantago ovata	Woolly plantain
Platanus racemosa	California sycamore
Poa secunda ssp. *secunda*	One-sided bluegrass
Populus fremontii	Fremont cottonwood
Pseudognaphalium californicum	Green everlasting
Pseudognaphalium leucocephalum	White cudweed
Psilocarphus tenellus	Slender wolly marbles

Table 1-3. List of Plant Species Observed at the Project Site

Scientific Name	Common Name
Pterostegia drymarioides	Fairy mist
Quercus agrifolia var. *agrifolia*	Coast live oak
Quercus berberidifolia	California scrub oak
Quercus lobata	Valley oak
Rafinesquia californica	California chicory
Raphanus sativa	Wild raddish
Rhamnus ilicifolia	Hollyleaf redberry
Rhus aromatic	Skunkbrush
Rhus integrifolia	Lemonade berry
Rhus ovata	Sugar bush
Rhus trilobata	Squawbush
Ricinus communis	Castor bean
Salix exigua	Narrowleaf willow
Salix gooddingii	Black willow
Salix laevigata	Yellow willow
Salsola tragus	Russian thistle
Salvia apiana var. *apiana*	White sage
Salvia columbariae	Chia
Salvia leucophylla	Purple sage
Salvia mellifera	Black sage
Sambucus mexicana	Mexican elderberry
Sambucus nigra ssp. *Caerulea*	Blue elderberry
Schinus molle	Brazillian pepper tree
Schismus barbatus	Mediterranean grass
Selaginella bigelovii	Bigelow spike-moss
Sisymbrium irio	London rocket
Solanum xanti	Chaparral nightshade
Sonchus asper var. *asper*	Prickly wild lettuce
Sonchus oleraceus	Common wild lettuce
Stephanomeria virgata	Wand chicory
Stephanomeria virgate ssp. *pleurocarpa*	Twiggy wreath plant
Stillingia linearifolia	Narrowleaf stillingia
Stipa coronate	Giant needlegrass
Stipa miliacea var. *miliacea*	Smilo grass
Stipa pulchra	Purple needlegrass
Stipa speciosa	Desert needlegrass
Tamarix ramosissima	Saltcedar
Thysanocarpus curvipes	Common fringe pod

Table 1-3. List of Plant Species Observed at the Project Site

Scientific Name	Common Name
Toxicodendron diversilobum	Western poison oak
Tribulus terrestris	Puncture vine
Trichostema lanceolatum	Vinegar weed
Trifolium spp.	a clover
Uropappus lindleyi	Silver puffs
Vulpia microstachys	Six-weeks fescue
Washingtonia robusta	Mexican fan palm
Yabea microcarpa	Yabea
Yucca whipplei	Our Lord's candle

Appendix E2
Chiquita Canyon Landfill
Oak Tree Report

sb horticulture
801 glennoyre street suite d
laguna beach ca 92651
sbhorticulture@cox.net
949.233.8076 cell
888.5521795 fax

June 6, 2014

Steve Cassulo
Chiquita Canyon Landfill
Waste Connections Inc.
29201 Henry Mayo Drive
Castaic, CA 91384

RE: **Chiquita Canyon Landfill Master Plan Revision**

Dear Mr. Cassulo:

Pursuant to the request of Chiquita Canyon Landfill, an oak tree field study evaluation has been conducted by this office to ascertain base line data in regard to native oak tree resources located at 29201 Henry Mayo Drive, City of Castaic. This project study is mandated by the Los Angeles County Oak Tree Ordinance.

The field study was conducted by sb horticulture (sbh) in early April 2012 and early June 2014. Specifications and photographs are included in this report related to individual tree species, size and overall condition.
The four oak trees evaluated are proposed for removal at client request due to future grading considerations.

Respectfully submitted by,

Sean Brown

sb horticulture

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- **Oak Tree Mitigation Proposed Location**

Appendix B 13
- **Aerial Photo of Existing Oak Trees Locations**

Appendix C 14
- **Report Glossary**

Appendix D 15
- **Oak Tree Location Plan**

Survey Methodology:

- Reference material used:
  - Oak tree location map supplied by Pinnacle Land Surveying, Inc.

- Tree diameters were field measured approximately 4.5 feet above grade with a LUFKIN diameter tape measure. This is referred to as DBH (Diameter at Breast Height). Where low branching or other factors interfered with measuring the tree diameter at 4.5 feet the measurement was moved and noted in the report.

- Tree height was field estimated.

- Driplines were measured in a minimum of four (4) compass directions.

- Trees were tagged with metal discs for identification and location purposes.

- The surveyed trees were photographed with a digital camera to facilitate reader ease in identification. These pictures are for reference only and should not be used to ascertain actual condition and size of the surveyed tree specimens.

  It is important to note that the information included in this report was collected during an above ground visual observation consistent with professional standards. No extensive internal tree or subsurface investigation was made. Trees are living entities and subject to stress and disease that may not be apparent during cursory inspection. Therefore, no guarantee is given or implied that any of the trees will survive planned construction activity and/or relocation.

Rating Review:

Individual species have been field rated in regard to form and health based on an A, B, C, D, F scale. The letter E is not utilized as a rating classification. Trees were also given a vigor rating as a percentage separate from the overall grade of the tree.

A That tree is rated as an excellent specimen and needs no special attention at this time as long as construction and development impacts do not negatively effect its environment.

B That condition of tree is average to slightly above average with regard to health and structure. Tree may have indicated possible need for minor pruning (deadwood removal). Implementing reasonable preservation procedures and practices, tree has excellent potential to survive planned development if construction guidelines and post-construction maintenance are followed.

C That condition of tree indicates a possible need for moderate corrective maintenance. Tree may be in good physiological condition while displaying one or more structural defects. Tree may display symptoms/signs of stress or decline due to adverse abiotic and/or biotic conditions.

D That tree has serious problems in regard to health, disease, or structure that it may not be possible to be remedied through reasonable preservation procedures and practices.

Overall Tree Conditions

Four (4) Los Angeles County ordinance sized oak trees were documented within the proposed project area. Two (2) are native trees- and both are growing adjacent to an abandoned field previously used for agricultural purposes. The other two trees are non native landscape trees growing within landscaped areas of the existing landfill facility.

It should be noted that one (1) heritage sized dead oak tree was observed adjacent to tree # 1. Arborist Sean Brown met onsite with representatives Bill Romo and Joseph Brunet from the Los Angeles County Forestry Division's Environmental Review Unit to confirm this oak tree was dead in late 2011. Because the tree is no longer living, it is not included in this August 2012 report. It is, however, still onsite and still tagged with the #87.

Survey Results:

- **4** Los Angeles County ordinance sized oak trees were documented within the proposed project area.
  - 3 Quercus agrifolia (Coast Live Oak)
  - 1 Quercus lobata (Valley Oak)

Impact summary

	Tree tag #'s
Proposed Removal	**1,2,3,89**
Encroachment	
No proposed impact	
Total trees in report	**four**

Oak Tree Data

Tag #	Species	Impact Status	DBH in inches	Grade	Vigor	Structure	Height
1	Valley Oak *Quercus lobata*	Remove	(10,5)	B	Good	Fair to Good	20'-30'
2	Coast Live Oak *Quercus agrifolia*	Remove	(10,5)	B-	Good	Fair	15'-20'
3	Coast Live Oak *Quercus agrifolia*	Remove	(11.5,6.5)	B-	Good	Fair	15'-20'
89	Coast Live Oak *Quercus agrifolia*	Remove	(18.5,17,14)	D+	Poor	Poor	25'-30'

Tree Notes

Tag #	Tree comments
1	Tree is a native specimen to the site. Tree is a multi-trunk. Trunk base slightly buried by natural fill from adjacent slope. Growing adjacent to large dead oak tree to west.
2	This tree is non native to the site and was planted as part of the installed landscape. Low branching. Some included bark. Tree is multi trunked. Low branching with canopy in contact with ground. Excessive branch production at point of codominance on larger trunk- may be result of precious damage to trunk.
3	This tree is non native to the site and was planted as part of the installed landscape. Low branching with canopy in contact with ground. Trunk base slightly buried by fill. Multi-trunked. Tree is growing within a partially landscaped area directly adjacent to a paved parking/storage facility.
89	Tree is a native specimen to the site. Multi-trunked. Tree is growing in natural area. Trunk base is heavily buried by adjacent natural slope failure. One dead trunk on ground. Exfoliating bark. Middle trunk lying on west trunk. Multiple broken large limbs. Heavy trunk damage and decay. Poor condition of tree is most likely a result of heavy fire damage and excess soil fill on trunk.

Canopy Measurements

Canopy Dripline From Trunk in Feet

Tag Number	N	E	S	W
1	14	10	14	18
2	9	9	11	11
3	9	10	9	14
89	12	12	18	23

Oak Tree Mitigation

- Required oak tree mitigation per Los Angeles County Oak Tree Ordinance:
  - 6 (two) 15 gallon Quercus agrifolia
  - 2 (two) 15 gallon Quercus lobata

  8 total mitigation trees. (Replacement to removal ratio--- 2:1)

- Recommended oak tree mitigation:
  - 11 (eleven) 15 gallon Quercus agrifolia
  - 5 (five) 15 gallon Quercus lobata

  16 total mitigation trees.

  This is only a recommendation. The final mitigation requirements will be determined by the Los Angeles County Forestry Department.

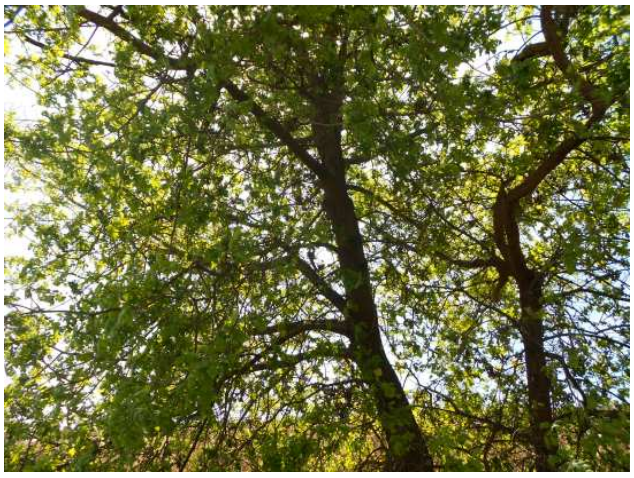
  Proposed mitigation tree planting site- These mitigation trees are proposed to be within the existing property in a natural area as detailed below (see Appendix B). Other alternative natural areas also exist within the project boundary. These are proposals only. The final mitigation requirements will be determined and approved by the Los Angeles County Forestry Division's Environmental Review Unit.

Tree Photographs

Tree #1







Tree Photographs continued

Tree #2







Tree Photographs continued

Tree #3





Tree Photographs continued

Tree #89





Tree Photographs continued

Tree #89







Appendix A

Oak Tree Mitigation Proposed Location



Appendix A

Oak Tree Mitigation Proposed Location



Appendix B

Aerial Photo of Existing Oak Trees Locations



Appendix C

Report Glossary

- **Arboriculture:** The science and art of caring for trees, shrubs and other woody plants.
- **Arborist:** A person possessing the technical competence through experience and related training to provide for or supervise the management of trees or other woody plants.
- **Cavity:** An open and exposed area of wood, where the bark is missing and internal wood has been decayed and dissolved.
- **Codominant:** Equal in size and relative importance, usually associated with either trunks/stems or limbs branches in the crown.
- **Crotch:** The point or angle at which two branches (or a branch and a leader) meet.
- **DBH –Diameter Breast Height**: The diameter of the trunk of a tree measured at 4.5 feet above natural grade.
- **Decay:** Progressive deterioration of organic tissues, usually caused by fungal or bacterial organisms, resulting in loss of cell structure, strength, and function. In wood, the loss of structural strength.
- **Defoliation:** Loss of leaves.
- **Dripline:** The width of the crown, as measured by the lateral extent of the foliage.
- **"Encroachment" as it pertains to the LA County Oak Tree Ordinance:** Proposed construction, excavation, grading and/or landfill within the Protective Zone.
- **Epicormic growth:** Growth that arises from latent buds that occur on stems, branches, and at the base of trees. This type of growth is more vigorous and weaker than normal growth
- **Foliage:** The live leaves or needles of the tree; the plant part primarily responsible for photosynthesis.
- **Heritage Oak Tree:** any oak tree measuring 36" or more in diameter, measured 4½ feet above natural grade.
- **Mulch:** Any material such as wood chips, straw, sawdust, leaves, and stone that is spread on the surface of the soil to protect the soil and plant roots from the effects of raindrops, soil crusting, freezing, and evaporation.
- **"Protective Zone" as it pertains to the LA County Oak Tree Ordinance:** "The Protected Zone shall mean that area within the dripline of an oak tree and extending there from to a point at least 5 feet outside the dripline or 15 feet from the trunk, whichever distance is greater."
- **Pruning:** Selective removal of woody plant parts of any size, using saws, pruners, clippers, or other pruning tools.
- **Root ball:** Area containing the main root structure.
- **Root crown:** Area at the base of a tree where the roots and stem merge.
- **Root System:** The portion of the tree containing the root organs, including buttress roots, transport roots, and fine absorbing roots; all underground parts of the tree.
- **Root Zone:** The area and volume of soil around the tree in which roots are normally found. May extend to three or more times the branch spread of the tree, or several times the height of the tree.
- **Shaded out:** Slower or stunted growth due to lack of sufficient light.
- **Species:** The main category of taxonomic classification into which living organisms are subdivided, comprising a group of similar individuals having a number of correlated characteristics.
- **Stress:** Unfavorable deviation from normal. The action on a body of any system of balanced forces whereby strain or deformation results. In arboriculture, the adverse alteration of tree health by abiotic or biotic factors.
- **Sucker:** Vigorous upright epicormic (Adventitious) shoot rising from the base of the trunk or just below the soil surface.
- **Re-growth/trunk sprout:** Growth rising from the base of damaged or cut trees/shrubs. Epicormic type growth.
- **Vigor:** Overall health; the capacity to grow and resist physiological stress.
- **Visual Tree Assessment:** Method of evaluating structural defects and stability in trees.

Appendix D Oak Tree Location Plan

WOLCOTT OAK TREE IMPACT EXHIBIT

JUNE 1, 2012

EXISTING PRIMARY CANYON LANDFILL (CLOSED)

SOUTHERN CALIFORNIA EDISON

LEACHATE STORAGE/ TREATMENT/ LOADOUT FACILITY

NEW ENTRANCE FACILITIES AREA

NEW SCALES & GATEHOUSE

ADMINISTRATION BLDG.

PUBLIC DROP-OFF

#3 OAK TREE PROTECTIVE ZONE

EXISTING OAK TREE TO REMOVE/RELOCATE

EXISTING OAK TREE TO BE REMOVED

#2

OAK TREE PROTECTIVE ZONE

EXISTING OAK TREE TO BE REMOVED

GRADING LIMITS (TYPICAL)

#89

OAK TREE PROTECTIVE ZONE

EXISTING OAK TREE TO REMOVE/RELOCATE

#1

OAK TREE PROTECTIVE ZONE

BENCH

900 TOP DIKE

EXISTING 36" CSP STORM DRAIN

1125 1100 1075 1050 1025 1000 975 950

HENRY MAYO DRIVE

LICENSED LAND SURVEYOR DANNY T. DAVIS L.S.7586 EXPIRES 12/31/13 STATE OF CALIFORNIA

GRAPHIC SCALE

80' 0' 40' 80' 160'

(IN FEET)

1 inch = 80 ft.

PINNACLE
Land Surveying, Inc.
28348 CONSTELLATION ROAD
SUITE 800
VALENCIA, CA 91355
TEL (661) 254-1928

WOLCOTT OAK TREE IMPACT EXHIBIT

JUNE 1, 2012

GRAPHIC SCALE

20' 0' 10' 20' 40'

(IN FEET)
1 inch = 20 ft.

975

EXISTING OAK TREE TO BE REMOVED

OAK TREE PROTECTIVE ZONE

#1

EXISTING 36" CSP CULVERT

#2

EXISTING OAK TREE TO BE REMOVED

OAK TREE PROTECTIVE ZONE

1025

1001

EXISTING OAK TREE TO BE REMOVED

OAK TREE PROTECTIVE ZONE

#3

GRADING LIMITS (TYPICAL)

EXISTING OAK TREE TO BE REMOVED

OAK TREE PROTECTIVE ZONE

#89

965

LICENSED LAND SURVEYOR
DANNY T. DAVIS
L.S.7586
EXPIRES 12/31/13
STATE OF CALIFORNIA

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Appendix E3
Draft Revegetation, Rare Plant Relocation, and Oak Tree Performance Criteria

APPENDIX E3

Draft Revegetation, Rare Plant Relocation, and Oak Tree Performance Criteria

E3.1 Introduction

Biological Resource Mitigation Measures BR-1, BR-9, and BR-15, require development of the following plans, respectively:

- Closure Revegetation Plan
- Rare Plant Relocation Plan
- Oak Tree and Oak Woodland Mitigation Plan

Prior to authorization of ground disturbing impacts, these plans will be developed consistent with performance criteria specified in this Appendix, and will require approval of LADRP and/or CDFW. Additional data which will support the development of these plans will include: precise incremental impacts to vegetation communities, rare plants, and oak trees and woodlands upon project implementation; final grade upon project completion including slope gradient and aspect; location and design of drainage features; sub- and top-soil covering depth upon project completion; soil characteristics of topsoil upon completion, including texture, pH, nutrient content, and other parameters; availability and adjacency of undisturbed habitats and conditions; and, extent of undisturbed rare plant populations by species and suitability for population enhancement.

E3.2 Draft Revegetation Performance Criteria

E3.2.1 Introduction

Vegetation communities impacted by the development of the Project will be replaced by revegetation at the Chiquita Canyon Landfill after closure. Closure shall include placement of appropriate barrier and gas collection technology on the landfill area, and placement of 5 feet of final soil cover on top of this. Once soil cover is in place, revegetation will occur to establish vegetation for erosion control and habitat replacement. The current existing condition is represented in vegetation mapping updated in 2016, as provided in Figure 8-3 of the Partially Recirculated Draft EIR. A total of 13 native alliances, 3 semi-natural (non-native) vegetation alliances, and 4 revegetated alliances have been identified on CCL. Table 8-1 of the Partially Recirculated Draft EIR provides a summary of vegetation alliances present on CCL, the existing acreage, and the anticipated impacts to vegetation alliances.

Revegetation objectives would be to achieve a 1:1 ratio of impacted native, revegetated, and semi-natural habitat to revegetated mitigation land. Shrub and forested communities would be revegetated to shrub and forest alliances, and naturalized non-native grasslands would be seeded with native grassland species. Invasive species would be controlled to less than the target performance criteria threshold.

Table E3-1 provides and defines the proposed metrics that would be used to evaluate site revegetation at CCL. Table E3-2 identifies which metrics would be utilized to evaluate each specific revegetated alliance.

The Closure Revegetation Plan will identify the final objective alliance types, location and acreage of restoration, plant propagule sources and types, planting methods, plant palettes, soil treatments or enhancements, temporary irrigation requirements, and long term monitoring and maintenance requirements. The final Closure Revegetation Plan will be developed and finalized in consultation with LADRP, and will be finalized prior to ground disturbing activities. It would be consistent with performance criteria provided in this document.

E3.2.2 Baseline Sampling

Vegetation mapping and sampling was conducted at CCL in February and March, 2016. The mapping consisted of preliminary ocular estimates of absolute species composition (including bare ground and litter) on homogenous vegetation stands and delineating stands on large scale aerial photographs (1:2400 scale). Data analysis provided estimates on relative and absolute cover by species, and was used to group homogenous stands into alliances based on Sawyer and Keeler-Wolf (1995).

After preliminary mapping was complete, transects were established in native shrub and herbaceous alliances. Non-native and revegetated alliances were not transected. Transect locations were established by generating random number locations on the map using GIS software along with an associated compass direction within alliances of interest. Transect locations that ventured out of existing alliance boundaries were discarded. Transects were 100 feet, established in the field using a tape while anchoring one end and proceeding in the computer-generated direction. Because of the small patch size and incongruous alliance types longer transects were generally not possible, and several shorter transects were more suitable than single long transects for the mosaic of alliance types and landscape. In general, the number of transects broadly reflected the acreage of the alliance. One herbaceous alliance was small and required a reduced transect length.

Once a transect was established, vegetation composition by species and/or ground cover was documented at a 0.1-foot precision. Data were recorded and analyzed to include absolute cover by species, relative cover by species, percent shrub cover, percent weed and invasive weed cover, and total vegetative cover. All transect data from multiple transects in an alliance were combined for summary statistics.

Upon completion of transect data analysis, alliance mapping was reevaluated to ensure that ocular estimates conducted to provide preliminary mapping accurately characterized alliances when compared with transect data. Some alliances were recoded and/or alliance boundaries were adjusted based on transect data.

Final vegetation mapping at CCL is provided in Figure 8-3 of the Partially Recirculated Draft EIR. A summary of transect data results is provided in Table E3-3. This data provides the reference data for revegetation performance criteria, as discussed below.

E3.2.3 Revegetation Criteria

Reference sites are regional examples of intact vegetation communities that can reflect target conditions for the revegetation site. The native, intact vegetation communities on CCL that were sampled and are anticipated for impacts may themselves serve as suitable reference sites, as they reflect relatively undisturbed vegetation communities comparable to the conditions throughout the region. The reference site data collected by alliance indicates typical total vegetative cover, species composition, percent shrub cover, and extent of non-native species present (e.g. ubiquitous grasses), and were used to inform the performance criteria for that vegetation type.

Based on the reference site data in Table E3-3, draft performance criteria were developed for each alliance type at CCL proposed for revegetation. Tables E3-4a through 4n provide the draft performance metric value ranges for each alliance that will be revegetated. In general, performance criteria for all alliances target less than 10 percent cover of non-native species (including ubiquitous grasses), and

achieving at least 80 percent of the reference site value for that alliance for parameters such as total vegetative cover or relative shrub cover within the 5-year monitoring period. Interim criteria (e.g. 1 year, 3 years) evaluate whether the revegetation effort is on track to achieve 5 year values.

E3.2.4 Monitoring and Reporting

Ongoing monitoring and reporting requirements will be detailed in the Closure Revegetation Plan, but will include at a minimum annual sampling of site conditions, including the criteria as specified in Table E3-1. Sampling frequency will be at a minimum one time per year, but during the first 1 – 2 years, additional sampling to identify weed infestations and vegetation conditions would be implemented. Reporting to LADRP would be conducted once per year, with the report developed later in the year to capture all sampling and remediation events conducted through the year. Additional information included in the monitoring reports will include site photographs from established photo stations, records of remediation activities completed and planned for the following year, raw field data from sampling, and an overall discussion of site success towards revegetation.

E3.2.5 Remediation Measures

Remediation measures would be implemented when revegetation sites do not meet performance criteria at any point. Remediation measures would be adaptively managed; that is, ongoing evaluation of success of remediation measures would be considered in designing or implementing measures to promote success. Where annual monitoring results indicate revegetation sites are not on target to meet performance criteria, remediation measures would be implemented.

The following represents a preliminary list of potential remediation measures. Actual measures would be developed based on site-specific conditions, performance monitoring results, and extent and duration of non-conformance with performance criteria.

- Weed management within revegetation sites including hand removal and/or chemical application;
- Weed management within adjacent sites contributing to weed establishment on revegetation sites;
- Application of mulch or other potential weed barriers where small-scale weed infestation problems are persistent;
- Hydroseed and/or hand seeding where percent cover requirements are not meeting criteria.
- Modification of irrigation rates and/or extension of temporary irrigation where soil water is limiting revegetation success.
- Reconfiguration of planting basins and/or application of mulch in planting basins for greater water retention and weed control.
- Installation of browse protection where significant damage is occurring to revegetation efforts from excessive browse.
- Re-planting as requiring, including re-application of seeds and reinstallation of container stock as needed to meet cover goals.
- Limited application of fertilizer in rare cases where needed to enhance growth based on laboratory tests indicating lack of suitable soil conditions for optimal revegetation.
- Application of other soil amendments (e.g. gypsum) where lab tests suggest soil conditions are constraining revegetation success.
- Alteration of plant propagule methods to optimize revegetation success; for example, modifying from seeding to container stock or cuttings.

- Alteration of which species are planted based on site response.
- Alteration of density of plantings based on site response.
- Offsite mitigation land will be purchased to offset the loss of the portion of shrub and forest vegetation communities that do not meet the success criteria, if necessary, as outlined in Mitigation Measure BR-1.

Annual activities related to remediation of problem conditions, along with intended activities yet to be implemented, would be included in annual monitoring reports.

E3.3 Draft Rare Plant Mitigation Performance Criteria

E3.3.1 Introduction

During rare plant surveys in 2016, rare plants were identified at CCL including club-haired Mariposa lily, slender Mariposa lily, and hybrids between these subspecies; and Peirson's morning-glory, California sunflower, narrowleaf Stillingea, and beavertail cactus. Some individuals and populations of these rare plants are within areas of CCL that are proposed for grading and development, and are anticipated to be impacted. Mitigation Measure BR-9 is provided to mitigate for impacts to special-status plants. Other special-status plant species (including any CNPS rare plants designated 1 – 4 or Locally Rare) may occur at CCL and be identified in pre-construction rare plant surveys as required under BR-9 prior to each phase of site development; if found, avoidance or mitigation for impacts to them would also be achieved through BR-9. Figure 8-5 in the Partially Recirculated Draft EIR shows the locations of rare plants at CCL during surveys conducted in 2016 relative to anticipated disturbance limits.

Where avoidance of special-status plant species is possible, it will be achieved through fenced exclusion zones as specified in BR-9. The final grading plan for each cell of CCL will be evaluated for potential impacts on rare plant individuals or stands. If locations of rare plants are in areas that cannot be effectively avoided, then a Rare Plant Relocation Plan would identify effective means of translocation of the individuals or stands. The Rare Plant Relocation Plan would be developed consistent with performance criteria and other information provided in this document, and would require approval of LADRP and CDFW.

E3.3.2 Rare Plant Translocation

Relocation for special-status plants may include the following measures, individually or in concert. The final Rare Plant Relocation Plan will be developed in coordination with CDFW, and will determine the detailed approach to rare plant translocation as required, including methods of propagule collection and propagation.

- Collection of baseline data on impacted rare plant locations to generate population estimates for potential translocation, per BR-9;
- Identification of receptor sites for rare plant translocation, consisting of conserved areas of suitable conditions for the species and ideally, extant populations that can be enhanced;
- Conserved sites may be portions of CCL that are not developed, or alternative nearby locations where land can be acquired and preserved;
- Collection of baseline data of conserved sites per BR-9, including soil conditions at impact and receptor sites;
- Topsoil conservation from rare plant locations to be impacted, for distribution on conserved sites;
- Seed collection/salvage and distribution on conserved sites;

- Collection of other propagules, including bulbs (*Calochortus* spp.), rhizomes (*Calystegia peirsonii*), and entire plants and pads (*Opuntia basilaris* var. *basilaris*) for distribution on conserved sites;
- Nursery propagation of species from collected propagules for outplanting and/or seed amplification (e.g. for *Helianthus californicus* or *Stillingia linearifolia*).

Conserved sites will require appropriate land protection instruments and financial assurances per BR-9. Where relocation cannot be achieved, through lack of receptor sites, or lack of success during monitoring period, then purchase of mitigation credits or offsite property with known populations of the affected species for inclusion in permanent open space areas or a conservation easement would be implemented per BR-9.

E3.3.3 Draft Translocation Performance Criteria

Success of transplanted rare plants varies considerably, and may be as low as 10 percent, and is rarely higher than 50 percent. To effectively translocate populations of rare plants on CCL on a 1:1 ratio (impacted population:translocated population), appropriate methods are essential, and considerable overplanting will be required. Population estimates based on above ground individuals may also not reflect the true population level, particularly for perennial, bulbiferous species or species with below ground rhizomes.

The following performance criteria will be evaluated to achieve success of rare plant translocation.

- Population estimates of above ground plants will be considered complete if surveys are conducted in appropriate time of year for the species (usually blooming periods) and the rainfall for the year is within 20 percent of normal;
- Population estimates of above ground plants for bulbiferous or rhizomatous perennial species will be multiplied by 5 to provide a baseline for translocation;
- A total of 10 times the number of propagules as plants from the population estimate will be translocated;
- A minimum of 50 percent of propagules will germinate and/or bud the first growing season after transplant;
- A minimum of 10 percent of propagules will mature to flowering the first growing season after transplant for species with an annual flowering cycle;
- The population will show a stable or increasing trend during the full 5-year monitoring period, when compared to reference sites with intact populations of the species.

E3.3.4 Monitoring and Reporting

Ongoing monitoring and reporting requirements will be detailed in the Rare Plant Relocation Plan, but will include at a minimum annual sampling of rare plant populations, as indicated above. Sampling frequency will be at a minimum one time per year. Reporting to LADRP would be conducted once per year, with the report developed later in the year to capture all sampling and remediation events conducted through the year. In assessing rare plant populations, each year's plants would represent a stand-alone number used to assess trends, and would be compared to a nearby reference population to account for annual variation in rare plant blooming and detectability.

E3.3.5 Remediation Measures

Remediation measures would be implemented when the transplanted rare plant population is demonstrating a downward trend of greater than 10 percent when compared to reference populations, or any other of the above performance criteria are not met for the year.

Remediation measures may include any of the following, and would be developed in coordination with CDFW. The following represents a preliminary list of potential remediation measures. Actual measures would be developed based on site-specific conditions, performance monitoring results, and extent and duration of non-conformance with performance criteria.

- Weed management within receptor sites including hand removal and/or chemical application;
- Weed management within adjacent sites contributing to weed establishment on receptor sites;
- Application of mulch or other potential weed barriers where small-scale weed infestation problems are persistent;
- Implementation of temporary irrigation where soil water is limiting translocation success;
- Other measures supporting plant establishment where deemed appropriate, including establishment of planting basins, application of mulch, installation of browse protection;
- Re-planting as required, following the same protocol as originally utilized if it can be modified to increase success, or alternative propagation methods if original method has proved unsuccessful;
- Nursery propagation of species and outplanting to increase success;
- If rare plant relocation cannot be achieved, then per BR-9, purchase of mitigation credits or offsite property with known populations of the affected species for inclusion in permanent open space areas or a conservation easement would be implemented.

Annual activities related to remediation of problem conditions, along with intended activities yet to be implemented, would be included in annual monitoring reports.

E3.4 Draft Oak Tree Mitigation Performance Criteria

The Oak Tree and Oak Woodland Mitigation Plan will be developed to identify location and acreage of oak tree and oak woodland restoration, plant propagule sources and types, planting methods, soil treatments or enhancements, temporary irrigation requirements, and long term monitoring and maintenance requirements.

An Oak Tree Report (SB Horticulture, 2014) identified a total of three coast live oaks and one valley oak that qualify for protection under the Los Angeles County Oak Tree Ordinance (see Figure 8-6 of the Partially Recirculated Draft EIR). One former heritage coast live oak was identified as deceased. The Project would require the removal of four protected oak trees because of their location in the landfill development area. This impact will be mitigated by Mitigation Measure BR-15; specifically, an oak tree permit would be acquired for removal of the qualifying oaks and all permit terms and conditions would be complied with. This is anticipated to include replanting of oaks.

The Oak Tree Report has the following anticipated replanting requirements for oak trees per the Los Angeles County Oak Tree Ordinance:

- 6 (six) 15 gallon *Quercus agrifolia*
- 2 (two) 15 gallon *Quercus lobata*

The total of 8 mitigation trees would be at a replacement to removal ratio of 2:1. To account for any survivorship challenges with these trees, the Oak Tree Report recommends planting at a higher ratio. Their recommendation is as follows:

- 11 (eleven) 15 gallon *Quercus agrifolia*
- 5 (five) 15 gallon *Quercus lobata*

The total of 16 mitigation trees would provide for allowance should trees not survive.

The Oak Tree and Oak Woodland Mitigation Plan will also identify the details for implementation of mitigation for impacts to Quercus berberidifolia Shrubland Alliance. The mitigation plan for impacts to scrub oak woodland will be developed consistent with the Los Angeles County Oak Woodlands Conservation and Management Plan.

Replanted oaks would be monitored on a schedule consistent with other site monitoring including tree survivorship, tree health/condition, tree height, and any conditions contributing to long-term survivorship, including browse, irrigation, weed intrusion, planting basins and/or mulch, etc.

CCL provides the following performance criteria for replanted oak trees, to be finalized based on conditions of the Oak Tree Permit which will be required for issuance prior to any oak tree removal.

- Oak tree plantings would be evaluated for survivorship annually, and dead trees would be remediated per measures below;
- Oak trees with a rating for health/condition of D (SB Horticulture, 2014) shall be considered dead, and remediated according to measures below;
- Oak trees would be monitored for survivorship for a minimum of 3 years without supplemental water; if supplemental water is required after year 2 of monitoring, then the overall 5-year monitoring schedule would be extended;
- Oak trees would require a minimum of 100 percent survivorship with a rating of A or B (SB Horticulture, 2014) in year 5, or a minimum of 3 years after the last supplemental water;
- Oak trees would gain a minimum of 10 percent of original height and/or canopy width each year when averaged over the 5-year monitoring period.
- Scrub oak trees planted within the oak woodland mitigation areas for Quercus berberidifolia Shrubland Alliance would also be subjected to performance criteria, as described under the Draft Revegetation Performance Criteria described in Section E3.2.3.

Remedial measures would be implemented when oak trees do not meet performance criteria. Remedial measures would include replanting oaks in new planting basins (except where original oak had died), and monitoring them for an additional 5 years after planting for compliance with performance criteria.

Table E3-1. Proposed Metrics for Measuring Performance of Site Revegetation

Metric	Parameter	Definition	Typical Measurement Method
Total Non-native Species	**% absolute coverage**	Total foliar cover measured as the proportion of non-native plant cover to total sample area	Ocular estimation combined with vegetative transects (belt, or point-intersect)
Moderate to High Priority Invasive Species	**% absolute coverage**	Total foliar cover measured as the proportion of non-native plant cover of invasives to total sample area. Moderate to high priority invasive species are as defined by the California Invasive Plant Council (http://www.cal-ipc.org/)	Ocular estimation combined with vegetative transects (belt, or point-intersect)
Total Vegetative Coverage	**% absolute coverage**	Represents a proportion of the total foliar cover to total sample area	Vegetative transect sampling (plot, belt, or point-intersect)
Native Coverage	**% relative coverage**	Total foliar cover measured as the proportion of native plant cover to total plant cover	Vegetative transect sampling (plot, belt, or point-intersect).
Tree Survivorship	**% survivorship**	Planted trees surviving after installation over a specified time period.	Visual inspection during growing season.
Shrub Coverage	**% relative coverage**	Represents a proportion of the total foliar shrub cover to total plant cover	Vegetative transect sampling (plot, belt, or point-intersect)
Tree Growth	**feet/year**	Planted tree height	Measured with a stadia rod or with ocular estimates.

Table E3-2. Metrics Proposed for Evaluation for Revegetation Performance by Alliance

VegCAMP Code to Association	Alliance Name	Metrics Evaluated					
		Total Non-native Species	Moderate to High Priority Invasive Species	Total Vegetative Coverage	Tree Survivorship	Shrub Coverage	Tree Growth
37.102.00	Adenostoma fasciculatum-Salvia mellifera Shrubland Alliance	✓		✓		✓	
32.010.00	Artemisia californica Shrubland Alliance	✓	✓	✓		✓	
32.110.05	Artemisia californica-Eriogonum fasciculatum Shrubland Alliance	✓	✓	✓		✓	
32.120.00	Artemisia californica-Salvia mellifera Shrubland Alliance	✓	✓	✓		✓	
36.310.00	Atriplex canescens Shrubland Alliance	✓	✓	✓		✓	
44.150.03	Avena (barbata, fatua) Herbaceous Semi-Natural Alliance		✓				
63.510.01	Baccharis salicifolia Shrubland Alliance	✓	✓	✓		✓	
32.050.00	Encelia californica Shrubland Alliance	✓	✓	✓		✓	
32.040.02	Eriogonum fasciculatum Shrubland Alliance	✓	✓	✓		✓	
61.130.14	Populus fremontii Forest Alliance	✓	✓	✓	✓		✓
37.407.00	Quercus berberidifolia Shrubland Alliance	✓	✓	✓	✓	✓	
32.090.00	Salvia leucophylla Shrubland Alliance	✓	✓	✓		✓	
32.020.00	Salvia mellifera Shrubland Alliance	✓	✓	✓		✓	
42.062.00	Selaginella bigelovii Herbaceous Alliance	✓	✓	✓			

Table E3-3. Reference Data of Alliances on Undisturbed Portions of Chiquita Canyon Landfill

Alliance	Alliance Species Composition			Summary of Percent Cover from Transect Data			
	Cover (Native Vegetation in Bold)	Absolute %	Relative %	Alliance Summary	Absolute %	Relative %
Quercus berberidifolia Shrubland Alliance	**Scrub oak (*Quercus berberidifolia*)**	**44.37%**	**64.30%**	shrub cover	65.23%	94.54%
	Chamise (*Adenostoma fasciculatum*)	**6.03%**	**8.74%**	total native	65.73%	95.27%
	California sagebrush (*Artemisia californica*)	**5.67%**	**8.21%**	total non-native	3.27%	4.73%
	Black sage (*Salvia mellifera*)	**5.03%**	**7.29%**	total invasive/noxious	0.00%	0.00%
	Toyon (*Heteromeles arbutifolia*)	**3.80%**	**5.51%**	total vegetated	69.00%	100.00%
	California buckwheat (*Eriogonum fasciculatum*)	**0.33%**	**0.48%**			
	Moss	**0.50%**	**0.72%**			
	Non-native grass	3.27%	4.73%			
	Bare ground	10.63%				
	Leaf litter	20.37%				
	Total	100.00%	100.00%			
Salvia leucophylla Shrubland Alliance	**Purple sage (*Salvia leucophylla*)**	**34.32%**	**55.50%**	shrub cover	59.02%	95.44%
	California sagebrush (*Artemisia californica*)	**8.08%**	**13.07%**	total native	60.24%	97.41%
	California buckwheat (*Eriogonum fasciculatum*)	**7.34%**	**11.87%**	total non-native	1.60%	2.59%
	Chamise (*Adenostoma fasciculatum*)	**5.94%**	**9.61%**	total invasive/noxious	0.06%	0.10%
	Black sage (*Salvia mellifera*)	**2.00%**	**3.23%**	total vegetated	61.84%	100.00%
	Scrub oak (*Quercus berberidifolia*)	**1.34%**	**2.17%**			
	Moss	**1.14%**	**1.84%**			
	Coffee fern (*Pellaea andromedifolia*)	**0.02%**	**0.03%**			
	Unknown	0.06%	0.10%			
	Russian thistle (*Salsola tragus*)	0.06%	0.10%			
	Non-native grass	1.54%	2.49%			
	Bare ground	11.78%				
	Leaf litter	26.38%				
	Total	100.00%	100.00%			
Adenostoma fasciculatum-Salvia mellifera Shrubland Alliance	**Black sage (*Salvia mellifera*)**	**21.30%**	**36.92%**	shrub cover	50.70%	87.87%
	Chamise (*Adenostoma fasciculatum*)	**16.25%**	**28.16%**	total native	51.10%	88.56%
	Scrub oak (*Quercus berberidifolia*)	**5.85%**	**10.14%**	total non-native	6.60%	11.44%
	Purple sage (*Salvia leucophylla*)	**3.60%**	**6.24%**	total invasive/noxious	0.00%	0.00%
	California sagebrush (*Artemisia californica*)	**2.70%**	**4.68%**	total vegetated	57.70%	100.00%
	Toyon (*Heteromeles arbutifolia*)	**1.00%**	**1.73%**			
	Coyote melon (*Cucurbita californica*)	**0.40%**	**0.69%**			
	Non-native grass	6.60%	11.44%			
	Bare ground	12.30%				
	Leaf litter	30.00%				
	Total	100.00%	100.00%			

Table E3-3. Reference Data of Alliances on Undisturbed Portions of Chiquita Canyon Landfill

Alliance	Alliance Species Composition			Summary of Percent Cover from Transect Data		
	Cover (Native Vegetation in Bold)	Absolute %	Relative %	Alliance Summary	Absolute %	Relative %
Eriogonum fasciculatum Shrubland Alliance	**California buckwheat (*Eriogonum fasciculatum*)**	**38.53%**	**51.78%**	shrub cover	56.18%	75.50%
	Bush sunflower (*Encelia californica*)	**11.35%**	**15.26%**	total native	56.18%	75.50%
	Mule fat (*Baccharis salicifolia*)	**2.08%**	**2.79%**	total non-native	18.23%	24.50%
	Black sage (*Salvia mellifera*)	**1.88%**	**2.52%**	total invasive/noxious	8.68%	11.66%
	Our Lord's candle (*Yucca whipplei*)	**1.13%**	**1.51%**	total vegetated	74.40%	100.00%
	Bush mallow (*Malacothamnus* sp.)	**0.65%**	**0.87%**			
	California sagebrush (*Artemisia californica*)	**0.35%**	**0.47%**			
	Deerweed (*Lotus scoparius*)	**0.23%**	**0.30%**			
	Russian thistle (*Salsola tragus*)	8.68%	11.66%			
	Non-native grass	9.55%	12.84%			
	Rock/RipRap	2.40%				
	Woody Debris	0.85%				
	Bare ground	7.18%				
	Leaf litter	15.18%				
	Total	100.00%	100.00%			
Encelia californica Shrubland Alliance	**Bush sunflower (*Encelia californica*)**	**41.62%**	**78.94%**	shrub cover	47.77%	90.61%
	Black sage (*Salvia mellifera*)	**3.37%**	**6.39%**	total native	47.78%	90.64%
	California buckwheat (*Eriogonum fasciculatum*)	**1.18%**	**2.24%**	total non-native	4.93%	9.36%
	California sagebrush (Artemisia californica)	**0.83%**	**1.58%**	total invasive/noxious	1.12%	2.12%
	Mule fat (*Baccharis salicifolia*)	**0.77%**	**1.45%**	total vegetated	52.72%	100.00%
	Coffee fern (*Pellaea andromedifolia*)	**0.02%**	**0.03%**			
	Russian thistle (*Salsola tragus*)	1.12%	2.12%			
	Non-native grass	3.82%	7.24%			
	Bare ground	17.63%				
	Leaf litter	29.65%				
	Total	100.00%	100.00%			
Populus fremontii Forest Alliance	**Fremont cottonwood (*Populus fremontii*)**	**24.50%**	**35.25%**	tree cover	24.50%	35.25%
	Mule fat (*Baccharis salicifolia*)	**24.90%**	**35.83%**	shrub cover	36.40%	52.37%
	Coyote brush (*Baccharis pilularis*)	**10.00%**	**14.39%**	total native	60.90%	87.63%
	Bush sunflower (*Encelia californica*)	**0.35%**	**0.50%**	total non-native	8.60%	12.37%
	Unknown	1.15%	1.65%	total invasive/noxious	8.60%	12.37%
	Tamarix (*Tamarix* sp.)	8.25%	11.87%	total vegetated	69.50%	100.00%
	Russian thistle (*Salsola tragus*)	0.35%	0.50%			
	Woody Debris	5.80%				
	Bare ground	10.25%				
	Leaf litter	14.45%				
	Total	100.00%	100.00%			

Table E3-3. Reference Data of Alliances on Undisturbed Portions of Chiquita Canyon Landfill

Alliance	Alliance Species Composition			Summary of Percent Cover from Transect Data		
	Cover (Native Vegetation in Bold)	Absolute %	Relative %	Alliance Summary	Absolute %	Relative %
Artemisia californica-Eriogonum fasciculatum Shrubland Alliance	**California buckwheat (*Eriogonum fasciculatum*)**	**22.10%**	**30.87%**	shrub cover	56.30%	78.63%
	California sagebrush (*Artemisia californica*)	**20.40%**	**28.49%**	total native	60.10%	83.94%
	California montain-mahogany (*Cercocarpus betuloides*)	**5.50%**	**7.68%**	total non-native	11.50%	16.06%
	Black sage (*Salvia mellifera*)	**3.80%**	**5.31%**	total invasive/noxious	0.00%	0.00%
	Purple sage (*Salvia leucophylla*)	**3.70%**	**5.17%**	total vegetated	71.60%	100.00%
	Mule fat (*Baccharis salicifolia*)	**0.80%**	**1.12%**			
	Coffee fern (*Pellaea andromedifolia*)	**0.50%**	**0.70%**			
	Moss	**3.30%**	**4.61%**			
	Non-native grass	11.50%	16.06%			
	Bare ground	9.90%				
	Leaf litter	18.50%				
	Total	100.00%	100.00%			
Selaginella bigelovii Herbaceous Alliance	**Bigelow's spike moss (*Selaginella bigelovii*)**	**44.00%**	**70.29%**	herb cover	44.00%	70.29%
	California buckwheat (*Eriogonum fasciculatum*)	**12.80%**	**20.45%**	shrub cover	18.60%	29.71%
	Bush sunflower (*Encelia californica*)	**4.40%**	**7.03%**	total native	62.60%	100.00%
	Our Lord's candle (*Yucca whipplei*)	**1.40%**	**2.24%**	total non-native	0.00%	0.00%
	Bare ground	30.80%		total invasive/noxious	0.00%	0.00%
	Leaf litter	6.60%		total vegetated	62.60%	100.00%
	Total	100.00%	100.00%			
Baccharis salicifolia Shrubland Alliance	**Mule fat (*Baccharis salicifolia*)**	**46.30%**	**72.68%**	shrub cover	51.10%	80.22%
	Coyote brush (*Baccharis pilularis*)	**4.30%**	**6.75%**	total native	51.10%	80.22%
	California buckwheat (*Eriogonum fasciculatum*)	**0.50%**	**0.78%**	total non-native	12.60%	19.78%
	Non-native grass	12.60%	19.78%	total invasive/noxious	0.00%	0.00%
	Bare ground	10.15%		total vegetated	63.70%	100.00%
	Leaf litter	26.15%				
	Total	100.00%	100.00%			
Artemisia californica-Salvia mellifera Shrubland Alliance	**Black sage (*Salvia mellifera*)**	**30.15%**	**44.93%**	shrub cover	65.55%	97.69%
	California sagebrush (*Artemisia californica*)	**30.85%**	**45.98%**	total native	65.55%	97.69%
	Purple sage (*Salvia leucophylla*)	**2.90%**	**4.32%**	total non-native	1.55%	2.31%
	Coyote brush (*Baccharis pilularis*)	**1.65%**	**2.46%**	total invasive/noxious	0.00%	0.00%
	Non-native grass	1.55%	2.31%	total vegetated	67.10%	100.00%
	Bare ground	12.20%				
	Leaf litter	20.70%				
	Total	100.00%	100.00%			

Table E3-3. Reference Data of Alliances on Undisturbed Portions of Chiquita Canyon Landfill

Alliance	Alliance Species Composition			Summary of Percent Cover from Transect Data		
	Cover (Native Vegetation in Bold)	Absolute %	Relative %	Alliance Summary	Absolute %	Relative %
Salvia mellifera Shrubland Alliance	**Black sage (*Salvia mellifera*)**	**40.95%**	**55.77%**	shrub cover	65.40%	89.07%
	California buckwheat (*Eriogonum fasciculatum*)	**21.45%**	**29.21%**	total native	65.50%	89.21%
	Bush sunflower (*Encelia californica*)	**2.23%**	**3.03%**	total non-native	7.93%	10.79%
	California sagebrush (*Artemisia californica*)	**0.53%**	**0.72%**	total invasive/noxious	0.00%	0.00%
	Mule fat (*Baccharis salicifolia*)	**0.25%**	**0.34%**	total vegetated	73.43%	100.00%
	Coffee fern (*Pellaea andromedifolia*)	**0.10%**	**0.14%**			
	Non-native grass	7.93%	10.79%			
	Bare ground	11.53%				
	Leaf litter	15.05%				
	Total	100.00%	100.00%			
Atriplex canescens Shrubland Alliance	**Fourwing saltbush (*Atriplex canescens*)**	**37.28%**	**60.03%**	shrub cover	48.76%	78.52%
	California sagebrush (*Artemisia californica*)	**8.16%**	**13.14%**	total native	48.76%	78.52%
	California buckwheat (*Eriogonum fasciculatum*)	**1.88%**	**3.03%**	total non-native	13.34%	21.48%
	Bush sunflower (*Encelia californica*)	**1.22%**	**1.96%**	total invasive/noxious	2.06%	3.32%
	Black sage (*Salvia mellifera*)	**0.22%**	**0.35%**	total vegetated	62.10%	100.00%
	Non-native grass	11.28%	18.16%			
	Russian thistle (*Salsola tragus*)	2.06%	3.32%			
	Bare ground	18.06%				
	Leaf litter	19.84%				
	Total	100.00%	100.00%			
Artemisia californica Shrubland Alliance	**California sagebrush (*Artemisia californica*)**	**51.35%**	**67.88%**	shrub cover	67.85%	89.69%
	Purple sage (*Salvia leucophylla*)	**9.35%**	**12.36%**	total native	67.85%	89.69%
	California buckwheat (*Eriogonum fasciculatum*)	**7.15%**	**9.45%**	total non-native	7.80%	10.31%
	Non-native grass	7.10%	9.39%	total invasive/noxious	0.70%	0.93%
	Russian thistle (*Salsola tragus*)	0.70%	0.93%	total vegetated	75.65%	100.00%
	Bare ground	8.25%				
	Leaf litter	16.10%				
	Total	100.00%	100.00%			

Table E3-4a. Proposed Success Criteria for Selaginella bigelovii Herbaceous Alliance (42.062.00)

Year	Metrics Evaluated		
	Total Non-native Species	Moderate to High Priority Invasive Species	Total Vegetative Coverage
	Parameter		
	% absolute coverage	% absolute coverage	% absolute coverage
Reference Site Summary	0%	0%	62.60%
1	<30%	<20%	>25%
3	<20%	<10%	>35%
5	<10%	<5%	>50%

Table E3-4b. Proposed Success Criteria for Salvia mellifera Shrubland Alliance (32.020.00)

Year	Metrics Evaluated			
	Total Non-native Species	Moderate to High Priority Invasive Species	Total Vegetative Coverage	Shrub Coverage
	Parameter			
	% absolute coverage	% absolute coverage	% absolute coverage	% relative coverage
Reference Site Summary	7.3%	0.0%	73.4%	89.1%
1	<30%	<20%	>20%	>30%
3	<20%	<10%	>40%	>50%
5	<10%	<5%	>60%	>75%

Table E3-4c. Proposed Success Criteria for Salvia leucophylla Shrubland Alliance (32.090.00)

Year	Metrics Evaluated			
	Total Non-native Species	Moderate to High Priority Invasive Species	Total Vegetative Coverage	Shrub Coverage
	Parameter			
	% absolute coverage	% absolute coverage	% absolute coverage	% relative coverage
Reference Site Summary	1.6%	0.1%	61.8%	95.4%
1	<30%	<20%	>20%	>25%
3	<20%	<10%	>35%	>50%
5	<10%	<5%	>50%	>80%

Table E3-4d. Proposed Success Criteria for Quercus berberidifolia Shrubland Alliance (37.407.00)

Year	Metrics Evaluated				
	Total Non-native Species	Moderate to High Priority Invasive Species	Total Vegetative Coverage	Survivorship	Shrub Coverage
	Parameter				
	% absolute coverage	% absolute coverage	% absolute coverage	% survivorship	% relative coverage
Reference Site Summary	3.3%	0.0%	69.0%	n/a	94.5%
1	<30%	<20%	>15%	60%	>25%
3	<20%	<10%	>30%	40%	>50%
5	<10%	<5%	>50%	--	>80%

Table E3-4e. Proposed Success Criteria for Encelia californica Shrubland Alliance (32.050.00)

Year	Metrics Evaluated			
	Total Non-native Species	Moderate to High Priority Invasive Species	Total Vegetative Coverage	Shrub Coverage
	Parameter			
	% absolute coverage	% absolute coverage	% absolute coverage	% relative coverage
Reference Site Summary	4.9%	1.1%	52.7%	90.6%
1	<30%	<20%	>15%	>25%
3	<20%	<10%	>30%	>50%
5	<10%	<5%	>40%	>80%

Table E3-4f. Proposed Success Criteria for Atriplex canescens Shrubland Alliance (36.310.00)

Year	Metrics Evaluated			
	Total Non-native Species	Moderate to High Priority Invasive Species	Total Vegetative Coverage	Shrub Coverage
	Parameter			
	% absolute coverage	% absolute coverage	% absolute coverage	% relative coverage
Reference Site Summary	13.3%	2.1%	62.1%	78.5%
1	<30%	<20%	>15%	>20%
3	<20%	<10%	>30%	>40%
5	<10%	<5%	>45%	>60%

Table E3-4g. Proposed Success Criteria for Artemisia californica-Salvia mellifera Shrubland Alliance (32.120.00)

Year	Metrics Evaluated			
	Total Non-native Species	Moderate to High Priority Invasive Species	Total Vegetative Coverage	Shrub Coverage
	Parameter			
	% absolute coverage	% absolute coverage	% absolute coverage	% relative coverage
Reference Site Summary	1.6%	0.0%	67.1%	97.7%
1	<30%	<20%	>15%	>20%
3	<20%	<10%	>30%	>50%
5	<10%	<5%	>50%	>80%

Table E3-4h. Proposed Success Criteria for Artemisia californica Shrubland Alliance (32.010.00)

Year	Metrics Evaluated			
	Total Non-native Species	Moderate to High Priority Invasive Species	Total Vegetative Coverage	Shrub Coverage
	Parameter			
	% absolute coverage	% absolute coverage	% absolute coverage	% relative coverage
Reference Site Summary	7.8%	0.7%	75.6%	89.7%
1	<30%	<20%	>20%	>25%
3	<20%	<10%	>40%	>50%
5	<10%	<5%	>60%	>70%

Table E3-4i. Proposed Success Criteria for Adenostoma fasciculatum-Salvia mellifera Shrubland Alliance (37.102.00)

Year	Metrics Evaluated			
	Total Non-native Species	Moderate to High Priority Invasive Species	Total Vegetative Coverage	Shrub Coverage
	Parameter			
	% absolute coverage	% absolute coverage	% absolute coverage	% relative coverage
Reference Site Summary	6.6%	0.0%	57.7%	87.9%
1	<30%	<20%	>15%	>20%
3	<20%	<10%	>30%	>45%
5	<10%	<5%	>45%	>70%

Table E3-4j. Proposed Success Criteria for Populus fremontii Forest Alliance (61.130.14)

Year	Metrics Evaluated				
	Total Non-native Species	Moderate to High Priority Invasive Species	Total Vegetative Coverage	Survivorship	Tree Growth
	Parameter				
	% absolute coverage	% absolute coverage	% absolute coverage	% survivorship	feet/year
Reference Site Summary	8.6%	8.6%	69.5%	n/a	n/a
1	<30%	<20%	>15%	70%	5'
3	<20%	<10%	>30%	--	10'
5	<10%	<5%	>55%	--	15'

Table E3-4k. Proposed Success Criteria for Artemisia californica-Eriogonum fasciculatum Shrubland Alliance (32.110.05)

Year	Metrics Evaluated			
	Total Non-native Species	Moderate to High Priority Invasive Species	Total Vegetative Coverage	Shrub Coverage
	Parameter			
	% absolute coverage	% absolute coverage	% absolute coverage	% relative coverage
Reference Site Summary	11.5%	0.0%	71.6%	78.6%
1	<30%	<20%	>15%	>20%
3	<20%	<10%	>30%	>40%
5	<10%	<5%	>60%	>60%

Table E3-4l. Proposed Success Criteria for Eriogonum fasciculatum Shrubland Alliance (32.040.02)

Year	Metrics Evaluated			
	Total Non-native Species	Moderate to High Priority Invasive Species	Total Vegetative Coverage	Shrub Coverage
	Parameter			
	% absolute coverage	% absolute coverage	% absolute coverage	% relative coverage
Reference Site Summary	18.2%	8.7%	74.4%	75.5%
1	<30%	<20%	>15%	>20%
3	<20%	<10%	>30%	>40%
5	<10%	<5%	>60%	>60%

Table E3-4m. Proposed Success Criteria for Baccharis salicifolia Shrubland Alliance (63.510.01)

Year	Metrics Evaluated			
	Total Non-native Species	Moderate to High Priority Invasive Species	Total Vegetative Coverage	Shrub Coverage
	Parameter			
	% absolute coverage	% absolute coverage	% absolute coverage	% relative coverage
Reference Site Summary	12.6%	0.0%	63.7%	80.2%
1	<30%	<20%	>15%	>20%
3	<20%	<10%	>30%	>40%
5	<10%	<5%	>50%	>60%

Table E3-4n. Proposed Success Criteria for Avena (barbata, fatua) Semi-natural Stands (44.150.03)

Year	Metric
	Moderate to High Priority Invasive Species
	% absolute coverage
Reference Site Summary	Not Sampled
1	<20%
3	<10%
5	<5%

Appendix F
Cultural Resources

Summary of Technical Support Documents for Cultural Resources

Appendix F comprises three documents, a letter to the Native American Heritage Commission from the Fernandeño Tataviam Band of Mission Indians (Tataviam) dated April 12, 2014, the *Cultural Resources Inventory Report for the Chiquita Canyon Landfill Master Plan Revision*, dated December 2011, and the *Investigation of Archaeological Site CA-LAN-36 (Bowers Cave) for the Chiquita Canyon Landfill Master Plan Revision, Los Angeles County, California*, dated May 2013.

The letter from Tataviam explains the negotiations between Tataviam and CCL and their agreement to provide construction and cultural resource oversight and monitoring to CCL. The remaining two documents are technical analyses and are described briefly below.

***Cultural Resources Inventory Report for the Chiquita Canyon Landfill Master Plan Revision* (Inventory Report)**

The Inventory Report describes the results of a pedestrian survey of the 143-acre expansion area, conducted in January 2010. The Inventory Report details the natural setting of the site; methods, including literature search and pedestrian survey; results, including Native American consultation and pedestrian survey; and determination of eligibility and assessment of potential effects. The Inventory Report also includes project photos.

The Inventory Report is included as part of Appendix F.

Investigation of Archaeological Site CA-LAN-36 (Bowers Cave) for the Chiquita Canyon Landfill Master Plan Revision, Los Angeles County, California

Subsequent to the Inventory Report, additional investigation was undertaken specifically to assess impacts the Chiquita Canyon Landfill Master Plan Revision may have on identified cultural resources. Specifically, the *Investigation of Archaeological Site CA-LAN-36 (Bowers Cave) for the Chiquita Canyon Landfill Master Plan Revision, Los Angeles County, California* addresses the following topics:

- Previous work
- Resource access
- Additional Native American and historical society consultation
- Research design
- Evaluation methodology
- Results
- Determination of eligibility and assessment of potential effects
- California Register status
- Management considerations

The technical report of this additional investigation is a confidential document and is therefore not included in Appendix F. The technical report and its appendixes will be filed with the South Central Coastal Information Center of the California Historical Resources Information System located at California State University, Fullerton.

Appendix F1
Fernandeño Tataviam
Band of Mission Indians Letter

Larry J. Ortega Sr.
Tribal President

Tribal Historic & Cultural Preservation Committee
Steve Ortega
Chairman
Berta Pleitez

Fernandeño Tataviam Band of Mission Indians
Tribal Historic & Cultural Preservation

April 12, 2014

David Singleton
Program Analyst
Native American Heritage Commission
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691

Subject: Chiquita Landfill Project, Los Angeles County, CA

Dear Mr. Singleton,

The Fernandeño Tataviam Band of Mission Indians (Tataviam) thank you for the effort you have invested and would like to inform you that Tataviam have entered into an agreement with Chiquita Canyon, LLC (CCL) on the matter of the Chiquita Canyon Landfill Project (CCLP). Tataviam are providing CCL with construction monitoring and cultural resource oversight services for the CCLP.

We identified the potential for cultural resources within the CCLP proposed grading and excavation. Tataviam entered into negotiation with CCL for the proposed grading and excavation to be adjusted to exclude the Bower's Cave site. Tataviam were successful in having the grading and excavation plans moved in avoidance of Bower's cave, for the sake of the site's cultural relevance and preservation. We are doing our best to ensure that artifacts and features are avoided, but here is still a possibility that they will be encountered. Artifacts and features can go undetected and can also shift due to erosion and tectonic activity. Therefore, Tataviam are providing construction and cultural resource oversight and monitoring to CCL for the CCLP.

Furthermore, all artifacts that may be found will be returned to Tataviam or reinterred into the earth. CCL understands that Bower's Cave cultural, historical, and archaeological site is to remain untouched and avoided by both personnel and impacts of the project. If any other artifacts or features of cultural, historical, or archaeological nature are found, the tribe is to be notified immediately.

Sincerely,

Caitlin B. Gulley
Tribal Historic and Cultural Preservation
cgulley@tataviam-nsn.us

Appendix F2
Cultural Resources Inventory Report

Final

Cultural Resources Inventory Report

For the

Chiquita Canyon Landfill Master Plan Revision

Los Angeles County, California

Submitted to:

Waste Connections, Inc.

December 2011

Prepared by:

CH2MHILL

6 Hutton Centre Drive, Suite 700
Santa Ana, CA 92707

ES092311093436SCO/ 113320001

Cultural Resources Inventory Report for the Chiquita Canyon Landfill Master Plan Revision, Los Angeles County, California

FINAL

Report Prepared For:

Waste Connections, Inc.

For the Chiquita Canyon Landfill

Prepared by:
Natalie Lawson, M.A., RPA

and Clint Helton, M.A., RPA

CH2M HILL
6 Hutton Centre Drive, Suite 700
Santa Ana, CA 92707

December 2011

National Archaeological Database (NADB)
Type of Study: Literature Search and Survey
Sites Recorded/Updated: CA-LAN-36 (Bower's Cave)
USGS Quadrangle: Val Verde, CA; Newhall, CA
Acreage: 143 acres
Level of Investigation: CEQA
Key Words: Chiquita Canyon, CEQA, Positive Survey, Bower's Cave, Prehistoric Site, Landfill Expansion

Management Summary

CH2M HILL completed a cultural resources inventory of an approximately 140-acre area in support of the proposed expansion of the Chiquita Canyon Landfill (CCL) site within the Transverse Mountain Ranges in the northwestern portion of unincorporated Los Angeles County, California. The CCL Master Plan Revision (Proposed Project) is being proposed by Waste Connections, Inc. The Proposed Project increases the permitted landfill footprint by approximately 143 acres by extending it slightly south toward the existing landfill entrance and to the north. The landfill footprint increases from the currently permitted acreage, approximately 257 acres, to approximately 400 acres. The Proposed Project also increases the maximum elevation to 1,573 feet.

The cultural resources inventory was conducted in compliance with Section 5024.1 of the *California Public Resources Code* (PRC) to identify archaeological or historical resources in the area of potential effect. "Historical Resource" is a California Environmental Quality Act (CEQA) term referring to a resource eligible for or listed on the California Register of Historical Resources (CRHR) and generally older than 50 years of age by definition. Cultural resources include prehistoric and historic archaeological sites; districts and objects; standing historic structures, buildings, districts and objects; and locations of important historic events, or sites of traditional/ cultural importance to various groups. This assessment includes a review of previous studies, the results of a systematic pedestrian surface survey, and preliminary site evaluations of recorded resources. The archival research was completed in 2005 and updated in January 2010. Native American consultation was completed in 2005. Field work was completed in January 2010.

A literature search was requested by CH2M HILL of the South Central Coastal Information Center (SCCIC), located at California State University, Fullerton, California (CSUF). The majority of CCL was previously surveyed in 1993 for the Phase I Cultural Resource Evaluation of the Chiquita Canyon Sanitary Landfill Expansion project. Additional studies also included portions of the landfill.

A systematic pedestrian cultural resource survey of the 143-acre area was conducted on January 28, 2010, by CH2M HILL. One previously recorded archaeological site was documented within the survey area. This resource has been determined as an eligible or potentially eligible resource (Bowers Cave [CA-LAN-36]). Although the cave is located approximately 200 feet above the proposed grading footprint, the cave may be impacted by the Proposed Project. Additional work was proposed at the cave to determine its eligibility for the CRHR.

If human remains are encountered, State Health and Safety Code Section 7050.5 states that no further disturbance will occur until the County Coroner has made a determination of origin and disposition pursuant to PRC Section 5097.98. The County Coroner must be notified of the find immediately. If the remains are determined to be Native American, the County Coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a Most Likely Descendant (MLD). With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD will complete the inspection within 48 hours of notification by the NAHC. The MLD may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials.

A copy of this report will be filed with the SCCIC of the California Historical Resources Information System located at CSUF.

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1 Project Vicinity, Location, and Archaeological Survey Area

Attachments

A Project Photos

B Department of Parks and Recreation Forms (Confidential)

Acronyms and Abbreviations

CCL	Chiquita Canyon Landfill
CCR	*California Code of Regulations*
CEQA	California Environmental Quality Act
CHRIS	California Historical Resources Information System
CRHR	California Register of Historical Resources
CSUF	California State University, Fullerton
DPR	Department of Parks and Recreation
GPS	Global Positioning System
MLD	Most Likely Descendant
NADB	National Archaeological Database
NAHC	Native American Heritage Commission
NRHP	National Register of Historic Places
OHP	Office of Historic Preservation
PRC	*California Public Resources Code*
Proposed Project	Chiquita Canyon Landfill Master Plan Revision
SCCIC	South Central Coastal Information Center
SR-126	State Route 126
USGS	United States Geological Survey
WPA	Work Progress Administration

SECTION 1.0

Introduction

CH2M HILL was contracted by Waste Connections Inc. to complete a cultural resource assessment in support of California Environmental Quality Act (CEQA) documentation for the Chiquita Canyon Landfill (CCL) Master Plan Revision (Proposed Project), a proposed landfill expansion in Los Angeles County, California. The cultural resources assessment was conducted in compliance with Section 5024.1 of the *California Public Resources Code* (PRC) to identify archaeological or historic resources in the area of potential effect.

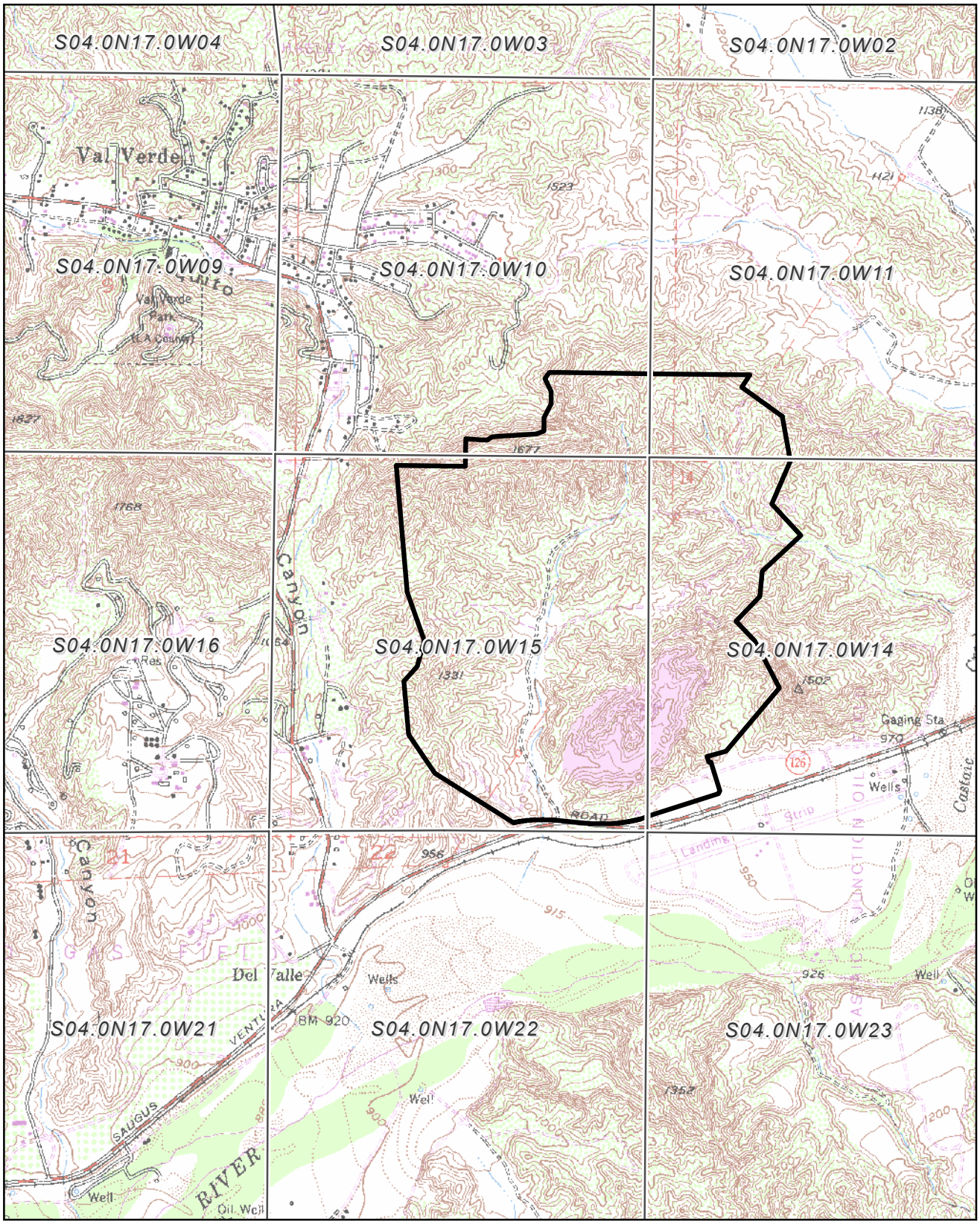
The Proposed Project would extend the waste footprint at CCL, better utilize the landfill's remaining and potential disposal capacity, and allow for the disposal of all non-hazardous wastes acceptable at a Class III solid waste disposal landfill. The Proposed Project would also include the continued diversion of such materials as green waste, asphalt/concrete, and metal through ongoing landfill waste diversion programs on which numerous jurisdictions depend to comply with state-mandated waste diversion goals.

CCL is located on private land south of the census-designated population of Val Verde in northwestern Los Angeles County, California, and within the planning area of the City of Santa Clarita, California. CCL is located approximately 3 miles west of the Interstate 5 and the State Route 126 (SR-126) intersection. Specifically, the landfill is located in Section 15, Township 4 North, Range 17 West, San Bernardino Baseline and Meridian on the *Val Verde, California* and *Newhall, California* 7.5-minute United States Geological Survey (USGS) quadrangle topographic maps. The site latitude and longitude are 34°25'N and 118°39'W, respectively (Figure 1). This cultural resources assessment focuses on areas of proposed disturbance, referred to here as the cultural resources survey area (survey area), which consists of approximately 140 acres.

This report contains two appendices. Attachment A contains representative project photos. Confidential Attachment B contains all Department of Parks and Recreation (DPR) forms.

The cultural resource assessment for the CCL survey area was completed pursuant to CEQA PRC Chapter 2.6, Section 21083.2 and 21084.1, and the *California Code of Regulations* (CCR) Title 14, Chapter 3, Article 5, Section 15064.5.

Project personnel included Natalie Lawson, M.A., RPA. Clint Helton, M.A., RPA, reviewed this final technical report.



LEGEND

Project Boundary

N

0 1,000 2,000

Feet

FIGURE 1
Project Vicinity, Location, and Archaeological Survey Area
Chiquita Canyon Landfill
Master Plan Revision

Basemap Source: 7.5 Minute USGS Quad (Val Verde)

\\galt\proj\chiquita\MapFiles\2013\Cultural_TechReport_130425.mxd

CH2MHILL

SECTION 2.0

Environmental Setting

2.1 Natural Setting

CCL lies near the eastern end of the late Cenozoic Ventura Basin, which is situated in the western Transverse Ranges Province. The eastern end of the basin in CCL vicinity is composed of stratigraphic or sedimentary rock units consisting of late Cenozoic marine and stratigraphically overlying nonmarine strata reflecting the final filling of the basin and its emergence above sea level. Surficial geologic mapping of CCL and vicinity prepared by Jennings and Strand (1969), Dibblee (1993), and Winterer and Durham (1962) indicates the landfill is underlain by three late Cenozoic rock units including the Pliocene marine upper Pico Formation and the Pliocene and Pleistocene nonmarine Saugus Formation, which forms the hills at the project site, and younger alluvium, which floors the gullies.

Precipitation varies little in the vicinity of CCL, averaging about 4 to 5 inches annually. Rain typically falls in winter during the wet season. Snow occurs at the higher elevations. Temperatures typically average between 60 and 80 degrees Fahrenheit throughout the year. In the summer, however, temperatures can reach into the 90s. At higher elevations, temperatures can drop below freezing.

2.1.1 Biology

The project area was historically located within the Coastal Scrub and Chaparral Communities as defined by Jaeger and Smith (1966).

The Coastal Scrub Biotic Community occurs on the slopes of cismontane areas between the sea and the higher elevation chaparral covered mountainous slopes. Plants in this community include California wormwood or sagebrush (*Artemisia californica*), white sage (*Salvia apiana*), black sage (*Salvia mellifera*), encelia (*Encelia farinosa*), yerba santa (*Eriodictyon crassifolium*), buckwheat (*Eriogonum fasciculatum*), prickly pears (*Opuntia* spp.), and Our Lord's candle (*Yucca whipplei*). Birds include Costa's hummingbird (*Calypte costae*), cactus wren (*Campylorhynchus brunneicapillum*), lazuli bunting (*Passerina amoena*), wrentit (*Chamaea fasciata*), brown towhee (*Pipilo fuscus*), sage sparrow (*Amphispiza belli*), and rufous-crowned sparrow (*Aimophila ruficeps*). Mammals in this community include the California ground squirrel (*Spermophilus beecheyi*), nimble kangaroo rat (*Dipodomys agilis*), desert woodrat (*Neotoma lepida*), California mouse (*Peromyscus californicus*), and short-eared pocket mouse (*Perognathus fallax*). Reptiles in this community include the western fence lizard (*Sceloporus occidentalis*), striped racer (*Masticophis lateralis*), and the western rattlesnake (*Crotalus viridis*).

The Chaparral Biotic Community is located along the foothills of the mountains between 1,000 to 4,000 feet in elevation. Plants in this community include chamise (*Adenostoma fasciculatum*), scrub oak (*Quercus dumosa*), foothill ash (*Fraxinus dipetala*), hard tack (*Cercocarpus betuloides*), wild lilac (*Ceanothus cordulatus*, *C. greggii*, *C. leucodermis*, *C. megacarpus*, *C. crassifolius*), holly-leaf cherry (*Prunus ilicifolia*), bear brush (*Garrya fremontii*), quinine bush (*Garrya flavescens*), manzanita (*Arctostaphylos pungens*, *A. pringlei*, *A. glauca*, *A. glandulosa*), toyon (*Heteromeles arbutifolia*), and sugarbush (*Rhus ovata*). Mammals include the mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), bobcat (*Lynx rufus*), brush rabbit (*Sylvilagus bachmanni*), dusky-footed woodrat (*Neotoma fuscipes*), nimble kangaroo rat (*Dipodomys agilis*), California pocket mouse (*Perognathus californicus*), and the California mouse (*Peromyscus californicus*). Birds of this community include the mountain quail (*Oreortyx pictus*), scrub jay (*Aphelocoma coerulescens*), wrentit (*Chamaea fasciata*), poor-will (*Phalaenoptilis nuttallii*), Bewick's wren (*Thryomanes bewickii*), California thrasher (*Toxostoma redivivum*), rufous-sided towhee (*Pipilo erythrophthalmus*), and orange-crowned warbler (*Vermivora celata*). The reptiles include the western fence lizard (*Sceloporus occidentalis*), southern alligator lizard (*Gerrhontus multicarinatus*), coast horned lizard (*Phrynosoma coronatum*), striped racer (*Masticophis lateralis*), and the western rattlesnake (*Crotalus viridis*).

2.1.2 Current Land Use

Much of the area surrounding CCL consists of undeveloped open space as a result of steep topography. Surrounding land uses include mostly open lands to the north; rural residential development is located to the west and northwest along Chiquito Canyon Road and in the Val Verde area, respectively. Relatively new suburban residential areas are located to the northeast. The closest of these residential dwellings is located approximately 500 feet from the northwest site boundary corner and 1,200 feet from the landfill footprint, and intervening topography prevents residential views of the operating landfill from these locations. Industrial/commercial uses are located to the northeast, east, and southeast. The United States Postal Service has a General Mail Facility adjacent to the eastern edge of the landfill property boundary. The property immediately west and south of the landfill is owned by the Newhall Land and Farming Company and is currently either vacant or is used for agricultural activities. Oil extraction fields and associated storage areas are located less than 1 mile from the landfill to the west and south. Valencia Travel Village, a short- and long-term recreational vehicle resort, is located approximately 1 mile east of the landfill on the south side of SR-126.

2.1.3 Cultural Context

Aboriginal settlement of North America probably began over 25,000 years ago when people crossed the Bering Straits land bridge (exposed continental shelf). Some of the oldest sites occur in southern California. In January 1936, Work Progress Administration (WPA) workers digging a storm drain along the Los Angeles River (north of Baldwin Hills) recovered human bones from an ancient stream bed (Moratto, 1984:52-53). In March 1936, imperial mammoth teeth were exposed at the same depth as the human remains (Moratto, 1984:53). The next oldest site in southern California where both human skeletal remains and artifacts occur is the La Brea Tar Pits (CA-LAN-159).

Evidence for Paleo-Indian occupation in California exists but remains scanty, particularly along the coast of southern California (Byrd and Raab, 2007). The following chronology is based on Byrd and Raab's updated synthesis of the southern bight cultures (2007).

2.1.3.1 Early Holocene (9,600 cal B.C. – 5,600 cal B.C.)

The first groups to inhabit California (for which there is significant evidence) are described as hunters and gatherers with specialized bifacial projectile points, well-made scrapers, knives and many other tools designed for subsistence related tasks (food processing). They adapted to a number of environments and developed a variety of secondary subsistence strategies that enabled them to live in a changing environment (Pleistocene to Holocene). As the (Wisconsin) Ice Age ended, previously stable water sources began to dry up in inland California, prompting migrations to the coast. California's islands were occupied as early as 9600 to 9000 cal B.C., as indicated by the oldest levels at Daisy Cave on San Miguel Island. Southern California dwellers exploited a wider range of plants and animals, and the archaeological record shows that a greater emphasis was placed on gathering wild grasses and seeds, rather than on hunting large mammals. Coastal groups, including those living on the islands off of California's coast, utilized marine resources such as shellfish, fish, sea lions, and dolphins. Shell midden sites of the early Holocene are characterized by cobble tools, basin metates, manos, discoids, and flexed burials (Byrd and Raab, 2007).

2.1.3.2 Middle Holocene (6,000 cal B.C. – cal A.D. 500)

At the start of the Middle Holocene, millingstone cultures appeared throughout central and southern California. The Millingstone Horizon represents an adaptive subsistence shift indicated by the first occurrence of millingstones (mano and metate), which were used to process hard seeds like Salvia sp. (sages) and buckwheat. Sites from this period are characterized by the majority of artifacts being manos and metates suggesting the importance of vegetal resources. Most of these sites are located in grassland and sagebrush communities where these hard seeds could support small populations on a yearly basis. Late fall and winter were difficult seasons when vegetal foods were scarce and their diet had to be supplemented with deer and small mammal hunting and shellfish collecting (Tartaglia, 1976).

Middle Holocene cultures are quite diverse. Large Middle Holocene sites have been well documented along the coast as well as inland. Archaeological evidence of extensive trade networks between southern California and the Southwest has been found. Rare artifact types, including the marine purple olive shell, indicate trade networks that extend from Catalina Island through the Mojave Desert and into Oregon (Byrd and Raab, 2007).

Temporary settlements for a few nuclear families (10 to 25 individuals) have been recorded. These sites were seasonal campsites for exploiting yucca and acorns from April throughout September. The seasonal pattern has been documented as regional variations in the Millingstone Horizon sites in southern California (King, 1967). These sites are characterized by plant processing tools (scraper planes, millingstones, and earth ovens--necessary to prepare yucca) and an absence of hunting implements. The inhabitants of the region intensively exploited their environment with reliance on no particular food resource. Characteristic features of this period include crude chopping tools, large projectile points, manos and metates, Olivella shell beads, quartz crystals and cog stones, few ornaments, earth roasting pits, extended posture burials, reburials (secondary interment), and rock cairns (Wallace, 1955:219-221). The first evidence of cemeteries are recorded during this period and based on the relative absence of non-utilitarian artifacts, an egalitarian social system was likely to have been in operation (Tartaglia, 1976).

2.1.3.3 Late Holocene (cal A.D. 500 – Historic Contact)

The Late Holocene is characterized by a larger number of more specialized and diversified sites. Population increased substantially and is reflected in a greater number of sites recorded during this time period. This period is characterized by large village sites, tightly flexed burials, bow and arrow, arrowshaft straighteners, ollas (jars) and comals (cooking flats), personal ornaments, pottery vessels, circular shell fishhooks, an extensive trade network, a wide variety of ritual objects, and large stone bowls (Wallace, 1955:223-226). Elaborate mortuary artifacts are recovered from sites of this period.

Villages occur in the same general locations as they did in earlier time periods, but they increased in size and decreased in their frequency; base camps were often associated with villages. There was also an increase in the number of specialized and/or diversified sites. Trade was extensive during this period and long distance trading is reflected in artifacts recovered from the American Southwest (pottery) in California sites, while, steatite objects and Pacific Coast seashells occur in American Southwest sites. During the Late Period, many more classes of artifacts are found in the archaeological record and reveal a higher order of workmanship. Larger and more extensive settlement systems are evident, likely a byproduct of a more intensive subsistence base exploiting all available food resources. The bow and arrow was introduced along with other aspects of an expanded culture (population growth, more complex social system, and trade network).

New studies indicate that culture change in southern California may have been rapid, rather than gradual. Overexploitation of resources may have caused shifts to new resources that occurred in greater amounts (Byrd and Raab, 2007). On the coast, intensified fishing and small sea mammal hunting replaced hunting of large sea mammals and shellfish collection. Inland groups focused on grasses rather than acorns and direct evidence for acorn use is minimal at Late Holocene sites.

In the upper Santa Clara River drainage, it was reported that no drastic interruptions in the cultural sequence can be detected in the artifactual assemblages. But a gradual shift from one subsistence/settlement pattern to another with associated changes in technology and socio-political organization seems to have taken place in the project vicinity. This is similar to the shift in the coastal Chumash area, but began about 500 years later than in the areas to the west (Tartaglia, 1976).

2.1.4 Ethnographic Overview

At the time of Spanish contact, the lower Santa Clara River Valley was occupied by the Hokan speaking Ventureño Chumash while the upper Santa Clara River drainage was inhabited by the Uto-Aztecan speaking Tataviam (Kroeber 1925:621). Piru Creek was the territorial boundary between these two linguistic groups. The linguistic affinities and boundaries of this region have not been resolved, but many of the native inhabitants were bilingual and intermarriage with neighboring groups was fairly common (Forbes, 1966:138).

2.1.4.1 Tataviam

Tataviam is identified as a Takic branch of Uto-Aztecan stock, closely related to the Serrano (Johnson and Earle, 1990; Solis, 2008). The "People Who Face the Sun" likely migrated into the Santa Clara River area approximately 1,500 years ago and were possibly an offshoot of the Serrano, although there is some debate on this point (Solis, 2008). The extent of Tataviam territory is under debate. Their core area was identified in the early 1900s as stretching from Piru to Soledad Canyon, over much of the upper Santa Clara Valley (Bright, 1975). Johnson and Earle (1990) tentatively identify Tataviam speakers as far north as modern day Quail Lake, near the intersection of Interstate 5 and Highway 138, on the western end of the Antelope Valley. Generally, Tataviam territory included areas from the Santa Clara River to Piru Creek, from the Liebre Mountains to the Santa Susanna Mountains and into the westernmost parts of the Antelope Valley (Higgins, 1996; Johnson and Earle, 1990).

The Tataviam were hunter-gatherers who alternately occupied permanent villages in winter and temporary campsites used for resource gathering of plant foods such as acorns, seeds, berries, yucca, piñon nuts, and hunting deer and rabbit during the spring, summer, and fall months (Solis, 2008). Permanent villages consisted of familial dwellings, a *ki'j*, which was dome shaped and consisted of small saplings or branches affixed to a willow frame and covered with bulrush or cattails. Villages also had a sweat lodge, a *Sehé,* which consisted of a dug out area with a frame similar to the *ki'j*. Sweat lodges were also used as meeting places and dances (Solis, 2008). Johnson and Earle (1990) identified and confirmed several Tataviam villages through genealogical research and review of Harrington and Kroeber's early interviews with local Native Americans including *Cuecchao, Piru, Tochonanga, Siutasegena*, and *Tochaborunga*.

Of the three groups who occupied the project area in pre-contact times, the Tataviam are the least known of all Native California groups (Johnson, 2006; Solis, 2008). What written information survives, references the Tataviam in generalizations and comparisons to their neighbors. Population estimates are at less than 3,000 at time of contact, but there is no feasible manner to accurately verify that information. When it comes to population estimates at the time of contact by Europeans, these numbers are approximations and no reliable data exist (Johnson, 2006). Little was recorded about the Tataviam culture during Spanish exploration and later missionization in the 1770s; the Tataviam appeared to have intermarried with other groups and moved to new locations when Europeans settled near the Santa Clara River. Mission records and other historic documents often failed to distinguish the Tataviam as an individual group when multiple tribes and languages where encountered; often ethnic affiliation was not distinguished or commented upon. Many of the Tataviam were relocated to the San Fernando Mission during historic times and were assimilated with other groups into an indistinct neophyte culture. Despite missionization and European introduced diseases, the Tataviam survived into the 20th century. The remnants of the native Tataviam language, however, were documented by John Peabody Harrington in the early 1900s, as the last native speaker died in 1916 (Native-Languages, 2009; Survey of California Other Native Languages, 2010).

2.1.4.2 Chumash

The Chumash language belongs to the Hokan linguistic stock and they occupied the territory between Point Conception and Malibu, including three of the Channel Islands. This span of territory afforded the Chumash large trade networks that webbed into central California (King, 1971). The Chumash economic activities produced great wealth and possibly allowed for population increase; the largest villages of the pre-contact Chumash reportedly contained a thousand members (Moratto, 1984:119).

The Chumash had a strict socio-economic hierarchy made up of elites and non-elites; only the chief could have multiple wives (Fages, 1937; McCawley, 1996). It is theorized that there was an inter-dependent relationship between those who specialized in craft production and the elites, who managed the distribution of goods (Arnold, 2004). Chester King (1971) reported that the Chumash economy was a market economy in which shell beads were the exchange medium. Reciprocal ceremonial exchange was also employed, during feasts and celebrations. Open intervillage exchange was also likely (Gamble, 2008). In 1769, Pedro Fages accompanied the Gaspar de Portola expedition which crossed through California. Fages made some of the first written observations of the Chumash, and although colored by the prejudices of the Spanish at the time, did note the

artistry and richness of Chumash wares. Fages (1937) noted the Chumash manufactured wares of great artistry, including stone mortars with inlaid mother-of-pearl, baskets of white, black, and red, and cloaks with shells and small stones. Headgear was often embroidered. Women's skirts were decorated with small shells and stones, as well. Shell bracelets, necklaces, and hair ornaments were also noted by the Spaniards (Fages, 1937).

Coastal Chumash marine resource procurement was heavily dependent on the seaworthiness of fishing vessels; the Chumash were master plank canoe, or *tomol* builders (Gamble, 2002). Plank canoe building is credited with establishing the sociopolitical power the Chumash held amongst their neighbors, with the exception of the Gabrieleño, a neighboring, largely maritime, culture who seems to have been the sociopolitical equals to the Chumash (Gamble, 2002; McCawley, 1996). The Chumash also constructed a tule reed balsa, a lighter weight watercraft which was used along the coastline or in calm waters. Explorers and settlers in the area noted the Chumash also used a dugout canoe in the late 1800s, but there is no clear evidence that they employed the dugout before the arrival of the Europeans (Gamble, 2008). Along with marine resource procurement, control of waterways provided the Chumash with a command of transportation and goods distribution to the interior, resulting in the Chumash controlling various trade networks (Gamble, 2002). Plank canoe ownership appears to have been limited to the wealthy Chumash elite. Building a plank canoe was an expensive endeavor, both in time and in materials. The owners of the canoes, in part, controlled trade between the mainland and the islands, likely acting as middlemen between goods manufacturers and tribal chiefs, or *wots* (Gamble, 2008).

Like most hunter-gatherers, the Chumash moved seasonally, primarily in the summer, to optimize their resources. It is reported that they kept permanent winter villages, confining the seasonal camps to temporary occupancy during resource procurement, harvesting, and hunting (Arnold, 2004; King, 1971). These villages consisted of family houses, shaped like half globes with doors on the east and west sides and an opening in the ceiling at the middle of the structure. Four or five related families resided in each house (Fages, 1937). Villages were well populated. Fages estimated at least one village contained about 600 men considered able to bear arms. The village chief appeared to function primarily as a military commander (Fages, 1937) to the Spanish.

At the time of Missionization, baptismal records indicate an average population of 90 members per village and reports by Fages and Anza estimate a total of 3,000 Chumash at the time of contact. However, a Chumash village survey by Kroeber documented 41 villages on the coast and 25 villages in the interior; the survey results yielded population estimates at more than 10,000 members (Cooke, 1976).

2.1.5 Historic Era (1769 AD – present)

Although Alta California, as it was then known, was discovered by Juan Rodrigues Cabrillo in 1542, it was not until 1769 that Spain first began to explore and colonize Alta California. Successful colonization and religious conversion of native peoples in Lower California led the Jesuits to attempt the same in Alta California in a joint effort between the Church and the Spanish Government. The Spanish Government provided soldiers to protect the missionaries from rebellious Indians and to subjugate them while the Church converted the natives to Christianity. The Indians were the labor force of the mission system (Guinn, 1909:82).

The Alta California expedition was prepared by Jose de Galvez, Visitador General of New Spain and Junipero Serra, head of the Franciscans in Lower California. On July 1, 1769, the expedition arrived at San Diego, the northern frontier settlement of Lower California. The Spanish Government organized an expedition to explore the country and establish a second mission at Monterey; led by Gaspar de Portola, Governor of the Californias and Comandante of the Military.

The historic period in the immediate project vicinity began with Portola passing through the Santa Clara River Valley on his way to Monterey. He camped northwest of the San Fernando Mission before entering the Newhall-Saugus area via the Fremont Pass following Indian trails. Portola's expedition probably camped near the rancheria of *Chaguayavit*, near the Newhall ranch. It is assumed that Portola witnessed the Mourning Ceremony based on his description of the village population. The next contact occurred in 1776 when Father Garces followed the same overall route. Garces asked the chief of the *Cuabajay* (apparently the *Castaic*

Chumash) with whom he was staying, “to cease waging war against the people living on the upper Santa Clara River” (King and Blackburn, 1978:536).

Missions San Gabriel (1771), San Buenaventura (1782), and San Fernando (1797) recruited neophytes from villages in the Saugus-Newhall area who were incorporated into the developing mission system. In 1810, nearly all the Tatavium were baptized at the San Fernando Mission and by 1820, nearly all the Indian villages in the Santa Clara Valley had been abandoned or severely reduced in size (Tartaglia, 1976). The Indians were acculturated, their lifestyle destroyed, and their numbers decimated by disease epidemics. Many died within a short time of being brought into the mission system.

After the founding of San Fernando Mission, the headwaters of the Santa Clara River came under its control as part of Rancho San Francisco. On the exact spot that Friar Crespi recommended for a mission site, an Assistencia was built in 1804, which served as the headquarters for all the mission activities on the rancho. The Mission San Fernando padres established the Assistencia near the former village of *Chaguaya-vit;* Indians were baptized there and were taught to tend the herds and carry out various manufacturing activities.

While still under Mexican rule, interest in the Santa Clara River Valley as a passage route was fostered by a number of American explorers and fur trappers such as Jededdiah Strong Smith in 1826 and John C. Fremont in the 1840’s. Meanwhile, the Spanish Government began to institute the practice of Land Grants in the form of leases and ranchos to retired soldiers for services rendered. This practice continued throughout the Mexican Period (1822 to 1846) when the ranchos were sold for money to help defray the costs of the government. During the Mission Period (1789 to 1834), the Indians were under the jurisdiction and protection of the Church, but as the Church declined in power, the mission system collapsed and many of the neophytes (missionized Indians) became laborers on the ranchos.

Since the early Mexican Republic, the rancho became an important part of southern California history because the social and economic systems that revolved around the ranchos served to stratify the Spanish, Mexican, and Indian cultures. The Spanish owners or “Gente de Razon” were the elite of the area controlling vast amounts of land which enabled them to exert great political and economic influence. After 12 years of armed conflict, Mexico finally won its independence from Spain in 1822. Conflicts immediately arose between the already existing mission system and the new government. In 1833 the missions were secularized, and in 1834 Don Antonio del Valle had been appointed to oversee the desecularization of the Mission San Fernando. He used part of the Rancho San Francisco for his personal use as early as 1824 and on January 22, 1839, he petitioned Governor Alvarado for the Rancho. He relocated at the Mission Assistencia and used the Rancho for livestock grazing.

In March of 1842, gold was first discovered in southern California in Placerita Canyon by Don Francisco Lopez from this Mission Assistencia (Tartaglia, 1976). Several hundred miners immediately poured into the canyon and started placer mining, which continued until about 1935. In the 1860s and 1870s, other canyons were placer mined for gold (San Francisquito, Dry, Castaic, and Haskell Canyons). After the war with Mexico and the northern California gold strike at Sutter’s Mill in 1848, settlements began to increase. Many Mother Lode bound gold seekers passed through the Santa Clara River Valley to purchase provisions and food, causing an economic shift to beef, grain, and crop production for the valley ranches.

Both the Gold Rush and California’s statehood in 1850 provided the first great impetus towards the development of roads, the growth of freighting and express companies, and the emergence of a stagecoach system. Miners, unwilling to leave profitable claims, were willing to pay for someone to carry their mail, bring supplies, and transport gold. Traders hauling freight in large wagons, brought in by the emigrants to the ever-changing mining locations, were the first to open many of the roads (Beck and Haase, 1974). In 1853, the Pacific Railroad Survey, led by Lieutenant Williamson, passed through San Francisquito Canyon, which he reported as the only feasible route through the La Liebre and Techachapi Mountains. Gold was discovered in 1854 on the Kern River and on August 10, 1854, Fort Tejon was established on the Grapevine Pass. For the first time on December 5, 1854, a stage line from Fort Tejon followed an old Mexican pack trail through the Grapevine and San Francisquito Canyon.

With California's Statehood in 1850, regular stagecoach routes followed with emphasis still oriented through the Grapevine to the north. Stage lines were dependent on livestock and wagons; therefore, stations were located at rather short intervals. Lyons Stations was probably the first Anglo settlement in the project area and was opened in the early 1850s by Henry Wiley and Jose Ygnacio del Valle. The Butterfield Overland mail stage, a transcontinental link from St. Louis to San Francisco, began service in 1854. The initial local leg of the route extended from San Bernardino to San Francisco, via Cajon and Tejon Passes, through the San Andreas rift zone valleys, bypassing the Santa Clarita Valley. Later, one route ran through the Newhall Pass area and Bouquet Canyon to Lake Elizabeth. Another route passed along the traditional Santa Clara River corridor from Ventura to San Bernardino. The Butterfield followed the Williamson-Banning route through San Francisquito Canyon from October 21, 1858, until the outbreak of the Civil War in 1861. United States Secretary of War, Jefferson Davis, imported camels to supply isolated army posts from New Mexico to Fort Tejon, California. The camel caravans passed through San Francisquito Canyon to Los Angeles until June of 1861.

In 1866, oil seepage in Wiley Canyon was being "skimmed" and the "oil salvaged" was shipped to the Metropolitan Gas Works in San Francisco (Perkins, 1957:21). In 1876, the Star Oil Company's Well No. 4 became California's first successful commercial oil well. A refinery was established just outside of Newhall and oil wells started producing. In the 1880s, San Francisquito Canyon was mined for gold. There was a gold camp (Hollandsville) beyond the present day Powerhouse No. 1 of the Los Angeles Aqueduct (built from 1907 to 1913). Oil wells continued to be drilled into the 1890s; oil wells and placer claims sprung up all over the area (part of the Soledad Mining District).

As noted elsewhere, on May 2, 1884, McCoy Pyle traveled over an old Indian trail toward the San Martins and found a cave. Upon entering it, he observed many Indian baskets, containing feather robes and headdresses woven with flicker and condor feathers. There were also four stone ax heads, quartz crystals, and an assortment of ceremonial obsidian knife blades (Van Valkenburgh, 1952:5-7). Coincidentally, Stephen Bowers was in the region seeking Indian relics. When he heard of the Pyle discovery, he immediately went to Mud Springs Canyon were he purchased the Pyle collection for $1,500. Bowers sold part of the collection (including the ceremonial wands) to Professor F.W. Putnum of Harvard's Peabody Museum.

By 1890, the town of Newhall was established as a community and the early 1900s marked the beginning of urban growth in the general area. However in 1883, the Newhall Land and Farming Company was incorporated by the Newhall family to supervise the various activities of its land holdings. This included Rancho San Francisco, whose main functions centered around livestock raising and mineral exploitation. By 1916, the last speaker of the Tataviam language died (King and Blackburn, 1978:536).

SECTION 3.0

Methods

3.1 Literature Search

A literature search of the Proposed Project area was conducted by staff of the South Central Coastal Information Center (SCCIC) of the California Historical Resources Information System (CHRIS) at California State University, Fullerton (CSUF) in 2005. An updated literature search was requested by CH2M HILL on January 19, 2010. A 1-mile buffer zone around the project area was included in this search. The CHRIS literature and records review included a review of all recorded archaeological sites as well as all known cultural resource survey and excavation reports. The National Register of Historic Places (NHRP), the California Register, California Historical Landmarks, and California Points of Historical Interest were all examined. State and local listings were consulted for the presence of historic buildings, structures, landmarks, points of historical interest, and other cultural resources.

The majority of the project area was previously surveyed in 1993 by Theodore Cooley, George Toren, and Loren Santoro for the Phase 1 Cultural Resource Evaluation of the Chiquita Canyon Sanitary Landfill Expansion project (Cooley et al., 1993). This report was thoroughly reviewed as a part of the literature search.

3.2 Pedestrian Survey

Survey methodology for prehistoric and historic archaeological resources was performed using pedestrian transects spaced at 10- to 15-meter intervals throughout the entire surveyed area. The topography of the project area is varied and ranges from relatively flat lowlands to narrow ridgelines bounded by brush-covered slopes. The only areas that were not surveyed were slopes greater than 25 percent. See Attachment A for photographs of the project area. Many of the steeper slopes were surveyed during the process of accessing the higher ridgelines. Although slopes greater than 25 percent were only opportunistically surveyed, all were examined for the presence of bedrock outcrops, historic features, or anomalous characteristics. If any such features were noted, these were examined during the opportunistic survey. Subsurface exposures, including rodent burrows and cut banks, were examined. The survey crew navigated via a Trimble Geo XT global positioning system (GPS). Additionally, transects were recorded using GPS during the survey to record that the survey was accomplished using the 10- to 15-meter intervals.

CH2M HILL identified the single previously recorded resource located within the survey area and updated the site record for this site on appropriate DPR forms. This site was also mapped using a Trimble Geo XT GPS and photographed. Information on the appearance and physical characteristics of the resources as well as the location of the resources was gathered. The survey was noncollection and no artifacts were collected by CH2M HILL.

SECTION 4.0

Results

4.1 Literature Search

The literature search requested by CH2M HILL revealed that several previous studies had been conducted within Proposed Project area. All previous surveys were thoroughly reviewed.

The majority of the project area was previously surveyed in 1993 by Theodore Cooley, George Toren, and Loren Santoro for the Phase 1 Cultural Resource Evaluation of the Chiquita Canyon Sanitary Landfill Expansion project (Cooley et al., 1993). Twenty-four studies (LA285, LA294, LA990, LA1318, LA1660, LA1753, LA1775, LA1785, LA1832, LA2255, LA2362, LA2437, LA2950, LA2980, LA3309, LA3360, LA3397, LA3499, LA4546, LA4547, LA6250, LA6251, LA6585, and LA6595) have been conducted within the project area or immediately adjacent to the project area. There are 18 additional investigations located on the Val Verde and Newhall 7.5-minute USGS Quadrangles that are potentially within the project area vicinity, but were not mapped by CHRIS due to insufficient locational information (Letter to CH2M HILL from Thomas David Shackford, Assistant Coordinator, SCCIC, January 21, 2010).

One previously recorded site, Bower's Cave, LAN-36, is noted within the overall project area, but outside of the grading footprint. Isolated find CA-LAN-IF-27 (Cooley and Toren, 1989), a United States Forest Reserve boundary monument dated 1905 is no longer present within the project area and was destroyed by previous landfill grading (Cooley et al., 1993:13-14). Three prehistoric archaeological sites are located outside the project area on the south side of SR-126 (Henry Mayo Drive) or west of Chiquita Canyon Road. A single, dark grey Franciscan chert projectile point was found outside the project area, to the north of Bowers Cave.

The California Points of Historical Interest (2004) of the Office of Historic Preservation (OHP), DPR lists no properties within the project area. The California Historical Landmarks (2004) of the OHP DPR also lists no properties within the project area. The California Register of Historical Places (2004) and the NRHP (2004) list no properties within the project area. The City of Los Angeles Historic Resources Inventory (2004) lists no properties that have been evaluated for historical significance within the Proposed Project area.

4.1.1 CA-LAN-36, Bowers Cave

During the 1880s, Everett Pyle and his brother, McCoy, lived with their mother, Mandy Pyle, in Mud Springs Canyon, just 3 miles northwest of present Castaic Junction. The family raised bees and livestock. The boys hunted in the nearby canyons and ridges.

On May 2, 1884, McCoy traveled westward over an old Indian trail toward the San Martins to look for deer. Fifty feet below the summit, McCoy reached the lip of a cave. Upon entering it, he observed many Indian baskets. Inside some of the baskets, he saw feather robes and headdresses woven with flicker and condor features. There were also four stone axe heads, quartz crystals, and an assortment of ceremonial obsidian knife blades. Four ceremonial "wands or sceptors" were also recovered, probably representing "sun sticks" used in solstice ceremonies.

McCoy returned to the ranch and told his brother Everett what he had found. The boys returned to the cave and removed the "treasures" to be stored in the milk house at the ranch (Van Valkenburgh, 1952:5-7).

At the same time, Stephen Bowers was in the region obtaining Indian relics. When he heard of the Pyle discovery, he immediately went to Mud Springs Canyon. There, he purchased the Pyle collection for $1,500. Bowers sold part of the collection, including the ceremonial wands, to Professor F.W. Putnam of the Peabody Museum at Harvard University. What happened to the remaining artifacts is unknown; perhaps, there were sold to other museums. In 1884, McCoy carved an inscription in the sandstone of the cave, "MAC – 1884" (Van Valkenburgh 1952:7-8).

In the early 1950s, Richard Van Valkenburgh revisited the cave now referred to as “Bowers Cave” (CA-LAN-36). Using nonscientific excavation methods, Van Valkenburgh removed additional materials from the cave. Small blue and rose colored glass beads were found that date to approximately A.D. 1800. The absence of hearths suggests that the cave was not a permanent, but a temporary site. Three American Southwest ceramic fragments (Verde black-on-grey) date from the thirteenth century were also found (Van Valkenburgh 1952:8).

No subsequent recorded excavations from this cave have been reported; however, local looting of this site probably occurred. The artifacts purchased by Putnam and stored at the Peabody Museum were analyzed and published in The Archaeology of Bowers Cave, Los Angeles County, California by Albert Elsasser and Robert Heizer (Elsasser and Heizer, 1963). On February 26, 1981, Louis Tartaglia and R. Wlodarski (Tartaglia and Wlodarski, 1981) revisited Bowers Cave and prepared an updated archaeological site survey record form.

Based on the results of a 1993 field survey conducted by Theodore Cooley, George Toren, and Loren Santoro for the Phase 1 Cultural Resource Evaluation of the Chiquita Canyon Sanitary Landfill Expansion project (Cooley et al., 1993), prehistoric site CA-LAN-36 was determined to be immediately adjacent to the western boundary line of the northernmost portion of the Proposed Project area. Cooley, Toren, and Santoro made the following recommendation (Cooley et al., 1993:17):

> No newly discovered prehistoric cultural resources were found during the current field survey, but one previously recorded prehistoric site, CA-LAN-36, situated on the slope of a very steep ridge, immediately adjacent, or contiguous to, the project property. A more accurate determination of the location of the site, relative to the project property boundary, would be required if project grading near this slope were to occur in the future. Portions of the northern and western property boundaries adjacent to the archaeological site location should be staked by surveyors, and then the boundary lines should be evaluated, by a qualified archaeological, in the field, in relation to the site location.
>
> If the archaeologist determines that the project boundary is close enough that, under CEQA, further mitigation measures are required, particularly if grading is to occur within a 300 linear foot radius of the site, a qualified archaeologist should be retained to flag-off the site area to ensure avoidance of the site. Grading plans should clearly depict the sensitive area and state that grading must not occur beyond a buffer established by the archaeologist.

4.1.2 Isolated Find CA-LAN-IF-27

Isolated find CA-LAN-IF-27 (Cooley and Toren, 1989), a United States Forest Reserve boundary monument dated 1905 is no longer present within the project area and was destroyed by previous landfill grading (Cooley et al., 1993).

4.1.3 Sites CA-LAN-2234, -2235, and -2236

Three prehistoric archaeological sites are located outside the project area on the south side of SR-126 (Henry Mayo Drive) or west of Chiquita Canyon Road. Site CA-LAN-2234 is a small lithic scatter or campsite, perhaps slightly buried by colluvial processes (Whitley and Simon, 1994). Two manos and quartzite and chert primary flakes are present. Site CA-LAN-2235 is a small habitation/village site, probably Late Prehistoric in age (Whitley and Simon, 1994). Chert, quartzite and fused shale debitage, core/cobble complex tools, and a possible schist metate fragment are present. Midden soil, burnt animal bone, and fire-cracked rock are also present. Site CA-LAN-2336 is a small, low density lithic scatter; eight quartzite flakes are present (Whitley and Simon, 1994).

4.1.4 Isolated Find 19-100511

A single, dark grey Franciscan chert projectile point was found outside the project area, to the north of Bowers Cave. It resembles a Malaga Cover Leaf Cluster type projectile point believed to date to the Canaliño period (A.D. 300 to 1300) (McKenna, 2004).

4.2 Native American Consultation

The Native American Heritage Commission (NAHC) conducted a record search of the sacred lands file; their record search on September 16, 2005, failed to indicate the presence of Native American cultural resources in the immediate project area. As recommended by the NAHC, letters were sent to the following individuals/ groups: on September 19, 2005: Charles Cooke (*Chumash, Fernandeño, Tataviam, Kitanemuk*), Beverly Salazar Folkes (*Chumash, Tataviam, Fernandeño*), Randy Guzman-Folkes (*Chumash, Fernandeño, Tataviam, Shoshone Paiute, Yaqui*), John Valenzuela (San Fernando Band of Mission Indians – *Fernandeño, Tataviam, Serrano, Vanyume, Kitanemuk*), and Ron Andrade (LA City/County Native American Indian Commission) soliciting information on potential Native American cultural resources. No responses were received. No additional Native American consultation was conducted in 2010.

The NAHC record search of the Sacred Lands file did not indicate the presence of Native American cultural resources in the CCL survey area. The record search conducted at the SCCIC also did not indicate the presence of Native American traditional cultural properties.

4.3 Pedestrian Survey

CH2M HILL conducted an archaeological survey of the 143-acre expansion in January 2010.

The majority of the Proposed Project area was surveyed at 10- to 15-meter intervals. The only areas not surveyed were slopes which were greater than 25 percent. All slopes were searched, however, for rock outcrops or possible caves. All observed rock outcrops were examined. Aside from CA-LAN-36, no other caves were observed in the Proposed Project area. Visibility throughout the majority of the Proposed Project area was excellent at approximately 70 percent. Visibility of a small section of the southern portion of the Proposed Project area was considered fair at approximately 50 percent as much of this area consisted of thick grasses. No new cultural resources were identified during this survey.

The Proposed Project area includes CA-LAN-36, which was revisited by CH2M HILL during the archaeological survey. Locational data of Bowers Cave was recorded with a submeter accurate Trimble Geo XT GPS. No artifacts were found either inside the cave or immediately outside of the cave. Much of the sandstone ceiling has collapsed onto the floor of the cave and large chunks of sandstone obscures much of the floor. Modern plastic and a large wood rat nest were observed on the western end of the cave. Modern graffiti, including several stick figures, was observed on the walls of the cave but the inscription “MAC-1884” described by Valkenburgh above was not relocated. The majority of the signatures are new; one inscription reads “1911.”

SECTION 5.0

Determination of Eligibility and Assessment of Potential Effects

5.1 Standards of Significance

CEQA guidelines define three ways that a property may qualify as a historical resource for the purposes of CEQA review:

- If the resource is listed in or determined eligible for listing in the California Register of Historical Resources (CRHR),
- If the resource is included in a local register of historical resources, as defined in Section 5020.1(k) of the PRC, or identified as significant in an historical resource survey meeting the requirements of PRC Section 5024.1(g) unless the preponderance of evidence demonstrates that it is not historically or culturally significant, or
- The lead agency determines the resource to be significant as supported by substantial evidence in light of the whole record (CCR Title 14, Division 6, Chapter 3, Section 15064.5[a]).

Each of these ways of qualifying a property as an historical resource for the purpose of CEQA is related to the eligibility criteria for inclusion in the CRHR (PRC 5020.1(k), 5024.1, 5024.1(g)). A historical resource may be eligible for inclusion in the CRHR if it:

- Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
- Is associated with the lives of persons important in our past;
- Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
- Has yielded, or may be likely to yield, information important in prehistory or history.

Properties that are listed in or eligible for listing in the NRHP are considered eligible for listing in the CRHR, and thus are significant historical resources for the purpose of CEQA (PRC Section 5024.1(d)(1)).

5.1.1 Integrity

Integrity is the authenticity of an historical resource's physical identity evidence by the survival of characteristics that existed during the resource's period of significance. Historical resources eligible for listing in the California Register must meet one of the criteria of significance described above and retain enough of their historic character or appearance to be recognizable as historical resources and to convey the reasons for their significance. Historical resources that have been rehabilitated or restored may be evaluated for listing.

Integrity is evaluated with regard to the retention of location, design, setting, materials, workmanship, feeling, and association. It must also be judged with reference to the particular criteria under which a resource is proposed for eligibility. Alterations over time to a resource or historic changes in its use may themselves have historical, cultural, or architectural significance.

It is possible that historical resources may not retain sufficient integrity to meet the criteria for listing in the National Register, but they may still be eligible for listing in the California Register. A resource that has lost its historical character or appearance may still have sufficient integrity for the California Register if it maintains the potential to yield significant scientific or historical information or specific data.

An adverse effect on a cultural resource is defined as:

- Substantial adverse change in the significance of a historical resource by physical demolition, destruction, relocation, or alteration of the resource of its immediate surroundings
- Demolishes or materially alters those physical characteristics of a historical resource that convey its significance and that justify its inclusion in, or eligibility for inclusion in, the CRHR, or inclusion in a local register

Section 7052 of the Health and Safety Code establishes a felony penalty for mutilating, disinterring, or otherwise disturbing human remains, except by relatives. Penal Code Section 622.5 provides misdemeanor penalties for injuring or destroying objects of historical or archaeological interest location on public or private lands, but specifically excludes the landowner. PRC Section 5097.5 defines as a misdemeanor the unauthorized disturbance or removal of archaeological, historical, or paleontological resources located on public lands.

5.1.2 California Register of Historical Resources

As provided in California PRC Section 5020.4, the California Legislature established the CRHR in 1992. The CRHR is used as a guide by state and local agencies, private groups, and citizens to identify the state historical resources and to include which properties are to be protected, to the extent prudent and feasible, from substantial adverse change. The CRHR, as instituted by the California PRC, automatically includes all California properties already listed in the NRHP. It also includes those formally determined to be eligible for listing in the NRHP (Categories 1 and 2 in the State Inventory of Historical Resources), as well as specific listings of the State Historical Landmarks and in the State Inventory of Historical Resources), as well as specific listings of State Historical Landmarks and State Points of Historical Interest. The CRHR may also include various other types of historical resources that meet the criteria for eligibility, including the following:

- Individual historical resources
- Resources that contribute to a historic district
- Resources identified as significant in historic resource surveys
- Resources with a significance rating of Category 3 through Category 5 in the State Inventory (Categories 3 and 4 refer to potential eligibility for the NRHP; Category 5 indicates a property with local significance)

The CRHR follows the lead of the NRHP in utilizing the 50-year threshold. A resource is usually considered for its historical significance after it reaches the age of 50 years. This threshold is not absolute, but was selected as a reasonable span of time after which a professional evaluation of historical value/importance can be made.

5.2 California Register/National Register Status

The archaeological survey conducted in 2010 confirms the presence of CA-LAN-36 within the Proposed Project area. Although most of the artifacts were removed from this cave by looting and early investigations, it is possible that there could be some intact subsurface deposition. Intact subsurface deposits could have the potential for additional information important to the prehistory of the area and thus, this site could be eligible for inclusion on the CRHR under Criterion 4.

A Phase II evaluation of the cave is proposed to determine whether the cave is eligible for listing on the CRHR.

5.3 Potential for Buried Archaeological Resources

In portions of the CCL survey area the potential exists for archaeological resources to have been buried through alluviation, colluviation, or Aeolian processes, and would not be found during a surface reconnaissance. The potential that project implementation could uncover and destroy buried resources must be assessed. Generally, the potential of an area to contain buried resources can be assessed by reference to topography, soil types, and proximity to water. This potential can be ranked by relative sensitivity (i.e., none, low, medium, high

potential for buried resources), and rankings can be used to avoid sites, or plan appropriate mitigation in the event that sites are discovered. Further, the geomorphological environment for the project area is one of alluvial deposition. Important archaeological deposits with no surface expression may be buried beneath deep alluvial sediments. Mitigation to address the possibility of impact to buried resources is discussed in Chapter 9.0 of the CCL Master Plan Revision Draft Environmental Impact Report.

5.4 Management Considerations

The Proposed Project could directly affect an historical resource as defined by CEQA. The areas delineated for vertical and horizontal landfill expansion grading footprint have already been archaeologically surveyed with negative results, no historical resources are present. In addition, the vertical and lateral expansion areas have already been graded and used for landfilling as a result of earlier permitting (Cooley et al., 1993). The archaeological survey conducted in 2010 confirms the presence of CA-LAN-36 within the Proposed Project area. This resource is recommended as potentially eligible for listing on the CRHR. A Phase II evaluation should be completed, and the eligibility of this resource should be determined. Most impact potential would exist during the construction phase of the project, although disturbance could occur during operation and maintenance of the facilities. Ground-disturbing activities, including the operation of heavy equipment, could result in significant impacts to cultural resources. In addition, development outside of recorded site boundaries could result in unanticipated discoveries.

As with any ground-disturbing project, there remains a potential for the accidental discovery of buried cultural resources not detected through a surface inventory, or even through shovel testing. If cultural resources or materials are discovered during ground-disturbing activities, the work in the vicinity of the discovery should cease and the area be protected until the find can be evaluated by a qualified archaeologist. Depending on the nature of the find, additional consultation with the SHPO or Tribal leaders may be necessary before work can resume in the area of the find.

If human remains are encountered, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to PRC Section 5097.98. The County Coroner must be notified of the find immediately. If the remains are determined to be Native American, the County Coroner will notify the NAHC, which will determine and notify a Most Likely Descendant (MLD). The MLD may inspect the site of the discovery with the permission of the landowner, or his or her authorized representative. The MLD shall complete its inspection within 48 hours of its notification by the NAHC. The MLD may recommend scientific removal and analysis of human remains and items associated with Native American burials.

SECTION 6.0

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Attachment A
Project Photos



Photo 1, View west of survey area near SR-126.



Photo 2, View northeast of survey area near SR-126.



Photo 3, View north of survey area on the north end of CCL.



Photo 4, View north of CA-LAN-36, from the edge of the proposed grading footprint.

Confidential Attachment B
Department of Parks and Recreation Forms (Confidential)

Appendix G
Traffic Analysis

Appendix G-1
Chiquita Canyon Landfill Master Plan
Revision Traffic Analysis July 2014

Final Report

Chiquita Canyon Landfill Master Plan Revision Traffic Analysis

Prepared for

Los Angeles County Department of Public Works, Traffic and Lighting Division

July 2014

Prepared by

CH2MHILL

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Appendix

Appendix A – Los Angeles County Traffic Study Memorandum of Understanding
Appendix B – Existing Turning Movement Data Collection Sheets
Appendix C - Traffic Analysis Work Sheets
Appendix D – Traffic Signal Warrant Worksheets
Appendix E – Other Project Trip Distributions
Appendix F – Traffic Index Calculation Worksheets

1. Introduction

This report documents the potential traffic-related impacts of the proposed Chiquita Canyon Landfill (CCL) Master Plan Revision.

The scope of the analysis in this report is in accordance with direction provided by Los Angeles County Department of Public Works, Traffic and Lighting Division staff. The signed Memorandum of Understanding (MOU), which outlines the agreed upon scope of this traffic study, is provided in Appendix A. This report satisfies the Traffic Impact requirements of the Congestion Management Program (CMP) for Los Angeles County. The analysis focuses on on-site circulation and access, off-site traffic impacts, and addresses the project impact at area intersections.

1.1 Project Description and Location

CCL is located in the northwestern portion of unincorporated Los Angeles County, approximately three miles west of the intersection of Interstate 5 (I-5) and State Route 126 (SR-126). A regional vicinity map is provided on **Figure 1-1.** Access to the project site is from SR-126 (Henry Mayo Drive), a four-lane paved highway running east-west along the southern boundary of CCL. Access to the existing CCL at SR-126 includes left-turn and right-turn deceleration lanes for traffic entering the site.

CCL is located within the planning area of the City of Santa Clarita, but outside its city limits and sphere of influence. The landfill site is also located within the Santa Clarita Valley Area Plan of the Los Angeles County General Plan and in the Castaic Area Community Standards District.

The proposed project would continue the landfill operation by extending the waste footprint at CCL by approximately 143 acres within the confines of the existing property boundary, relocating the site entrance, better utilizing the landfill's remaining and potential disposal capacity, and allowing for the disposal of all nonhazardous wastes acceptable at a Class III solid waste disposal landfill. The proposed project would also include the continued diversion of such materials as green waste, asphalt/concrete, and metal through ongoing as well as permitted, but not yet developed, landfill waste diversion programs on which numerous jurisdictions depend to comply with state-mandated waste diversion goals, and continued landfill gas control and recovery for beneficial use. Figure 1-2 illustrates the existing and proposed CCL project footprint.

FIGURE 1-1
Vicinity Map

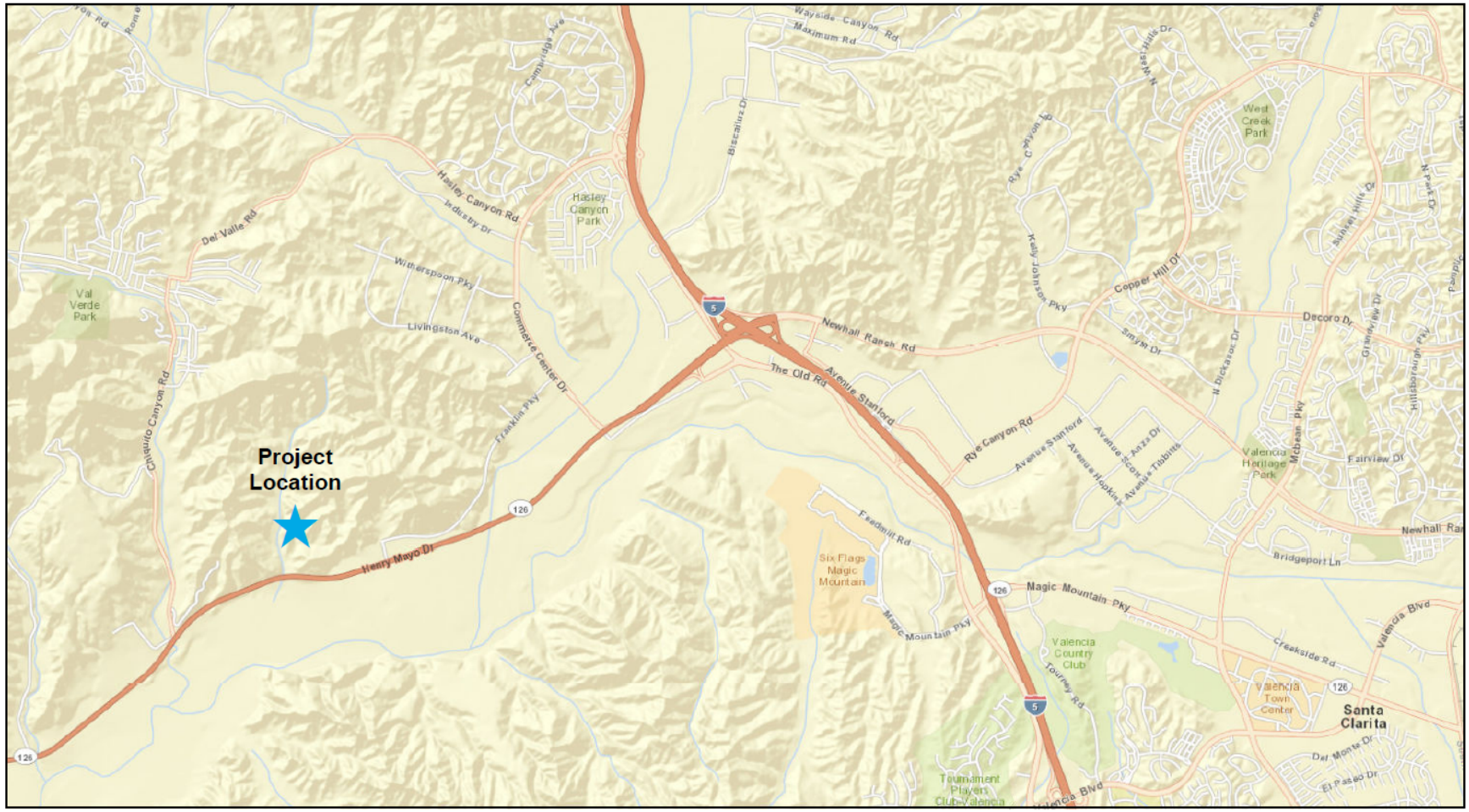
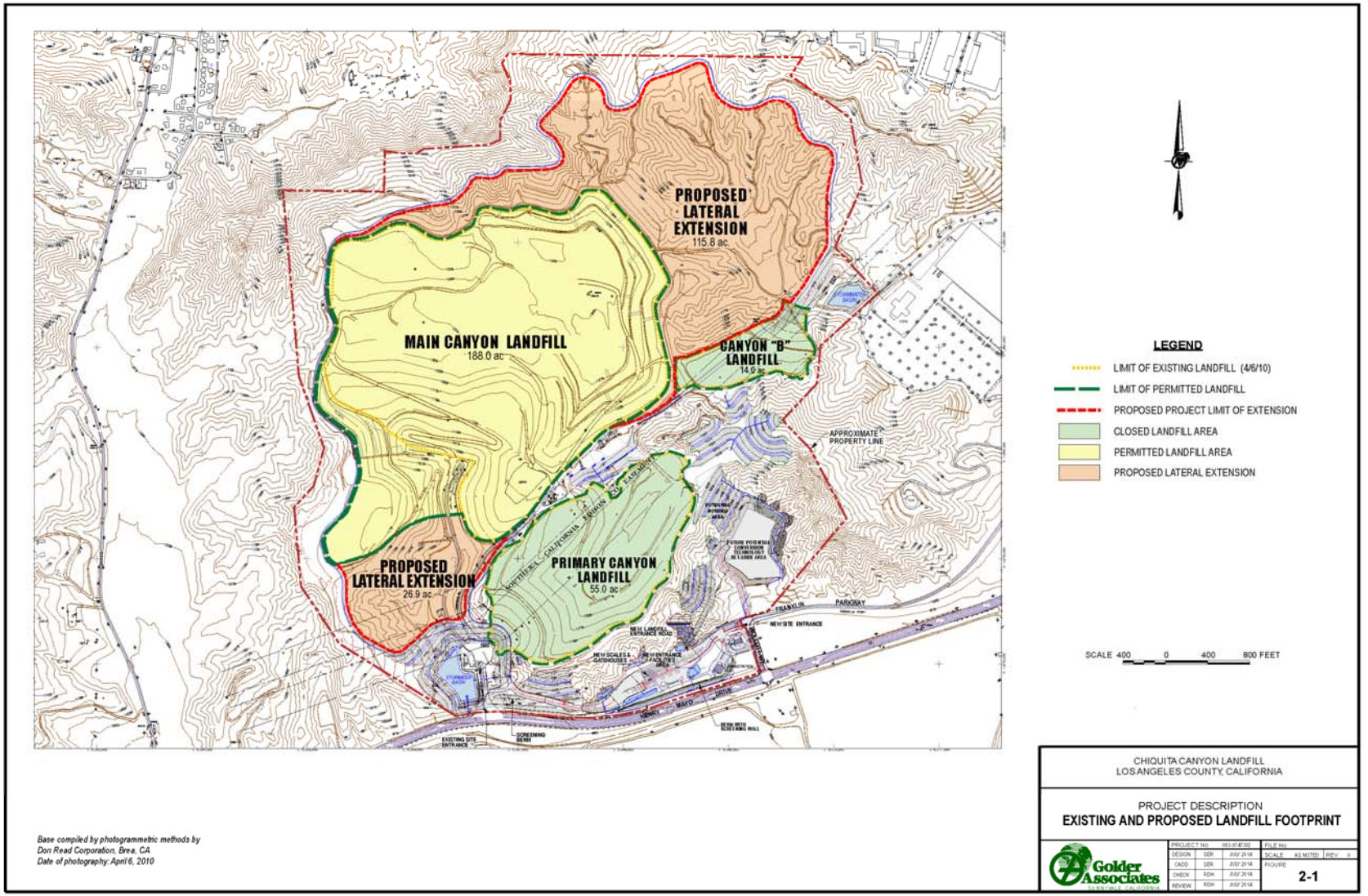


FIGURE 1-2
Existing and Proposed Landfill Footprint



1.2 Study Area

This traffic study includes documentation of existing conditions, analysis of project build-out traffic conditions and identification of project-related impacts at the following study intersections:

- Chiquito Canyon Road @ SR-126
- Chiquita Canyon Landfill Entrance (existing) @ SR-126
- Wolcott Way @ SR-126
- Commerce Center Drive @ SR-126
- I-5 Southbound Ramps @ SR-126
- I-5 Northbound Ramps @ SR-126
- Franklin Parkway @ Commerce Center Drive
- Wolcott Way @ Franklin Parkway (proposed CCL entrance)

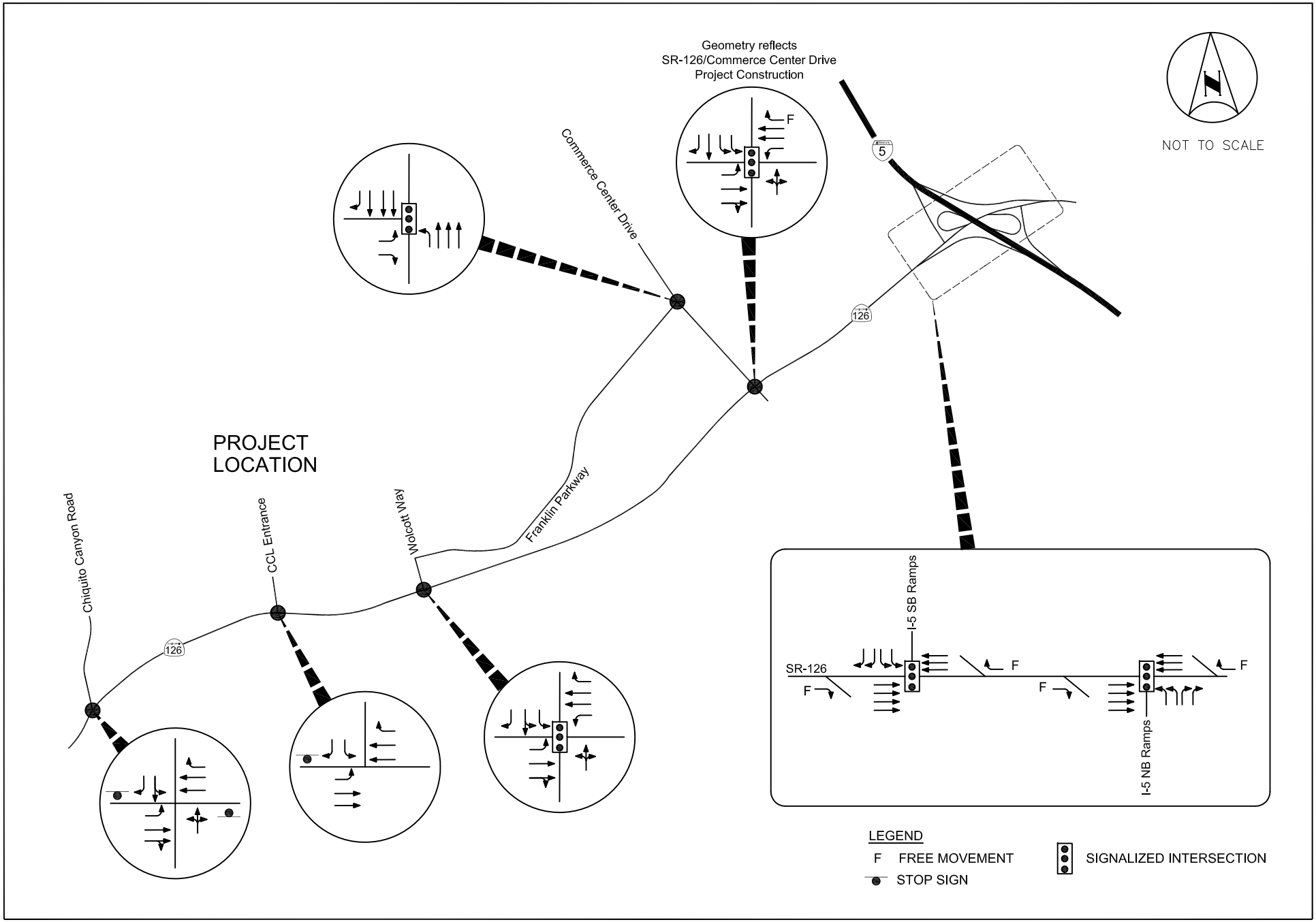
The existing lane configurations of the study intersections are illustrated in Figure 1-3. For each of the study intersections, five analysis scenarios were analyzed for the morning and evening peak hours:

- Existing Conditions
- Existing plus Growth (2015) Conditions without Project
- Existing plus Growth (2015) plus Other Development Conditions without Project
- Existing plus Growth (2015) Conditions with Project
- Existing plus Growth (2015) plus Other Development Conditions with Project

1.3 Analysis Methodology

Traffic analysis for the intersections was conducted using two different methods to accommodate the requirements of the both Caltrans and the County. The Highway Capacity Manual (HCM) and Intersection Capacity Utilization (ICU) methodologies were used to analyze intersection operations.

Caltrans uses the HCM methodology for intersection analysis. The HCM methodology assesses Level of Service (LOS) based on average delay per vehicle. The delay is calculated using peak hourly traffic volumes, peak hour factors, number of lanes, type of operation (signalized or unsignalized), and other factors. For this study, the HCM methodology was implemented using the Synchro software (Version 8). The HCM delay forecast translates to a LOS assessment, ranging from LOS A to LOS F using the delay ranges shown in Table 1-1.



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CHIQUITA CANYON LANDFILL MASTER PLAN REVISION
EXISTING LANE CONFIGURATIONS

FIGURE 1-3

TABLE 1-1
HCM-Based Level of Service and Delay Ranges

Average Delay (seconds / vehicle)		LOS
Signalized Intersections	**Unsignalized intersections**	
< 10.0	< 10.0	A
> 10.0 to < 20.0	> 10.0 to < 15.0	B
> 20.0 to < 35.0	> 15.0 to < 25.0	C
> 35.0 to < 55.0	> 25.0 to < 35.0	D
> 55.0 to < 80.0	> 35.0 to < 50.0	E
> 80.0	> 50.0	F

Source: Highway Capacity Manual, 2010

The ICU methodology provides a comparison of the number of vehicles actually passing through an intersection during a given hour to the theoretical hourly vehicular capacity of that intersection. A saturation flow rate of 1,600 vehicles/hour/lane for all through/turn lanes and 2,880 vehicles/hour/lane for all dual turn lanes was used in the ICU calculation, consistent with the guidance provided in the Los Angeles County CMP. The ICU calculation returns a volume-to-capacity (V/C) ratio that translates into a corresponding LOS. A summary description of each LOS and the corresponding V/C ratio is provided in Table 1-2.

TABLE 1-2
ICU Level of Service Criteria

LOS	V/C Ratio	Definition
A	0.00 - 0.60	At LOS A, there are no cycles that are fully loaded, and few are even close to loaded. No approach phase is fully utilized by traffic and no vehicle waits longer than one red indication. Typically, the approach appears quite open, turning movements are easily made, and nearly all drivers find freedom of operation.
B	>0.60 - 0.70	LOS B represents stable operation. An occasional approach phase is fully utilized and a substantial number are approaching full use. Many drivers begin to feel somewhat restricted with platoons of vehicles.
C	>0.70 - 0.80	In LOS C stable operation continues. Full signal cycle loading is still intermittent, but more frequent. Occasionally drivers may have to wait through more than one red signal indication and back-ups may develop behind turning vehicles.
D	>0.80 – 0.90	LOS D encompasses a zone of increasing restriction, approaching instability. Delays to approaching vehicles may be substantial during short peaks within the peak period, but enough cycles with lower demand occur to permit periodic clearance of developing queues, thus preventing excessive back-ups.
E	>0.90 – 1.00	LOS E represents the most vehicles that any particular intersection approach can accommodate. At capacity (V/C = 1.00) there may be long queues of vehicles waiting upstream of the intersection and delays may be great (up to several signal cycles).
F	> 1.00	LOS F represents jammed conditions. Back-ups from location downstream or on the cross street may restrict or prevent movement of vehicles out of the approach under consideration; hence, volumes carried are not predictable. V/C values are highly variable, because full utilization of the approach may be prevented by outside conditions.

Source: 2010 Congestion Management Program for Los Angeles County, Los Angeles County Metropolitan Transportation Authority.

For comparison purposes, both the HCM and ICU analysis values are reported in the summary tables.

1.4 Congestion Management Program Compliance

The Los Angeles County CMP was established in 1992. The 1992 CMP forged new ground in linking transportation, land use and air quality decisions for the most populous and one of the most complex urban areas in the country. The 2010 CMP is the eighth CMP adopted for Los Angeles County since the requirement became effective with the passage of Proposition 111 in 1990. The hallmark of the CMP program is that it is intended to address the impact of local growth on the regional transportation system. Compliance with the CMP requirements ensures a local jurisdiction's eligibility to compete for State gas tax funds for local transportation projects. SR-126 (Henry Mayo Drive) is a CMP Highway and Roadway System arterial in the project study area.

The Los Angeles County CMP states that "a CMP Transportation Impact Analysis (TIA) is required for all projects required to prepare and Environmental Impact Report (EIR) based on local determination." The proposed CCL Master Plan Revision is required to prepare an EIR. Therefore, a CMP-level analysis is required for this project. The traffic analysis documented in this report is consistent with the Guidelines for CMP Transportation Impact Analysis in Appendix D of the Los Angeles County CMP.

1.5 Traffic Impact Criteria

The purpose of a traffic impact study is to identify the impacts of a proposed development, and to determine whether or not those impacts are significant. If determined to be significant, the project would be required to mitigate the project's traffic-related impacts.

Based on the County of Los Angeles Department of Public Works Traffic Impact Analysis Guidelines, a significant impact occurs if the project related increase in the V/C ratio equals or exceeds the threshold shown in Table 1-3.

TABLE 1-3
Significant Impact Thresholds

INTERSECTIONS		
Pre-Project		Project V/C Increase
LOS	V/C	
C	0.71 to 0.80	0.04 or more
D	0.81 to 0.90	0.02 or more
E/F	0.91 or more	0.01 or more

V/C calculations are done using the ICU methodology only. All impacts are assessed using the ICU methodology only. The HCM analysis is provided for Caltrans review purposes since SR-126 is a Caltrans facility.

2. Existing Conditions

2.1 Existing Traffic Volumes

Morning and evening peak hour turning movement traffic counts were conducted at the study intersections in March 2013, and are depicted on Figure 2-1. Copies of the traffic count data sheets are provided in Appendix B.

2.2 Level of Service Analysis

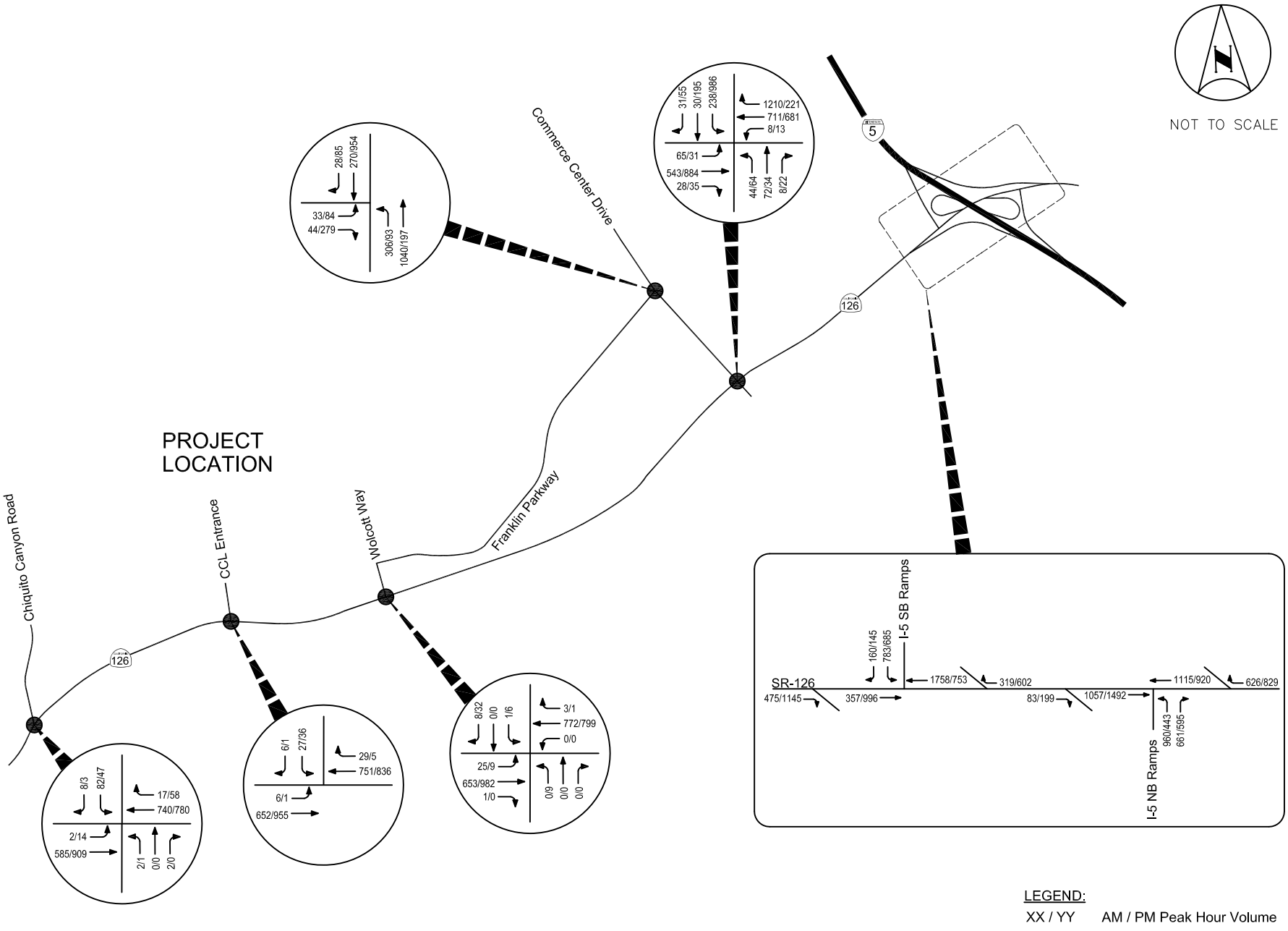
Existing morning and evening peak hour operating conditions were evaluated using the HCM and ICU methodologies. The results of the existing conditions analysis are summarized on Table 2-1. Copies of intersection analysis worksheets are provided in Appendix C.

TABLE 2-1
Summary of Intersection Analysis – Existing Conditions

			Existing Conditions							
			AM Peak				PM Peak			
Intersection		Control	Delay (sec/veh)	LOS	ICU	LOS	Delay (sec/veh)	LOS	ICU	LOS
1	Chiquito Canyon Road @ SR-126	Unsignalized*	40.1	E	0.386	A	53.0	F	0.414	A
2	Chiquita Canyon Landfill Entrance @ SR-126	Unsignalized*	23.5	C	0.355	A	38.9	E	0.421	A
3	Wolcott Way @ SR-126	Signalized	13.5	B	0.357	A	26.6	C	0.415	A
4	Commerce Center Drive @ SR-126	Signalized	26.4	C	0.490	A	66.7	E	0.759	C
5	I-5 Southbound Ramps @ SR-126	Signalized	18.6	B	0.738	C	11.2	B	0.495	A
6	I-5 Northbound Ramps @ SR-126	Signalized	24.3	C	0.532	A	25.0	C	0.425	A
7	Franklin Parkway @ Commerce Center Drive	Signalized	8.8	A	0.368	A	18.2	B	0.409	A
8	Wolcott Way @ Franklin Parkway	Unsignalized**	Intersection does not exist currently							

* HCM results (delay) reported for worst stop controlled approach

** HCM results (delay) reported for overall stop controlled intersection



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CHIQUITA CANYON LANDFILL MASTER PLAN REVISION

EXISTING PEAK HOUR VOLUMES

FIGURE 2-1

Table 2-1 shows that all study intersections are currently operating at LOS C or better using the ICU methodology.

Using the HCM methodology, the following intersections currently operate at LOS E or worse:

- Chiquito Canyon Road @ SR-126 (two-way stop controlled, LOS E in the AM, LOS F in the PM)
- Chiquita Canyon Landfill Entrance @ SR-126 (two-way stop controlled, LOS E in the PM)
- Commerce Center Drive @ SR-126 (signalized, LOS E in the PM)

Peak hour volume traffic signal warrants indicate that signals are not warranted at Chiquito Canyon Road/SR-126 and Chiquita Canyon Landfill Entrance/SR-126 under existing conditions. Copies of the peak hour volume warrant worksheets are provided in Appendix D.

3. Cumulative Conditions

3.1 Ambient Growth

Future peak hour traffic projections for the study intersections have been developed for the proposed project buildout year of 2015. An annual ambient growth rate of 2.75% per year has been applied to the existing (2013) traffic volumes. The annual growth rate is based upon direction received from Los Angeles County Department of Public Works, Traffic and Lighting Division staff (see the signed MOU in Appendix A). The 2015 buildout year without project volumes (Existing plus Growth traffic) at each of the study intersections is shown on Figure 3-1.

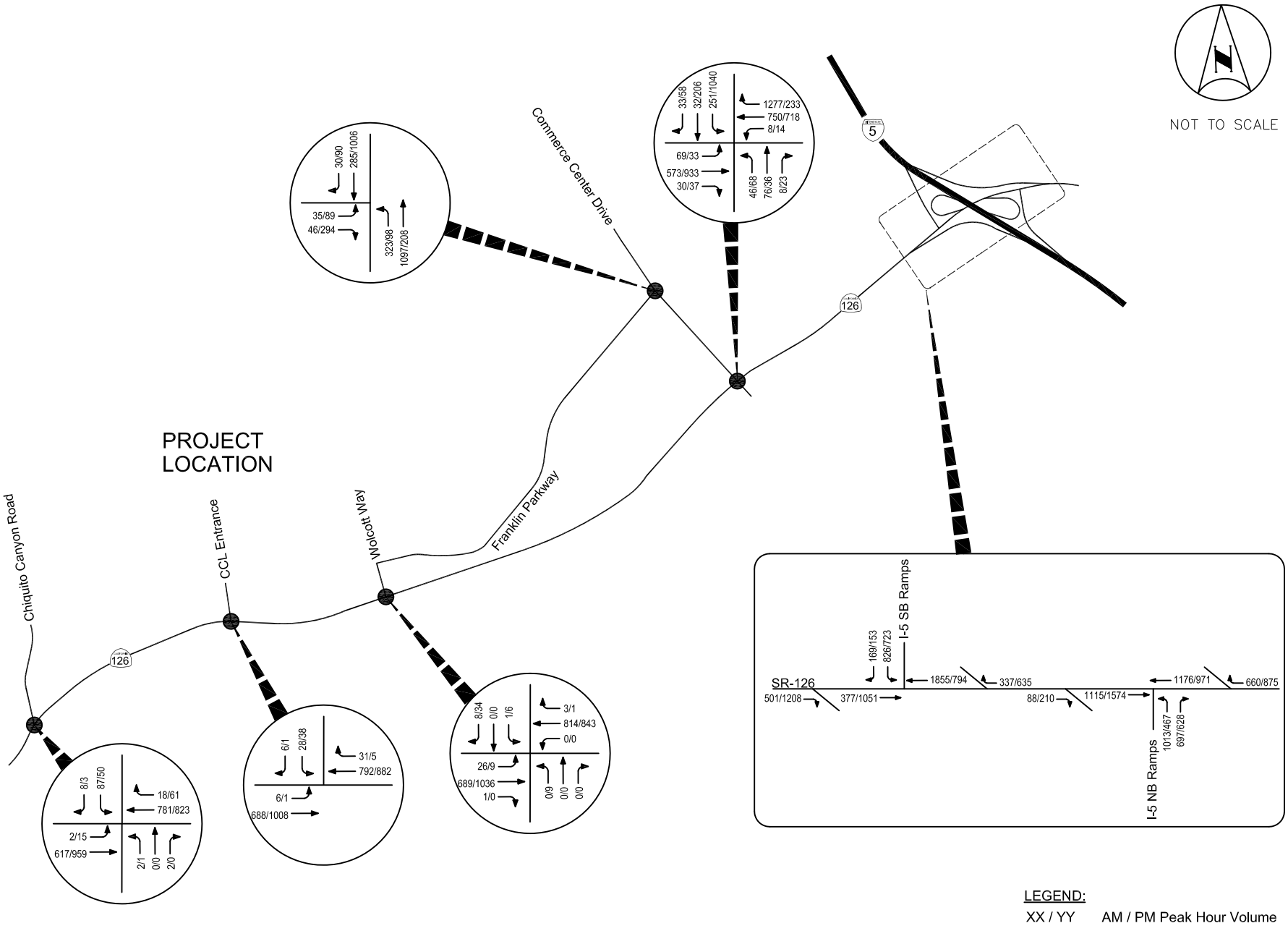
3.2 Other Development

In addition to the ambient growth rate, anticipated traffic from other development in the vicinity of the project was added to existing traffic volumes. Other development includes any project that has already been approved but is not yet constructed, or any project that is in the application process, and is a reasonably foreseeable development. The projects currently planned or proposed in the cumulative impact area of the Proposed Project were provided by the Los Angeles County Department of Regional Planning (LADRP). The cumulative project information is based on the best information available at the time this Draft Environmental Impact Report (DEIR) was prepared. A summary of other development is provided in Table 3-1. The location of each of these projects and their associated trip distribution information is attached in Appendix E. Cumulatively, all other development has the potential to generate a total of 919 trips in the morning peak hour, and 1,249 trips in the evening peak hour by 2015 in the vicinity of the project.

Traffic from the other development projects was assigned to the study intersections by referencing the traffic studies for each project. The assumed trip distribution of each of these projects through the study area is also included in Appendix E. The total combined traffic generated in the Cumulative condition (Existing plus Growth plus Other Development traffic) at each of the study intersections is shown on Figure 3-2.

TABLE 3-1
Summary of Other Development Land Use and Trip Generation

PROJECT					PEAK HOUR					
					AM			PM		
County ID	Name	LAND USE	QUANTITY	UNITS	IN	OUT	TOTAL	IN	OUT	TOTAL
PM060030	Sterling Gateway	Insustrial Park	1,221.36	TSF	672	122	794	159	635	794
PM060734	Valencia Gateway	Shopping Center	135.01	TSF	76	49	125	218	237	455
TOTAL FORECASTED TRIPS BY THE YEAR 2015					***748***	***171***	***919***	***377***	***872***	***1,249***



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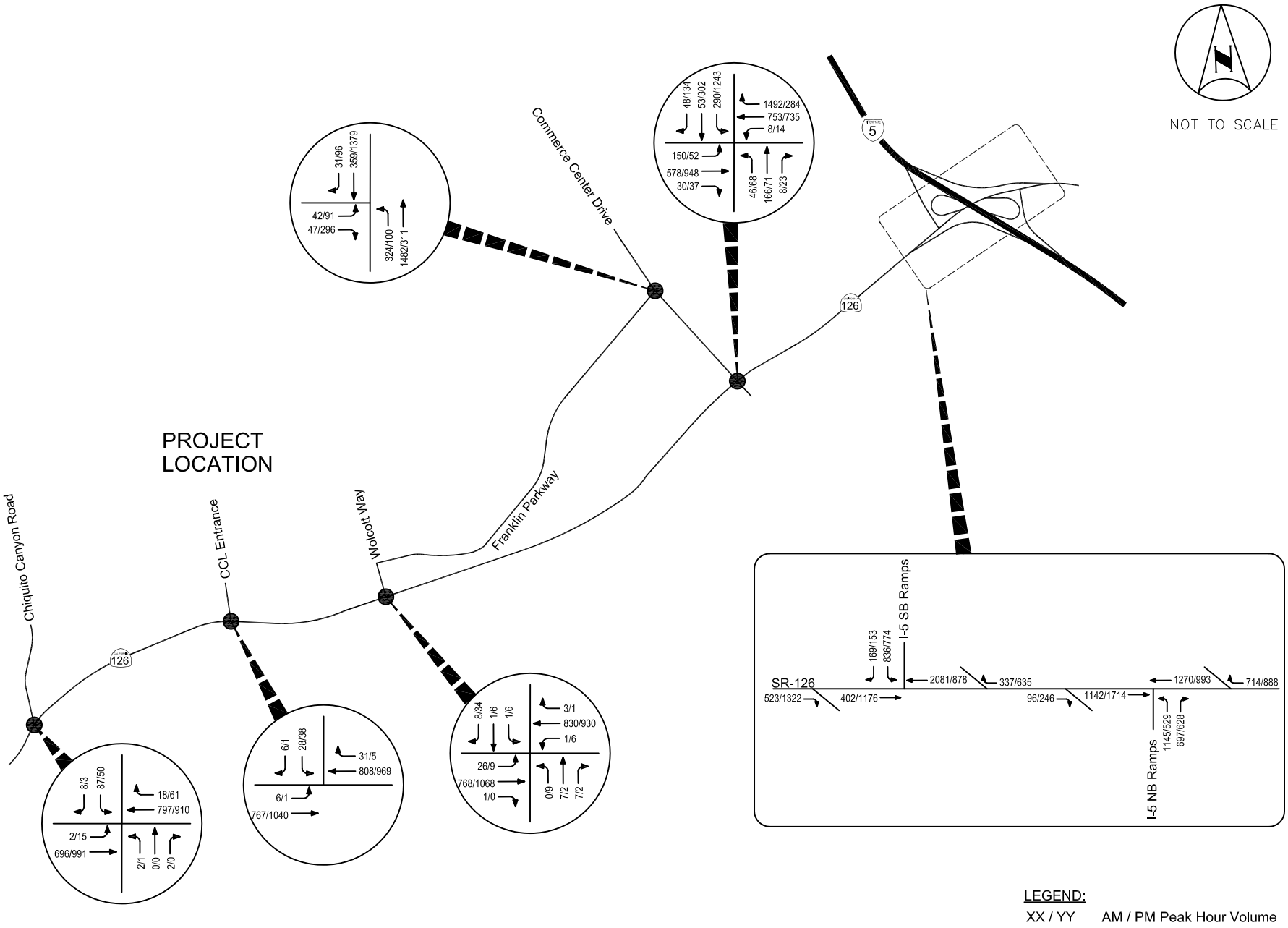
CHIQUITA CANYON LANDFILL MASTER PLAN REVISION

EXISTING PLUS GROWTH WITHOUT PROJECT PEAK HOUR VOLUMES

FIGURE 3-1



CHIQUITA CANYON LANDFILL MASTER PLAN REVISION

EXISTING PLUS GROWTH PLUS OTHER DEVELOPMENT WITHOUT PROJECT PEAK HOUR VOLUMES

FIGURE 3-2

3.3 Level of Service Analysis

3.3.1 Existing plus Growth Conditions

The results of the Existing plus Growth analysis are summarized on Table 3-2. Morning and evening peak hour operating conditions were evaluated using HCM and ICU methodologies. Copies of intersection analysis worksheets are provided in Appendix C.

TABLE 3-2
Summary of Intersection Analysis – Existing plus Growth Conditions

			Existing plus Growth Conditions							
			AM Peak				PM Peak			
Intersection		Control	Delay (sec/veh)	LOS	ICU	LOS	Delay (sec/veh)	LOS	ICU	LOS
1	Chiquito Canyon Road @ SR-126	Unsignalized*	49.7	E	0.402	A	65.9	F	0.432	A
2	Chiquita Canyon Landfill Entrance @ SR-126	Unsignalized*	25.7	D	0.369	A	45.5	E	0.439	A
3	Wolcott Way @ SR-126	Signalized	14.2	B	0.371	A	29.2	C	0.432	A
4	Commerce Center Drive @ SR-126	Signalized	27.0	C	0.546	A	71.0	E	0.852	D
5	I-5 Southbound Ramps @ SR-126	Signalized	20.6	C	0.773	C	11.8	B	0.516	A
6	I-5 Northbound Ramps @ SR-126	Signalized	26.3	C	0.556	A	26.7	C	0.443	A
7	Franklin Parkway @ Commerce Center Drive	Signalized	9.1	A	0.383	A	19.2	B	0.426	A
8	Wolcott Way @ Franklin Parkway	Unsignalized**	Intersection does not exist without project							

* HCM results (delay) reported for worst stop controlled approach

** HCM results (delay) reported for overall stop controlled intersection

Table 3-2 shows that all study intersections will operate at LOS D or better using the ICU methodology in the Existing plus Growth (2015 buildout year) without project conditions.

Using the HCM methodology, the following intersections will operate at LOS E or worse (same as existing conditions):

- Chiquito Canyon Road @ SR-126 (two-way stop controlled, LOS E in the AM, LOS F in the PM)
- Chiquita Canyon Landfill Entrance @ SR-126 (two-way stop controlled, LOS E in the PM)
- Commerce Center Drive @ SR-126 (signalized, LOS E in the PM)

Peak hour volume traffic signal warrants indicate that signals are not warranted at Chiquito Canyon Road/SR-126 and Chiquita Canyon Landfill Entrance/SR-126 under Existing plus Growth (2015 buildout year) without project conditions. Copies of the peak hour volume warrant worksheets are provided in Appendix D.

3.3.2 Existing plus Growth plus Other Development Conditions

The results of the Existing plus Growth plus Other Development analysis are summarized on Table 3-3. Morning and evening peak hour operating conditions were evaluated using HCM and ICU methodologies. Copies of intersection analysis worksheets are provided in Appendix C.

TABLE 3-3
Summary of Intersection Analysis – Existing plus Growth plus Other Development Conditions

			Existing plus Growth plus Other Development Conditions							
			AM Peak				PM Peak			
Intersection		Control	Delay (sec/veh)	LOS	ICU	LOS	Delay (sec/veh)	LOS	ICU	LOS
1	Chiquito Canyon Road @ SR-126	Unsignalized*	58.7	F	0.407	A	88.9	F	0.442	A
2	Chiquita Canyon Landfill Entrance @ SR-126	Unsignalized*	27.9	D	0.374	A	55.7	F	0.449	A
3	Wolcott Way @ SR-126	Signalized	35.0	D	0.385	A	42.6	D	0.448	A
4	Commerce Center Drive @ SR-126	Signalized	36.0	D	0.667	B	97.8	F	0.949	E
5	I-5 Southbound Ramps @ SR-126	Signalized	24.0	C	0.824	D	12.6	B	0.553	A
6	I-5 Northbound Ramps @ SR-126	Signalized	27.4	C	0.603	A	26.7	C	0.478	A
7	Franklin Parkway @ Commerce Center Drive	Signalized	8.3	A	0.435	A	19.5	B	0.507	A
8	Wolcott Way @ Franklin Parkway	Unsignalized**	Intersection does not exist without project							

* HCM results (delay) reported for worst stop controlled approach

** HCM results (delay) reported for overall stop controlled intersection

Table 3-3 shows that all but one study intersection will operate at LOS D or better using the ICU methodology in the Existing plus Growth plus Other Development without project conditions. The intersection of Commerce Center Drive and SR-126 is projected to operate at LOS E in the PM peak hour using the ICU methodology. It is important to note that the intersection of Commerce Center Drive and SR-126 will still be under construction in 2015 as part of the Commerce Center Drive/SR-126 improvement project. The Commerce Center Drive/SR-126 improvement project is schedule to be complete in 2016. Upon completion, the planned improvements at this intersection (interchange) will return operations to LOS D or better in both the morning and evening peak hours.

Using the HCM methodology, the following intersections will operate at LOS E or worse:

- Chiquito Canyon Road @ SR-126 (two-way stop controlled, LOS F in the AM and PM)
- Chiquita Canyon Landfill Entrance @ SR-126 (two-way stop controlled, LOS F in the PM)
- Commerce Center Drive @ SR-126 (signalized, LOS F in the PM)

Peak hour volume traffic signal warrants indicate that signals are not warranted at Chiquito Canyon Road/SR-126 and Chiquita Canyon Landfill Entrance/SR-126 under Existing plus Growth plus Other Development without project conditions. Copies of the peak hour volume warrant worksheets are provided in Appendix D.

4.0 Project Traffic

4.1 Project Trip Generation

In addition to traffic at CCL that results from incoming waste, there are several other sources of inbound and outbound traffic at CCL. A wide variety of material that is diverted from the waste stream is accepted at CCL for other uses, including alternative daily cover, road base, compost, and erosion control material. Material from CCL, including clean soil, compost products, and recycled materials, may also be trucked from the site to other locations. Additionally, periodic cell construction occurs at CCL, during which time additional traffic related to construction occurs. Table 4-1 details the potential maximum daily traffic volume at CCL under baseline project conditions. Table 4-2 details the potential maximum daily traffic volume at CCL under proposed project conditions. Table 4-3 details the potential maximum daily net new trips of the proposed project (i.e., proposed project minus baseline project).

Tables 4-1 through 4-3 are based on historical records for different vehicle and material types, so the data represent a typical day of CCL operations. Also, Tables 4-1 through 4-3 summarize the project trips in passenger car equivalents (PCEs). A PCE factor of 2.0 was used to convert truck trips to PCEs. This factor was agreed upon by Los Angeles County staff during the scoping process for the traffic report.

From Table 4-3, there will be 2,332 net new trips with the proposed. These values were determined on a daily basis, so it was necessary to convert to peak hours for the traffic analysis. AM and PM peak hour project trips (net new trips) were developed to reflect the peak of the surrounding network system (one hour between 7 and 9 AM and one hour between 4 and 6 PM). Peak hour project trips were developed with historical time of day gate receipt data collected by CCL. Table 4-4 summarizes time of day vehicle count information for a typical weekday in April 2013 at CCL. Based on the historical data presented in Table 4-4, approximately 6.4% of the net new trips for the proposed project will occur in the AM peak hour (8 to 9 AM) and 6.5% will occur in the PM peak hour (4 to 5 PM). The majority of the net new trips will occur outside the peak hours of the surrounding roadway system.

4.2 Project Trip Distribution and Assignment

Project trip distribution assumptions for the proposed project were based on historical gate receipt information from CCL. Final trip distribution assumptions are shown on Figure 4-1. Based on these trip distribution patterns, the net new trips to be added to the street system by the proposed project were calculated, and are shown on Figure 4-2 (volumes are shown as PCEs).

TABLE 4-1
Summary of Baseline Peak Potential Daily Inbound and Outbound Traffic

Traffic Source	Number of Vehicles Peak Potential Daily[a,b]	Number of Vehicles Peak Potential Daily - PCE	Number of Trip Ends Peak Potential Daily - PCE
Inbound			
Trash (Disposal)[c]			
Transfer	273	546	1092
Route	300	600	1200
Roll-offs	460	920	1840
Self Haul	500	500	1000
Other Materials (Beneficial Reuse)			
Shredded Curbside Green Waste	40	80	160
Clean Soil	200	400	800
Contaminated Soil[d]			
Large Trucks	300	600	1200
10-Wheelers	60	120	240
Protective Cover			
TASW	200	400	800
MRF Fines	40	80	160
Tire Shred	15	30	60
C&D Fines	25	50	100
Road Base			
Concrete	50	100	200
Asphalt	50	100	200
Processed C&D Material	30	60	120
Composting[e]	55	110	220
Outbound			
Clean Soil	100	200	400
Compost Products	8	16	32
Other	25	50	100
Special Projects[f]			
Cell Construction			
Mobilize/Demobilize Traffic	20	20	40
Contractor Employees	80	80	160
Employees			
Landfill – Permanent	34	34	68
Landfill – Temporary	25	25	50
LFGTE Plant	2	2	4
Transfer Drivers	4	4	8
Total	**2,896**	**5,127**	**10,254**

Notes:

[a] These numbers are one-way trips and based on 5 days per week.

[b] The maximum number of trash vehicles in each category does not happen simultaneously. The daily maximum tonnage is still 6,000 tons per day.

[c] Regardless of actual vehicle mix, incoming waste tonnage would not exceed 6,000 tons per day per existing CUP condition 9e.

[d] Contaminated soils may also be disposed and not put to beneficial reuse.

[e] The existing CUP allows for operation of up to a 560-tons-per-day composting facility for windrow or in-vessel technology composting operation.

[f] These projects occur periodically. Typically once every 2-3 years.

TASW = treated auto shredder waste

TABLE 4-2
Summary of Proposed Peak Potential Daily Inbound and Outbound Traffic

Traffic Source	Number of Vehicles Peak Potential Daily[a,b]	Number of Vehicles Peak Potential Daily - PCE	Number of Trip Ends Peak Potential Daily - PCE
Inbound			
Trash (Disposal)[c]			
Transfer	545	1090	2180
Route	600	1200	2400
Roll-offs	460	920	1840
Self Haul	500	500	1000
Other Materials (Beneficial Reuse)			
Shredded Curbside Green Waste	40	80	160
Clean Soil	200	400	800
Contaminated Soil[d]			
Large Trucks	300	600	1200
10-Wheelers	60	120	240
Protective Cover			
TASW	200	400	800
MRF Fines	40	80	160
Tire Shred	15	30	60
C&D Fines	25	50	100
Road Base			
Concrete	50	100	200
Asphalt	50	100	200
Processed C&D Material	30	60	120
Composting[e]	55	110	220
Outbound			
Clean Soil	100	200	400
Compost Products	8	16	32
Other	25	50	100
Special Projects[f]			
Cell Construction			
Mobilize/Demobilize Traffic	20	20	40
Contractor Employees	80	80	160
Employees			
Landfill – Permanent	55	55	110
Landfill – Temporary	25	25	50
LFGTE Plant	3	3	6
Transfer Drivers	4	4	8
Total	**3,490**	**6,293**	**12,586**

Notes:

[a] These numbers are one-way trips and based on 5 days per week.

[b] The maximum number of trash vehicles in each category does not happen simultaneously. The daily maximum tonnage is still 12,000 tons per day.

[c] Regardless of actual vehicle mix, incoming waste tonnage would not exceed 12,000 tons per day.

[d] Contaminated soils may also be disposed and not put to beneficial reuse.

[e] The existing CUP allows for operation of up to a 560-tons-per-day composting facility for windrow or in-vessel technology composting operation.

[f] These projects occur periodically. Typically once every 2 to 3 years.

TABLE 4-3
Summary of Proposed Net New Peak Potential Daily Inbound and Outbound Traffic

Traffic Source	Number of Vehicles Peak Potential Daily[a,b]	Number of Vehicles Peak Potential Daily - PCE	Number of Trip Ends Peak Potential Daily - PCE
Inbound			
Trash (Disposal)[c]			
Transfer	272	544	1088
Route	300	600	1200
Roll-offs	0	0	0
Self Haul	0	0	0
Other Materials (Beneficial Reuse)			
Shredded Curbside Green Waste	0	0	0
Clean Soil	0	0	0
Contaminated Soil[d]			
Large Trucks	0	0	0
10-Wheelers	0	0	0
Protective Cover			
TASW	0	0	0
MRF Fines	0	0	0
Tire Shred	0	0	0
C&D Fines	0	0	0
Road Base			
Concrete	0	0	0
Asphalt	0	0	0
Processed C&D Material	0	0	0
Composting[e]	0	0	0
Outbound			
Clean Soil	0	0	0
Compost Products	0	0	0
Other	0	0	0
Special Projects[f]			
Cell Construction			
Mobilize/Demobilize Traffic	0	0	0
Contractor Employees	0	0	0
Employees			
Landfill – Permanent	21	21	42
Landfill – Temporary	0	0	0
LFGTE Plant	1	1	2
Transfer Drivers	0	0	0
Total	**594**	**1,166**	**2,332**

Notes:

[a] These numbers are one-way trips and based on 5 days per week.

[b] The maximum number of trash vehicles in each category does not happen simultaneously. The daily maximum tonnage is still 12,000 tons per day.

[c] Regardless of actual vehicle mix, incoming waste tonnage would not exceed 12,000 tons per day.

[d] Contaminated soils may also be disposed and not put to beneficial reuse.

[e] The existing CUP allows for operation of up to a 560-tons-per-day composting facility for windrow or in-vessel technology composting operation.

[f] These projects occur periodically. Typically once every 2 to 3 years.

TABLE 4-4
CCL Time of Day Vehicle Distribution based on Historical Gate Receipts

Time of Day			Inbound Vehicles	Outbound Vehicles
12:00 AM	to	1:00 AM	3	3
1:00 AM	to	2:00 AM	2	2
2:00 AM	to	3:00 AM	5	5
3:00 AM	to	4:00 AM	7	7
4:00 AM	to	5:00 AM	21	21
5:00 AM	to	6:00 AM	21	21
6:00 AM	to	7:00 AM	19	19
7:00 AM	to	8:00 AM	27	27
8:00 AM	to	9:00 AM	30	30
9:00 AM	to	10:00 AM	41	41
10:00 AM	to	11:00 AM	57	57
11:00 AM	to	12:00 PM	47	47
12:00 PM	to	1:00 PM	34	34
1:00 PM	to	2:00 PM	32	32
2:00 PM	to	3:00 PM	38	38
3:00 PM	to	4:00 PM	36	36
4:00 PM	to	5:00 PM	31	31
5:00 PM	to	6:00 PM	0	0
6:00 PM	to	7:00 PM	0	0
7:00 PM	to	8:00 PM	0	0
8:00 PM	to	9:00 PM	0	0
9:00 PM	to	10:00 PM	0	0
10:00 PM	to	11:00 PM	11	11
11:00 PM	to	12:00 AM	10	10
Daily Total			**472**	**472**

Note: Data based on three-day weekday average collected in April 2013. Data represents actual vehicles entering the site (not PCEs).

The proposed project will remove the existing CCL entrance which is currently located on SR-126 between Chiquito Canyon Road and Wolcott Way and construct a new entrance on the corner of Wolcott Way and Franklin Parkway. Therefore, existing and new CCL trips will access CCL from Wolcott Way. It is assumed that the new entrance will operate as an all-way stop controlled intersection at Wolcott Way and Franklin Parkway. The intersection of SR-126 and Wolcott Way will see a change in traffic patterns due to the fact that all CCL trips (existing and new) will take access to the site via Wolcott Way. These changes are noted in Figure 4-2. Additional discussion and analysis of the new entrance is provided in Section 7 and 8 of this report.

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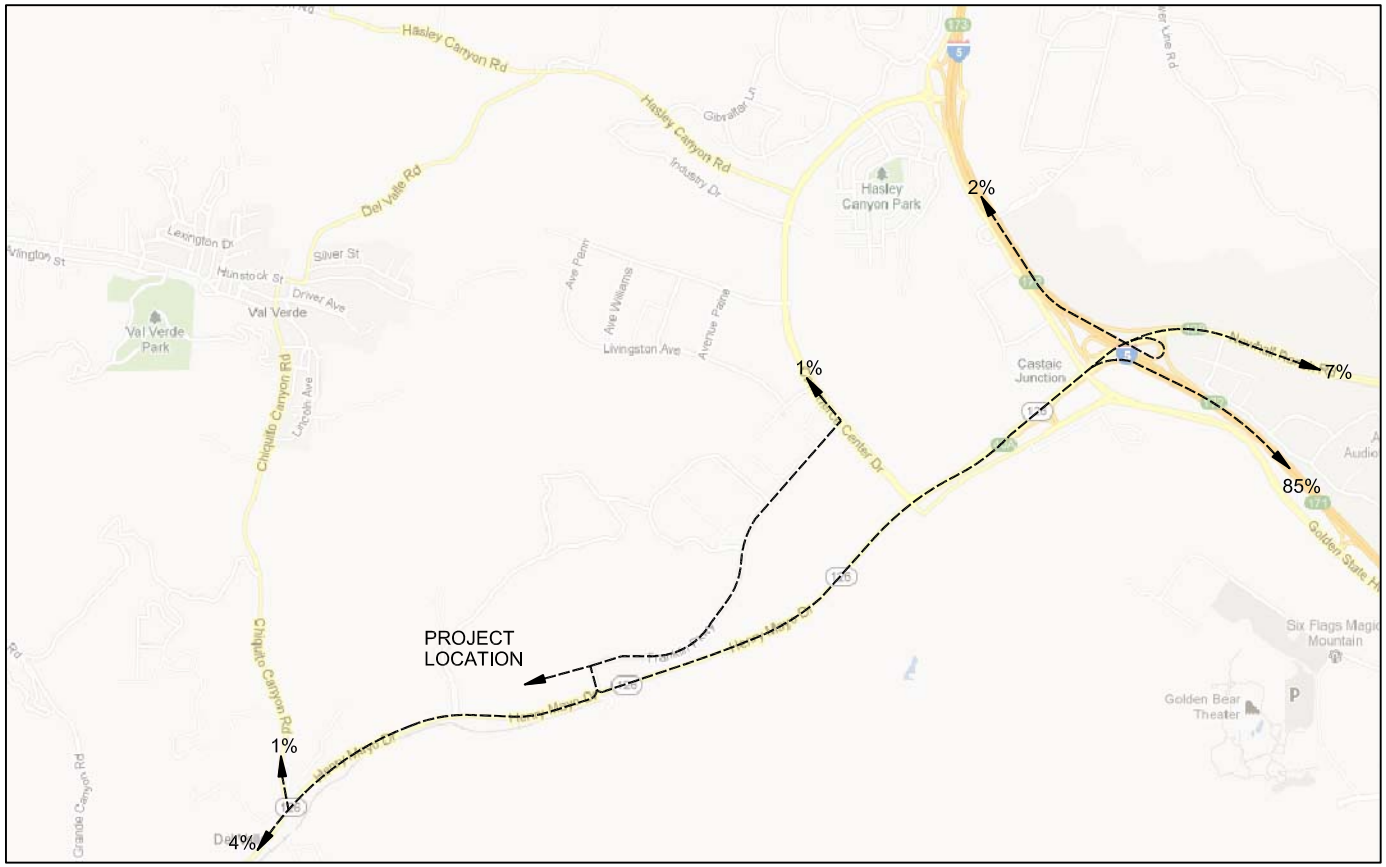

LEGEND:

XX% Project Distribution (to/from distribution assumed to be identical)

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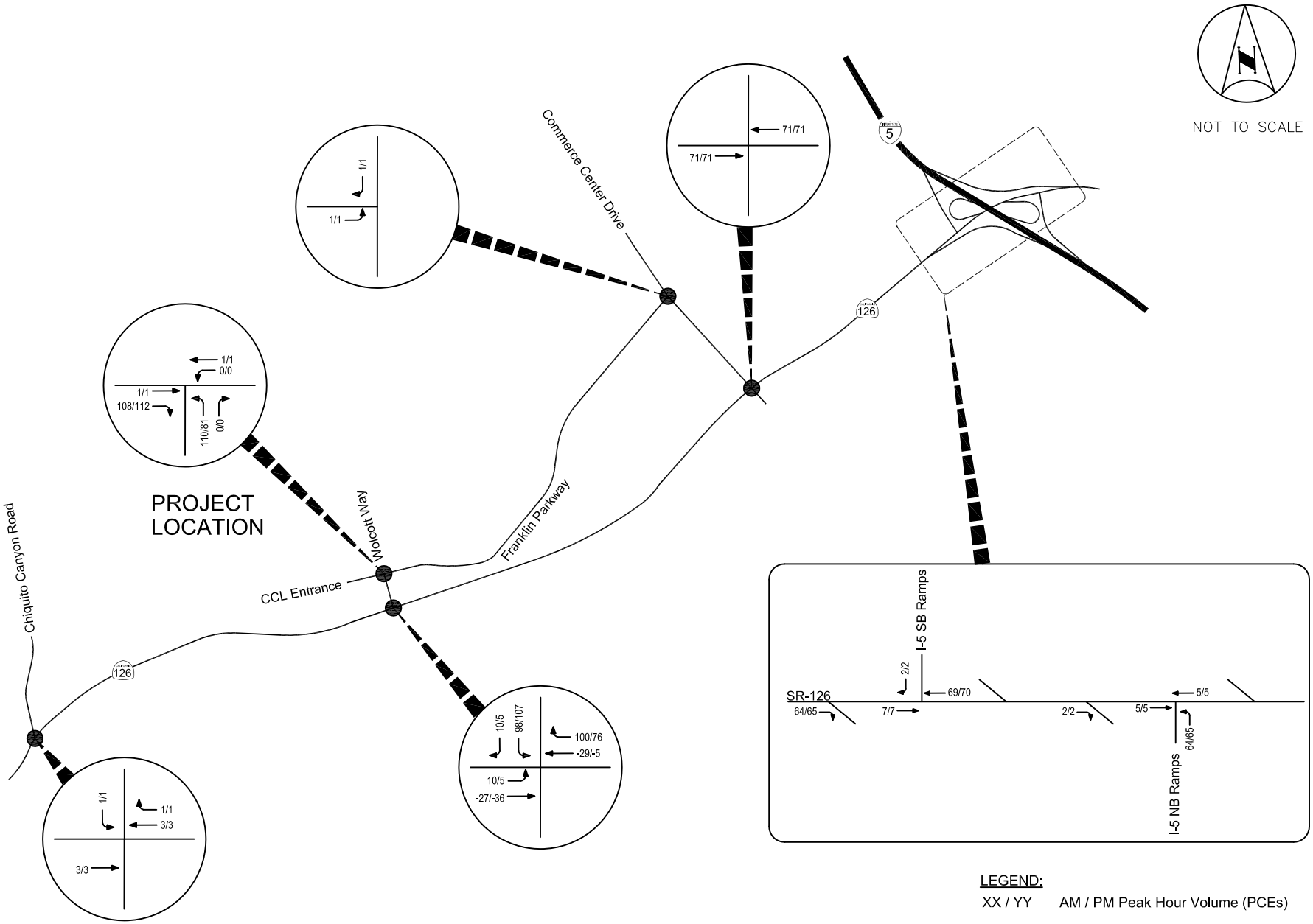
PROPOSED PROJECT TRIP DISTRIBUTION

FIGURE 4-1



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PROPOSED PROJECT PEAK HOUR VOLUMES

FIGURE 4-2

5. Project Buildout Year with Project Conditions

5.1 Level of Service Analysis

Project traffic volumes were added to the 2015 buildout year conditions (Existing plus Growth, Existing plus Growth plus Other Development) to assess potential traffic impacts. The resulting Existing plus Growth plus Project traffic volumes are shown on Figure 5-1. Existing plus Growth plus Other Development plus Project traffic volumes are shown on Figure 5-2. The study intersections were re-analyzed with these traffic volumes to determine the project's impact on peak hour intersection operations. The results of the analysis are summarized on Table 5-1 and 5-2. Table 5-1 summarizes Existing plus Growth conditions with and without project. Table 5-2 summarizes Existing plus Growth plus Other Development conditions with and without project. Tables 5-1 and 5-2 also indicate whether or not the project has a significant impact at any of the study intersections. Copies of intersection analysis worksheets are provided in Appendix C.

5.1.1 Existing plus Growth plus Project Conditions

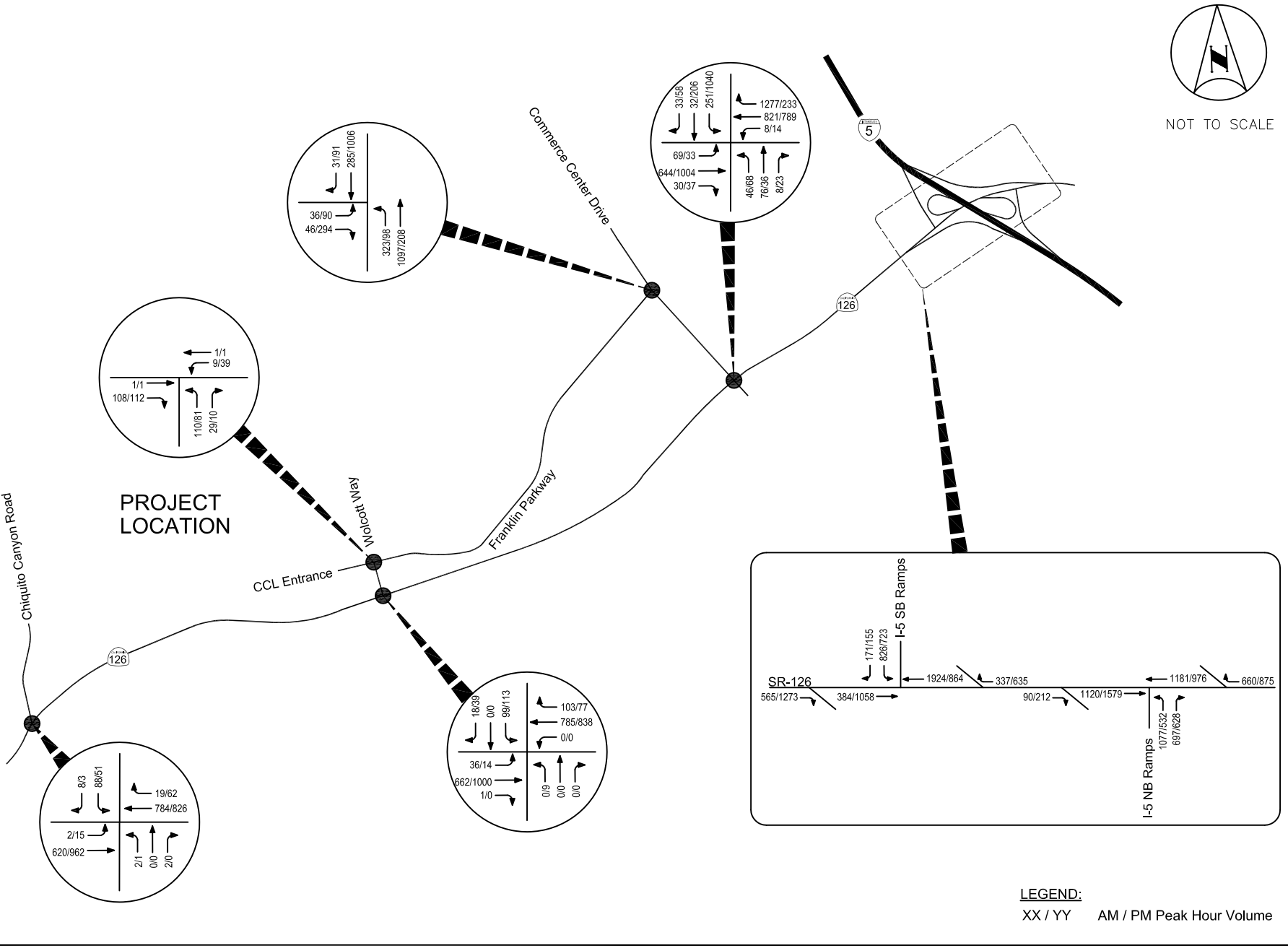
Table 5-1 shows that all study intersections will operate at LOS D or better using the ICU methodology in the Existing plus Growth plus Project condition.

Using the HCM methodology, the following intersections will operate at LOS E or worse:

- Chiquito Canyon Road @ SR-126 (two-way stop controlled, LOS F in the AM and PM)
- Commerce Center Drive @ SR-126 (signalized, LOS E in the PM)

The proposed project will have a significant impact at the intersection of Commerce Center Drive and SR-126 based on the Los Angeles County CMP guidelines (see Section 1.5 of this report). However, the intersection of Commerce Center Drive and SR-126 will still be under construction in 2015 as part of the Commerce Center Drive/SR-126 improvement project. The Commerce Center Drive/SR-126 improvement project is schedule to be complete in 2016. Upon completion, the planned improvements at this intersection (interchange) will return operations to LOS D or better in both the morning and evening peak hours. Therefore, no mitigation is required of the CCL project since mitigation measures during construction conditions would interfere with the planned staging of the Commerce Center Drive/SR-126 improvement project.

Peak hour volume traffic signal warrants indicate that signals are not warranted at Chiquito Canyon Road/SR-126 under Existing plus Growth plus Project conditions. Copies of the peak hour volume warrant worksheets are provided in Appendix D.



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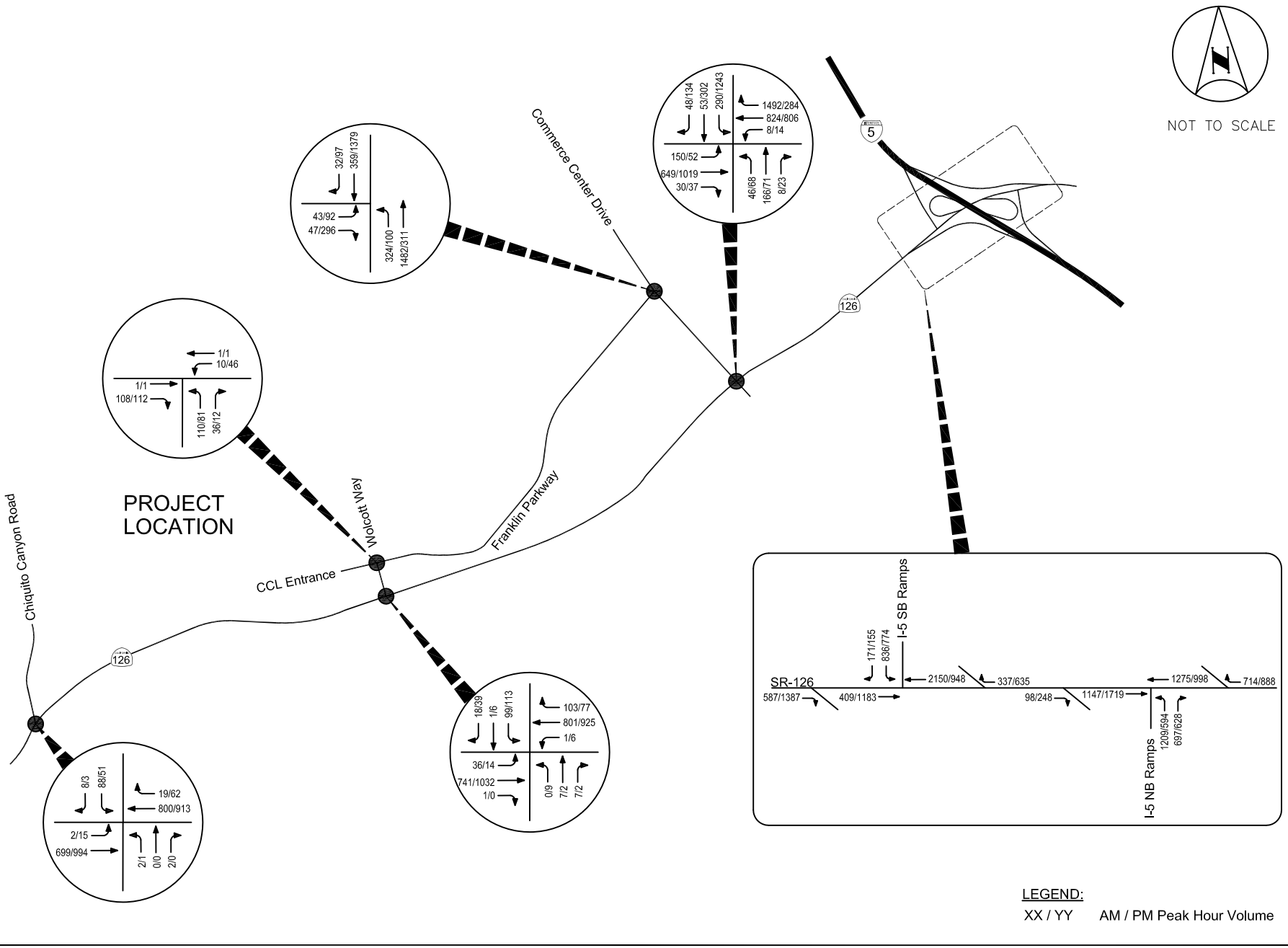
EXISTING PLUS GROWTH WITH PROJECT PEAK HOUR VOLUMES

FIGURE 5-1



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EXISTING PLUS GROWTH PLUS OTHER DEVELOPMENT WITH PROJECT PEAK HOUR VOLUMES

FIGURE 5-2

TABLE 5-1
Summary of Intersection Analysis – Existing plus Growth plus Project Conditions

			Existing plus Growth Conditions								Existing plus Growth plus Project Conditions									
			AM Peak				PM Peak				AM Peak					PM Peak				
Intersection		Control	Delay (sec/veh)	LOS	ICU	LOS	Delay (sec/veh)	LOS	ICU	LOS	Delay (sec/veh)	LOS	ICU	LOS	Significant Impact?	Delay (sec/veh)	LOS	ICU	LOS	Significant Impact?
1	Chiquito Canyon Road @ SR-126	Unsignalized*	49.7	E	0.402	A	65.9	F	0.432	A	50.8	F	0.404	A	No	68.0	F	0.433	A	No
2	Chiquita Canyon Landfill Entrance @ SR-126	Unsignalized*	25.7	D	0.369	A	45.5	E	0.439	A	Intersection does not exist with project									
3	Wolcott Way @ SR-126	Signalized	14.2	B	0.371	A	29.2	C	0.432	A	13.6	B	0.409	A	No	27.3	C	0.465	A	No
4	Commerce Center Drive @ SR-126	Signalized	27.0	C	0.546	A	71.0	E	0.852	D	28.1	C	0.568	A	No	73.9	E	0.875	D	**Yes**
5	I-5 Southbound Ramps @ SR-126	Signalized	20.6	C	0.773	C	11.8	B	0.516	A	21.1	C	0.788	C	No	12.0	B	0.531	A	No
6	I-5 Northbound Ramps @ SR-126	Signalized	26.3	C	0.556	A	26.7	C	0.443	A	26.2	C	0.570	A	No	26.5	C	0.458	A	No
7	Franklin Parkway @ Commerce Center Drive	Signalized	9.1	A	0.383	A	19.2	B	0.426	A	9.1	A	0.384	A	No	19.2	B	0.427	A	No
8	Wolcott Way @ Franklin Parkway	Unsignalized**	Intersection does not exist without project								7.8	A	0.206	A	No	8.0	A	0.199	A	No

* HCM results (delay) reported for worst stop controlled approach

** HCM results (delay) reported for overall stop controlled intersection

TABLE 5-2
Summary of Intersection Analysis – Existing plus Growth plus Other Development plus Project Conditions

			Existing plus Growth plus Other Development Conditions								Existing plus Growth plus Other Development plus Project Conditions									
			AM Peak				PM Peak				AM Peak					PM Peak				
Intersection		Control	Delay (sec/veh)	LOS	ICU	LOS	Delay (sec/veh)	LOS	ICU	LOS	Delay (sec/veh)	LOS	ICU	LOS	Significant Impact?	Delay (sec/veh)	LOS	ICU	LOS	Significant Impact?
1	Chiquito Canyon Road @ SR-126	Unsignalized*	58.7	F	0.407	A	88.9	F	0.442	A	60.3	F	0.409	A	No	90.5	F	0.443	A	No
2	Chiquita Canyon Landfill Entrance @ SR-126	Unsignalized*	27.9	D	0.374	A	55.7	F	0.449	A	Intersection does not exist with project									
3	Wolcott Way @ SR-126	Signalized	35.0	D	0.385	A	42.6	D	0.448	A	50.9	D	0.423	A	No	37.1	D	0.481	A	No
4	Commerce Center Drive @ SR-126	Signalized	36.0	D	0.667	B	97.8	F	0.949	E	37.7	D	0.689	B	No	105.8	F	0.972	E	**Yes**
5	I-5 Southbound Ramps @ SR-126	Signalized	24.0	C	0.824	D	12.6	B	0.553	A	25.4	C	0.838	D	No	12.8	B	0.566	A	No
6	I-5 Northbound Ramps @ SR-126	Signalized	27.4	C	0.603	A	26.7	C	0.478	A	27.4	C	0.618	B	No	26.5	C	0.492	A	No
7	Franklin Parkway @ Commerce Center Drive	Signalized	8.3	A	0.435	A	19.5	B	0.507	A	8.3	A	0.436	A	No	19.5	B	0.507	A	No
8	Wolcott Way @ Franklin Parkway	Unsignalized**	Intersection does not exist without project								7.7	A	0.206	A	No	8	A	0.199	A	No

* HCM results (delay) reported for worst stop controlled approach

** HCM results (delay) reported for overall stop controlled intersection

5.1.2 Existing plus Growth plus Other Development plus Project Conditions

Table 5-2 shows that all but one of the study intersections will operate at LOS D or better using the ICU methodology in the Existing plus Growth plus Other Development plus Project condition. The intersection of Commerce Center Drive and SR-126 is projected to operate at LOS E in the PM peak hour.

Using the HCM methodology, the following intersections will operate at LOS E or worse:

- Chiquito Canyon Road @ SR-126 (two-way stop controlled, LOS F in the AM and PM)
- Commerce Center Drive @ SR-126 (signalized, LOS F in the PM)

The proposed project will have a significant impact at the intersection of Commerce Center Drive and SR-126 based on the Los Angeles County CMP guidelines (see Section 1.5 of this report). However, the intersection of Commerce Center Drive and SR-126 will still be under construction in 2015 as part of the Commerce Center Drive/SR-126 improvement project. The Commerce Center Drive/SR-126 improvement project is schedule to be complete in 2016. Upon completion, the planned improvements at this intersection (interchange) will return operations to LOS D or better in both the morning and evening peak hours. Therefore, no mitigation is required of the CCL project since mitigation measures during construction conditions would interfere with the planned staging of the Commerce Center Drive/SR-126 improvement project.

Peak hour volume traffic signal warrants indicate that signals are not warranted at Chiquito Canyon Road/SR-126 under Existing plus Growth plus Other Development plus Project conditions. Copies of the peak hour volume warrant worksheets are provided in Appendix D.

6. I-5 Freeway Ramp Queuing Analysis

Queue lengths at the northbound and southbound I-5 off-ramps were examined to evaluate whether or not adequate storage is available to accommodate peak hour traffic with the proposed project. Table 6-1 reports the available I-5 northbound and southbound off-ramp storage at SR-126 and the anticipated queue lengths in the following scenarios:

- Existing Conditions
- Existing plus Growth (2015) Conditions without Project
- Existing plus Growth (2015) plus Other Development Conditions without Project
- Existing plus Growth (2015) Conditions with Project
- Existing plus Growth (2015) plus Other Development Conditions with Project

The queue lengths reported in Table 6-1 represent the 95th percentile queue length as calculated in Synchro. The worse peak hour queue length is reported.

Review of the anticipated 95th percentile queue lengths in Table 6-1 shows that the peak hour queue lengths do not exceed the available off-ramp storage in any of the five scenarios analyzed. In addition, the proposed project will only cause a slight increase (less than 10 feet) the queue length in the Existing plus Growth plus Other Development plus Project conditions (based on Synchro analysis).

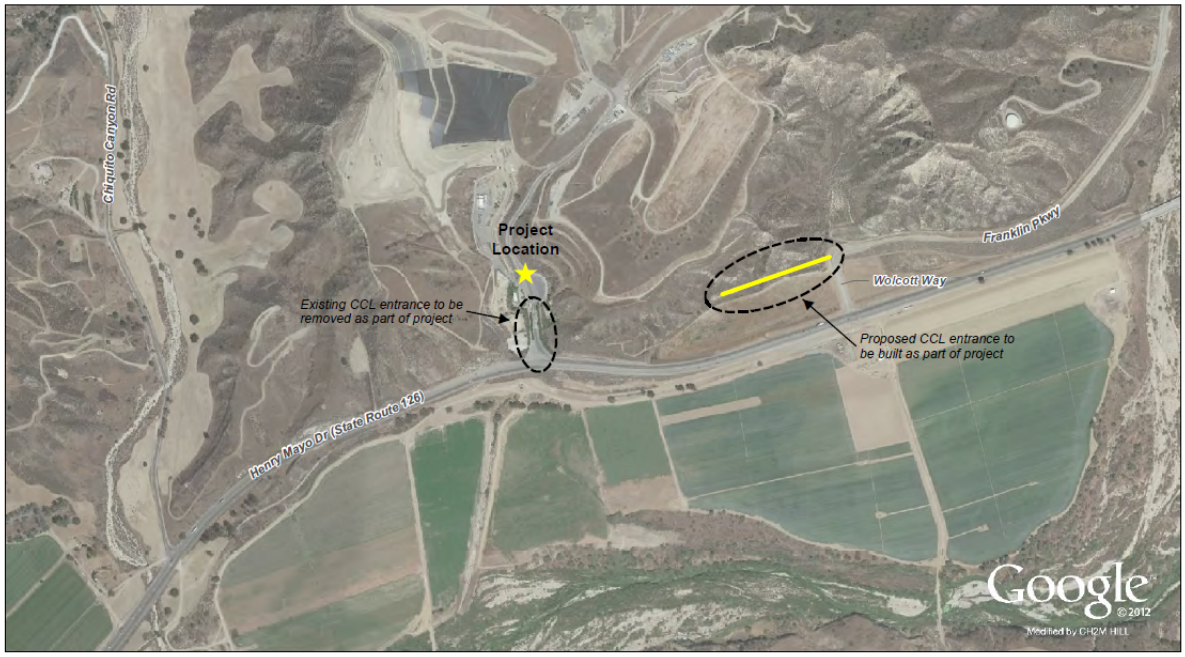
TABLE 6-1
I-5 Off-Ramp Queue Analysis at SR-126

	I-5 Southbound off-ramp and SR-126	I-5 Northbound off-ramp and SR-126
Available Off-Ramp Storage Length (ft)	1,600	1,300
Existing Conditions Queue Length (ft)	237	507
Existing plus Growth Queue Length (ft)	281	556
Existing plus Growth plus Other Development Queue Length (ft)	303	564
Existing plus Growth plus Project Queue Length (ft)	281	556
Existing plus Growth plus Other Development plus Project Queue Length (ft)	311	565

7. Project Site Entrance Queuing Analysis

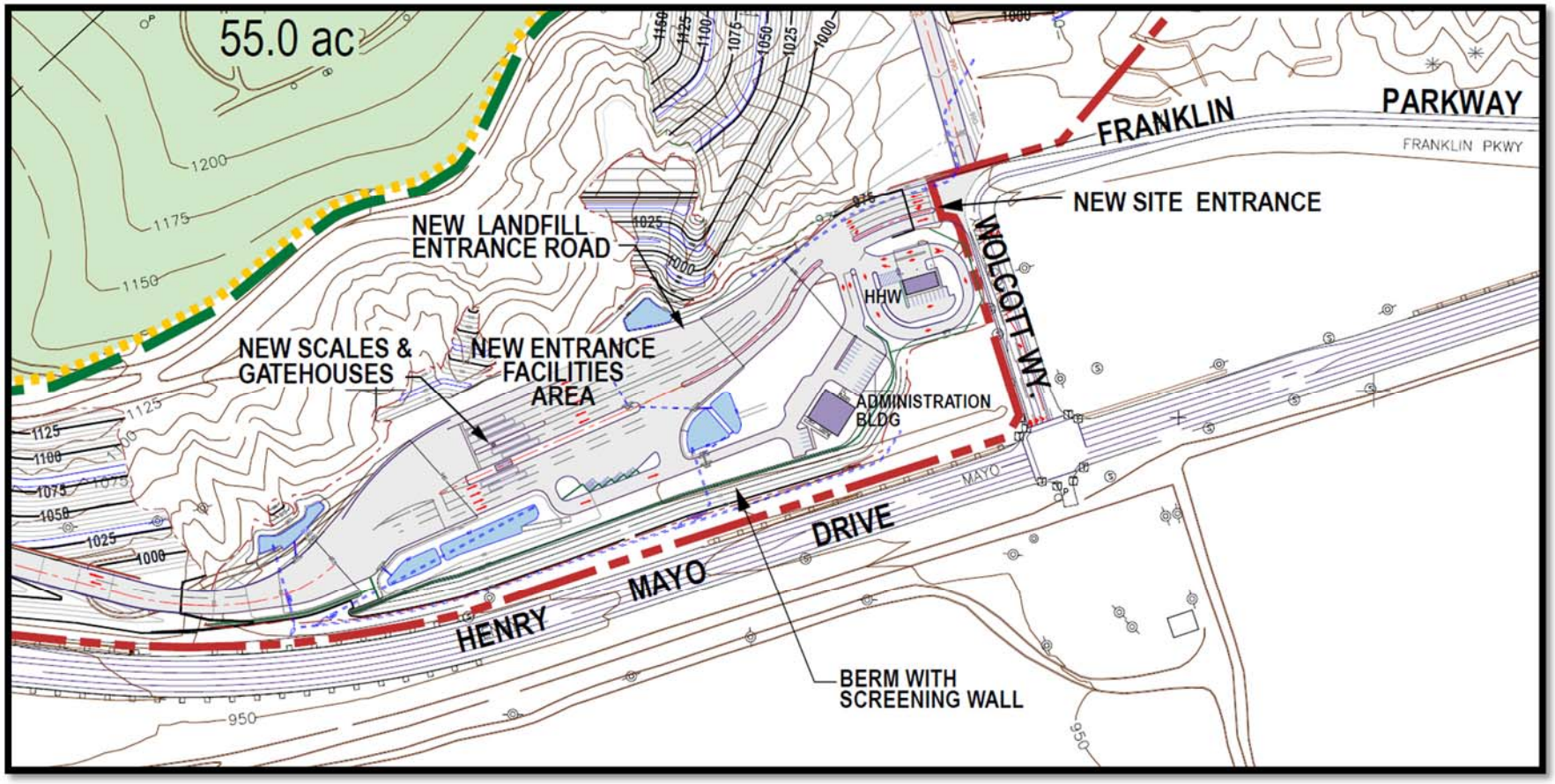
The proposed project will remove the existing CCL entrance which is currently located on SR-126 between Chiquito Canyon Road and Wolcott Way and construct a new entrance on the corner of Wolcott Way and Franklin Parkway. Figure 7-1 illustrates the location of the existing entrance and proposed entrance to CCL. Figure 7-2 illustrates a detailed plan of the proposed entrance. It is assumed that the new entrance will operate as an all-way stop controlled intersection at Wolcott Way and Franklin Parkway.

FIGURE 7-1
Location of Existing and Proposed CCL Entrance



The new entrance of the CCL facility will bring vehicles to the site from Wolcott Way/Franklin Parkway. Vehicles will enter the site and drive westbound to the scales and gatehouses located approximately 900 feet west of the intersection of Wolcott Way and Franklin Parkway.

FIGURE 7-2
Proposed CCL Entrance Plan



7.1 Main Entrance

Queuing calculations were done for the main entrance to ensure that projected CCL traffic will not queue through the Wolcott Way/Franklin Parkway intersection. The following factors were used in the queue calculations:

- The distance between the Wolcott Way and the limit line where vehicles must wait to enter the scales is 900 feet.
- There are two lanes of storage between the limit line where vehicles must wait to enter the scales and Wolcott Street (site entrance). These two lanes provide a total of 1,800 feet of storage.
- There is a third lane that extends from the limit line to approximately 480 feet east.
- There is a fourth lane that extends from the limit line to approximately 290 feet east.
- There is a fifth lane that extends from the limit line to approximately 200 feet east.
- There is a sixth lane that extends from the limit line to approximately 130 feet east.
- The combined storage of these four lanes is 2,900 feet.
- The average vehicle length is assumed to be 50 feet (truck).
- The proposed entrance can store 58 vehicles (50 feet per vehicle) at any given time.
- Based on historical gate receipt data, the average wait time at the scales is one minute per vehicle.
- The proposed entrance will have four scales on opening day. Each scale can process 60 vehicles per hour based on historical data. This will allow the CCL entrance to process approximately 240 vehicles per hour (4 vehicles per minute).
- CCL is permitted to be open 24 hours per day, 6 days per week. This gives CCL the operational flexibility to coordinate with customers and truck arrival times and can arrange to be open when loads are anticipated. Therefore, there are never extended periods of time when vehicles would not be processed through the scales and forced to queue without release. Table 4-4 shows that historically there are no trips between 5:00 PM and 10:00 PM. This is because CCL customers have historically not arranged to bring loads during this time. If needed, CCL would serve customers during this time as well.
- The vehicle arrival rate is typically spread out over the course of each hour. However, a peak 15-minute analysis was completed to analyze a worst-case scenario. A peak hour factor (PHF) of 0.95 was used to generate the anticipated peak 15-minute arrival rate. The PHF of 0.95 was chosen because this is consistent with the PHF observed on SR-126 in the study area during the peak periods (see Appendix B). This type of analysis will project the worst-case queue length at the CCL entrance.

Based on the factors above, queue calculations were done for the projected CCL traffic that will arrive over the course of a typical day. Table 7-1 summarizes the results of the queue calculations. The analysis shows that the storage provided at the new CCL entrance will be able to accommodate the projected number of vehicles arriving to the site throughout the day. In addition, the peak 15-minute analysis shows that the provided storage will also accommodate the peak periods within each hour and not queue through the Wolcott Way/Franklin Parkway intersection. Therefore, the proposed CCL entrance will provide enough storage to accommodate projected CCL traffic without queuing onto public roadways.

Intersection spacing on Wolcott Way between Franklin Parkway and SR-126 was also evaluated to assess the available storage for queuing on Wolcott Way. When the proposed CCL entrance is constructed, there will be approximately 450 feet of storage on Wolcott Way between SR-126 and Franklin Parkway/CCL entrance. Peak hour intersection analysis shows that the northbound queue at Wolcott Way/Franklin Parkway and the southbound queue at Wolcott Way/SR-126 will not exceed 100 feet in either peak hour. Therefore, there is adequate storage on Wolcott Way to accommodate the increase in traffic due to the proposed CCL entrance.

7.2 Household Hazardous Waste Facility Entrance

As shown in Figure 7-2, the project will build a Household Hazardous Waste (HHW) facility located immediately south of the main entrance to CCL (west of Wolcott Way). Drivers will enter the CCL main entrance and turn left to enter the HHW facility through a two-way driveway located immediately west of Wolcott Way. Upon completion of their drop-off at the HHW facility, drivers will exit through the same driveway they came in and turn right to exit through the CCL main driveway.

Queuing calculations were also done for the HHW facility driveway to determine how many vehicles the HHW facility can accommodate on a typical event day without queuing through the CCL main entrance. The following factors were used in the queue calculations:

- The HHW facility will be a permanent center which offers a twice a month service, between the hours 9 AM and 3 PM (off-peak hours of the surrounding roadway network).
- It is assumed that the peak arrival period will occur between 9 and 11 AM.
- It takes approximately 10 minutes per car to unload.
- The entrance driveway for the HHW facility provides 680 feet of storage.
- The average vehicle length is assumed to be 25 feet (passenger car).
- The proposed entrance can store 27 vehicles (25 feet per vehicle) at any given time.

TABLE 7-1
Summary of Queuing Analysis at Proposed CCL Main Entrance

Time of Day	(A) Hourly Processing Rate (veh/hour)*	(B) Total Inbound Vehicles per hour	Will Queue Exceed Storage (Is B > A)?	(C) Peak 15-Minute Processing Rate (veh/15-minute)**	(D) Total Inbound Vehicles per peak 15 minutes***	Will Queue Exceed Storage (Is D > C)?
12:00 AM to 1:00 AM	240	10	No	60	3	No
1:00 AM to 2:00 AM	240	7	No	60	2	No
2:00 AM to 3:00 AM	240	17	No	60	4	No
3:00 AM to 4:00 AM	240	24	No	60	6	No
4:00 AM to 5:00 AM	240	73	No	60	19	No
5:00 AM to 6:00 AM	240	73	No	60	19	No
6:00 AM to 7:00 AM	240	66	No	60	17	No
7:00 AM to 8:00 AM	240	94	No	60	25	No
8:00 AM to 9:00 AM	240	104	No	60	27	No
9:00 AM to 10:00 AM	240	142	No	60	37	No
10:00 AM to 11:00 AM	240	198	No	60	52	No
11:00 AM to 12:00 PM	240	163	No	60	43	No
12:00 PM to 1:00 PM	240	118	No	60	31	No
1:00 PM to 2:00 PM	240	111	No	60	29	No
2:00 PM to 3:00 PM	240	132	No	60	35	No
3:00 PM to 4:00 PM	240	125	No	60	33	No
4:00 PM to 5:00 PM	240	108	No	60	28	No
5:00 PM to 6:00 PM	240	0	No	60	0	No
6:00 PM to 7:00 PM	240	0	No	60	0	No
7:00 PM to 8:00 PM	240	0	No	60	0	No
8:00 PM to 9:00 PM	240	0	No	60	0	No
9:00 PM to 10:00 PM	240	0	No	60	0	No
10:00 PM to 11:00 PM	240	38	No	60	10	No
11:00 PM to 12:00 AM	240	35	No	60	9	No

* Number of 50-foot vehicles that can be processed per hour at CCL entrance without queueing.

** Number of 50-foot vehicles that can be processed per 15-minutes at CCL entrance without queueing.

*** Assumes a peak hour factor of 0.95 to calculate the peak 15-minute arrival rate.

Indicates peak arrival rate of CCL.

- The proposed drop-off area has two lanes and can process six cars at one time (three cars in each lane). Given the average unload time of 10 minutes per car, the drop-off area can process 36 cars per hour.

Table 7-2 summarizes the results of the queue calculations. The analysis shows that the HHW facility can accommodate up to 243 vehicles on a typical event day without queuing through the CCL main entrance driveway.

It is important to note that if the HHW facility event day occurs on a weekday, the HHW facility traffic will mix with the CCL truck traffic as they both enter the project site. As shown in Figure 7-2, the left-turn pocket into the HHW facility will ensure that HHW traffic does not block truck traffic entering the site and continuing west to the CCL scales. Based on the queueing analysis summarized in Table 7-1, it can also be concluded that truck traffic is not projected to queue and block the entrance to the HHW facility since the number of projected trucks entering CCL will never exceed the service rate at the scales.

TABLE 7-2
Summary of Queuing Analysis at Proposed CCL HHW Facility Entrance

Time of Day	Arrival Rate (veh per 10 mins)	Processing Rate (veh per 10 mins)	Queue at end of this period (veh)	Queue at end of this period (ft)	Available Storage (ft)	Will Demand Exceed Storage?
9:10 AM	7	6	1.0	25	680	No
9:20 AM	7	6	2.0	50	680	No
9:30 AM	8	6	4.0	100	680	No
9:40 AM	8	6	6.0	150	680	No
9:50 AM	8	6	8.0	200	680	No
10:00 AM	8	6	10.0	250	680	No
10:10 AM	8	6	12.0	300	680	No
10:20 AM	8	6	14.0	350	680	No
10:30 AM	8	6	16.0	400	680	No
10:40 AM	8	6	18.0	450	680	No
10:50 AM	8	6	20.0	500	680	No
11:00 AM	8	6	22.0	550	680	No
11:10 AM	7	6	23.0	575	680	No
11:20 AM	7	6	24.0	600	680	No
11:30 AM	7	6	25.0	625	680	No
11:40 AM	7	6	26.0	650	680	No
11:50 AM	7	6	27.0	675	680	No
12:00 PM	6	6	27.0	675	680	No
12:10 PM	6	6	27.0	675	680	No
12:20 PM	6	6	27.0	675	680	No
12:30 PM	6	6	27.0	675	680	No
12:40 PM	6	6	27.0	675	680	No
12:50 PM	6	6	27.0	675	680	No
1:00 PM	6	6	27.0	675	680	No
1:10 PM	6	6	27.0	675	680	No
1:20 PM	6	6	27.0	675	680	No
1:30 PM	6	6	27.0	675	680	No
1:40 PM	6	6	27.0	675	680	No
1:50 PM	6	6	27.0	675	680	No
2:00 PM	6	6	27.0	675	680	No
2:10 PM	6	6	27.0	675	680	No
2:20 PM	6	6	27.0	675	680	No
2:30 PM	6	6	27.0	675	680	No
2:40 PM	6	6	27.0	675	680	No
2:50 PM	6	6	27.0	675	680	No
3:00 PM	6	6	27.0	675	680	No
Total Number of Vehicles	**243**	**Maximum Queue Legth (ft)**		**675**	**Will Queue Exceed Storage**	**No**

8. Project Features on Wolcott Way/Franklin Parkway

8.1 Project Entrance and Wolcott Way/Franklin Parkway Intersection

The project proposes to install an all-way stop controlled intersection at the new project entrance and the corner of Wolcott Way and Franklin Parkway. An analysis based on the Manual on Uniform Traffic Control Devices (MUTCD) multi-way stop control methodology was done for this proposed intersection. The MUTCD multi-way stop control methodology consists of warrants based on eight-hour minimum volumes, collision history and other criteria such as limited sight distance at the intersections. The MUTCD multi-way stop warrant was not included in the signed MOU with the County of Los Angeles Traffic and Lighting Division staff. Therefore, the necessary data to conduct the multi-way stop warrant was not collected for the study (i.e., crash data, eight consecutive hours of traffic and pedestrian data, and speed study data along Wolcott Way and Franklin Parkway). However, the MUTCD states the following optional criteria that can be used to meet the multi-way stop warrant:

A. The need to control left-turn conflicts;
B. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;
C. Locations where a road user, after stopping, cannot see conflicting traffic and is not able to negotiate the intersection unless conflicting cross traffic is also required to stop; and
D. An intersection of two residential neighborhood collectors (through) streets of similar design and operating characteristics where multi-way stop control would improve traffic operational characteristics of the intersection.

Figure 7-2 (presented previously) illustrates the proposed configuration of the new project entrance and the Wolcott Way/Franklin Parkway intersection. The proposed project entrance will essentially create a T-intersection with Wolcott Way and Franklin Parkway (the driveway shown to the north is a future leg of the intersection that will be built at a later date). Because of the geometry, several movements will have difficulty seeing conflicting movements (i.e., traffic travelling westbound on Franklin Parkway will not be able to see traffic making a northbound left-turn from Wolcott Way until they arrive at the intersection). This satisfies optional criteria C (listed above) of the MUTCD multi-way stop warrant. Therefore, it is recommended that the proposed project entrance and Wolcott Way/Franklin Parkway Intersection be built as an all-way stop controlled intersection.

8.2 Improvements along Wolcott Way and Franklin Parkway

As part of the project improvements, striping and signing changes will be made along the northbound approach on Wolcott Way and the westbound approach along Franklin Parkway. These striping/signing modifications will provide the configuration shown in Figure 7-2 (lane assignment, limit lines, stop signs, and guidance signs). No additional improvements will be made on Wolcott Way or Franklin Parkway as part of the project.

9. Traffic Index Calculations

The traffic index (TI) is a measure of the deteriorating effects that truck traffic has on asphalt concrete pavement. TI calculations were performed along Wolcott Way and SR-126 for the project. TI calculations were performed in accordance with the *County of Los Angeles Department of Public Works, Traffic Index Guidelines* (Traffic and Lighting Division, June 2002). 10-year TI calculations were performed for both Wolcott Way and SR-126 in the study area. Table 9-1 summarizes the 10-year TI calculations for 2014 conditions with and without the project. Table 9-2 summarizes the 20-year TI calculations for 2014 conditions with and without the project. These comparisons help understand the effect the proposed project traffic will have on pavement deterioration. TI worksheets are provided in Appendix F.

TABLE 9-1
Summary of 10-Year TI Calculations

Roadway	10-Year TI based on 2014 without Project Volumes	10-Year TI based on 2014 with Project Volumes
SR-126 between Wolcott Way and Commerce Center Drive	12.0	12.0
Wolcott Way between SR-126 and Franklin Parkway	7.5	9.0

TABLE 9-2
Summary of 20-Year TI Calculations

Roadway	20-Year TI based on 2014 without Project Volumes	20-Year TI based on 2014 with Project Volumes
SR-126 between Wolcott Way and Commerce Center Drive	13.5	13.5
Wolcott Way between SR-126 and Franklin Parkway	8.0	10.0

The TI calculations show that the proposed project will have no effect on the 10-year or 20-year TI's for SR-126. The increase in truck traffic on SR-126 with the proposed project is minimal compared to the amount of truck traffic already using SR-126. On Wolcott Way, the proposed project will increase the 10-year TI from 7.5 to 9.0 and the 20-year TI from 8.0 to 10.0. This is expected because the location of the new project entrance will increase the amount of truck traffic on Wolcott Way.

APPENDIX A
LOS ANGELES COUNTY TRAFFIC STUDY MEMORANDUM OF UNDERSTANDING

SCOPING FOR TRAFFIC STUDY

Project Name:	Chiquita Canyon Landfill Master Plan Revision

This Memorandum of Understanding (MOU) acknowledges Los Angeles County Department of Public Works, Traffic and Lighting Division (TLD) requirements of traffic impact analysis for the project and is subject to change:

Project Address:	29201 Henry Mayo Drive, Castaic, CA 91384		
Project Description:	The Chiquita Canyon Landfill (CCL) Master Plan Revision (Proposed Project) would extend the waste footprint at CCL by approximately 143 acres, better utilize the landfill's remaining and potential disposal capacity, and allow for the disposal of all nonhazardous wastes acceptable at a Class III solid waste disposal landfill. The Proposed Project would also include the continued diversion of such materials as green waste, asphalt/concrete, and metal through ongoing landfill waste diversion programs on which numerous jurisdictions depend to comply with state-mandated waste diversion goals.		
City:	Castaic		
Project Buildout Year:	2014	**Ambient or CMP Growth Rate per Year:**	2.75%
Closest Intersection (Xtn) to the Project: SR-126/Chiquita Canyon Landfill Entrance			
Xtn N/S Street Name:	Chiquita Canyon Landfill Entrance		
Xtn E/W Street Name:	SR-126		
Thomas Guide Pg+Grid:	4549, D2	**Los Angeles County Supervisorial District:**	5

	Consultant	Developer
Company:	CH2M HILL	
Name:	Jim Roldan	
Address:	6 Hutton Centre Drive, Suite 700	
City, State, Zip Code:	Santa Ana, CA 92707	
Phone #:	714-435-6225	
Fax #:	714-424-2187	
Email:	jim.roldan@ch2m.com	

By: J. Roldan **Reviewed By:**

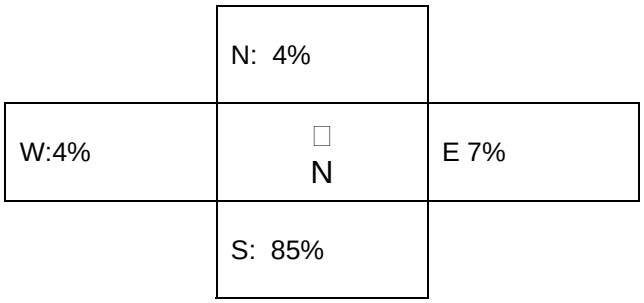
Print Name: JIM ROLDAN, CH2MHILL **Print Name:**

SCOPING FOR TRAFFIC STUDY

Project Name:	Chiquita Canyon Landfill Master Plan Revision

Consultant/Developer's Representative	**Date**	**TLD's Representative**	**Date**

1. Traffic Distribution: Figure(s) illustrating project trip distribution in percentages and volumes at the studied intersections analyzed.



SEE ATTACHED TRIP DISTRIBUTION ON FIGURE 1 FOR GREATER DETAIL. TRAFFIC DISTRUBUTIONS ARE BASED ON HISTORICAL GATE RECEIPT INFORMATION PROVIDED BY CCL.

Trip Credit: Exact amount of credit subject to approval by TLD.

Transportation Demand Management (TDM)	NO	
Existing Active Land Use	YES	Trip generation numbers in this MOU only reflect the net new trips. Existing land use trips accounted for in existing/background data.
Previous Land Use	NO	
Internal Trip Reduction	NO	
Pass-by Trip Reduction	NO	

Project Name:	Chiquita Canyon Landfill Master Plan Revision

2. Trip Generation

In addition to traffic at CCL that results from incoming waste, there are several other sources of in- and outbound traffic at CCL. A wide variety of material that is diverted from the waste stream is accepted at CCL for other uses, including alternative daily cover, road base, compost, and erosion control material. Material from CCL, including clean soil, compost products, and recycled materials, may also be trucked from the site to other locations. Additionally, periodic cell construction occurs at CCL, during which time additional traffic related to construction occurs. Table 1 details the potential maximum daily traffic volume at CCL under Baseline Conditions. Table 2 details the potential maximum daily traffic volume at CCL under Proposed Project Conditions. Table 3 details the potential maximum daily net new trips of the Proposed Project (i.e., Proposed Project minus Baseline Project). Although Tables 1 through 3 are based on historical records for different vehicle and material types, it does not represent a specific day.

AM and PM peak hour project trips (net new trips) will be developed in the traffic report to reflect the peak of the surrounding network system. Project peak hour trips will represent a percentage of the daily trips summarized in Table 3 and will be based on historical time of day data collected at CCL (i.e., CCL gate receipts).

SCOPING FOR TRAFFIC STUDY

Project Name:	Chiquita Canyon Landfill Master Plan Revision

Table 1
Summary of Baseline Peak Potential Daily
Inbound and Outbound Traffic
Chiquita Canyon Landfill

Traffic Source	Number of Vehicles Peak Potential Daily[a,b]	Number of Vehicles Peak Potential Daily - PCE	Number of Trip Ends Peak Potential Daily - PCE
Inbound			
Trash (Disposal)[c]			
Transfer	273	546	1092
Route	300	600	1200
Roll-offs	460	920	1840
Self Haul	500	500	1000
Other Materials (Beneficial Reuse)			
Shredded Curbside Green Waste	40	80	160
Clean Soil	200	400	800
Contaminated Soil[d]			
Large Trucks	300	600	1200
10-Wheelers	60	120	240
Protective Cover			
TASW	200	400	800
MRF Fines	40	80	160
Tire Shred	15	30	60
C&D Fines	25	50	100
Road Base			
Concrete	50	100	200
Asphalt	50	100	200
Processed C&D Material	30	60	120
Composting[e]	55	110	220
Outbound			
Clean Soil	100	200	400
Compost Products	8	16	32
Other	25	50	100
Special Projects[f]			
Cell Construction			
Mobilize/Demobilize Traffic	20	20	40
Contractor Employees	80	80	160
Employees			
Landfill – Permanent	34	34	68
Landfill – Temporary	25	25	50
LFGTE Plant	2	2	4
Transfer Drivers	4	4	8
Total	**2,896**	**5,127**	**10,254**

Notes:
[a] These numbers are one-way trips and based on 5
[b] The maximum number of trash vehicles in each category does not happen simultaneously. The daily
[c] Regardless of actual vehicle mix, incoming waste tonnage would not exceed 6,000 tons per day per
[d] Contaminated soils may also be disposed and not
[e] The existing CUP allows for operation of up to a 560-tons-per-day composting facility for windrow or
[f] These projects occur periodically. Typically once
TASW = treated auto shredder waste

Table 2
Summary of Proposed Peak Potential Daily
Inbound and Outbound Traffic
Chiquita Canyon Landfill

Traffic Source	Number of Vehicles Peak Potential Daily[a,b]	Number of Vehicles Peak Potential Daily - PCE	Number of Trip Ends Peak Potential Daily - PCE
Inbound			
Trash (Disposal)[c]			
Transfer	545	1090	2180
Route	600	1200	2400
Roll-offs	460	920	1840
Self Haul	500	500	1000
Other Materials (Beneficial Reuse)			
Shredded Curbside Green Waste	40	80	160
Clean Soil	200	400	800
Contaminated Soil[d]			
Large Trucks	300	600	1200
10-Wheelers	60	120	240
Protective Cover			
TASW	200	400	800
MRF Fines	40	80	160
Tire Shred	15	30	60
C&D Fines	25	50	100
Road Base			
Concrete	50	100	200
Asphalt	50	100	200
Processed C&D Material	30	60	120
Composting[e]	55	110	220
Outbound			
Clean Soil	100	200	400
Compost Products	8	16	32
Other	25	50	100
Special Projects[f]			
Cell Construction			
Mobilize/Demobilize Traffic	20	20	40
Contractor Employees	80	80	160
Employees			
Landfill – Permanent	55	55	110
Landfill – Temporary	25	25	50
LFGTE Plant	3	3	6
Transfer Drivers	4	4	8
Total	**3,490**	**6,293**	**12,586**

Notes:
[a] These numbers are one-way trips and based on 5
[b] The maximum number of trash vehicles in each category does not happen simultaneously. The daily
[c] Regardless of actual vehicle mix, incoming waste tonnage would not exceed 12,000 tons per day.
[d] Contaminated soils may also be disposed and not
[e] The existing CUP allows for operation of up to a 560-tons-per-day composting facility for windrow or
[f] These projects occur periodically. Typically once

Table 3
Summary of Proposed Net New Peak Potential
Daily Inbound and Outbound Traffic
Chiquita Canyon Landfill

Traffic Source	Number of Vehicles Peak Potential Daily[a,b]	Number of Vehicles Peak Potential Daily - PCE	Number of Trip Ends Peak Potential Daily - PCE
Inbound			
Trash (Disposal)[c]			
Transfer	272	544	1088
Route	300	600	1200
Roll-offs	0	0	0
Self Haul	0	0	0
Other Materials (Beneficial Reuse)			
Shredded Curbside Green Waste	0	0	0
Clean Soil	0	0	0
Contaminated Soil[d]			
Large Trucks	0	0	0
10-Wheelers	0	0	0
Protective Cover			
TASW	0	0	0
MRF Fines	0	0	0
Tire Shred	0	0	0
C&D Fines	0	0	0
Road Base			
Concrete	0	0	0
Asphalt	0	0	0
Processed C&D Material	0	0	0
Composting[e]	0	0	0
Outbound			
Clean Soil	0	0	0
Compost Products	0	0	0
Other	0	0	0
Special Projects[f]			
Cell Construction			
Mobilize/Demobilize Traffic	0	0	0
Contractor Employees	0	0	0
Employees			
Landfill – Permanent	21	21	42
Landfill – Temporary	0	0	0
LFGTE Plant	1	1	2
Transfer Drivers	0	0	0
Total	**594**	**1,166**	**2,332**

Notes:
[a] These numbers are one-way trips and based on 5
[b] The maximum number of trash vehicles in each category does not happen simultaneously. The daily
[c] Regardless of actual vehicle mix, incoming waste tonnage would not exceed 12,000 tons per day.
[d] Contaminated soils may also be disposed and not
[e] The existing CUP allows for operation of up to a 560-tons-per-day composting facility for windrow or
[f] These projects occur periodically. Typically once

SCOPING FOR TRAFFIC STUDY

Project Name:	Chiquita Canyon Landfill Master Plan Revision

3. Study Intersections: At minimum, the study shall include the following intersections. The list is subject to change after related projects, trip generation and distribution are determined. Consultant should check with adjoining Cities regarding their requirements in addition to the following County/City intersections. Documentation of the consultation from these agencies shall be included in the traffic study.

Xtn #	% County	Thomas Guide Page+Grid	N/S/E/W Street Name	City	Signalized	CMP
1	0%	4549, C3	Chiquito Canyon Road @ SR-126	LA County	NO	YES
2	0%	4549, D2	CCL Entrance @ SR-126	LA County	NO	NO
3	0%	4549, F2	Wolcott Way @ SR-126	LA County	YES	NO
4	0%	4549, H1	Commerce Center Drive @ SR-126	LA County	YES	NO
5	0%	4459, J7	I-5 SB Ramps @ SR-126	LA County	YES	NO
6	0%	4460, A6	I-5 NB Ramps @ SR-126	Santa Clarita	YES	NO
7	100%	4549, F2	Wolcott Way @ Franklin Parkway (future project entrance)	LA County	NO	NO
8	100%	4549, H1	Franklin Parkway @ Commerce Center Drive	LA County	YES	NO
9						
10						

Cites to be consulted: Santa Clarita and CALTRANS

SCOPING FOR TRAFFIC STUDY

Project Name:	Chiquita Canyon Landfill Master Plan Revision

4. Related Projects: Consultant should check with Los Angeles County Department of Regional Planning and planning departments of adjoining Cities. Documentation of the consultation from these agencies shall be included in the traffic study. Related projects list shall be submitted to TLD for our review and approval before being incorporated in the study.

5. Congested Management Program (CMP): A CMP TIA is required for all projects required to prepare an Environmental Assessment based on local determination or projects requiring a traffic study. Where the project meets the criteria established in the Transportation Impact Analysis (TIA section of the County of Los Angeles' CMP TIA Land Use Analysis Guidelines, a CMP analysis must be prepared. At a minimum, the geographic area examined in the TIA must include the following:

- All CMP arterial monitoring intersections (see Appendix A, exhibit A-2, page A-15 of the 2002 Guidelines), including freeway on- or off-ramp intersections, where the proposed project will add 50 or more trips during either the a.m. or p.m. peak hours.
- Main line freeway monitoring locations (see Chapter 2, exhibit 2-4, page 16 of the 2002 Guidelines) where the project will add 150 or more trips, in either direction, during the a.m. or p.m. weekday peak hours.

A copy of the 2002 CMP Land Use Analysis Guidelines can be obtained by calling the CMP Hotline at (213) 922-2830.

6. Freeway Analysis: The potential traffic impact on the following Freeway(s) must be considered.

Queuing analysis at the I-5 SB Ramps/SR-126 and I-5 NB Ramp/SR-126 intersections

will be included in the analysis.

The applicant shall consult with the State of California Department of Transportation (Caltrans) to determine the California Environmental Quality Act levels of significance with regard to traffic impacts on Caltrans' freeway facilities. This consultation shall also include a determination of Caltrans requirements for the study of traffic impacts to its facilities and the mitigation of any such impacts. This analysis must follow the most current Caltrans' Guide for the Preparation of Traffic Impact Studies (December 2002) and can be obtained from http://www.dot.ca.gov/hq/traffops/developserv/operationalsystems/reports/tiguide.pdf. If Caltrans finds that the project has a significant impact on the freeway, Caltrans shall be requested to include the basis for this finding in their response. If fees are proposed to mitigate the freeway impact, Caltrans shall be requested to identify the specific project to which the fees will apply. These written comments from Caltrans shall be included with the traffic study and submitted to Public Works for review and approval. If a documented good faith effort is made to consult with Caltrans and written comments cannot be obtained from within a reasonable amount of time, an analysis of the freeway impact shall be made using the County of Los Angeles' CMP Land Use Analysis Guidelines.

SCOPING FOR TRAFFIC STUDY

Project Name:	Chiquita Canyon Landfill Master Plan Revision

7. Other:

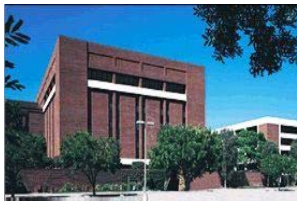
Traffic counts may be conducted immediately per the following:
• Must be taken on Tuesdays, Wednesdays or Thursdays.
• Must exclude holidays, and the first weekdays before and after the holiday.
• Must be taken on days when local schools or colleges are in session.
• Must be taken on days of good weather, and avoid atypical conditions (e.g., road construction, detours, or major traffic incidents).
• Traffic counts used for other traffic studies in the area shall **NOT** be reused again, unless 25% of the counts conducted for that particular traffic study are validated with new counts. The difference in volumes between the old and new counts at each corresponding movement should not be more than 10%.
• New traffic counts shall be checked to ensure the difference in volumes at corresponding approaches, if applicable, between two adjacent intersections is no more than 10% unless the difference can be justified.
For all proposed mitigation measures, a conceptual plan for the improvements shall be submitted to our Traffic Studies section for review and approval prior to the approval of the Traffic Impact Analysis. All proposed improvements shall be within the right-of-way.
For all cumulative mitigation measures, a cost estimate for the improvement shall be submitted.
Traffic Indices Calculations shall be conducted along Wolcott Way and SR-126
On-sites as well as I-5 Off Ramp and SR-126 Queuing Analyses shall be included in the Traffic Impact Analysis

This analysis must follow the most current Traffic Impact Analysis Report Guidelines.

SCOPING FOR TRAFFIC STUDY

Project Name:	Chiquita Canyon Landfill Master Plan Revision

Please return signed page 1 of 9 in person, by Mail or by Fax

In Person	By Mail
Los Angeles County Department of Public Works Traffic and Lighting Division, **Traffic Studies Section, Traffic Studies Unit** **1000 South Fremont Avenue** **Building A-9E, 4th Floor** **Alhambra, CA 91803-8800** **Our building, on the left with parking structure on the right.** **Check the following web site, for additional information:** **http://www.thealhambra.net** 	**Los Angeles County Department of Public Works** **Traffic and Lighting Division,** **Traffic Studies Section, Traffic Studies Unit** **P.O. Box 1460** **Alhambra, CA 91802-1460**

By Fax

	Processing Engineer	Telephone No.	Fax No.	E-Mail Address
	Jeffrey PLETYAK	(626) 300-4721	(626) 300-4736	JPlety@dpw.lacounty.gov
	Suen Fei LAU	(626) 300-4820		SFLau@dpw.lacounty.gov
	Gerald LEY	(626) 300-4822		GLey@dpw.lacounty.gov
	Thanh LE	(626) 300-4730		TLe@dpw.lacounty.gov
	Diran YANIKIAN	(626) 300-4756		DYanikian@dpw.lacounty.gov
	Lindsay SAGORSKI	(626) 300-4784		LSagorski@dpw.lacounty.gov
	Isaac WONG	(626) 300-4796		IsWong@dpw.lacounty.gov
	Virgilio (Gil) LAZATIN	(626) 300-4866		VLazatin@dpw.lacounty.gov

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
TRAFFIC AND LIGHTING DIVISION
APPLICATION FOR ENVIRONMENTAL IMPACT REPORT
TRAFFIC STUDY REVIEW SERVICES, ORDINANCE NO. 91-0101

Road Fund No:	B03	Revenue Source	9254	Program No:	R291

Department Receipt No.:		**Date:**	
Project No.:	R2004-00559-(5)	**Studies No.:**	
Project Name:	Chiquita Canyon Landfill Master Plan Revision		
Applicant/Engineer:	Chiquita Canyon Landfill LLC	**Telephone No.:**	(661) 257-3655
Company:		**Fax No.:**	
Address:	29201 Henry Mayo Drive		
City, State:	Castaic, CA	**Zip:**	91384

The traffic study (TS), required as part of the environmental review process, has been received. **Before a traffic study review can begin, the indicated fee must be paid to this Department.** The fee may be paid in person or mailed to:

In Person	By Mail
Cashier, Mezzanine Level (626) 458-6399 **Los Angeles County Department of Public Works** **900 South Fremont Avenue** **Alhambra, CA 91803-1331**	**Cashier, Mezzanine Level** **Los Angeles County Department of Public Works** **P.O. Box 1460** **Alhambra, CA 91802-1460**

Please **return this form** along with your payment to insure proper credit to your account. Make check payable to the **Los Angeles County Department of Public Works.**

TS review fees are based on the number of Average Daily Trips (ADT's) generated by the project and for six traffic conditions as indicated on page 5 of our 1997 guidelines, as follows:

ADT's	**FEE (Effective March 1, 2012)*
1 - 1,000	**$1,662**
1,001 - 5,000	**$3,322**
5,001 - 10,000	**$4,154**
10,001 and over	**$4,984**
ADT For This Project:	Fee:

* For additional information, http://planning.co.la.ca.us/
** Additional fee is required for additional traffic conditions/phases

Processing Engineer	Telephone No.	Fax No.	E-Mail Address
Jeffrey PLETYAK	(626) 300-4721	(626) 300-4736	JPlety@dpw.lacounty.gov
Suen Fei LAU	(626) 300-4820		SFLau@dpw.lacounty.gov
Gerald LEY	(626) 300-4822		GLey@dpw.lacounty.gov
Thanh LE	(626) 300-4730		TLe@dpw.lacounty.gov
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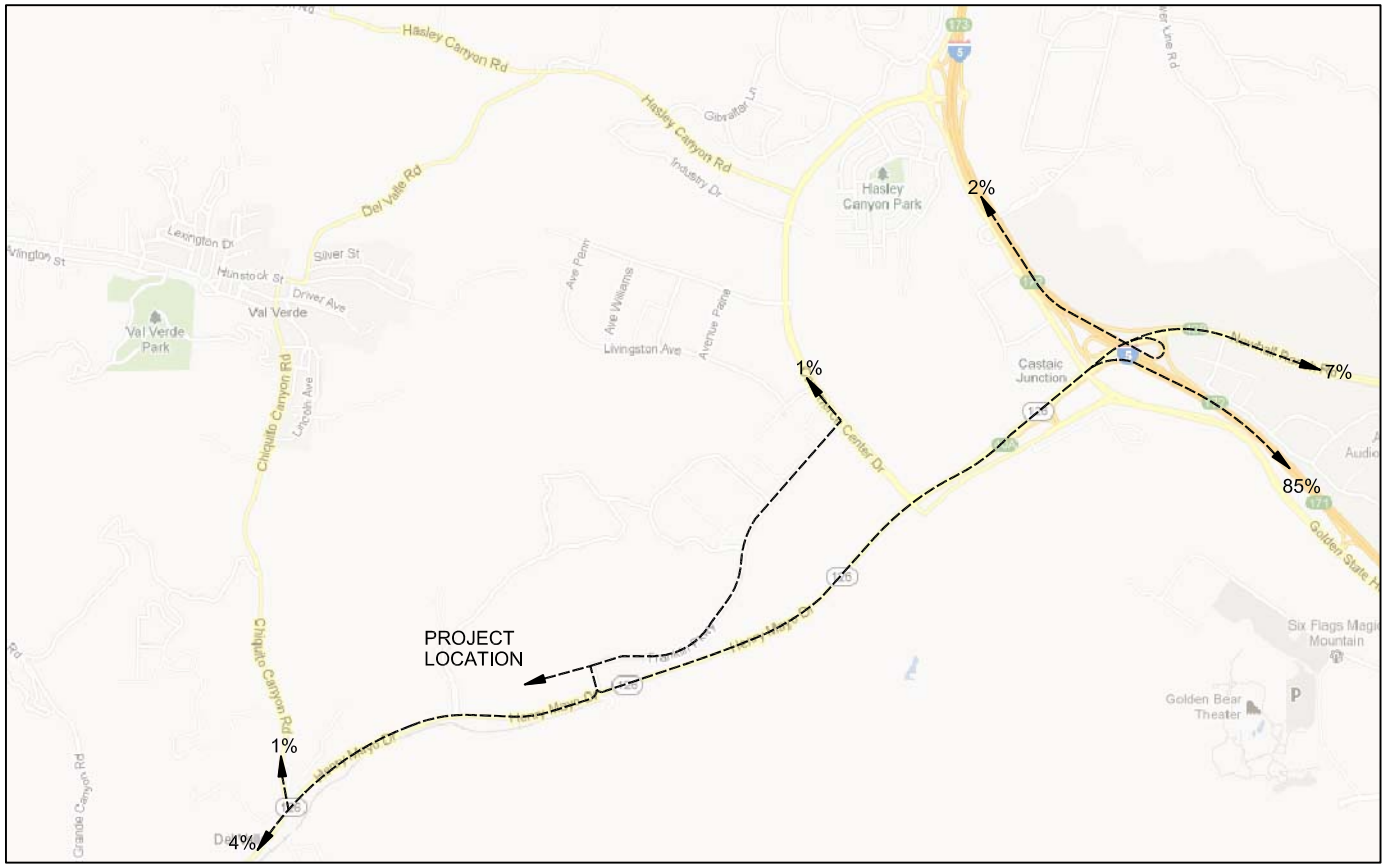
Isaac WONG	(626) 300-4796		IsWong@dpw.lacounty.gov
Virgilio (Gil) LAZATIN	(626) 300-4866		VLazatin@dpw.lacounty.gov

cc: Cashier Note: Normal review time is 6-8 weeks after review fee is paid and receipt is received by Studies Unit.
P:\tlpub\WPFILES\FILES\STU\VL\MOU\LA County MOU 03-01-11 Blank.docx Updated 03/01/11

NOT TO SCALE



LEGEND:

XX% Project Distribution (to/from distribution assumed to be identical)

CH2MHILL

CHIQUITA CANYON LANDFILL MASTER PLAN REVISION

PROPOSED PROJECT TRIP DISTRIBUTION

FIGURE 1

APPENDIX B
EXISTING TURNING MOVEMENT DATA COLLECTION SHEETS

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_001 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

AM

NS/EW Streets:	Chiquito Canyon Rd			Chiquito Canyon Rd			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	1	1	1	1	2	0	0	2	1	
7:00 AM	0		0	26		5	0	134	0		200	6	371
7:15 AM	1		2	21		2	1	135	0		171	5	338
7:30 AM	1		0	23		0	1	159	0		183	4	371
7:45 AM	0		0	12		1	0	157	0		186	2	358
8:00 AM	0		0	11		3	0	134	0		183	2	333
8:15 AM	0		0	13		2	0	109	0		171	9	304
8:30 AM	0		0	11		1	0	137	1		151	3	304
8:45 AM	0		0	14		1	1	134	0		109	3	262
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	2	0	2	131	0	15	3	1099	1	0	1354	34	2641
APPROACH %'s :	50.00%	0.00%	50.00%	89.73%	0.00%	10.27%	0.27%	99.64%	0.09%	0.00%	97.55%	2.45%	
PEAK HR START TIME :	700 AM												TOTAL
PEAK HR VOL :	2	0	2	82	0	8	2	585	0	0	740	17	1438
PEAK HR FACTOR :		0.333			0.726			0.917			0.919		0.969

CONTROL : 1-Way Stop (SB)

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_001 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

PM

NS/EW Streets:	Chiquito Canyon Rd			Chiquito Canyon Rd			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	1	1	1	1	2	0	0	2	1	
4:00 PM	0		1	15	2	0	3	198	0		184	11	414
4:15 PM	1		1	15	0	6	9	184	0		186	12	414
4:30 PM	0		0	11	0	2	1	213	1		191	7	426
4:45 PM	0		0	11	0	0	4	244	0		216	16	491
5:00 PM	0		0	9	0	2	3	214	0		190	14	432
5:15 PM	1		0	13	0	0	4	213	0		193	18	442
5:30 PM	0		0	14	0	1	3	238	0		181	10	447
5:45 PM	0		0	12	0	2	4	242	0		161	11	432
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	2	0	2	100	2	13	31	1746	1	0	1502	99	3498
APPROACH %'s :	50.00%	0.00%	50.00%	86.96%	1.74%	11.30%	1.74%	98.20%	0.06%	0.00%	93.82%	6.18%	
PEAK HR START TIME :	445 PM												TOTAL
PEAK HR VOL :	1	0	0	47	0	3	14	909	0	0	780	58	1812
PEAK HR FACTOR :		0.250			0.833			0.930			0.903		0.923

CONTROL : 1-Way Stop (SB)

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_002 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

AM

NS/EW Streets:	Chiquito Canyon Landfill Entrance			Chiquito Canyon Landfill Entrance			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	0	1	1	1	2	0	0	2	1	
7:00 AM				6		2	0	154			200	6	368
7:15 AM				7		1	3	149			179	10	349
7:30 AM				9		2	1	173			182	7	374
7:45 AM				5		1	2	176			190	6	380
8:00 AM				4		2	0	144			179	9	338
8:15 AM				7		0	0	123			184	7	321
8:30 AM				5		0	1	143			147	12	308
8:45 AM				6		0	1	151			119	7	284
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	49	0	8	8	1213	0	0	1380	64	2722
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	85.96%	0.00%	14.04%	0.66%	99.34%	0.00%	0.00%	95.57%	4.43%	
PEAK HR START TIME :	700 AM												TOTAL
PEAK HR VOL :	0	0	0	27	0	6	6	652	0	0	751	29	1471
PEAK HR FACTOR :		0.000			0.750			0.924			0.947		0.968

CONTROL : 1-Way Stop (SB)

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_002 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

PM

NS/EW Streets:	Chiquito Canyon Landfill Entrance			Chiquito Canyon Landfill Entrance			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	0	1	1	1	2	0	0	2	1	
4:00 PM				13		0	0	208			189	10	420
4:15 PM				8		0	1	205			203	8	425
4:30 PM				10		2	0	218			190	7	427
4:45 PM				9		0	1	252			225	5	492
5:00 PM				4		0	0	225			211	0	440
5:15 PM				13		1	0	222			209	0	445
5:30 PM				10		0	0	256			191	0	457
5:45 PM				0		0	0	249			169	0	418
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	67	0	3	2	1835	0	0	1587	30	3524
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	95.71%	0.00%	4.29%	0.11%	99.89%	0.00%	0.00%	98.14%	1.86%	
PEAK HR START TIME :	445 PM												TOTAL
PEAK HR VOL :	0	0	0	36	0	1	1	955	0	0	836	5	1834
PEAK HR FACTOR :		0.000			0.661			0.934			0.914		0.932

CONTROL : 1-Way Stop (SB)

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_003 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

AM

NS/EW Streets:	Wolcott Way			Wolcott Way			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	1.5	.5	1	1	2	0	1	2	1	
7:00 AM				0		1	3	150	0	0	199	1	354
7:15 AM				0		2	4	159	0	0	193	0	358
7:30 AM				1		2	13	165	1	0	187	0	369
7:45 AM				0		3	5	179	0	0	193	2	382
8:00 AM				0		5	3	141	0	0	178	0	327
8:15 AM				1		4	1	133	0	0	192	2	333
8:30 AM				0		0	1	140	1	0	156	0	298
8:45 AM				0		0	4	159	0	1	129	1	294
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	2	0	17	34	1226	2	1	1427	6	2715
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	10.53%	0.00%	89.47%	2.69%	97.15%	0.16%	0.07%	99.51%	0.42%	

PEAK HR START TIME :	700 AM												TOTAL
PEAK HR VOL :	0	0	0	1	0	8	25	653	1	0	772	3	1463
PEAK HR FACTOR :		0.000			0.750			0.923			0.969		0.957

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_003 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

PM

NS/EW Streets:	Wolcott Way			Wolcott Way			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	1.5	.5	1	1	2	0	1	2	1	
4:00 PM	1			0		12	3	214	1	1	182	0	414
4:15 PM	0			0		3	1	215	0	0	211	0	430
4:30 PM	0			5		19	5	220	0	0	174	0	423
4:45 PM	2			3		13	5	249	0	0	214	1	487
5:00 PM	0			3		9	2	234	0	0	203	0	451
5:15 PM	1			0		8	2	225	0	0	193	0	429
5:30 PM	6			0		2	0	274	0	0	189	0	471
5:45 PM	0			1		1	2	243	0	0	161	1	409
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	10	0	0	12	0	67	20	1874	1	1	1527	2	3514
APPROACH %'s :	100.00%	0.00%	0.00%	15.19%	0.00%	84.81%	1.06%	98.89%	0.05%	0.07%	99.80%	0.13%	
PEAK HR START TIME :	445 PM												TOTAL
PEAK HR VOL :	9	0	0	6	0	32	9	982	0	0	799	1	1838
PEAK HR FACTOR :		0.375			0.594			0.904			0.930		0.944

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_004 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

AM

NS/EW Streets:	Commerce Center Dr			Commerce Center Dr			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	1	2	1	1	1	2	0	1	2	2	
7:00 AM	14	13	1	57	10	14	17	142	6	2	156	196	628
7:15 AM	13	18	1	31	6	5	12	117	6	2	181	281	673
7:30 AM	9	17	3	73	9	6	15	150	13	1	189	297	782
7:45 AM	10	20	1	76	7	10	21	150	5	2	173	357	832
8:00 AM	12	17	3	58	8	10	17	126	4	3	168	275	701
8:15 AM	5	10	2	49	10	5	8	116	5	5	174	209	598
8:30 AM	6	15	1	74	9	7	7	141	6	5	147	187	605
8:45 AM	12	7	4	46	5	7	12	136	7	4	120	159	519
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	81	117	16	464	64	64	109	1078	52	24	1308	1961	5338
APPROACH %'s :	37.85%	54.67%	7.48%	78.38%	10.81%	10.81%	8.80%	87.01%	4.20%	0.73%	39.72%	59.55%	
PEAK HR START TIME :	715 AM												TOTAL
PEAK HR VOL :	44	72	8	238	30	31	65	543	28	8	711	1210	2988
PEAK HR FACTOR :		0.969			0.804			0.893			0.906		0.898

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_004 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

PM

NS/EW Streets:	Commerce Center Dr			Commerce Center Dr			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	1	2	1	1	1	2	0	1	2	2	
4:00 PM	31	8	6	234	40	15	6	186	5	2	166	48	747
4:15 PM	10	7	2	184	18	6	5	216	6	4	175	60	693
4:30 PM	23	10	7	324	74	12	6	185	9	3	156	63	872
4:45 PM	18	6	4	204	36	15	6	262	10	4	188	58	811
5:00 PM	13	11	9	274	67	22	14	221	10	2	162	40	845
5:15 PM	19	9	4	188	26	11	6	208	7	1	164	44	687
5:30 PM	18	3	6	228	19	16	11	237	7	2	163	31	741
5:45 PM	14	7	2	129	15	7	8	230	7	3	148	35	605
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	146	61	40	1765	295	104	62	1745	61	21	1322	379	6001
APPROACH %'s :	59.11%	24.70%	16.19%	81.56%	13.63%	4.81%	3.32%	93.42%	3.27%	1.22%	76.77%	22.01%	
PEAK HR START TIME :	415 PM												TOTAL
PEAK HR VOL :	64	34	22	986	195	55	31	884	35	13	681	221	3221
PEAK HR FACTOR :		0.750			0.754			0.854			0.915		0.923

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_005 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

AM

NS/EW Streets:	I-5 SB Ramps			I-5 SB Ramps			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	2	0	2	0	4	1	0	3	1	
7:00 AM				99		33		111	113		321	61	738
7:15 AM				171		40		69	90		428	70	868
7:30 AM				276		42		93	142		435	64	1052
7:45 AM				202		44		103	136		488	90	1063
8:00 AM				134		34		92	107		407	95	869
8:15 AM				128		40		82	109		353	69	781
8:30 AM				134		35		99	125		296	70	759
8:45 AM				111		32		103	89		249	82	666
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	1255	0	300	0	752	911	0	2977	601	6796
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	80.71%	0.00%	19.29%	0.00%	45.22%	54.78%	0.00%	83.20%	16.80%	
PEAK HR START TIME :	715 AM												TOTAL
PEAK HR VOL :	0	0	0	783	0	160	0	357	475	0	1758	319	3852
PEAK HR FACTOR :		0.000			0.741			0.870			0.898		0.906

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_005 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

PM

NS/EW Streets:	I-5 SB Ramps			I-5 SB Ramps			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	2	0	2	0	4	1	0	3	1	
4:00 PM				173		52		175	322		171	99	992
4:15 PM				160		39		187	233		213	76	908
4:30 PM				187		36		249	333		197	209	1211
4:45 PM				148		45		245	268		204	126	1036
5:00 PM				187		34		271	299		176	137	1104
5:15 PM				163		30		231	245		176	130	975
5:30 PM				131		30		256	265		162	127	971
5:45 PM				116		31		210	178		144	108	787
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	1265	0	297	0	1824	2143	0	1443	1012	7984
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	80.99%	0.00%	19.01%	0.00%	45.98%	54.02%	0.00%	58.78%	41.22%	
PEAK HR START TIME :	430 PM												TOTAL
PEAK HR VOL :	0	0	0	685	0	145	0	996	1145	0	753	602	4326
PEAK HR FACTOR :		0.000			0.930			0.920			0.834		0.893

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_006 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

AM

NS/EW Streets:	I-5 NB Ramps			I-5 NB Ramps			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	3	0	1	0	0	0	0	4	1	0	3	1	
7:00 AM	197		122					190	26		191	92	818
7:15 AM	215		129					215	19		278	134	990
7:30 AM	246		174					356	17		262	134	1189
7:45 AM	281		190					282	19		287	207	1266
8:00 AM	218		168					204	28		288	151	1057
8:15 AM	174		173					183	21		244	140	935
8:30 AM	166		158					215	23		202	116	880
8:45 AM	147		162					191	18		182	82	782
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	1644	0	1276	0	0	0	0	1836	171	0	1934	1056	7917
APPROACH %'s :	56.30%	0.00%	43.70%	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	91.48%	8.52%	0.00%	64.68%	35.32%	
PEAK HR START TIME :	715 AM												TOTAL
PEAK HR VOL :	960	0	661	0	0	0	0	1057	83	0	1115	626	4502
PEAK HR FACTOR :		0.860			0.000			0.764			0.881		0.889

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_006 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

PM

NS/EW Streets:	I-5 NB Ramps			I-5 NB Ramps			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	3	0	1	0	0	0	0	4	1	0	3	1	
4:00 PM	100		149					323	34		174	151	931
4:15 PM	118		128					293	46		167	182	934
4:30 PM	126		133					399	46		284	190	1178
4:45 PM	118		143					354	46		213	194	1068
5:00 PM	104		164					394	56		209	230	1157
5:15 PM	95		155					345	51		214	215	1075
5:30 PM	102		148					333	52		184	199	1018
5:45 PM	88		186					283	52		173	177	959
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	851	0	1206	0	0	0	0	2724	383	0	1618	1538	8320
APPROACH %'s :	41.37%	0.00%	58.63%	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	87.67%	12.33%	0.00%	51.27%	48.73%	
PEAK HR START TIME :	430 PM												TOTAL
PEAK HR VOL :	443	0	595	0	0	0	0	1492	199	0	920	829	4478
PEAK HR FACTOR :		0.968			0.000			0.939			0.922		0.950

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_007 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

AM

NS/EW Streets:	Commerce Center Dr			Commerce Center Dr			Franklin Parkway			Franklin Parkway			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	3	0	0	3	1	1	0	1	0	0	0	
7:00 AM	30	203			47	5	4		34				323
7:15 AM	62	246			43	3	9		6				369
7:30 AM	80	249			83	10	7		14				443
7:45 AM	102	291			77	8	11		10				499
8:00 AM	62	254			67	7	6		14				410
8:15 AM	43	192			60	2	2		3				302
8:30 AM	20	196			75	8	4		8				311
8:45 AM	17	168			58	3	8		5				259
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	416	1799	0	0	510	46	51	0	94	0	0	0	2916
APPROACH %'s :	18.78%	81.22%	0.00%	0.00%	91.73%	8.27%	35.17%	0.00%	64.83%	#DIV/0!	#DIV/0!	#DIV/0!	
PEAK HR START TIME :	715 AM												TOTAL
PEAK HR VOL :	306	1040	0	0	270	28	33	0	44	0	0	0	1721
PEAK HR FACTOR :		0.856			0.801			0.917			0.000		0.862

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_007 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

PM

NS/EW Streets:	Commerce Center Dr			Commerce Center Dr			Franklin Parkway			Franklin Parkway			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	3	0	0	3	1	1	0	1	0	0	0	
4:00 PM	18	48			203	29	21		81				400
4:15 PM	28	46			182	20	13		37				326
4:30 PM	24	45			286	24	28		123				530
4:45 PM	30	48			195	25	25		47				370
5:00 PM	11	58			291	16	18		72				466
5:15 PM	14	46			174	10	13		42				299
5:30 PM	10	33			226	10	3		32				314
5:45 PM	8	45			120	9	4		31				217
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	143	369	0	0	1677	143	125	0	465	0	0	0	2922
APPROACH %'s :	27.93%	72.07%	0.00%	0.00%	92.14%	7.86%	21.19%	0.00%	78.81%	#DIV/0!	#DIV/0!	#DIV/0!	
PEAK HR START TIME :	415 PM												TOTAL
PEAK HR VOL :	93	197	0	0	954	85	84	0	279	0	0	0	1692
PEAK HR FACTOR :		0.929			0.838			0.601			0.000		0.798

CONTROL : Signalized

APPENDIX C
TRAFFIC ANALYSIS WORKSHEETS

INTERSECTION CAPACITY UTILIZATION WORKSHEET

INTERSECTION: 1 **N / S:** Chiquito Canyon Road **E / W:** SR-126

AM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	0.0	0	2	0.000	0	0.0	0	2	0.000	0	0.0	0	2	0.000	0	0.0	0	2	0.000	0	0.0	0	2	0.000	0
NR	0.0	0	2	0.000	0	0.0	0	2	0.000	0	0.0	0	2	0.000	0	0.0	0	2	0.000	0	0.0	0	2	0.000	0
NT	1.0	1600	0	0.003	1	1.0	1600	0	0.003	1	1.0	1600	0	0.003	1	1.0	1600	0	0.003	1	1.0	1600	0	0.003	1
SL	1.0	1600	82	0.051	1	1.0	1600	87	0.054	1	1.0	1600	87	0.054	1	1.0	1600	88	0.055	1	1.0	1600	88	0.055	1
SR	1.0	1600	8	0.005	1	1.0	1600	8	0.005	1	1.0	1600	8	0.005	1	1.0	1600	8	0.005	1	1.0	1600	8	0.005	1
ST	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
EL	1.0	1600	2	0.001	1	1.0	1600	2	0.001	1	1.0	1600	2	0.001	1	1.0	1600	2	0.001	1	1.0	1600	2	0.001	1
ER	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
ET	2.0	3200	585	0.183	0	2.0	3200	617	0.193	0	2.0	3200	696	0.218	0	2.0	3200	620	0.194	0	2.0	3200	699	0.218	0
WL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WR	1.0	1600	17	0.011	0	1.0	1600	18	0.011	0	1.0	1600	18	0.011	0	1.0	1600	19	0.012	0	1.0	1600	19	0.012	0
WT	2.0	3200	740	0.231	1	2.0	3200	781	0.244	1	2.0	3200	797	0.249	1	2.0	3200	784	0.245	1	2.0	3200	800	0.250	1
N/S component					0.054	N/S component				0.057	N/S component				0.057	N/S component				0.058	N/S component				0.058
E/W component					0.233	E/W component				0.245	E/W component				0.250	E/W component				0.246	E/W component				0.251
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU	0.386				ICU	0.402				ICU	0.407				ICU	0.404				ICU	0.409
				LOS	A				LOS	A				LOS	A				LOS	A				LOS	A

PM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	0.0	0	1	0.000	0	0.0	0	1	0.000	0	0.0	0	1	0.000	0	0.0	0	1	0.000	0	0.0	0	1	0.000	0
NR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
NT	1.0	1600	0	0.001	1	1.0	1600	0	0.001	1	1.0	1600	0	0.001	1	1.0	1600	Z	0.001	1	1.0	1600	0	0.001	1
SL	1.0	1600	47	0.029	1	1.0	1600	50	0.031	1	1.0	1600	50	0.031	1	1.0	1600	51	0.032	1	1.0	1600	51	0.032	1
SR	1.0	1600	3	0.002	0	1.0	1600	3	0.002	0	1.0	1600	3	0.002	0	1.0	1600	3	0.002	0	1.0	1600	3	0.002	0
ST	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
EL	1.0	1600	14	0.009	0	1.0	1600	15	0.009	0	1.0	1600	15	0.009	0	1.0	1600	15	0.009	0	1.0	1600	15	0.009	0
ER	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
ET	2.0	3200	909	0.284	1	2.0	3200	959	0.300	1	2.0	3200	991	0.310	1	2.0	3200	962	0.301	1	2.0	3200	994	0.311	1
WL	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
WR	1.0	1600	58	0.036	0	1.0	1600	61	0.038	0	1.0	1600	61	0.038	0	1.0	1600	62	0.039	0	1.0	1600	62	0.039	0
WT	2.0	3200	780	0.244	0	2.0	3200	823	0.257	0	2.0	3200	910	0.284	0	2.0	3200	826	0.258	0	2.0	3200	913	0.285	0
N/S component					0.030	N/S component				0.032	N/S component				0.032	N/S component				0.033	N/S component				0.033
E/W component					0.284	E/W component				0.300	E/W component				0.310	E/W component				0.301	E/W component				0.311
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU	0.414				ICU	0.432				ICU	0.442				ICU	0.433				ICU	0.443
				LOS	A				LOS	A				LOS	A				LOS	A				LOS	A

Critical movement identified by a 1.

Ten lanes for a right turn indicates free movement.

INTERSECTION CAPACITY UTILIZATION WORKSHEET

INTERSECTION: 2 **N / S:** Chiquita Canyon Landfill Entrance **E / W:** SR-126

AM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0										
NR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0										
NT	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1										
SL	1.0	1600	27	0.017	1	1.0	1600	28	0.018	1	1.0	1600	28	0.018	1										
SR	1.0	1600	6	0.004	0	1.0	1600	6	0.004	0	1.0	1600	6	0.004	0										
ST	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0										
EL	1.0	1600	6	0.004	1	1.0	1600	6	0.004	1	1.0	1600	6	0.004	1										
ER	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0										
ET	2.0	3200	652	0.204	0	2.0	3200	688	0.215	0	2.0	3200	767	0.240	0										
WL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0										
WR	1.0	1600	29	0.018	0	1.0	1600	31	0.019	0	1.0	1600	31	0.019	0										
WT	2.0	3200	751	0.235	1	2.0	3200	792	0.248	1	2.0	3200	808	0.253	1										
N/S component					0.017	N/S component				0.018	N/S component				0.018										
E/W component					0.238	E/W component				0.251	E/W component				0.256										
Clearance					0.100	Clearance				0.100	Clearance				0.100										
				ICU LOS	**0.355 A**				**ICU LOS**	**0.369 A**				**ICU LOS**	**0.374 A**										

Intersection does not exist with project

Intersection does not exist with project

PM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0										
NR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0										
NT	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1										
SL	1.0	1600	36	0.023	1	1.0	1600	38	0.024	1	1.0	1600	38	0.024	1										
SR	1.0	1600	1	0.001	0	1.0	1600	1	0.001	0	1.0	1600	1	0.001	0										
ST	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0										
EL	1.0	1600	1	0.001	0	1.0	1600	1	0.001	0	1.0	1600	1	0.001	0										
ER	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0										
ET	2.0	3200	955	0.298	1	2.0	3200	1008	0.315	1	2.0	3200	1040	0.325	1										
WL	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1										
WR	1.0	1600	5	0.003	0	1.0	1600	5	0.003	0	1.0	1600	5	0.003	0										
WT	2.0	3200	836	0.261	0	2.0	3200	882	0.276	0	2.0	3200	969	0.303	0										
N/S component					0.023	N/S component				0.024	N/S component				0.024										
E/W component					0.298	E/W component				0.315	E/W component				0.325										
Clearance					0.100	Clearance				0.100	Clearance				0.100										
				ICU LOS	**0.421 A**				**ICU LOS**	**0.439 A**				**ICU LOS**	**0.449 A**										

Intersection does not exist with project

Intersection does not exist with project

Critical movement identified by a 1.

Ten lanes for a right turn indicates free movement.

INTERSECTION CAPACITY UTILIZATION WORKSHEET

INTERSECTION: 3 **N / S:** Wolcott Way **E / W:** SR-126

AM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
NR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	7	0.000	0	0.0	0	0	0.000	0	0.0	0	7	0.000	0
NT	1.0	1600	0	0.000	1	1.0	1600	0	0.000	1	1.0	1600	7	0.009	1	1.0	1600	0	0.000	1	1.0	1600	7	0.009	1
SL	1.5	2400	1	0.000	1	1.5	2400	1	0.000	1	1.5	2400	1	0.000	1	1.5	2400	99	0.041	1	1.5	2400	99	0.041	1
SR	1.0	1600	8	0.005	0	1.0	1600	8	0.005	0	1.0	1600	8	0.005	0	1.0	1600	18	0.011	0	1.0	1600	18	0.011	0
ST	0.5	800	0	0.000	0	0.5	800	0	0.000	0	0.5	800	1	0.001	0	0.5	800	0	0.000	0	0.5	800	1	0.001	0
EL	1.0	1600	25	0.016	1	1.0	1600	26	0.016	1	1.0	1600	26	0.016	1	1.0	1600	36	0.023	1	1.0	1600	36	0.023	1
ER	0.0	0	1	0.000	0	0.0	0	1	0.000	0	0.0	0	1	0.000	0	0.0	0	1	0.000	0	0.0	0	1	0.000	0
ET	2.0	3200	653	0.204	0	2.0	3200	689	0.216	0	2.0	3200	768	0.240	0	2.0	3200	662	0.207	0	2.0	3200	741	0.232	0
WL	1.0	1600	0	0.000	0	1.0	1600	0	0.000	0	1.0	1600	1	0.001	0	1.0	1600	0	0.000	0	1.0	1600	1	0.001	0
WR	1.0	1600	3	0.002	0	1.0	1600	3	0.002	0	1.0	1600	3	0.002	0	1.0	1600	103	0.064	0	1.0	1600	103	0.064	0
WT	2.0	3200	772	0.241	1	2.0	3200	814	0.254	1	2.0	3200	830	0.259	1	2.0	3200	785	0.245	1	2.0	3200	801	0.250	1
N/S component					0.000	N/S component				0.000	N/S component				0.009	N/S component				0.041	N/S component				0.050
E/W component					0.257	E/W component				0.271	E/W component				0.276	E/W component				0.268	E/W component				0.273
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU LOS	0.357 A				ICU LOS	0.371 A				ICU LOS	0.385 A				ICU LOS	0.409 A				ICU LOS	0.423 A

PM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	0.0	0	9	0.000	0	0.0	0	9	0.000	0	0.0	0	9	0.000	0	0.0	0	9	0.000	0	0.0	0	9	0.000	0
NR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	2	0.000	0	0.0	0	0	0.000	0	0.0	0	2	0.000	0
NT	1.0	1600	0	0.006	1	1.0	1600	0	0.006	1	1.0	1600	2	0.008	1	1.0	1600	0	0.006	1	1.0	1600	2	0.008	1
SL	1.5	2400	6	0.003	1	1.5	2400	6	0.003	1	1.5	2400	6	0.003	1	1.5	2400	113	0.047	1	1.5	2400	113	0.047	1
SR	1.0	1600	32	0.020	1	1.0	1600	34	0.021	1	1.0	1600	34	0.021	1	1.0	1600	39	0.024	1	1.0	1600	39	0.024	1
ST	0.5	800	0	0.000	0	0.5	800	0	0.000	0	0.5	800	6	0.008	0	0.5	800	0	0.000	0	0.5	800	6	0.008	0
EL	1.0	1600	9	0.006	0	1.0	1600	9	0.006	0	1.0	1600	9	0.006	0	1.0	1600	14	0.009	0	1.0	1600	14	0.009	0
ER	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
ET	2.0	3200	982	0.307	1	2.0	3200	1036	0.324	1	2.0	3200	1068	0.334	1	2.0	3200	1000	0.313	1	2.0	3200	1032	0.323	1
WL	1.0	1600	0	0.000	1	1.0	1600	0	0.000	1	1.0	1600	6	0.004	1	1.0	1600	0	0.000	1	1.0	1600	6	0.004	1
WR	1.0	1600	1	0.001	0	1.0	1600	1	0.001	0	1.0	1600	1	0.001	0	1.0	1600	77	0.048	0	1.0	1600	77	0.048	0
WT	2.0	3200	799	0.250	0	2.0	3200	843	0.263	0	2.0	3200	930	0.291	0	2.0	3200	838	0.262	0	2.0	3200	925	0.289	0
N/S component					0.008	N/S component				0.008	N/S component				0.011	N/S component				0.053	N/S component				0.055
E/W component					0.307	E/W component				0.324	E/W component				0.338	E/W component				0.313	E/W component				0.326
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU LOS	0.415 A				ICU LOS	0.432 A				ICU LOS	0.448 A				ICU LOS	0.465 A				ICU LOS	0.481 A

Critical movement identified by a 1.

Ten lanes for a right turn indicates free movement.

INTERSECTION CAPACITY UTILIZATION WORKSHEET

INTERSECTION: 4 **N / S:** Commerce Center Drive **E / W:** SR-126

AM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	1.0	1600	44	0.028	0	0.0	0	46	0.000	0	0.0	0	46	0.000	0	0.0	0	46	0.000	0	0.0	0	46	0.000	0
NR	1.0	1600	8	0.005	0	0.0	0	8	0.000	0	0.0	0	8	0.000	0	0.0	0	8	0.000	0	0.0	0	8	0.000	0
NT	1.0	1600	72	0.045	1	1.0	1600	76	0.081	1	1.0	1600	166	0.138	1	1.0	1600	76	0.081	1	1.0	1600	166	0.138	1
SL	2.0	2880	238	0.083	1	2.0	2880	251	0.087	1	2.0	2880	290	0.101	1	2.0	2880	251	0.087	1	2.0	2880	290	0.101	1
SR	1.0	1600	31	0.019	0	1.0	1600	33	0.021	0	1.0	1600	48	0.030	0	1.0	1600	33	0.021	0	1.0	1600	48	0.030	0
ST	1.0	1600	30	0.019	0	1.0	1600	32	0.020	0	1.0	1600	53	0.033	0	1.0	1600	32	0.020	0	1.0	1600	53	0.033	0
EL	1.0	1600	65	0.041	1	1.0	1600	69	0.043	1	1.0	1600	150	0.094	1	1.0	1600	69	0.043	1	1.0	1600	150	0.094	1
ER	0.0	0	28	0.000	0	0.0	0	30	0.000	0	0.0	0	30	0.000	0	0.0	0	30	0.000	0	0.0	0	30	0.000	0
ET	2.0	3200	543	0.178	0	2.0	3200	573	0.188	0	2.0	3200	578	0.190	0	2.0	3200	644	0.211	0	2.0	3200	649	0.212	0
WL	1.0	1600	8	0.005	0	1.0	1600	8	0.005	0	1.0	1600	8	0.005	0	1.0	1600	8	0.005	0	1.0	1600	8	0.005	0
WR	1.0	1600	1210	0.756	1	1.0	1600	1277	0.798	1	1.0	1600	1492	0.933	1	1.0	1600	1277	0.798	1	1.0	1600	1492	0.933	1
WT	2.0	3200	711	0.222	1	2.0	3200	750	0.234	1	2.0	3200	753	0.235	1	2.0	3200	821	0.257	1	2.0	3200	824	0.258	1
N/S component					0.128	N/S component				0.168	N/S component				0.238	N/S component				0.168	N/S component				0.238
E/W component					0.263	E/W component				0.278	E/W component				0.329	E/W component				0.300	E/W component				0.351
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU	0.490				ICU	0.546				ICU	0.667				ICU	0.568				ICU	0.689
				LOS	A				LOS	A				LOS	B				LOS	A				LOS	B

PM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	1.0	1600	64	0.040	0	0.0	0	68	0.000	0	0.0	0	68	0.000	0	0.0	0	68	0.000	0	0.0	0	68	0.000	0
NR	1.0	1600	22	0.014	0	0.0	0	23	0.000	0	0.0	0	23	0.000	0	0.0	0	23	0.000	0	0.0	0	23	0.000	0
NT	1.0	1600	34	0.021	1	1.0	1600	36	0.079	1	1.0	1600	71	0.101	1	1.0	1600	36	0.079	1	1.0	1600	71	0.101	1
SL	2.0	2880	986	0.342	1	2.0	2880	1040	0.361	1	2.0	2880	1243	0.432	1	2.0	2880	1040	0.361	1	2.0	2880	1243	0.432	1
SR	1.0	1600	55	0.034	0	1.0	1600	58	0.036	0	1.0	1600	134	0.084	0	1.0	1600	58	0.036	0	1.0	1600	134	0.084	0
ST	1.0	1600	195	0.122	0	1.0	1600	206	0.129	0	1.0	1600	302	0.189	0	1.0	1600	206	0.129	0	1.0	1600	302	0.189	0
EL	1.0	1600	31	0.019	0	1.0	1600	33	0.021	0	1.0	1600	52	0.033	0	1.0	1600	33	0.021	0	1.0	1600	52	0.033	0
ER	0.0	0	35	0.000	0	0.0	0	37	0.000	0	0.0	0	37	0.000	0	0.0	0	37	0.000	0	0.0	0	37	0.000	0
ET	2.0	3200	884	0.287	1	2.0	3200	933	0.303	1	2.0	3200	948	0.308	1	2.0	3200	1004	0.325	1	2.0	3200	1019	0.330	1
WL	1.0	1600	13	0.008	1	1.0	1600	14	0.009	1	1.0	1600	14	0.009	1	1.0	1600	14	0.009	1	1.0	1600	14	0.009	1
WR	1.0	1600	221	0.138	0	1.0	1600	233	0.146	0	1.0	1600	284	0.178	0	1.0	1600	233	0.146	0	1.0	1600	284	0.178	0
WT	2.0	3200	681	0.213	0	2.0	3200	718	0.224	0	2.0	3200	735	0.230	0	2.0	3200	789	0.247	0	2.0	3200	806	0.252	0
N/S component					0.364	N/S component				0.440	N/S component				0.533	N/S component				0.440	N/S component				0.533
E/W component					0.295	E/W component				0.312	E/W component				0.317	E/W component				0.334	E/W component				0.339
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU	0.759				ICU	0.852				ICU	0.949				ICU	0.875				ICU	0.972
				LOS	C				LOS	D				LOS	E				LOS	D				LOS	E

Critical movement identified by a 1.

Ten lanes for a right turn indicates free movement.

INTERSECTION CAPACITY UTILIZATION WORKSHEET

INTERSECTION: 5 **N / S:** I-5 SB Ramps **E / W:** SR-126

AM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
NR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
NT	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
SL	2.0	2880	783	0.272	1	2.0	2880	826	0.287	1	2.0	2880	836	0.290	1	2.0	2880	826	0.287	1	2.0	2880	836	0.290	1
SR	2.0	3200	160	0.050	1	2.0	3200	169	0.053	1	2.0	3200	169	0.053	1	2.0	3200	171	0.053	1	2.0	3200	171	0.053	1
ST	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
EL	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
ER	10.0	16000	475	0.030	0	10.0	16000	501	0.031	0	10.0	16000	523	0.033	0	10.0	16000	565	0.035	0	10.0	16000	587	0.037	0
ET	4.0	6400	357	0.056	0	4.0	6400	377	0.059	0	4.0	6400	402	0.063	0	4.0	6400	384	0.060	0	4.0	6400	409	0.064	0
WL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WR	10.0	16000	319	0.020	0	10.0	16000	337	0.021	0	10.0	16000	337	0.021	0	10.0	16000	337	0.021	0	10.0	16000	337	0.021	0
WT	3.0	4800	1758	0.366	1	3.0	4800	1855	0.386	1	3.0	4800	2081	0.434	1	3.0	4800	1924	0.401	1	3.0	4800	2150	0.448	1
N/S component					0.272	N/S component				0.287	N/S component				0.290	N/S component				0.287	N/S component				0.290
E/W component					0.366	E/W component				0.386	E/W component				0.434	E/W component				0.401	E/W component				0.448
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU LOS	0.738 C				ICU LOS	0.773 C				ICU LOS	0.824 D				ICU LOS	0.788 C				ICU LOS	0.838 D

PM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
NR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
NT	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
SL	2.0	2880	685	0.238	1	2.0	2880	723	0.251	1	2.0	2880	774	0.269	1	2.0	2880	723	0.251	1	2.0	2880	774	0.269	1
SR	2.0	3200	145	0.045	1	2.0	3200	153	0.048	1	2.0	3200	153	0.048	1	2.0	3200	155	0.048	1	2.0	3200	155	0.048	1
ST	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
EL	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	0	0.0	0	0	0.000	1	0.0	0	0	0.000	1
ER	10.0	16000	1145	0.072	0	10.0	16000	1208	0.076	0	10.0	16000	1322	0.083	0	10.0	16000	1273	0.080	0	10.0	16000	1387	0.087	0
ET	4.0	6400	996	0.156	0	4.0	6400	1051	0.164	0	4.0	6400	1176	0.184	1	4.0	6400	1058	0.165	0	4.0	6400	1183	0.185	0
WL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	1	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WR	10.0	16000	602	0.038	0	10.0	16000	635	0.040	0	10.0	16000	635	0.040	0	10.0	16000	635	0.040	0	10.0	16000	635	0.040	0
WT	3.0	4800	753	0.157	1	3.0	4800	794	0.165	1	3.0	4800	878	0.183	0	3.0	4800	864	0.180	1	3.0	4800	948	0.198	1
N/S component					0.238	N/S component				0.251	N/S component				0.269	N/S component				0.251	N/S component				0.269
E/W component					0.157	E/W component				0.165	E/W component				0.184	E/W component				0.180	E/W component				0.198
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU LOS	0.495 A				ICU LOS	0.516 A				ICU LOS	0.553 A				ICU LOS	0.531 A				ICU LOS	0.566 A

Critical movement identified by a 1.

Ten lanes for a right turn indicates free movement.

INTERSECTION CAPACITY UTILIZATION WORKSHEET

INTERSECTION: 6 **N / S:** I-5 NB Ramps **E / W:** SR-126

AM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	3.0	4800	960	0.200	1	3.0	4800	1013	0.211	1	3.0	4800	1145	0.239	1	3.0	4800	1077	0.224	1	3.0	4800	1209	0.252	1
NR	1.0	1600	661	0.413	1	1.0	1600	697	0.436	1	1.0	1600	697	0.436	1	1.0	1600	697	0.436	1	1.0	1600	697	0.436	1
NT	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
SL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
SR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
ST	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
EL	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
ER	10.0	16000	83	0.005	0	10.0	16000	88	0.006	0	10.0	16000	96	0.006	0	10.0	16000	90	0.006	0	10.0	16000	98	0.006	0
ET	4.0	6400	1057	0.165	0	4.0	6400	1115	0.174	0	4.0	6400	1142	0.178	0	4.0	6400	1120	0.175	0	4.0	6400	1147	0.179	0
WL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WR	10.0	16000	626	0.039	0	10.0	16000	660	0.041	0	10.0	16000	714	0.045	0	10.0	16000	660	0.041	0	10.0	16000	714	0.045	0
WT	3.0	4800	1115	0.232	1	3.0	4800	1176	0.245	1	3.0	4800	1270	0.265	1	3.0	4800	1181	0.246	1	3.0	4800	1275	0.266	1
N/S component					0.200	N/S component				0.211	N/S component				0.239	N/S component				0.224	N/S component				0.252
E/W component					0.232	E/W component				0.245	E/W component				0.265	E/W component				0.246	E/W component				0.266
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU LOS	0.532 A				ICU LOS	0.556 A				ICU LOS	0.603 A				ICU LOS	0.570 A				ICU LOS	0.618 B

PM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	3.0	4800	443	0.092	1	3.0	4800	467	0.097	1	3.0	4800	529	0.110	1	3.0	4800	532	0.111	1	3.0	4800	594	0.124	1
NR	1.0	1600	595	0.372	1	1.0	1600	628	0.393	1	1.0	1600	628	0.393	1	1.0	1600	628	0.393	1	1.0	1600	628	0.393	1
NT	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
SL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
SR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
ST	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
EL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
ER	10.0	16000	199	0.012	0	10.0	16000	210	0.013	0	10.0	16000	246	0.015	0	10.0	16000	212	0.013	0	10.0	16000	248	0.016	0
ET	4.0	6400	1492	0.233	1	4.0	6400	1574	0.246	1	4.0	6400	1714	0.268	1	4.0	6400	1579	0.247	1	4.0	6400	1719	0.269	1
WL	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
WR	10.0	16000	829	0.052	0	10.0	16000	875	0.055	0	10.0	16000	888	0.056	0	10.0	16000	875	0.055	0	10.0	16000	888	0.056	0
WT	3.0	4800	920	0.192	0	3.0	4800	971	0.202	0	3.0	4800	993	0.207	0	3.0	4800	976	0.203	0	3.0	4800	998	0.208	0
N/S component					0.092	N/S component				0.097	N/S component				0.110	N/S component				0.111	N/S component				0.124
E/W component					0.233	E/W component				0.246	E/W component				0.268	E/W component				0.247	E/W component				0.269
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU LOS	0.425 A				ICU LOS	0.443 A				ICU LOS	0.478 A				ICU LOS	0.458 A				ICU LOS	0.492 A

Critical movement identified by a 1.

Ten lanes for a right turn indicates free movement.

INTERSECTION CAPACITY UTILIZATION WORKSHEET

INTERSECTION: 7 **N / S:** Commerce Center Drive **E / W:** Franklin Parkway

AM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	1.0	1600	306	0.191	1	1.0	1600	323	0.202	1	1.0	1600	324	0.203	0	1.0	1600	323	0.202	1	1.0	1600	324	0.203	0
NR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
NT	3.0	4800	1040	0.217	0	3.0	4800	1097	0.229	0	3.0	4800	1482	0.309	1	3.0	4800	1097	0.229	0	3.0	4800	1482	0.309	1
SL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	1	0.0	0	0	0.000	0	0.0	0	0	0.000	1
SR	1.0	1600	28	0.018	0	1.0	1600	30	0.019	0	1.0	1600	31	0.019	0	1.0	1600	31	0.019	0	1.0	1600	32	0.020	0
ST	3.0	4800	270	0.056	1	3.0	4800	285	0.059	1	3.0	4800	359	0.075	0	3.0	4800	285	0.059	1	3.0	4800	359	0.075	0
EL	1.0	1600	33	0.021	1	1.0	1600	35	0.022	1	1.0	1600	42	0.026	1	1.0	1600	36	0.023	1	1.0	1600	43	0.027	1
ER	1.0	1600	44	0.028	0	1.0	1600	46	0.029	0	1.0	1600	47	0.029	0	1.0	1600	46	0.029	0	1.0	1600	47	0.029	0
ET	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WT	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
N/S component					0.248	N/S component				0.261	N/S component				0.309	N/S component				0.261	N/S component				0.309
E/W component					0.021	E/W component				0.022	E/W component				0.026	E/W component				0.023	E/W component				0.027
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU	0.368				ICU	0.383				ICU	0.435				ICU	0.384				ICU	0.436
				LOS	A				LOS	A				LOS	A				LOS	A				LOS	A

PM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	1.0	1600	93	0.058	1	1.0	1600	98	0.061	1	1.0	1600	100	0.063	1	1.0	1600	98	0.061	1	1.0	1600	100	0.063	1
NR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
NT	3.0	4800	197	0.041	0	3.0	4800	208	0.043	0	3.0	4800	311	0.065	0	3.0	4800	208	0.043	0	3.0	4800	311	0.065	0
SL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
SR	1.0	1600	85	0.053	0	1.0	1600	90	0.056	0	1.0	1600	96	0.060	0	1.0	1600	91	0.057	0	1.0	1600	97	0.061	0
ST	3.0	4800	954	0.199	1	3.0	4800	1006	0.210	1	3.0	4800	1379	0.287	1	3.0	4800	1006	0.210	1	3.0	4800	1379	0.287	1
EL	1.0	1600	84	0.053	1	1.0	1600	89	0.056	1	1.0	1600	91	0.057	1	1.0	1600	90	0.056	1	1.0	1600	92	0.058	1
ER	1.0	1600	279	0.174	1	1.0	1600	294	0.184	1	1.0	1600	296	0.185	1	1.0	1600	294	0.184	1	1.0	1600	296	0.185	1
ET	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WT	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
N/S component					0.257	N/S component				0.271	N/S component				0.350	N/S component				0.271	N/S component				0.350
E/W component					0.053	E/W component				0.056	E/W component				0.057	E/W component				0.056	E/W component				0.058
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU	0.409				ICU	0.426				ICU	0.507				ICU	0.427				ICU	0.507
				LOS	A				LOS	A				LOS	A				LOS	A				LOS	A

Critical movement identified by a 1.

Ten lanes for a right turn indicates free movement.

INTERSECTION CAPACITY UTILIZATION WORKSHEET

INTERSECTION: 8 **N / S:** Wolcott Way **E / W:** Franklin Parkway

AM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL																2.0	2880	110	0.038	1	2.0	2880	110	0.038	1
NR																1.0	1600	29	0.018	1	1.0	1600	36	0.023	1
NT																0.0	0	0	0.000	0	0.0	0	0	0.000	0
SL																0.0	0	0	0.000	0	0.0	0	0	0.000	0
SR																0.0	0	0	0.000	0	0.0	0	0	0.000	0
ST																0.0	0	0	0.000	1	0.0	0	0	0.000	1
EL																0.0	0	0	0.000	0	0.0	0	0	0.000	0
ER																0.0	0	108	0.000	0	0.0	0	108	0.000	0
ET	Intersection does not exist without project					Intersection does not exist without project					Intersection does not exist without project					1.0	1600	1	0.068	1	1.0	1600	1	0.068	1
WL																0.0	0	9	0.000	1	0.0	0	10	0.000	1
WR																0.0	0	0	0.000	0	0.0	0	0	0.000	0
WT																1.0	1600	1	0.006	0	1.0	1600	1	0.007	0
																		N/S component		0.038			N/S component		0.038
																		E/W component		0.068			E/W component		0.068
																		Clearance		0.100			Clearance		0.100
																			ICU LOS	0.206 A				ICU LOS	0.206 A

PM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL																2.0	2880	81	0.028	1	2.0	2880	81	0.028	1
NR																1.0	1600	10	0.006	1	1.0	1600	12	0.008	1
NT																0.0	0	0	0.000	0	0.0	0	0	0.000	0
SL																0.0	0	0	0.000	0	0.0	0	0	0.000	0
SR																0.0	0	0	0.000	0	0.0	0	0	0.000	0
ST																0.0	0	0	0.000	1	0.0	0	0	0.000	1
EL																0.0	0	0	0.000	0	0.0	0	0	0.000	0
ER																0.0	0	112	0.000	0	0.0	0	112	0.000	0
ET	Intersection does not exist without project					Intersection does not exist without project					Intersection does not exist without project					1.0	1600	1	0.071	1	1.0	1600	1	0.071	1
WL																0.0	0	39	0.000	1	0.0	0	46	0.000	1
WR																0.0	0	0	0.000	0	0.0	0	0	0.000	0
WT																1.0	1600	1	0.025	0	1.0	1600	1	0.029	0
																		N/S component		0.028			N/S component		0.028
																		E/W component		0.071			E/W component		0.071
																		Clearance		0.100			Clearance		0.100
																			ICU LOS	0.199 A				ICU LOS	0.199 A

Critical movement identified by a 1.

Ten lanes for a right turn indicates free movement.

EXISTING CONDITIONS

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	2	585	0	0	740	17	2	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	2	585	0	0	740	17	2	0	2

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	740	0	0	585	0	0	959	1329	293
Stage 1	-	-	-	-	-	-	589	589	-
Stage 2	-	-	-	-	-	-	370	740	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	812	-	-	933	-	-	200	144	680
Stage 1	-	-	-	-	-	-	442	474	-
Stage 2	-	-	-	-	-	-	601	403	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	812	-	-	933	-	-	197	144	680
Mov Cap-2 Maneuver	-	-	-	-	-	-	197	144	-
Stage 1	-	-	-	-	-	-	441	473	-
Stage 2	-	-	-	-	-	-	593	403	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	17
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	305	812	-	-	933	-	-	174	605
HCM Lane V/C Ratio	0.013	0.002	-	-	-	-	-	0.471	0.013
HCM Control Delay (s)	17	9.4	-	-	0	-	-	42.9	11
HCM Lane LOS	C	A	-	-	A	-	-	E	B
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	2.2	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	82	0	8
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	82	0	8

Major/Minor	Minor2		
Conflicting Flow All	1037	1329	370
Stage 1	740	740	-
Stage 2	297	589	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	175	144	605
Stage 1	357	403	-
Stage 2	665	474	-
Platoon blocked, %			
Mov Cap-1 Maneuver	174	144	605
Mov Cap-2 Maneuver	174	144	-
Stage 1	356	403	-
Stage 2	661	473	-

Approach	SB
HCM Control Delay, s	40.1
HCM LOS	E

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	6	652	751	29	27	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	200	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	6	652	751	29	27	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	751	0	-	0	1089	376
Stage 1	-	-	-	-	751	-
Stage 2	-	-	-	-	338	-
Critical Hdwy	4.3	-	-	-	7	7.1
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	2.3	-	-	-	3.6	3.4
Pot Cap-1 Maneuver	804	-	-	-	198	599
Stage 1	-	-	-	-	407	-
Stage 2	-	-	-	-	671	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	804	-	-	-	197	599
Mov Cap-2 Maneuver	-	-	-	-	197	-
Stage 1	-	-	-	-	407	-
Stage 2	-	-	-	-	666	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	23.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	804	-	-	-	197	599
HCM Lane V/C Ratio	0.007	-	-	-	0.137	0.01
HCM Control Delay (s)	9.5	-	-	-	26.2	11.1
HCM Lane LOS	A	-	-	-	D	B
HCM 95th %tile Q(veh)	0	-	-	-	0.5	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	25	653	1	0	772	3	0	0	0	1	0	8
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	25	653	1	0	772	3	0	0	0	1	0	8
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	2	0	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	33	1307	2	3	973	414	0	3	0	1016	0	453
Arrive On Green	0.02	0.45	0.45	0.00	0.33	0.33	0.00	0.00	0.00	0.37	0.00	0.37
Sat Flow, veh/h	1385	2904	4	1385	2909	1236	0	1455	0	2771	0	1236
Grp Volume(v), veh/h	25	327	327	0	772	3	0	0	0	1	0	8
Grp Sat Flow(s),veh/h/ln	1385	1455	1454	1385	1455	1236	0	1455	0	1385	0	1236
Q Serve(g_s), s	0.8	7.0	7.0	0.0	10.5	0.1	0.0	0.0	0.0	0.0	0.0	0.2
Cycle Q Clear(g_c), s	0.8	7.0	7.0	0.0	10.5	0.1	0.0	0.0	0.0	0.0	0.0	0.2
Prop In Lane	1.00		0.00	1.00		1.00	0.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	33	655	654	3	973	414	0	3	0	1016	0	453
V/C Ratio(X)	0.75	0.50	0.50	0.00	0.79	0.01	0.00	0.00	0.00	0.00	0.00	0.02
Avail Cap(c_a), veh/h	127	655	654	127	1200	510	0	533	0	1016	0	453
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.2	8.5	8.5	0.0	13.2	9.7	0.0	0.0	0.0	8.8	0.0	8.8
Incr Delay (d2), s/veh	28.5	0.6	0.6	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	2.8	2.8	0.0	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.1
LnGrp Delay(d),s/veh	49.6	9.1	9.1	0.0	16.2	9.7	0.0	0.0	0.0	8.8	0.0	8.9
LnGrp LOS	D	A	A		B	A				A		A
Approach Vol, veh/h		679			775			0			9	
Approach Delay, s/veh		10.6			16.2			0.0			8.9	
Approach LOS		B			B						A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		0.0	0.0	23.6		20.0	5.0	18.6
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	4.0	18.0
Max Q Clear Time (g_c+I1), s		0.0	0.0	9.0		2.2	2.8	12.5
Green Ext Time (p_c), s		0.0	0.0	5.1		0.0	0.0	2.1

Intersection Summary	
HCM 2010 Ctrl Delay	13.5
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	65	543	28	8	711	1210	44	72	8	238	30	31
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	65	543	28	8	711	0	44	72	8	238	30	31
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	76	1082	56	11	1011	0	104	170	19	486	284	241
Arrive On Green	0.05	0.39	0.39	0.01	0.35	0.00	0.21	0.21	0.21	0.20	0.20	0.20
Sat Flow, veh/h	1385	2743	141	1385	2909	0	502	821	91	2494	1455	1236
Grp Volume(v), veh/h	65	288	283	8	711	0	124	0	0	238	30	31
Grp Sat Flow(s),veh/h/ln	1385	1455	1430	1385	1455	0	1413	0	0	1247	1455	1236
Q Serve(g_s), s	3.8	12.2	12.3	0.5	17.3	0.0	6.3	0.0	0.0	7.0	1.4	1.7
Cycle Q Clear(g_c), s	3.8	12.2	12.3	0.5	17.3	0.0	6.3	0.0	0.0	7.0	1.4	1.7
Prop In Lane	1.00		0.10	1.00		0.00	0.35		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	76	574	564	11	1011	0	293	0	0	486	284	241
V/C Ratio(X)	0.85	0.50	0.50	0.71	0.70	0.00	0.42	0.00	0.00	0.49	0.11	0.13
Avail Cap(c_a), veh/h	118	1720	1691	68	3334	0	293	0	0	486	284	241
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.4	18.7	18.8	40.6	23.1	0.0	28.2	0.0	0.0	29.4	27.1	27.2
Incr Delay (d2), s/veh	28.5	0.7	0.7	58.5	0.9	0.0	4.4	0.0	0.0	3.5	0.7	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	5.0	4.9	0.4	7.0	0.0	2.8	0.0	0.0	2.6	0.6	0.7
LnGrp Delay(d),s/veh	67.0	19.4	19.5	99.1	24.0	0.0	32.7	0.0	0.0	32.9	27.9	28.3
LnGrp LOS	E	B	B	F	C		C			C	C	C
Approach Vol, veh/h		636			719			124			299	
Approach Delay, s/veh		24.3			24.8			32.7			31.9	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	4.7	36.3		20.0	8.5	32.5
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	97.0		16.0	7.0	94.0
Max Q Clear Time (g_c+I1), s		8.3	2.5	14.3		9.0	5.8	19.3
Green Ext Time (p_c), s		0.3	0.0	9.2		0.6	0.0	9.2

Intersection Summary	
HCM 2010 Ctrl Delay	26.4
HCM 2010 LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	357	1758	0	783	160
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	357	1758	0	783	160
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	3121	2341	0	888	793
Arrive On Green	0.00	0.54	0.54	0.00	0.36	0.36
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	357	1758	0	783	160
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	2.3	23.3	0.0	22.0	3.7
Cycle Q Clear(g_c), s	0.0	2.3	23.3	0.0	22.0	3.7
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	3121	2341	0	888	793
V/C Ratio(X)	0.00	0.11	0.75	0.00	0.88	0.20
Avail Cap(c_a), veh/h	0	3121	2341	0	1070	955
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	8.5	13.4	0.0	22.5	16.6
Incr Delay (d2), s/veh	0.0	0.1	2.3	0.0	7.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.9	9.8	0.0	8.4	1.1
LnGrp Delay(d),s/veh	0.0	8.6	15.7	0.0	30.2	16.8
LnGrp LOS		A	B		C	B
Approach Vol, veh/h		357	1758		943	
Approach Delay, s/veh		8.6	15.7		27.9	
Approach LOS		A	B		C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				49.4		30.6		49.4
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				40.0		32.0		40.0
Max Q Clear Time (g_c+I1), s				4.3		24.0		25.3
Green Ext Time (p_c), s				19.4		2.6		10.7

Intersection Summary	
HCM 2010 Ctrl Delay	18.6
HCM 2010 LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1057	0	0	1115	960	661
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1057	0	0	1115	960	661
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1745	0	0	1309	2244	742
Arrive On Green	0.30	0.00	0.00	0.30	0.60	0.60
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1057	0	0	1115	960	661
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	12.4	0.0	0.0	19.2	11.0	36.8
Cycle Q Clear(g_c), s	12.4	0.0	0.0	19.2	11.0	36.8
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1745	0	0	1309	2244	742
V/C Ratio(X)	0.61	0.00	0.00	0.85	0.43	0.89
Avail Cap(c_a), veh/h	1745	0	0	1309	2244	742
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.0	0.0	0.0	26.3	8.6	13.8
Incr Delay (d2), s/veh	1.6	0.0	0.0	7.1	0.6	15.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.2	0.0	0.0	8.5	3.9	15.4
LnGrp Delay(d),s/veh	25.5	0.0	0.0	33.5	9.2	28.9
LnGrp LOS	C			C	A	C
Approach Vol, veh/h	1057			1115	1621	
Approach Delay, s/veh	25.5			33.5	17.2	
Approach LOS	C			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		52.0		28.0				28.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		48.0		24.0				24.0
Max Q Clear Time (g_c+I1), s		38.8		14.4				21.2
Green Ext Time (p_c), s		4.8		7.5				2.4

Intersection Summary	
HCM 2010 Ctrl Delay	24.3
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	33	44	306	1040	270	28
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	33	44	306	1040	270	28
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	75	67	355	3377	1882	533
Arrive On Green	0.05	0.05	0.26	0.77	0.43	0.43
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	33	44	306	1040	270	28
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	1.1	1.6	9.8	3.3	1.7	0.6
Cycle Q Clear(g_c), s	1.1	1.6	9.8	3.3	1.7	0.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	75	67	355	3377	1882	533
V/C Ratio(X)	0.44	0.66	0.86	0.31	0.14	0.05
Avail Cap(c_a), veh/h	476	425	476	3377	1882	533
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.3	21.6	16.5	1.6	8.0	7.7
Incr Delay (d2), s/veh	4.0	10.4	11.6	0.2	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	1.3	4.9	1.3	0.7	0.2
LnGrp Delay(d),s/veh	25.3	32.0	28.1	1.8	8.2	7.9
LnGrp LOS	C	C	C	A	A	A
Approach Vol, veh/h	77			1346	298	
Approach Delay, s/veh	29.1			7.8	8.2	
Approach LOS	C			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		6.5	15.9	24.1		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	16.0	16.0		
Max Q Clear Time (g_c+I1), s		5.3		3.6	11.8	3.7		
Green Ext Time (p_c), s		10.3		0.1	0.4	6.5		

Intersection Summary	
HCM 2010 Ctrl Delay	8.8
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	14	909	0	0	780	58	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	14	909	0	0	780	58	1	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	780	0	0	909	0	0	1327	1717	455
Stage 1	-	-	-	-	-	-	937	937	-
Stage 2	-	-	-	-	-	-	390	780	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	783	-	-	697	-	-	106	82	531
Stage 1	-	-	-	-	-	-	269	324	-
Stage 2	-	-	-	-	-	-	584	385	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	783	-	-	697	-	-	104	81	531
Mov Cap-2 Maneuver	-	-	-	-	-	-	104	81	-
Stage 1	-	-	-	-	-	-	264	318	-
Stage 2	-	-	-	-	-	-	581	385	-

Approach	EB	WB	NB
HCM Control Delay, s	0.1	0	40
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	104	783	-	-	697	-	-	116	587
HCM Lane V/C Ratio	0.01	0.018	-	-	-	-	-	0.405	0.005
HCM Control Delay (s)	40	9.7	-	-	0	-	-	55.7	11.2
HCM Lane LOS	E	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	1.7	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	47	0	3
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	47	0	3

Major/Minor	Minor2		
Conflicting Flow All	1263	1717	390
Stage 1	780	780	-
Stage 2	483	937	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	118	82	587
Stage 1	337	385	-
Stage 2	513	324	-
Platoon blocked, %			
Mov Cap-1 Maneuver	116	81	587
Mov Cap-2 Maneuver	116	81	-
Stage 1	331	385	-
Stage 2	504	318	-

Approach	SB
HCM Control Delay, s	53
HCM LOS	F

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	955	836	5	36	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	200	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	1	955	836	5	36	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	836	0	-	0	1316	418
Stage 1	-	-	-	-	836	-
Stage 2	-	-	-	-	480	-
Critical Hdwy	4.3	-	-	-	7	7.1
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	2.3	-	-	-	3.6	3.4
Pot Cap-1 Maneuver	744	-	-	-	139	562
Stage 1	-	-	-	-	366	-
Stage 2	-	-	-	-	566	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	744	-	-	-	139	562
Mov Cap-2 Maneuver	-	-	-	-	139	-
Stage 1	-	-	-	-	366	-
Stage 2	-	-	-	-	565	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	38.9
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	744	-	-	-	139	562
HCM Lane V/C Ratio	0.001	-	-	-	0.259	0.002
HCM Control Delay (s)	9.8	-	-	-	39.7	11.4
HCM Lane LOS	A	-	-	-	E	B
HCM 95th %tile Q(veh)	0	-	-	-	1	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	982	0	0	799	1	9	0	0	6	0	32
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	9	982	0	0	799	1	9	0	0	6	0	32
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	2	0	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	13	1159	0	2	974	414	303	0	0	606	0	270
Arrive On Green	0.01	0.40	0.00	0.00	0.33	0.33	0.22	0.00	0.00	0.22	0.00	0.22
Sat Flow, veh/h	1385	2909	0	1385	2909	1236	1385	0	0	2771	0	1236
Grp Volume(v), veh/h	9	982	0	0	799	1	9	0	0	6	0	32
Grp Sat Flow(s),veh/h/ln	1385	1455	0	1385	1455	1236	1385	0	0	1385	0	1236
Q Serve(g_s), s	0.5	22.4	0.0	0.0	18.4	0.0	0.4	0.0	0.0	0.1	0.0	1.5
Cycle Q Clear(g_c), s	0.5	22.4	0.0	0.0	18.4	0.0	0.4	0.0	0.0	0.1	0.0	1.5
Prop In Lane	1.00		0.00	1.00		1.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	13	1159	0	2	974	414	303	0	0	606	0	270
V/C Ratio(X)	0.71	0.85	0.00	0.00	0.82	0.00	0.03	0.00	0.00	0.01	0.00	0.12
Avail Cap(c_a), veh/h	76	1159	0	76	1114	473	303	0	0	606	0	270
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.1	20.0	0.0	0.0	22.3	16.2	22.5	0.0	0.0	22.4	0.0	22.9
Incr Delay (d2), s/veh	53.5	6.0	0.0	0.0	4.5	0.0	0.2	0.0	0.0	0.0	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	9.8	0.0	0.0	7.9	0.0	0.2	0.0	0.0	0.1	0.0	0.6
LnGrp Delay(d),s/veh	89.7	26.0	0.0	0.0	26.8	16.2	22.7	0.0	0.0	22.4	0.0	23.8
LnGrp LOS	F	C			C	B	C			C		C
Approach Vol, veh/h		991			800			9			38	
Approach Delay, s/veh		26.6			26.8			22.7			23.6	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	0.0	33.2		20.0	4.7	28.5
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	28.0		16.0	4.0	28.0
Max Q Clear Time (g_c+I1), s		2.4	0.0	24.4		3.5	2.5	20.4
Green Ext Time (p_c), s		0.0	0.0	2.8		0.0	0.0	4.1

Intersection Summary	
HCM 2010 Ctrl Delay	26.6
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	31	884	35	13	681	221	64	34	22	986	195	55
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	31	884	35	13	681	0	64	34	22	986	195	55
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	35	852	34	16	854	0	112	60	39	977	570	485
Arrive On Green	0.03	0.31	0.31	0.01	0.29	0.00	0.15	0.15	0.15	0.39	0.39	0.39
Sat Flow, veh/h	1385	2780	110	1385	2909	0	733	389	252	2494	1455	1236
Grp Volume(v), veh/h	31	463	456	13	681	0	120	0	0	986	195	55
Grp Sat Flow(s),veh/h/ln	1385	1455	1435	1385	1455	0	1373	0	0	1247	1455	1236
Q Serve(g_s), s	2.6	36.0	36.0	1.1	25.3	0.0	9.5	0.0	0.0	46.0	11.1	3.3
Cycle Q Clear(g_c), s	2.6	36.0	36.0	1.1	25.3	0.0	9.5	0.0	0.0	46.0	11.1	3.3
Prop In Lane	1.00		0.08	1.00		0.00	0.53		0.18	1.00		1.00
Lane Grp Cap(c), veh/h	35	446	440	16	854	0	211	0	0	977	570	485
V/C Ratio(X)	0.89	1.04	1.04	0.80	0.80	0.00	0.57	0.00	0.00	1.01	0.34	0.11
Avail Cap(c_a), veh/h	47	446	440	47	892	0	211	0	0	977	570	485
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.1	40.7	40.7	57.9	38.3	0.0	46.1	0.0	0.0	35.7	25.1	22.7
Incr Delay (d2), s/veh	77.2	52.5	52.8	57.5	5.0	0.0	10.7	0.0	0.0	31.0	1.6	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	20.9	20.6	0.7	10.8	0.0	4.2	0.0	0.0	20.0	4.7	1.2
LnGrp Delay(d),s/veh	134.3	93.2	93.5	115.3	43.2	0.0	56.8	0.0	0.0	66.7	26.7	23.2
LnGrp LOS	F	F	F	F	D		E			F	C	C
Approach Vol, veh/h		950			694			120			1236	
Approach Delay, s/veh		94.7			44.6			56.8			58.5	
Approach LOS		F			D			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		22.0	5.4	40.0		50.0	6.9	38.4
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		18.0	4.0	36.0		46.0	4.0	36.0
Max Q Clear Time (g_c+I1), s		11.5	3.1	38.0		48.0	4.6	27.3
Green Ext Time (p_c), s		0.2	0.0	0.0		0.0	0.0	5.4

Intersection Summary	
HCM 2010 Ctrl Delay	66.7
HCM 2010 LOS	E

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	996	753	0	685	145
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	996	753	0	685	145
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	2957	2217	0	864	771
Arrive On Green	0.00	0.51	0.51	0.00	0.35	0.35
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	996	753	0	685	145
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	5.6	5.7	0.0	13.6	2.5
Cycle Q Clear(g_c), s	0.0	5.6	5.7	0.0	13.6	2.5
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2957	2217	0	864	771
V/C Ratio(X)	0.00	0.34	0.34	0.00	0.79	0.19
Avail Cap(c_a), veh/h	0	2957	2217	0	1991	1777
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	8.0	8.1	0.0	16.2	12.6
Incr Delay (d2), s/veh	0.0	0.3	0.4	0.0	1.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.3	2.3	0.0	4.9	0.8
LnGrp Delay(d),s/veh	0.0	8.3	8.5	0.0	17.9	12.7
LnGrp LOS		A	A		B	B
Approach Vol, veh/h		996	753		830	
Approach Delay, s/veh		8.3	8.5		17.0	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				56.9		23.1		56.9
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				28.0		44.0		28.0
Max Q Clear Time (g_c+I1), s				7.6		15.6		7.7
Green Ext Time (p_c), s				11.0		3.5		11.0

Intersection Summary	
HCM 2010 Ctrl Delay	11.2
HCM 2010 LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1492	0	0	920	443	595
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1492	0	0	920	443	595
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1818	0	0	1364	2197	726
Arrive On Green	0.31	0.00	0.00	0.31	0.59	0.59
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1492	0	0	920	443	595
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	19.0	0.0	0.0	14.7	4.4	30.6
Cycle Q Clear(g_c), s	19.0	0.0	0.0	14.7	4.4	30.6
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1818	0	0	1364	2197	726
V/C Ratio(X)	0.82	0.00	0.00	0.67	0.20	0.82
Avail Cap(c_a), veh/h	1818	0	0	1364	2197	726
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.4	0.0	0.0	24.0	7.7	13.1
Incr Delay (d2), s/veh	4.3	0.0	0.0	2.7	0.2	10.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.1	0.0	0.0	6.2	1.6	12.3
LnGrp Delay(d),s/veh	29.7	0.0	0.0	26.6	7.9	23.1
LnGrp LOS	C			C	A	C
Approach Vol, veh/h	1492			920	1038	
Approach Delay, s/veh	29.7			26.6	16.6	
Approach LOS	C			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		51.0		29.0				29.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		47.0		25.0				25.0
Max Q Clear Time (g_c+I1), s		32.6		21.0				16.7
Green Ext Time (p_c), s		3.9		3.6				7.1

Intersection Summary	
HCM 2010 Ctrl Delay	25.0
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	84	279	93	197	954	85
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	84	279	93	197	954	85
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	351	314	110	2665	2023	573
Arrive On Green	0.25	0.25	0.08	0.61	0.46	0.46
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	84	279	93	197	954	85
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	2.8	12.8	3.9	1.1	8.8	2.3
Cycle Q Clear(g_c), s	2.8	12.8	3.9	1.1	8.8	2.3
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	351	314	110	2665	2023	573
V/C Ratio(X)	0.24	0.89	0.85	0.07	0.47	0.15
Avail Cap(c_a), veh/h	376	336	235	2665	2023	573
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.5	21.2	26.8	4.7	10.9	9.1
Incr Delay (d2), s/veh	0.3	23.2	16.0	0.1	0.8	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	9.9	2.0	0.5	3.7	0.9
LnGrp Delay(d),s/veh	17.8	44.4	42.8	4.7	11.6	9.7
LnGrp LOS	B	D	D	A	B	A
Approach Vol, veh/h	363			290	1039	
Approach Delay, s/veh	38.3			17.0	11.5	
Approach LOS	D			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		19.0	8.7	31.3		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	10.0	22.0		
Max Q Clear Time (g_c+I1), s		3.1		14.8	5.9	10.8		
Green Ext Time (p_c), s		9.2		0.2	0.1	5.6		

Intersection Summary	
HCM 2010 Ctrl Delay	18.2
HCM 2010 LOS	B

EXISTING PLUS GROWTH WITHOUT PROJECT CONDITIONS

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	2	617	0	0	781	18	2	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	2	617	0	0	781	18	2	0	2

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	781	0	0	617	0	0	1012	1402	309
Stage 1	-	-	-	-	-	-	621	621	-
Stage 2	-	-	-	-	-	-	391	781	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	782	-	-	906	-	-	183	129	664
Stage 1	-	-	-	-	-	-	423	458	-
Stage 2	-	-	-	-	-	-	584	385	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	782	-	-	906	-	-	180	129	664
Mov Cap-2 Maneuver	-	-	-	-	-	-	180	129	-
Stage 1	-	-	-	-	-	-	422	457	-
Stage 2	-	-	-	-	-	-	576	385	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	17.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	283	782	-	-	906	-	-	157	586
HCM Lane V/C Ratio	0.014	0.003	-	-	-	-	-	0.554	0.014
HCM Control Delay (s)	17.9	9.6	-	-	0	-	-	53.2	11.2
HCM Lane LOS	C	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	2.8	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	87	0	8
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	87	0	8

Major/Minor	Minor2		
Conflicting Flow All	1094	1402	391
Stage 1	781	781	-
Stage 2	313	621	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	158	129	586
Stage 1	337	385	-
Stage 2	650	458	-
Platoon blocked, %			
Mov Cap-1 Maneuver	157	129	586
Mov Cap-2 Maneuver	157	129	-
Stage 1	336	385	-
Stage 2	646	457	-

Approach	SB
HCM Control Delay, s	49.7
HCM LOS	E

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	6	688	792	31	28	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	200	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	6	688	792	31	28	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	792	0	-	0	1148	396
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	356	-
Critical Hdwy	4.3	-	-	-	7	7.1
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	2.3	-	-	-	3.6	3.4
Pot Cap-1 Maneuver	774	-	-	-	180	581
Stage 1	-	-	-	-	387	-
Stage 2	-	-	-	-	657	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	774	-	-	-	179	581
Mov Cap-2 Maneuver	-	-	-	-	179	-
Stage 1	-	-	-	-	387	-
Stage 2	-	-	-	-	652	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	25.7
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	774	-	-	-	179	581
HCM Lane V/C Ratio	0.008	-	-	-	0.156	0.01
HCM Control Delay (s)	9.7	-	-	-	28.8	11.3
HCM Lane LOS	A	-	-	-	D	B
HCM 95th %tile Q(veh)	0	-	-	-	0.5	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	26	689	1	0	814	3	0	0	0	1	0	8
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	26	689	1	0	814	3	0	0	0	1	0	8
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	2	0	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	34	1324	2	3	991	421	0	3	0	1005	0	448
Arrive On Green	0.02	0.46	0.46	0.00	0.34	0.34	0.00	0.00	0.00	0.36	0.00	0.36
Sat Flow, veh/h	1385	2904	4	1385	2909	1236	0	1455	0	2771	0	1236
Grp Volume(v), veh/h	26	345	345	0	814	3	0	0	0	1	0	8
Grp Sat Flow(s),veh/h/ln	1385	1455	1454	1385	1455	1236	0	1455	0	1385	0	1236
Q Serve(g_s), s	0.8	7.5	7.5	0.0	11.3	0.1	0.0	0.0	0.0	0.0	0.0	0.2
Cycle Q Clear(g_c), s	0.8	7.5	7.5	0.0	11.3	0.1	0.0	0.0	0.0	0.0	0.0	0.2
Prop In Lane	1.00		0.00	1.00		1.00	0.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	34	663	663	3	991	421	0	3	0	1005	0	448
V/C Ratio(X)	0.76	0.52	0.52	0.00	0.82	0.01	0.00	0.00	0.00	0.00	0.00	0.02
Avail Cap(c_a), veh/h	126	663	663	126	1187	504	0	528	0	1005	0	448
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.4	8.6	8.6	0.0	13.3	9.6	0.0	0.0	0.0	9.0	0.0	9.0
Incr Delay (d2), s/veh	28.3	0.7	0.7	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	3.1	3.1	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
LnGrp Delay(d),s/veh	49.7	9.3	9.3	0.0	17.4	9.6	0.0	0.0	0.0	9.0	0.0	9.1
LnGrp LOS	D	A	A		B	A				A		A
Approach Vol, veh/h		716			817			0			9	
Approach Delay, s/veh		10.8			17.3			0.0			9.1	
Approach LOS		B			B						A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		0.0	0.0	24.1		20.0	5.1	19.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	4.0	18.0
Max Q Clear Time (g_c+I1), s		0.0	0.0	9.5		2.2	2.8	13.3
Green Ext Time (p_c), s		0.0	0.0	5.1		0.0	0.0	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	14.2
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	69	573	30	8	750	1277	46	76	8	251	32	33
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	69	573	30	8	750	0	46	76	8	251	32	33
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	81	1133	59	11	1056	0	100	166	17	471	275	233
Arrive On Green	0.06	0.41	0.41	0.01	0.36	0.00	0.20	0.20	0.20	0.19	0.19	0.19
Sat Flow, veh/h	1385	2741	143	1385	2909	0	500	827	87	2494	1455	1236
Grp Volume(v), veh/h	69	304	299	8	750	0	130	0	0	251	32	33
Grp Sat Flow(s),veh/h/ln	1385	1455	1429	1385	1455	0	1414	0	0	1247	1455	1236
Q Serve(g_s), s	4.2	13.1	13.2	0.5	18.7	0.0	6.9	0.0	0.0	7.7	1.5	1.9
Cycle Q Clear(g_c), s	4.2	13.1	13.2	0.5	18.7	0.0	6.9	0.0	0.0	7.7	1.5	1.9
Prop In Lane	1.00		0.10	1.00		0.00	0.35		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	81	602	591	11	1056	0	284	0	0	471	275	233
V/C Ratio(X)	0.85	0.50	0.51	0.71	0.71	0.00	0.46	0.00	0.00	0.53	0.12	0.14
Avail Cap(c_a), veh/h	114	1665	1636	65	3228	0	284	0	0	471	275	233
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.5	18.4	18.4	41.9	23.2	0.0	29.8	0.0	0.0	31.0	28.5	28.6
Incr Delay (d2), s/veh	32.0	0.7	0.7	59.0	0.9	0.0	5.3	0.0	0.0	4.3	0.9	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	5.3	5.3	0.4	7.6	0.0	3.1	0.0	0.0	2.9	0.7	0.7
LnGrp Delay(d),s/veh	71.5	19.1	19.1	100.9	24.1	0.0	35.1	0.0	0.0	35.3	29.4	29.9
LnGrp LOS	E	B	B	F	C		D			D	C	C
Approach Vol, veh/h		672			758			130			316	
Approach Delay, s/veh		24.5			24.9			35.1			34.1	
Approach LOS		C			C			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	4.7	39.0		20.0	9.0	34.8
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	97.0		16.0	7.0	94.0
Max Q Clear Time (g_c+I1), s		8.9	2.5	15.2		9.7	6.2	20.7
Green Ext Time (p_c), s		0.3	0.0	10.0		0.6	0.0	10.0

Intersection Summary	
HCM 2010 Ctrl Delay	27.0
HCM 2010 LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	377	1855	0	826	169
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	377	1855	0	826	169
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	3058	2294	0	921	822
Arrive On Green	0.00	0.53	0.53	0.00	0.37	0.37
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	377	1855	0	826	169
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	2.5	26.7	0.0	23.8	3.9
Cycle Q Clear(g_c), s	0.0	2.5	26.7	0.0	23.8	3.9
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	3058	2294	0	921	822
V/C Ratio(X)	0.00	0.12	0.81	0.00	0.90	0.21
Avail Cap(c_a), veh/h	0	3058	2294	0	1049	936
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	9.2	14.9	0.0	22.6	16.4
Incr Delay (d2), s/veh	0.0	0.1	3.2	0.0	9.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.0	11.3	0.0	9.4	1.2
LnGrp Delay(d),s/veh	0.0	9.2	18.1	0.0	32.1	16.5
LnGrp LOS		A	B		C	B
Approach Vol, veh/h		377	1855		995	
Approach Delay, s/veh		9.2	18.1		29.4	
Approach LOS		A	B		C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				47.9		32.1		47.9
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				40.0		32.0		40.0
Max Q Clear Time (g_c+I1), s				4.5		25.8		28.7
Green Ext Time (p_c), s				20.8		2.3		9.0

Intersection Summary	
HCM 2010 Ctrl Delay	20.6
HCM 2010 LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1115	0	0	1176	1013	697
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1115	0	0	1176	1013	697
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1818	0	0	1364	2197	726
Arrive On Green	0.31	0.00	0.00	0.31	0.59	0.59
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1115	0	0	1176	1013	697
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	13.0	0.0	0.0	20.3	12.3	42.6
Cycle Q Clear(g_c), s	13.0	0.0	0.0	20.3	12.3	42.6
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1818	0	0	1364	2197	726
V/C Ratio(X)	0.61	0.00	0.00	0.86	0.46	0.96
Avail Cap(c_a), veh/h	1818	0	0	1364	2197	726
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.4	0.0	0.0	25.9	9.3	15.6
Incr Delay (d2), s/veh	1.6	0.0	0.0	7.4	0.7	24.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	0.0	0.0	9.0	4.3	19.3
LnGrp Delay(d),s/veh	24.9	0.0	0.0	33.3	10.0	40.5
LnGrp LOS	C			C	B	D
Approach Vol, veh/h	1115			1176	1710	
Approach Delay, s/veh	24.9			33.3	22.4	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		51.0		29.0				29.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		47.0		25.0				25.0
Max Q Clear Time (g_c+I1), s		44.6		15.0				22.3
Green Ext Time (p_c), s		1.7		8.0				2.4

Intersection Summary	
HCM 2010 Ctrl Delay	26.3
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	35	46	323	1097	285	30
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	35	46	323	1097	285	30
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	77	69	372	3371	1824	517
Arrive On Green	0.06	0.06	0.27	0.77	0.42	0.42
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	35	46	323	1097	285	30
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	1.1	1.7	10.4	3.6	1.9	0.7
Cycle Q Clear(g_c), s	1.1	1.7	10.4	3.6	1.9	0.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	77	69	372	3371	1824	517
V/C Ratio(X)	0.45	0.67	0.87	0.33	0.16	0.06
Avail Cap(c_a), veh/h	476	425	476	3371	1824	517
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.3	21.6	16.3	1.6	8.4	8.1
Incr Delay (d2), s/veh	4.1	10.6	13.0	0.3	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	1.4	5.3	1.4	0.8	0.3
LnGrp Delay(d),s/veh	25.4	32.1	29.2	1.9	8.6	8.3
LnGrp LOS	C	C	C	A	A	A
Approach Vol, veh/h	81			1420	315	
Approach Delay, s/veh	29.2			8.1	8.6	
Approach LOS	C			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		6.6	16.5	23.5		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	16.0	16.0		
Max Q Clear Time (g_c+I1), s		5.6		3.7	12.4	3.9		
Green Ext Time (p_c), s		11.0		0.1	0.4	6.8		

Intersection Summary	
HCM 2010 Ctrl Delay	9.1
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	15	959	0	0	823	61	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	15	959	0	0	823	61	1	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	823	0	0	959	0	0	1401	1812	480
Stage 1	-	-	-	-	-	-	989	989	-
Stage 2	-	-	-	-	-	-	412	823	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	753	-	-	666	-	-	93	71	511
Stage 1	-	-	-	-	-	-	250	306	-
Stage 2	-	-	-	-	-	-	567	368	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	753	-	-	666	-	-	91	70	511
Mov Cap-2 Maneuver	-	-	-	-	-	-	91	70	-
Stage 1	-	-	-	-	-	-	245	300	-
Stage 2	-	-	-	-	-	-	564	368	-

Approach	EB	WB	NB
HCM Control Delay, s	0.2	0	45
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	91	753	-	-	666	-	-	103	567
HCM Lane V/C Ratio	0.011	0.02	-	-	-	-	-	0.485	0.005
HCM Control Delay (s)	45	9.9	-	-	0	-	-	69.2	11.4
HCM Lane LOS	E	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	2.1	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	50	0	3
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	50	0	3

Major/Minor	Minor2		
Conflicting Flow All	1333	1812	412
Stage 1	823	823	-
Stage 2	510	989	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	105	71	567
Stage 1	317	368	-
Stage 2	494	306	-
Platoon blocked, %			
Mov Cap-1 Maneuver	103	70	567
Mov Cap-2 Maneuver	103	70	-
Stage 1	311	368	-
Stage 2	484	300	-

Approach	SB
HCM Control Delay, s	65.9
HCM LOS	F

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	1008	882	5	38	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	200	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	1	1008	882	5	38	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	882	0	-	0	1388	441
Stage 1	-	-	-	-	882	-
Stage 2	-	-	-	-	506	-
Critical Hdwy	4.3	-	-	-	7	7.1
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	2.3	-	-	-	3.6	3.4
Pot Cap-1 Maneuver	714	-	-	-	124	543
Stage 1	-	-	-	-	346	-
Stage 2	-	-	-	-	548	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	714	-	-	-	124	543
Mov Cap-2 Maneuver	-	-	-	-	124	-
Stage 1	-	-	-	-	346	-
Stage 2	-	-	-	-	547	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	45.5
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	714	-	-	-	124	543
HCM Lane V/C Ratio	0.001	-	-	-	0.306	0.002
HCM Control Delay (s)	10	-	-	-	46.4	11.6
HCM Lane LOS	B	-	-	-	E	B
HCM 95th %tile Q(veh)	0	-	-	-	1.2	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	1036	0	0	843	1	9	0	0	6	0	34
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	9	1036	0	0	843	1	9	0	0	6	0	34
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	2	0	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	13	1167	0	2	982	417	302	0	0	603	0	269
Arrive On Green	0.01	0.40	0.00	0.00	0.34	0.34	0.22	0.00	0.00	0.22	0.00	0.22
Sat Flow, veh/h	1385	2909	0	1385	2909	1236	1385	0	0	2771	0	1236
Grp Volume(v), veh/h	9	1036	0	0	843	1	9	0	0	6	0	34
Grp Sat Flow(s),veh/h/ln	1385	1455	0	1385	1455	1236	1385	0	0	1385	0	1236
Q Serve(g_s), s	0.5	24.3	0.0	0.0	19.9	0.0	0.4	0.0	0.0	0.1	0.0	1.6
Cycle Q Clear(g_c), s	0.5	24.3	0.0	0.0	19.9	0.0	0.4	0.0	0.0	0.1	0.0	1.6
Prop In Lane	1.00		0.00	1.00		1.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	13	1167	0	2	982	417	302	0	0	603	0	269
V/C Ratio(X)	0.71	0.89	0.00	0.00	0.86	0.00	0.03	0.00	0.00	0.01	0.00	0.13
Avail Cap(c_a), veh/h	75	1167	0	75	1109	471	302	0	0	603	0	269
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.3	20.5	0.0	0.0	22.7	16.1	22.6	0.0	0.0	22.5	0.0	23.1
Incr Delay (d2), s/veh	53.6	8.6	0.0	0.0	6.3	0.0	0.2	0.0	0.0	0.0	0.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	11.0	0.0	0.0	8.8	0.0	0.2	0.0	0.0	0.1	0.0	0.6
LnGrp Delay(d),s/veh	89.9	29.1	0.0	0.0	29.0	16.1	22.8	0.0	0.0	22.6	0.0	24.1
LnGrp LOS	F	C			C	B	C			C		C
Approach Vol, veh/h		1045			844			9			40	
Approach Delay, s/veh		29.6			29.0			22.8			23.8	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	0.0	33.5		20.0	4.7	28.8
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	28.0		16.0	4.0	28.0
Max Q Clear Time (g_c+I1), s		2.4	0.0	26.3		3.6	2.5	21.9
Green Ext Time (p_c), s		0.0	0.0	1.4		0.1	0.0	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	29.2
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	33	933	37	14	718	233	68	36	23	1040	206	58
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	33	933	37	14	718	0	68	36	23	1040	206	58
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	38	893	35	17	892	0	98	52	33	1016	593	504
Arrive On Green	0.03	0.32	0.32	0.01	0.31	0.00	0.13	0.13	0.13	0.41	0.41	0.41
Sat Flow, veh/h	1385	2779	110	1385	2909	0	736	389	249	2494	1455	1236
Grp Volume(v), veh/h	33	488	482	14	718	0	127	0	0	1040	206	58
Grp Sat Flow(s),veh/h/ln	1385	1455	1435	1385	1455	0	1374	0	0	1247	1455	1236
Q Serve(g_s), s	3.0	41.0	41.0	1.3	29.0	0.0	11.3	0.0	0.0	52.0	12.5	3.7
Cycle Q Clear(g_c), s	3.0	41.0	41.0	1.3	29.0	0.0	11.3	0.0	0.0	52.0	12.5	3.7
Prop In Lane	1.00		0.08	1.00		0.00	0.54		0.18	1.00		1.00
Lane Grp Cap(c), veh/h	38	468	461	17	892	0	183	0	0	1016	593	504
V/C Ratio(X)	0.88	1.04	1.04	0.82	0.81	0.00	0.69	0.00	0.00	1.02	0.35	0.12
Avail Cap(c_a), veh/h	43	468	461	43	935	0	183	0	0	1016	593	504
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.8	43.3	43.3	62.9	40.7	0.0	52.8	0.0	0.0	37.8	26.1	23.5
Incr Delay (d2), s/veh	84.1	53.7	54.0	60.7	5.0	0.0	19.5	0.0	0.0	34.2	1.6	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	23.3	23.1	0.8	12.3	0.0	5.3	0.0	0.0	22.6	5.2	1.3
LnGrp Delay(d),s/veh	146.0	97.0	97.3	123.6	45.8	0.0	72.3	0.0	0.0	72.0	27.7	23.9
LnGrp LOS	F	F	F	F	D		E			F	C	C
Approach Vol, veh/h		1003			732			127			1304	
Approach Delay, s/veh		98.7			47.2			72.3			62.9	
Approach LOS		F			D			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	5.6	45.0		56.0	7.5	43.1
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	41.0		52.0	4.0	41.0
Max Q Clear Time (g_c+I1), s		13.3	3.3	43.0		54.0	5.0	31.0
Green Ext Time (p_c), s		0.2	0.0	0.0		0.0	0.0	6.3

Intersection Summary	
HCM 2010 Ctrl Delay	71.0
HCM 2010 LOS	E

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	1051	794	0	723	153
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	1051	794	0	723	153
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	2921	2191	0	896	800
Arrive On Green	0.00	0.50	0.50	0.00	0.36	0.36
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	1051	794	0	723	153
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	6.3	6.4	0.0	15.1	2.7
Cycle Q Clear(g_c), s	0.0	6.3	6.4	0.0	15.1	2.7
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2921	2191	0	896	800
V/C Ratio(X)	0.00	0.36	0.36	0.00	0.81	0.19
Avail Cap(c_a), veh/h	0	2921	2191	0	1856	1657
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	8.7	8.8	0.0	16.7	12.7
Incr Delay (d2), s/veh	0.0	0.3	0.5	0.0	1.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.6	2.6	0.0	5.3	0.8
LnGrp Delay(d),s/veh	0.0	9.1	9.2	0.0	18.5	12.8
LnGrp LOS		A	A		B	B
Approach Vol, veh/h		1051	794		876	
Approach Delay, s/veh		9.1	9.2		17.5	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				55.2		24.8		55.2
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				29.0		43.0		29.0
Max Q Clear Time (g_c+I1), s				8.3		17.1		8.4
Green Ext Time (p_c), s				11.7		3.7		11.7

Intersection Summary	
HCM 2010 Ctrl Delay	11.8
HCM 2010 LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1574	0	0	971	467	628
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1574	0	0	971	467	628
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1818	0	0	1364	2197	726
Arrive On Green	0.31	0.00	0.00	0.31	0.59	0.59
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1574	0	0	971	467	628
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	20.4	0.0	0.0	15.7	4.7	34.1
Cycle Q Clear(g_c), s	20.4	0.0	0.0	15.7	4.7	34.1
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1818	0	0	1364	2197	726
V/C Ratio(X)	0.87	0.00	0.00	0.71	0.21	0.86
Avail Cap(c_a), veh/h	1818	0	0	1364	2197	726
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.9	0.0	0.0	24.3	7.8	13.8
Incr Delay (d2), s/veh	5.8	0.0	0.0	3.2	0.2	13.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.9	0.0	0.0	6.7	1.6	14.1
LnGrp Delay(d),s/veh	31.7	0.0	0.0	27.5	8.0	26.9
LnGrp LOS	C			C	A	C
Approach Vol, veh/h	1574			971	1095	
Approach Delay, s/veh	31.7			27.5	18.8	
Approach LOS	C			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		51.0		29.0				29.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		47.0		25.0				25.0
Max Q Clear Time (g_c+I1), s		36.1		22.4				17.7
Green Ext Time (p_c), s		3.6		2.4				6.4

Intersection Summary	
HCM 2010 Ctrl Delay	26.7
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	89	294	98	208	1006	90
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	89	294	98	208	1006	90
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	365	326	116	2629	1971	558
Arrive On Green	0.26	0.26	0.08	0.60	0.45	0.45
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	89	294	98	208	1006	90
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	3.0	13.7	4.2	1.2	9.8	2.6
Cycle Q Clear(g_c), s	3.0	13.7	4.2	1.2	9.8	2.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	365	326	116	2629	1971	558
V/C Ratio(X)	0.24	0.90	0.84	0.08	0.51	0.16
Avail Cap(c_a), veh/h	371	331	255	2629	1971	558
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.3	21.3	27.0	5.0	11.7	9.7
Incr Delay (d2), s/veh	0.3	26.3	14.8	0.1	0.9	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	10.8	2.1	0.5	4.1	1.0
LnGrp Delay(d),s/veh	17.7	47.6	41.8	5.0	12.6	10.3
LnGrp LOS	B	D	D	A	B	B
Approach Vol, veh/h	383			306	1096	
Approach Delay, s/veh	40.6			16.8	12.4	
Approach LOS	D			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		19.7	9.0	31.0		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	11.0	21.0		
Max Q Clear Time (g_c+I1), s		3.2		15.7	6.2	11.8		
Green Ext Time (p_c), s		9.9		0.0	0.1	5.1		

Intersection Summary	
HCM 2010 Ctrl Delay	19.2
HCM 2010 LOS	B

EXISTING PLUS GROWTH PLUS OTHER DEVELOPMENT WITHOUT PROJECT CONDITIONS

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	2	696	0	0	797	18	2	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	2	696	0	0	797	18	2	0	2

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	797	0	0	696	0	0	1099	1497	348
Stage 1	-	-	-	-	-	-	700	700	-
Stage 2	-	-	-	-	-	-	399	797	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	771	-	-	844	-	-	157	113	625
Stage 1	-	-	-	-	-	-	378	421	-
Stage 2	-	-	-	-	-	-	577	378	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	771	-	-	844	-	-	155	113	625
Mov Cap-2 Maneuver	-	-	-	-	-	-	155	113	-
Stage 1	-	-	-	-	-	-	377	420	-
Stage 2	-	-	-	-	-	-	569	378	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	19.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	248	771	-	-	844	-	-	143	579
HCM Lane V/C Ratio	0.016	0.003	-	-	-	-	-	0.608	0.014
HCM Control Delay (s)	19.8	9.7	-	-	0	-	-	63.1	11.3
HCM Lane LOS	C	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	3.2	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	87	0	8
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	87	0	8

Major/Minor	Minor2		
Conflicting Flow All	1149	1497	399
Stage 1	797	797	-
Stage 2	352	700	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	144	113	579
Stage 1	329	378	-
Stage 2	616	421	-
Platoon blocked, %			
Mov Cap-1 Maneuver	143	113	579
Mov Cap-2 Maneuver	143	113	-
Stage 1	328	378	-
Stage 2	612	420	-

Approach	SB
HCM Control Delay, s	58.7
HCM LOS	F

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	6	767	808	31	28	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	200	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	6	767	808	31	28	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	808	0	-	0	1204	404
Stage 1	-	-	-	-	808	-
Stage 2	-	-	-	-	396	-
Critical Hdwy	4.3	-	-	-	7	7.1
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	2.3	-	-	-	3.6	3.4
Pot Cap-1 Maneuver	763	-	-	-	165	574
Stage 1	-	-	-	-	379	-
Stage 2	-	-	-	-	626	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	763	-	-	-	164	574
Mov Cap-2 Maneuver	-	-	-	-	164	-
Stage 1	-	-	-	-	379	-
Stage 2	-	-	-	-	621	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	27.9
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	763	-	-	-	164	574
HCM Lane V/C Ratio	0.008	-	-	-	0.171	0.01
HCM Control Delay (s)	9.8	-	-	-	31.4	11.3
HCM Lane LOS	A	-	-	-	D	B
HCM 95th %tile Q(veh)	0	-	-	-	0.6	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	26	768	1	1	830	3	0	7	7	1	1	8
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	26	768	1	1	830	3	0	7	7	1	1	8
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	1	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	31	963	1	2	902	383	0	149	149	308	324	275
Arrive On Green	0.02	0.33	0.33	0.00	0.31	0.31	0.00	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	1385	2905	4	1385	2909	1236	0	668	668	1385	1455	1236
Grp Volume(v), veh/h	26	385	384	1	830	3	0	0	14	1	1	8
Grp Sat Flow(s),veh/h/ln	1385	1455	1454	1385	1455	1236	0	0	1337	1385	1455	1236
Q Serve(g_s), s	1.3	17.3	17.3	0.1	19.8	0.1	0.0	0.0	0.6	0.0	0.0	0.4
Cycle Q Clear(g_c), s	1.3	17.3	17.3	0.1	19.8	0.1	0.0	0.0	0.6	0.0	0.0	0.4
Prop In Lane	1.00		0.00	1.00		1.00	0.00		0.50	1.00		1.00
Lane Grp Cap(c), veh/h	31	482	482	2	902	383	0	0	297	308	324	275
V/C Ratio(X)	0.83	0.80	0.80	0.52	0.92	0.01	0.00	0.00	0.05	0.00	0.00	0.03
Avail Cap(c_a), veh/h	77	482	482	77	930	395	0	0	297	308	324	275
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.0	21.8	21.8	35.9	24.0	17.2	0.0	0.0	22.0	21.8	21.8	21.9
Incr Delay (d2), s/veh	40.4	9.1	9.1	134.4	13.8	0.0	0.0	0.0	0.3	0.0	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	8.2	8.2	0.1	9.7	0.0	0.0	0.0	0.2	0.0	0.0	0.1
LnGrp Delay(d),s/veh	75.4	31.0	31.0	170.3	37.8	17.2	0.0	0.0	22.3	21.8	21.8	22.1
LnGrp LOS	E	C	C	F	D	B			C	C	C	C
Approach Vol, veh/h		795			834			14			10	
Approach Delay, s/veh		32.4			37.9			22.3			22.0	
Approach LOS		C			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	4.1	27.8		20.0	5.6	26.3
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	23.0		16.0	4.0	23.0
Max Q Clear Time (g_c+I1), s		2.6	2.1	19.3		2.4	3.3	21.8
Green Ext Time (p_c), s		0.0	0.0	2.7		0.0	0.0	0.5

Intersection Summary	
HCM 2010 Ctrl Delay	35.0
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	150	578	30	8	753	1492	46	166	8	290	53	48
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	150	578	30	8	753	0	46	166	8	290	53	48
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	172	1272	66	11	1011	0	63	226	11	397	232	197
Arrive On Green	0.12	0.46	0.46	0.01	0.35	0.00	0.21	0.21	0.21	0.16	0.16	0.16
Sat Flow, veh/h	1385	2742	142	1385	2909	0	299	1079	52	2494	1455	1236
Grp Volume(v), veh/h	150	306	302	8	753	0	220	0	0	290	53	48
Grp Sat Flow(s),veh/h/ln	1385	1455	1429	1385	1455	0	1430	0	0	1247	1455	1236
Q Serve(g_s), s	10.7	14.3	14.4	0.6	22.9	0.0	14.4	0.0	0.0	11.1	3.2	3.4
Cycle Q Clear(g_c), s	10.7	14.3	14.4	0.6	22.9	0.0	14.4	0.0	0.0	11.1	3.2	3.4
Prop In Lane	1.00		0.10	1.00		0.00	0.21		0.04	1.00		1.00
Lane Grp Cap(c), veh/h	172	675	663	11	1011	0	299	0	0	397	232	197
V/C Ratio(X)	0.87	0.45	0.45	0.72	0.74	0.00	0.74	0.00	0.00	0.73	0.23	0.24
Avail Cap(c_a), veh/h	179	1348	1324	55	2434	0	299	0	0	397	232	197
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.1	18.3	18.3	49.7	28.8	0.0	37.1	0.0	0.0	40.1	36.8	36.9
Incr Delay (d2), s/veh	33.2	0.5	0.5	61.9	1.1	0.0	14.8	0.0	0.0	11.2	2.3	2.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	5.8	5.7	0.4	9.4	0.0	6.9	0.0	0.0	4.4	1.4	1.3
LnGrp Delay(d),s/veh	76.3	18.7	18.8	111.6	29.9	0.0	51.9	0.0	0.0	51.3	39.1	39.8
LnGrp LOS	E	B	B	F	C		D			D	D	D
Approach Vol, veh/h		758			761			220			391	
Approach Delay, s/veh		30.1			30.8			51.9			48.3	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		25.0	4.8	50.6		20.0	16.5	38.9
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		21.0	4.0	93.0		16.0	13.0	84.0
Max Q Clear Time (g_c+I1), s		16.4	2.6	16.4		13.1	12.7	24.9
Green Ext Time (p_c), s		0.4	0.0	10.1		0.4	0.0	10.0

Intersection Summary	
HCM 2010 Ctrl Delay	36.0
HCM 2010 LOS	D

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	402	2081	0	836	169
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	402	2081	0	836	169
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	3114	2335	0	905	808
Arrive On Green	0.00	0.54	0.54	0.00	0.36	0.36
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	402	2081	0	836	169
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	2.7	33.3	0.0	25.2	4.1
Cycle Q Clear(g_c), s	0.0	2.7	33.3	0.0	25.2	4.1
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	3114	2335	0	905	808
V/C Ratio(X)	0.00	0.13	0.89	0.00	0.92	0.21
Avail Cap(c_a), veh/h	0	3114	2335	0	953	851
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	9.1	16.2	0.0	24.0	17.2
Incr Delay (d2), s/veh	0.0	0.1	5.7	0.0	13.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.1	14.3	0.0	10.3	1.3
LnGrp Delay(d),s/veh	0.0	9.2	21.9	0.0	37.8	17.4
LnGrp LOS		A	C		D	B
Approach Vol, veh/h		402	2081		1005	
Approach Delay, s/veh		9.2	21.9		34.4	
Approach LOS		A	C		C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				47.5		32.5		47.5
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				42.0		30.0		42.0
Max Q Clear Time (g_c+I1), s				4.7		27.2		35.3
Green Ext Time (p_c), s				24.6		1.3		6.0

Intersection Summary	
HCM 2010 Ctrl Delay	24.0
HCM 2010 LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1142	0	0	1270	1145	697
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1142	0	0	1270	1145	697
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1891	0	0	1418	2151	711
Arrive On Green	0.32	0.00	0.00	0.32	0.57	0.57
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1142	0	0	1270	1145	697
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	13.2	0.0	0.0	22.2	15.0	43.9
Cycle Q Clear(g_c), s	13.2	0.0	0.0	22.2	15.0	43.9
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1891	0	0	1418	2151	711
V/C Ratio(X)	0.60	0.00	0.00	0.90	0.53	0.98
Avail Cap(c_a), veh/h	1891	0	0	1418	2151	711
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.7	0.0	0.0	25.7	10.4	16.6
Incr Delay (d2), s/veh	1.4	0.0	0.0	9.1	0.9	29.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	0.0	0.0	10.0	5.3	20.5
LnGrp Delay(d),s/veh	24.1	0.0	0.0	34.8	11.4	45.9
LnGrp LOS	C			C	B	D
Approach Vol, veh/h	1142			1270	1842	
Approach Delay, s/veh	24.1			34.8	24.4	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		50.0		30.0				30.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		46.0		26.0				26.0
Max Q Clear Time (g_c+I1), s		45.9		15.2				24.2
Green Ext Time (p_c), s		0.1		8.9				1.7

Intersection Summary	
HCM 2010 Ctrl Delay	27.4
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	42	47	324	1482	359	31
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	42	47	324	1482	359	31
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	81	72	373	3361	1813	514
Arrive On Green	0.06	0.06	0.27	0.77	0.42	0.42
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	42	47	324	1482	359	31
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	1.4	1.7	10.4	5.5	2.4	0.7
Cycle Q Clear(g_c), s	1.4	1.7	10.4	5.5	2.4	0.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	81	72	373	3361	1813	514
V/C Ratio(X)	0.52	0.65	0.87	0.44	0.20	0.06
Avail Cap(c_a), veh/h	474	423	474	3361	1813	514
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.4	21.5	16.3	1.9	8.7	8.2
Incr Delay (d2), s/veh	5.0	9.3	13.1	0.4	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	1.4	5.3	2.2	1.0	0.3
LnGrp Delay(d),s/veh	26.4	30.9	29.4	2.3	8.9	8.4
LnGrp LOS	C	C	C	A	A	A
Approach Vol, veh/h	89			1806	390	
Approach Delay, s/veh	28.7			7.2	8.9	
Approach LOS	C			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		6.7	16.6	23.4		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	16.0	16.0		
Max Q Clear Time (g_c+I1), s		7.5		3.7	12.4	4.4		
Green Ext Time (p_c), s		15.4		0.2	0.3	8.3		

Intersection Summary	
HCM 2010 Ctrl Delay	8.3
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	15	991	0	0	910	61	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	15	991	0	0	910	61	1	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	910	0	0	991	0	0	1476	1931	496
Stage 1	-	-	-	-	-	-	1021	1021	-
Stage 2	-	-	-	-	-	-	455	910	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	696	-	-	647	-	-	81	60	499
Stage 1	-	-	-	-	-	-	239	295	-
Stage 2	-	-	-	-	-	-	534	334	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	696	-	-	647	-	-	79	59	499
Mov Cap-2 Maneuver	-	-	-	-	-	-	79	59	-
Stage 1	-	-	-	-	-	-	234	289	-
Stage 2	-	-	-	-	-	-	531	334	-

Approach	EB	WB	NB
HCM Control Delay, s	0.2	0	51.2
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	79	696	-	-	647	-	-	86	531
HCM Lane V/C Ratio	0.013	0.022	-	-	-	-	-	0.581	0.006
HCM Control Delay (s)	51.2	10.3	-	-	0	-	-	93.5	11.8
HCM Lane LOS	F	B	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	2.6	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	50	0	3
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	50	0	3

Major/Minor	Minor2		
Conflicting Flow All	1436	1931	455
Stage 1	910	910	-
Stage 2	526	1021	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	87	60	531
Stage 1	280	334	-
Stage 2	483	295	-
Platoon blocked, %			
Mov Cap-1 Maneuver	86	59	531
Mov Cap-2 Maneuver	86	59	-
Stage 1	274	334	-
Stage 2	473	289	-

Approach	SB
HCM Control Delay, s	88.9
HCM LOS	F

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	1040	969	5	38	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	200	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	1	1040	969	5	38	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	969	0	-	0	1491	485
Stage 1	-	-	-	-	969	-
Stage 2	-	-	-	-	522	-
Critical Hdwy	4.3	-	-	-	7	7.1
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	2.3	-	-	-	3.6	3.4
Pot Cap-1 Maneuver	660	-	-	-	106	507
Stage 1	-	-	-	-	311	-
Stage 2	-	-	-	-	538	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	660	-	-	-	106	507
Mov Cap-2 Maneuver	-	-	-	-	106	-
Stage 1	-	-	-	-	311	-
Stage 2	-	-	-	-	537	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	55.7
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	660	-	-	-	106	507
HCM Lane V/C Ratio	0.002	-	-	-	0.358	0.002
HCM Control Delay (s)	10.5	-	-	-	56.8	12.1
HCM Lane LOS	B	-	-	-	F	B
HCM 95th %tile Q(veh)	0	-	-	-	1.4	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	1068	0	6	930	1	9	2	2	6	6	34
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	9	1068	0	6	930	1	9	2	2	6	6	34
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	1	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	13	1065	0	9	1057	449	198	44	44	290	304	259
Arrive On Green	0.01	0.37	0.00	0.01	0.36	0.36	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1385	2909	0	1385	2909	1236	948	211	211	1385	1455	1236
Grp Volume(v), veh/h	9	1068	0	6	930	1	13	0	0	6	6	34
Grp Sat Flow(s),veh/h/ln	1385	1455	0	1385	1455	1236	1370	0	0	1385	1455	1236
Q Serve(g_s), s	0.5	28.0	0.0	0.3	22.9	0.0	0.6	0.0	0.0	0.3	0.3	1.7
Cycle Q Clear(g_c), s	0.5	28.0	0.0	0.3	22.9	0.0	0.6	0.0	0.0	0.3	0.3	1.7
Prop In Lane	1.00		0.00	1.00		1.00	0.69		0.15	1.00		1.00
Lane Grp Cap(c), veh/h	13	1065	0	9	1057	449	287	0	0	290	304	259
V/C Ratio(X)	0.71	1.00	0.00	0.69	0.88	0.00	0.05	0.00	0.00	0.02	0.02	0.13
Avail Cap(c_a), veh/h	72	1065	0	72	1065	453	287	0	0	290	304	259
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.8	24.2	0.0	37.9	22.8	15.5	24.1	0.0	0.0	24.0	24.0	24.6
Incr Delay (d2), s/veh	54.1	28.2	0.0	67.7	8.6	0.0	0.3	0.0	0.0	0.1	0.1	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	15.3	0.0	0.3	10.4	0.0	0.2	0.0	0.0	0.1	0.1	0.7
LnGrp Delay(d),s/veh	91.9	52.5	0.0	105.6	31.4	15.5	24.4	0.0	0.0	24.1	24.1	25.6
LnGrp LOS	F	F		F	C	B	C			C	C	C
Approach Vol, veh/h		1077			937			13			46	
Approach Delay, s/veh		52.8			31.9			24.4			25.2	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	4.5	32.0		20.0	4.7	31.8
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	28.0		16.0	4.0	28.0
Max Q Clear Time (g_c+I1), s		2.6	2.3	30.0		3.7	2.5	24.9
Green Ext Time (p_c), s		0.0	0.0	0.0		0.1	0.0	2.6

Intersection Summary	
HCM 2010 Ctrl Delay	42.6
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	52	948	37	14	735	284	68	71	23	1243	302	134
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	52	948	37	14	735	0	68	71	23	1243	302	134
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	38	847	33	16	842	0	75	78	25	1114	650	552
Arrive On Green	0.03	0.30	0.30	0.01	0.29	0.00	0.13	0.13	0.13	0.45	0.45	0.45
Sat Flow, veh/h	1385	2781	109	1385	2909	0	584	609	197	2494	1455	1236
Grp Volume(v), veh/h	52	496	489	14	735	0	162	0	0	1243	302	134
Grp Sat Flow(s),veh/h/ln	1385	1455	1435	1385	1455	0	1391	0	0	1247	1455	1236
Q Serve(g_s), s	4.0	45.0	45.0	1.5	35.5	0.0	17.0	0.0	0.0	66.0	21.4	9.9
Cycle Q Clear(g_c), s	4.0	45.0	45.0	1.5	35.5	0.0	17.0	0.0	0.0	66.0	21.4	9.9
Prop In Lane	1.00		0.08	1.00		0.00	0.42		0.14	1.00		1.00
Lane Grp Cap(c), veh/h	38	443	437	16	842	0	179	0	0	1114	650	552
V/C Ratio(X)	1.39	1.12	1.12	0.85	0.87	0.00	0.91	0.00	0.00	1.12	0.46	0.24
Avail Cap(c_a), veh/h	38	443	437	38	886	0	179	0	0	1114	650	552
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	71.9	51.4	51.4	72.9	49.9	0.0	63.5	0.0	0.0	40.9	28.5	25.4
Incr Delay (d2), s/veh	280.6	79.4	79.6	68.2	9.3	0.0	46.3	0.0	0.0	64.7	2.4	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	27.7	27.4	0.9	15.4	0.0	8.8	0.0	0.0	32.6	9.0	3.5
LnGrp Delay(d),s/veh	352.5	130.7	131.0	141.0	59.2	0.0	109.8	0.0	0.0	105.6	30.9	26.4
LnGrp LOS	F	F	F	F	E		F			F	C	C
Approach Vol, veh/h		1037			749			162			1679	
Approach Delay, s/veh		142.0			60.7			109.8			85.8	
Approach LOS		F			E			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		23.0	5.7	49.0		70.0	8.0	46.7
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		19.0	4.0	45.0		66.0	4.0	45.0
Max Q Clear Time (g_c+I1), s		19.0	3.5	47.0		68.0	6.0	37.5
Green Ext Time (p_c), s		0.0	0.0	0.0		0.0	0.0	5.2

Intersection Summary	
HCM 2010 Ctrl Delay	97.8
HCM 2010 LOS	F

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	1176	878	0	774	153
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	1176	878	0	774	153
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	2834	2126	0	944	842
Arrive On Green	0.00	0.49	0.49	0.00	0.38	0.38
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	1176	878	0	774	153
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	7.7	7.7	0.0	16.7	2.7
Cycle Q Clear(g_c), s	0.0	7.7	7.7	0.0	16.7	2.7
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2834	2126	0	944	842
V/C Ratio(X)	0.00	0.41	0.41	0.00	0.82	0.18
Avail Cap(c_a), veh/h	0	2834	2126	0	1801	1607
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	9.8	9.8	0.0	16.7	12.3
Incr Delay (d2), s/veh	0.0	0.4	0.6	0.0	1.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.2	3.2	0.0	5.9	0.8
LnGrp Delay(d),s/veh	0.0	10.3	10.4	0.0	18.5	12.4
LnGrp LOS		B	B		B	B
Approach Vol, veh/h		1176	878		927	
Approach Delay, s/veh		10.3	10.4		17.5	
Approach LOS		B	B		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				53.5		26.5		53.5
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				29.0		43.0		29.0
Max Q Clear Time (g_c+I1), s				9.7		18.7		9.7
Green Ext Time (p_c), s				12.4		3.9		12.5

Intersection Summary	
HCM 2010 Ctrl Delay	12.6
HCM 2010 LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1714	0	0	993	529	628
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1714	0	0	993	529	628
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1964	0	0	1473	2104	695
Arrive On Green	0.34	0.00	0.00	0.34	0.56	0.56
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1714	0	0	993	529	628
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	22.1	0.0	0.0	15.6	5.8	36.1
Cycle Q Clear(g_c), s	22.1	0.0	0.0	15.6	5.8	36.1
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1964	0	0	1473	2104	695
V/C Ratio(X)	0.87	0.00	0.00	0.67	0.25	0.90
Avail Cap(c_a), veh/h	1964	0	0	1473	2104	695
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.9	0.0	0.0	22.7	8.9	15.6
Incr Delay (d2), s/veh	5.7	0.0	0.0	2.5	0.3	17.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.6	0.0	0.0	6.6	2.0	15.5
LnGrp Delay(d),s/veh	30.6	0.0	0.0	25.2	9.2	32.8
LnGrp LOS	C			C	A	C
Approach Vol, veh/h	1714			993	1157	
Approach Delay, s/veh	30.6			25.2	22.0	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		49.0		31.0				31.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		45.0		27.0				27.0
Max Q Clear Time (g_c+I1), s		38.1		24.1				17.6
Green Ext Time (p_c), s		2.9		2.7				8.3

Intersection Summary	
HCM 2010 Ctrl Delay	26.7
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	91	296	100	311	1379	96
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	91	296	100	311	1379	96
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	367	327	118	2625	1961	556
Arrive On Green	0.26	0.26	0.09	0.60	0.45	0.45
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	91	296	100	311	1379	96
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	3.1	13.8	4.3	1.8	15.2	2.8
Cycle Q Clear(g_c), s	3.1	13.8	4.3	1.8	15.2	2.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	367	327	118	2625	1961	556
V/C Ratio(X)	0.25	0.90	0.85	0.12	0.70	0.17
Avail Cap(c_a), veh/h	370	331	185	2625	1961	556
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.3	21.3	27.0	5.1	13.3	9.8
Incr Delay (d2), s/veh	0.3	26.7	18.6	0.1	2.1	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	10.9	2.2	0.7	6.4	1.0
LnGrp Delay(d),s/veh	17.7	48.0	45.6	5.2	15.4	10.5
LnGrp LOS	B	D	D	A	B	B
Approach Vol, veh/h	387			411	1475	
Approach Delay, s/veh	40.9			15.0	15.1	
Approach LOS	D			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		19.8	9.1	30.9		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	8.0	24.0		
Max Q Clear Time (g_c+I1), s		3.8		15.8	6.3	17.2		
Green Ext Time (p_c), s		15.1		0.0	0.0	5.1		

Intersection Summary	
HCM 2010 Ctrl Delay	19.5
HCM 2010 LOS	B

EXISTING PLUS GROWTH WITH PROJECT CONDITIONS

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	2	620	0	0	784	19	2	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	2	620	0	0	784	19	2	0	2

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	784	0	0	620	0	0	1016	1408	310
Stage 1	-	-	-	-	-	-	624	624	-
Stage 2	-	-	-	-	-	-	392	784	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	780	-	-	904	-	-	181	128	663
Stage 1	-	-	-	-	-	-	421	457	-
Stage 2	-	-	-	-	-	-	583	384	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	780	-	-	904	-	-	178	128	663
Mov Cap-2 Maneuver	-	-	-	-	-	-	178	128	-
Stage 1	-	-	-	-	-	-	420	456	-
Stage 2	-	-	-	-	-	-	575	384	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	18
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	281	780	-	-	904	-	-	156	585
HCM Lane V/C Ratio	0.014	0.003	-	-	-	-	-	0.564	0.014
HCM Control Delay (s)	18	9.6	-	-	0	-	-	54.4	11.2
HCM Lane LOS	C	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	2.9	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	88	0	8
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	88	0	8

Major/Minor	Minor2		
Conflicting Flow All	1098	1408	392
Stage 1	784	784	-
Stage 2	314	624	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	157	128	585
Stage 1	335	384	-
Stage 2	650	457	-
Platoon blocked, %			
Mov Cap-1 Maneuver	156	128	585
Mov Cap-2 Maneuver	156	128	-
Stage 1	334	384	-
Stage 2	646	456	-

Approach	SB
HCM Control Delay, s	50.8
HCM LOS	F

Minor Lane/Major Mvmt

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	36	662	1	0	785	103	0	0	0	99	0	18
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	36	662	1	0	785	103	0	0	0	99	0	18
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	2	0	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	45	1330	2	3	975	414	0	3	0	1001	0	447
Arrive On Green	0.03	0.46	0.46	0.00	0.34	0.34	0.00	0.00	0.00	0.36	0.00	0.36
Sat Flow, veh/h	1385	2904	4	1385	2909	1236	0	1455	0	2771	0	1236
Grp Volume(v), veh/h	36	332	331	0	785	103	0	0	0	99	0	18
Grp Sat Flow(s),veh/h/ln	1385	1455	1454	1385	1455	1236	0	1455	0	1385	0	1236
Q Serve(g_s), s	1.1	7.1	7.1	0.0	10.9	2.7	0.0	0.0	0.0	1.0	0.0	0.4
Cycle Q Clear(g_c), s	1.1	7.1	7.1	0.0	10.9	2.7	0.0	0.0	0.0	1.0	0.0	0.4
Prop In Lane	1.00		0.00	1.00		1.00	0.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	45	666	666	3	975	414	0	3	0	1001	0	447
V/C Ratio(X)	0.80	0.50	0.50	0.00	0.81	0.25	0.00	0.00	0.00	0.10	0.00	0.04
Avail Cap(c_a), veh/h	125	666	666	125	1183	503	0	526	0	1001	0	447
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.3	8.4	8.4	0.0	13.4	10.7	0.0	0.0	0.0	9.4	0.0	9.2
Incr Delay (d2), s/veh	27.2	0.6	0.6	0.0	3.5	0.3	0.0	0.0	0.0	0.2	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	2.9	2.9	0.0	4.8	1.0	0.0	0.0	0.0	0.4	0.0	0.2
LnGrp Delay(d),s/veh	48.5	9.0	9.0	0.0	16.9	11.0	0.0	0.0	0.0	9.6	0.0	9.3
LnGrp LOS	D	A	A		B	B				A		A
Approach Vol, veh/h		699			888			0			117	
Approach Delay, s/veh		11.0			16.2			0.0			9.5	
Approach LOS		B			B						A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		0.0	0.0	24.3		20.0	5.4	18.8
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	4.0	18.0
Max Q Clear Time (g_c+I1), s		0.0	0.0	9.1		3.0	3.1	12.9
Green Ext Time (p_c), s		0.0	0.0	5.3		0.3	0.0	2.0

Intersection Summary	
HCM 2010 Ctrl Delay	13.6
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	69	644	30	8	821	1277	46	76	8	251	32	33
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	69	644	30	8	821	0	46	76	8	251	32	33
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	82	1218	57	11	1137	0	99	164	17	439	256	218
Arrive On Green	0.06	0.44	0.44	0.01	0.39	0.00	0.20	0.20	0.20	0.18	0.18	0.18
Sat Flow, veh/h	1385	2758	128	1385	2909	0	500	827	87	2494	1455	1236
Grp Volume(v), veh/h	69	339	335	8	821	0	130	0	0	251	32	33
Grp Sat Flow(s),veh/h/ln	1385	1455	1432	1385	1455	0	1414	0	0	1247	1455	1236
Q Serve(g_s), s	4.5	15.4	15.5	0.5	21.8	0.0	7.4	0.0	0.0	8.4	1.7	2.1
Cycle Q Clear(g_c), s	4.5	15.4	15.5	0.5	21.8	0.0	7.4	0.0	0.0	8.4	1.7	2.1
Prop In Lane	1.00		0.09	1.00		0.00	0.35		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	82	642	632	11	1137	0	280	0	0	439	256	218
V/C Ratio(X)	0.85	0.53	0.53	0.72	0.72	0.00	0.46	0.00	0.00	0.57	0.12	0.15
Avail Cap(c_a), veh/h	91	1537	1513	61	3010	0	280	0	0	439	256	218
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.4	18.5	18.5	45.0	23.5	0.0	32.2	0.0	0.0	34.3	31.5	31.7
Incr Delay (d2), s/veh	45.2	0.7	0.7	60.1	0.9	0.0	5.4	0.0	0.0	5.3	1.0	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	6.2	6.2	0.4	8.8	0.0	3.3	0.0	0.0	3.2	0.7	0.8
LnGrp Delay(d),s/veh	87.6	19.1	19.2	105.1	24.4	0.0	37.6	0.0	0.0	39.6	32.5	33.2
LnGrp LOS	F	B	B	F	C		D			D	C	C
Approach Vol, veh/h		743			829			130			316	
Approach Delay, s/veh		25.5			25.1			37.6			38.2	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		22.0	4.7	44.1		20.0	9.3	39.5
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		18.0	4.0	96.0		16.0	6.0	94.0
Max Q Clear Time (g_c+I1), s		9.4	2.5	17.5		10.4	6.5	23.8
Green Ext Time (p_c), s		0.3	0.0	11.8		0.6	0.0	11.8

Intersection Summary	
HCM 2010 Ctrl Delay	28.1
HCM 2010 LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	384	1924	0	826	171
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	384	1924	0	826	171
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	3058	2293	0	921	822
Arrive On Green	0.00	0.53	0.53	0.00	0.37	0.37
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	384	1924	0	826	171
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	2.6	28.5	0.0	23.8	4.0
Cycle Q Clear(g_c), s	0.0	2.6	28.5	0.0	23.8	4.0
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	3058	2293	0	921	822
V/C Ratio(X)	0.00	0.13	0.84	0.00	0.90	0.21
Avail Cap(c_a), veh/h	0	3058	2293	0	1048	936
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	9.2	15.3	0.0	22.6	16.4
Incr Delay (d2), s/veh	0.0	0.1	3.9	0.0	9.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.0	12.0	0.0	9.4	1.2
LnGrp Delay(d),s/veh	0.0	9.3	19.2	0.0	32.1	16.5
LnGrp LOS		A	B		C	B
Approach Vol, veh/h		384	1924		997	
Approach Delay, s/veh		9.3	19.2		29.4	
Approach LOS		A	B		C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				47.9		32.1		47.9
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				40.0		32.0		40.0
Max Q Clear Time (g_c+I1), s				4.6		25.8		30.5
Green Ext Time (p_c), s				21.7		2.3		7.9

Intersection Summary	
HCM 2010 Ctrl Delay	21.1
HCM 2010 LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1120	0	0	1181	1077	697
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1120	0	0	1181	1077	697
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1818	0	0	1364	2197	726
Arrive On Green	0.31	0.00	0.00	0.31	0.59	0.59
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1120	0	0	1181	1077	697
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	13.1	0.0	0.0	20.4	13.3	42.6
Cycle Q Clear(g_c), s	13.1	0.0	0.0	20.4	13.3	42.6
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1818	0	0	1364	2197	726
V/C Ratio(X)	0.62	0.00	0.00	0.87	0.49	0.96
Avail Cap(c_a), veh/h	1818	0	0	1364	2197	726
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.4	0.0	0.0	25.9	9.6	15.6
Incr Delay (d2), s/veh	1.6	0.0	0.0	7.6	0.8	24.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	0.0	0.0	9.2	4.6	19.3
LnGrp Delay(d),s/veh	25.0	0.0	0.0	33.5	10.3	40.5
LnGrp LOS	C			C	B	D
Approach Vol, veh/h	1120			1181	1774	
Approach Delay, s/veh	25.0			33.5	22.2	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		51.0		29.0				29.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		47.0		25.0				25.0
Max Q Clear Time (g_c+I1), s		44.6		15.1				22.4
Green Ext Time (p_c), s		1.7		8.0				2.3

Intersection Summary	
HCM 2010 Ctrl Delay	26.2
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	36	46	323	1097	285	31
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	36	46	323	1097	285	31
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	78	69	372	3370	1823	517
Arrive On Green	0.06	0.06	0.27	0.77	0.42	0.42
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	36	46	323	1097	285	31
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	1.2	1.7	10.4	3.6	1.9	0.7
Cycle Q Clear(g_c), s	1.2	1.7	10.4	3.6	1.9	0.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	78	69	372	3370	1823	517
V/C Ratio(X)	0.46	0.66	0.87	0.33	0.16	0.06
Avail Cap(c_a), veh/h	475	424	475	3370	1823	517
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.3	21.6	16.3	1.6	8.5	8.1
Incr Delay (d2), s/veh	4.2	10.3	13.0	0.3	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	1.3	5.3	1.4	0.8	0.3
LnGrp Delay(d),s/veh	25.6	31.9	29.2	1.9	8.6	8.3
LnGrp LOS	C	C	C	A	A	A
Approach Vol, veh/h	82			1420	316	
Approach Delay, s/veh	29.1			8.1	8.6	
Approach LOS	C			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		6.6	16.5	23.5		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	16.0	16.0		
Max Q Clear Time (g_c+I1), s		5.6		3.7	12.4	3.9		
Green Ext Time (p_c), s		11.0		0.1	0.4	6.8		

Intersection Summary	
HCM 2010 Ctrl Delay	9.1
HCM 2010 LOS	A

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Movement	EBU	EBT	EBR	WBU	WBL	WBT	NBU	NBL	NBR
Vol, veh/h	0	1	108	0	9	1	0	110	29
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	0	1	108	0	9	1	0	110	29
Number of Lanes	0	1	0	0	0	1	0	2	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	3	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	3	0	1
HCM Control Delay	7.7	8.3	7.9
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1
Vol Left, %	100%	100%	0%	0%	90%
Vol Thru, %	0%	0%	0%	1%	10%
Vol Right, %	0%	0%	100%	99%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	55	55	29	109	10
LT Vol	0	0	0	1	1
Through Vol	0	0	29	108	0
RT Vol	55	55	0	0	9
Lane Flow Rate	55	55	29	109	10
Geometry Grp	7	7	7	7	7
Degree of Util (X)	0.082	0.082	0.019	0.131	0.015
Departure Headway (Hd)	5.379	5.379	2.303	4.322	5.543
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	661	661	1513	835	649
Service Time	3.157	3.157	0.08	2.022	3.246
HCM Lane V/C Ratio	0.083	0.083	0.019	0.131	0.015
HCM Control Delay	8.6	8.6	5.1	7.7	8.3
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.3	0.3	0.1	0.5	0

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	15	962	0	0	826	62	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	15	962	0	0	826	62	1	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	826	0	0	962	0	0	1405	1818	481
Stage 1	-	-	-	-	-	-	992	992	-
Stage 2	-	-	-	-	-	-	413	826	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	751	-	-	664	-	-	92	71	510
Stage 1	-	-	-	-	-	-	249	305	-
Stage 2	-	-	-	-	-	-	566	366	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	751	-	-	664	-	-	90	70	510
Mov Cap-2 Maneuver	-	-	-	-	-	-	90	70	-
Stage 1	-	-	-	-	-	-	244	299	-
Stage 2	-	-	-	-	-	-	563	366	-

Approach	EB	WB	NB
HCM Control Delay, s	0.2	0	45.4
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	90	751	-	-	664	-	-	102	566
HCM Lane V/C Ratio	0.011	0.02	-	-	-	-	-	0.5	0.005
HCM Control Delay (s)	45.4	9.9	-	-	0	-	-	71.3	11.4
HCM Lane LOS	E	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	2.2	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	51	0	3
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	51	0	3

Major/Minor	Minor2		
Conflicting Flow All	1337	1818	413
Stage 1	826	826	-
Stage 2	511	992	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	104	71	566
Stage 1	316	366	-
Stage 2	493	305	-
Platoon blocked, %			
Mov Cap-1 Maneuver	102	70	566
Mov Cap-2 Maneuver	102	70	-
Stage 1	310	366	-
Stage 2	483	299	-

Approach	SB
HCM Control Delay, s	68
HCM LOS	F

Minor Lane/Major Mvmt

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	1000	0	0	838	77	9	0	0	113	0	39
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	14	1000	0	0	838	77	9	0	0	113	0	39
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	2	0	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	19	1172	0	2	975	414	301	0	0	601	0	268
Arrive On Green	0.01	0.40	0.00	0.00	0.34	0.34	0.22	0.00	0.00	0.22	0.00	0.22
Sat Flow, veh/h	1385	2909	0	1385	2909	1236	1385	0	0	2771	0	1236
Grp Volume(v), veh/h	14	1000	0	0	838	77	9	0	0	113	0	39
Grp Sat Flow(s),veh/h/ln	1385	1455	0	1385	1455	1236	1385	0	0	1385	0	1236
Q Serve(g_s), s	0.7	23.0	0.0	0.0	19.8	3.3	0.4	0.0	0.0	2.5	0.0	1.9
Cycle Q Clear(g_c), s	0.7	23.0	0.0	0.0	19.8	3.3	0.4	0.0	0.0	2.5	0.0	1.9
Prop In Lane	1.00		0.00	1.00		1.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	19	1172	0	2	975	414	301	0	0	601	0	268
V/C Ratio(X)	0.75	0.85	0.00	0.00	0.86	0.19	0.03	0.00	0.00	0.19	0.00	0.15
Avail Cap(c_a), veh/h	75	1172	0	75	1105	470	301	0	0	601	0	268
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.2	20.0	0.0	0.0	22.9	17.4	22.7	0.0	0.0	23.5	0.0	23.3
Incr Delay (d2), s/veh	44.2	6.3	0.0	0.0	6.4	0.2	0.2	0.0	0.0	0.7	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	10.2	0.0	0.0	8.8	1.1	0.2	0.0	0.0	1.0	0.0	0.7
LnGrp Delay(d),s/veh	80.4	26.3	0.0	0.0	29.2	17.6	22.9	0.0	0.0	24.2	0.0	24.5
LnGrp LOS	F	C			C	B	C			C		C
Approach Vol, veh/h		1014			915			9			152	
Approach Delay, s/veh		27.0			28.3			22.9			24.3	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	0.0	33.7		20.0	5.0	28.7
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	28.0		16.0	4.0	28.0
Max Q Clear Time (g_c+I1), s		2.4	0.0	25.0		4.5	2.7	21.8
Green Ext Time (p_c), s		0.0	0.0	2.4		0.3	0.0	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	27.3
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	33	1004	37	14	789	233	68	36	23	1040	206	58
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	33	1004	37	14	789	0	68	36	23	1040	206	58
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	38	962	35	16	960	0	85	45	29	1046	610	519
Arrive On Green	0.03	0.35	0.35	0.01	0.33	0.00	0.12	0.12	0.12	0.42	0.42	0.42
Sat Flow, veh/h	1385	2788	103	1385	2909	0	736	389	249	2494	1455	1236
Grp Volume(v), veh/h	33	524	517	14	789	0	127	0	0	1040	206	58
Grp Sat Flow(s),veh/h/ln	1385	1455	1436	1385	1455	0	1374	0	0	1247	1455	1236
Q Serve(g_s), s	3.5	51.0	51.0	1.5	36.8	0.0	13.3	0.0	0.0	61.4	14.1	4.2
Cycle Q Clear(g_c), s	3.5	51.0	51.0	1.5	36.8	0.0	13.3	0.0	0.0	61.4	14.1	4.2
Prop In Lane	1.00		0.07	1.00		0.00	0.54		0.18	1.00		1.00
Lane Grp Cap(c), veh/h	38	502	496	16	960	0	158	0	0	1046	610	519
V/C Ratio(X)	0.88	1.04	1.04	0.85	0.82	0.00	0.80	0.00	0.00	0.99	0.34	0.11
Avail Cap(c_a), veh/h	38	502	496	38	1004	0	158	0	0	1046	610	519
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	71.6	48.4	48.4	72.9	45.5	0.0	63.7	0.0	0.0	42.7	29.0	26.1
Incr Delay (d2), s/veh	100.1	51.9	52.1	68.2	5.4	0.0	33.7	0.0	0.0	26.4	1.5	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	27.6	27.3	0.9	15.5	0.0	6.6	0.0	0.0	24.9	5.9	1.5
LnGrp Delay(d),s/veh	171.7	100.2	100.5	141.0	50.9	0.0	97.4	0.0	0.0	69.1	30.5	26.5
LnGrp LOS	F	F	F	F	D		F			E	C	C
Approach Vol, veh/h		1074			803			127			1304	
Approach Delay, s/veh		102.6			52.5			97.4			61.1	
Approach LOS		F			D			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	5.7	55.0		66.0	8.0	52.7
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	51.0		62.0	4.0	51.0
Max Q Clear Time (g_c+I1), s		15.3	3.5	53.0		63.4	5.5	38.8
Green Ext Time (p_c), s		0.1	0.0	0.0		0.0	0.0	7.8

Intersection Summary	
HCM 2010 Ctrl Delay	73.9
HCM 2010 LOS	E

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	1058	864	0	723	155
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	1058	864	0	723	155
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	2951	2213	0	892	796
Arrive On Green	0.00	0.51	0.51	0.00	0.36	0.36
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	1058	864	0	723	155
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	6.5	7.2	0.0	15.5	2.8
Cycle Q Clear(g_c), s	0.0	6.5	7.2	0.0	15.5	2.8
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2951	2213	0	892	796
V/C Ratio(X)	0.00	0.36	0.39	0.00	0.81	0.19
Avail Cap(c_a), veh/h	0	2951	2213	0	1770	1580
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	8.8	9.0	0.0	17.2	13.1
Incr Delay (d2), s/veh	0.0	0.3	0.5	0.0	1.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.6	3.0	0.0	5.5	0.9
LnGrp Delay(d),s/veh	0.0	9.1	9.5	0.0	19.0	13.2
LnGrp LOS		A	A		B	B
Approach Vol, veh/h		1058	864		878	
Approach Delay, s/veh		9.1	9.5		18.0	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				54.8		25.2		54.8
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				30.0		42.0		30.0
Max Q Clear Time (g_c+I1), s				8.5		17.5		9.2
Green Ext Time (p_c), s				12.5		3.6		12.2

Intersection Summary	
HCM 2010 Ctrl Delay	12.0
HCM 2010 LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1579	0	0	976	532	628
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1579	0	0	976	532	628
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1818	0	0	1364	2197	726
Arrive On Green	0.31	0.00	0.00	0.31	0.59	0.59
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1579	0	0	976	532	628
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	20.5	0.0	0.0	15.8	5.5	34.1
Cycle Q Clear(g_c), s	20.5	0.0	0.0	15.8	5.5	34.1
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1818	0	0	1364	2197	726
V/C Ratio(X)	0.87	0.00	0.00	0.72	0.24	0.86
Avail Cap(c_a), veh/h	1818	0	0	1364	2197	726
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.9	0.0	0.0	24.4	7.9	13.8
Incr Delay (d2), s/veh	5.9	0.0	0.0	3.2	0.3	13.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.0	0.0	0.0	6.7	1.9	14.1
LnGrp Delay(d),s/veh	31.9	0.0	0.0	27.6	8.2	26.9
LnGrp LOS	C			C	A	C
Approach Vol, veh/h	1579			976	1160	
Approach Delay, s/veh	31.9			27.6	18.3	
Approach LOS	C			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		51.0		29.0				29.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		47.0		25.0				25.0
Max Q Clear Time (g_c+I1), s		36.1		22.5				17.8
Green Ext Time (p_c), s		3.9		2.3				6.3

Intersection Summary	
HCM 2010 Ctrl Delay	26.5
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	90	294	98	208	1006	91
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	90	294	98	208	1006	91
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	365	326	116	2629	1971	558
Arrive On Green	0.26	0.26	0.08	0.60	0.45	0.45
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	90	294	98	208	1006	91
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	3.1	13.7	4.2	1.2	9.8	2.6
Cycle Q Clear(g_c), s	3.1	13.7	4.2	1.2	9.8	2.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	365	326	116	2629	1971	558
V/C Ratio(X)	0.25	0.90	0.84	0.08	0.51	0.16
Avail Cap(c_a), veh/h	371	331	255	2629	1971	558
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.3	21.3	27.0	5.0	11.7	9.7
Incr Delay (d2), s/veh	0.3	26.3	14.8	0.1	0.9	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	10.8	2.1	0.5	4.1	1.0
LnGrp Delay(d),s/veh	17.7	47.6	41.8	5.0	12.6	10.3
LnGrp LOS	B	D	D	A	B	B
Approach Vol, veh/h	384			306	1097	
Approach Delay, s/veh	40.6			16.8	12.4	
Approach LOS	D			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		19.7	9.0	31.0		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	11.0	21.0		
Max Q Clear Time (g_c+I1), s		3.2		15.7	6.2	11.8		
Green Ext Time (p_c), s		9.9		0.0	0.1	5.1		

Intersection Summary	
HCM 2010 Ctrl Delay	19.2
HCM 2010 LOS	B

Intersection	
Intersection Delay, s/veh	8
Intersection LOS	A

Movement	EBU	EBT	EBR	WBU	WBL	WBT	NBU	NBL	NBR
Vol, veh/h	0	1	112	0	39	1	0	81	10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	0	1	112	0	39	1	0	81	10
Number of Lanes	0	1	0	0	0	1	0	2	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	3	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	3	0	1
HCM Control Delay	7.6	8.5	8.2
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1
Vol Left, %	100%	100%	0%	0%	97%
Vol Thru, %	0%	0%	0%	1%	3%
Vol Right, %	0%	0%	100%	99%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	41	41	10	113	40
LT Vol	0	0	0	1	1
Through Vol	0	0	10	112	0
RT Vol	41	41	0	0	39
Lane Flow Rate	40	40	10	113	40
Geometry Grp	7	7	7	7	7
Degree of Util (X)	0.062	0.062	0.007	0.133	0.061
Departure Headway (Hd)	5.54	5.54	2.46	4.253	5.481
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	650	650	1459	848	657
Service Time	3.247	3.247	0.168	1.957	3.187
HCM Lane V/C Ratio	0.062	0.062	0.007	0.133	0.061
HCM Control Delay	8.6	8.6	5.2	7.6	8.5
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.2	0.2	0	0.5	0.2

EXISTING PLUS GROWTH PLUS OTHER DEVELOPMENT WITH PROJECT CONDITIONS

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	2	699	0	0	800	19	2	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	2	699	0	0	800	19	2	0	2

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	800	0	0	699	0	0	1103	1503	350
Stage 1	-	-	-	-	-	-	703	703	-
Stage 2	-	-	-	-	-	-	400	800	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	769	-	-	842	-	-	156	112	624
Stage 1	-	-	-	-	-	-	376	419	-
Stage 2	-	-	-	-	-	-	576	377	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	769	-	-	842	-	-	154	112	624
Mov Cap-2 Maneuver	-	-	-	-	-	-	154	112	-
Stage 1	-	-	-	-	-	-	375	418	-
Stage 2	-	-	-	-	-	-	568	377	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	19.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	247	769	-	-	842	-	-	142	578
HCM Lane V/C Ratio	0.016	0.003	-	-	-	-	-	0.62	0.014
HCM Control Delay (s)	19.8	9.7	-	-	0	-	-	64.8	11.3
HCM Lane LOS	C	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	3.3	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	88	0	8
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	88	0	8

Major/Minor	Minor2		
Conflicting Flow All	1154	1503	400
Stage 1	800	800	-
Stage 2	354	703	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	143	112	578
Stage 1	328	377	-
Stage 2	614	419	-
Platoon blocked, %			
Mov Cap-1 Maneuver	142	112	578
Mov Cap-2 Maneuver	142	112	-
Stage 1	327	377	-
Stage 2	610	418	-

Approach	SB
HCM Control Delay, s	60.3
HCM LOS	F

Minor Lane/Major Mvmt

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	36	741	1	1	801	103	0	7	7	99	1	18
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	36	741	1	1	801	103	0	7	7	100	0	18
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	2	0	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	40	850	1	2	770	327	0	157	157	652	0	291
Arrive On Green	0.03	0.29	0.29	0.00	0.26	0.26	0.00	0.24	0.24	0.24	0.00	0.24
Sat Flow, veh/h	1385	2904	4	1385	2909	1236	0	668	668	2771	0	1236
Grp Volume(v), veh/h	36	371	371	1	801	103	0	0	14	100	0	18
Grp Sat Flow(s),veh/h/ln	1385	1455	1454	1385	1455	1236	0	0	1337	1385	0	1236
Q Serve(g_s), s	1.8	16.5	16.5	0.0	18.0	4.5	0.0	0.0	0.6	1.9	0.0	0.8
Cycle Q Clear(g_c), s	1.8	16.5	16.5	0.0	18.0	4.5	0.0	0.0	0.6	1.9	0.0	0.8
Prop In Lane	1.00		0.00	1.00		1.00	0.00		0.50	1.00		1.00
Lane Grp Cap(c), veh/h	40	426	426	2	770	327	0	0	315	652	0	291
V/C Ratio(X)	0.90	0.87	0.87	0.49	1.04	0.31	0.00	0.00	0.04	0.15	0.00	0.06
Avail Cap(c_a), veh/h	82	426	426	82	770	327	0	0	315	652	0	291
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.9	22.8	22.8	33.9	25.0	20.0	0.0	0.0	20.1	20.6	0.0	20.2
Incr Delay (d2), s/veh	43.2	17.6	17.6	120.5	43.2	0.5	0.0	0.0	0.3	0.5	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	8.7	8.7	0.1	11.8	1.6	0.0	0.0	0.2	0.8	0.0	0.3
LnGrp Delay(d),s/veh	76.1	40.4	40.4	154.4	68.2	20.6	0.0	0.0	20.3	21.1	0.0	20.6
LnGrp LOS	E	D	D	F	F	C			C	C		C
Approach Vol, veh/h		778			905			14			118	
Approach Delay, s/veh		42.0			62.9			20.3			21.0	
Approach LOS		D			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	4.1	23.9		20.0	6.0	22.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	4.0	18.0
Max Q Clear Time (g_c+I1), s		2.6	2.0	18.5		3.9	3.8	20.0
Green Ext Time (p_c), s		0.0	0.0	0.0		0.3	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	50.9
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	150	649	30	8	824	1492	46	166	8	290	53	48
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	150	649	30	8	824	0	46	166	8	290	53	48
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	159	1336	62	11	1098	0	60	217	10	382	223	190
Arrive On Green	0.11	0.48	0.48	0.01	0.38	0.00	0.20	0.20	0.20	0.15	0.15	0.15
Sat Flow, veh/h	1385	2759	127	1385	2909	0	299	1079	52	2494	1455	1236
Grp Volume(v), veh/h	150	342	337	8	824	0	220	0	0	290	53	48
Grp Sat Flow(s),veh/h/ln	1385	1455	1432	1385	1455	0	1430	0	0	1247	1455	1236
Q Serve(g_s), s	11.2	16.5	16.6	0.6	25.7	0.0	15.2	0.0	0.0	11.6	3.3	3.6
Cycle Q Clear(g_c), s	11.2	16.5	16.6	0.6	25.7	0.0	15.2	0.0	0.0	11.6	3.3	3.6
Prop In Lane	1.00		0.09	1.00		0.00	0.21		0.04	1.00		1.00
Lane Grp Cap(c), veh/h	159	704	694	11	1098	0	288	0	0	382	223	190
V/C Ratio(X)	0.94	0.49	0.49	0.73	0.75	0.00	0.76	0.00	0.00	0.76	0.24	0.25
Avail Cap(c_a), veh/h	159	1296	1276	53	2369	0	288	0	0	382	223	190
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.8	18.1	18.2	51.7	28.2	0.0	39.4	0.0	0.0	42.3	38.8	38.9
Incr Delay (d2), s/veh	54.2	0.5	0.5	62.6	1.1	0.0	17.4	0.0	0.0	13.2	2.5	3.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.7	6.7	6.7	0.4	10.5	0.0	7.4	0.0	0.0	4.7	1.5	1.4
LnGrp Delay(d),s/veh	100.1	18.7	18.7	114.3	29.3	0.0	56.8	0.0	0.0	55.6	41.3	42.1
LnGrp LOS	F	B	B	F	C		E			E	D	D
Approach Vol, veh/h		829			832			220			391	
Approach Delay, s/veh		33.4			30.1			56.8			52.0	
Approach LOS		C			C			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		25.0	4.8	54.6		20.0	16.0	43.4
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		21.0	4.0	93.0		16.0	12.0	85.0
Max Q Clear Time (g_c+I1), s		17.2	2.6	18.6		13.6	13.2	27.7
Green Ext Time (p_c), s		0.4	0.0	11.9		0.4	0.0	11.7

Intersection Summary	
HCM 2010 Ctrl Delay	37.7
HCM 2010 LOS	D

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	409	2150	0	836	171
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	409	2150	0	836	171
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	3153	2365	0	891	795
Arrive On Green	0.00	0.54	0.54	0.00	0.36	0.36
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	409	2150	0	836	171
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	2.7	35.3	0.0	25.7	4.2
Cycle Q Clear(g_c), s	0.0	2.7	35.3	0.0	25.7	4.2
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	3153	2365	0	891	795
V/C Ratio(X)	0.00	0.13	0.91	0.00	0.94	0.22
Avail Cap(c_a), veh/h	0	3153	2365	0	911	813
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	9.0	16.4	0.0	24.7	17.8
Incr Delay (d2), s/veh	0.0	0.1	6.6	0.0	16.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.1	15.4	0.0	10.9	1.3
LnGrp Delay(d),s/veh	0.0	9.0	23.0	0.0	41.4	17.9
LnGrp LOS		A	C		D	B
Approach Vol, veh/h		409	2150		1007	
Approach Delay, s/veh		9.0	23.0		37.4	
Approach LOS		A	C		D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				47.6		32.4		47.6
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				43.0		29.0		43.0
Max Q Clear Time (g_c+I1), s				4.7		27.7		37.3
Green Ext Time (p_c), s				26.0		0.6		5.2

Intersection Summary	
HCM 2010 Ctrl Delay	25.4
HCM 2010 LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1147	0	0	1275	1209	697
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1147	0	0	1275	1209	697
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1891	0	0	1418	2151	711
Arrive On Green	0.32	0.00	0.00	0.32	0.57	0.57
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1147	0	0	1275	1209	697
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	13.3	0.0	0.0	22.3	16.2	43.9
Cycle Q Clear(g_c), s	13.3	0.0	0.0	22.3	16.2	43.9
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1891	0	0	1418	2151	711
V/C Ratio(X)	0.61	0.00	0.00	0.90	0.56	0.98
Avail Cap(c_a), veh/h	1891	0	0	1418	2151	711
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.7	0.0	0.0	25.7	10.7	16.6
Incr Delay (d2), s/veh	1.5	0.0	0.0	9.4	1.1	29.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	0.0	0.0	10.1	5.7	20.5
LnGrp Delay(d),s/veh	24.2	0.0	0.0	35.1	11.7	45.9
LnGrp LOS	C			D	B	D
Approach Vol, veh/h	1147			1275	1906	
Approach Delay, s/veh	24.2			35.1	24.2	
Approach LOS	C			D	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		50.0		30.0				30.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		46.0		26.0				26.0
Max Q Clear Time (g_c+I1), s		45.9		15.3				24.3
Green Ext Time (p_c), s		0.1		8.8				1.6

Intersection Summary	
HCM 2010 Ctrl Delay	27.4
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	43	47	324	1482	359	32
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	43	47	324	1482	359	32
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	82	73	373	3360	1812	513
Arrive On Green	0.06	0.06	0.27	0.77	0.42	0.42
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	43	47	324	1482	359	32
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	1.4	1.7	10.4	5.5	2.5	0.7
Cycle Q Clear(g_c), s	1.4	1.7	10.4	5.5	2.5	0.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	82	73	373	3360	1812	513
V/C Ratio(X)	0.53	0.64	0.87	0.44	0.20	0.06
Avail Cap(c_a), veh/h	474	423	474	3360	1812	513
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.4	21.5	16.3	1.9	8.7	8.2
Incr Delay (d2), s/veh	5.2	9.2	13.2	0.4	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	1.4	5.3	2.2	1.0	0.3
LnGrp Delay(d),s/veh	26.5	30.7	29.4	2.3	9.0	8.4
LnGrp LOS	C	C	C	A	A	A
Approach Vol, veh/h	90			1806	391	
Approach Delay, s/veh	28.7			7.2	8.9	
Approach LOS	C			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		6.8	16.6	23.4		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	16.0	16.0		
Max Q Clear Time (g_c+I1), s		7.5		3.7	12.4	4.5		
Green Ext Time (p_c), s		15.4		0.2	0.3	8.3		

Intersection Summary	
HCM 2010 Ctrl Delay	8.3
HCM 2010 LOS	A

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBU	EBT	EBR	WBU	WBL	WBT	NBU	NBL	NBR
Vol, veh/h	0	1	108	0	10	1	0	110	36
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	0	1	108	0	10	1	0	110	36
Number of Lanes	0	1	0	0	0	1	0	2	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	3	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	3	0	1
HCM Control Delay	7.7	8.4	7.7
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1
Vol Left, %	100%	100%	0%	0%	91%
Vol Thru, %	0%	0%	0%	1%	9%
Vol Right, %	0%	0%	100%	99%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	55	55	36	109	11
LT Vol	0	0	0	1	1
Through Vol	0	0	36	108	0
RT Vol	55	55	0	0	10
Lane Flow Rate	55	55	36	109	11
Geometry Grp	7	7	7	7	7
Degree of Util (X)	0.082	0.082	0.023	0.131	0.017
Departure Headway (Hd)	5.38	5.38	2.305	4.33	5.556
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	660	660	1511	833	648
Service Time	3.16	3.16	0.083	2.03	3.258
HCM Lane V/C Ratio	0.083	0.083	0.024	0.131	0.017
HCM Control Delay	8.6	8.6	5.1	7.7	8.4
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.3	0.3	0.1	0.5	0.1

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	15	994	0	0	913	62	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	15	994	0	0	913	62	1	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	913	0	0	994	0	0	1481	1937	497
Stage 1	-	-	-	-	-	-	1024	1024	-
Stage 2	-	-	-	-	-	-	457	913	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	694	-	-	645	-	-	81	59	498
Stage 1	-	-	-	-	-	-	238	294	-
Stage 2	-	-	-	-	-	-	532	333	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	694	-	-	645	-	-	79	58	498
Mov Cap-2 Maneuver	-	-	-	-	-	-	79	58	-
Stage 1	-	-	-	-	-	-	233	288	-
Stage 2	-	-	-	-	-	-	529	333	-

Approach	EB	WB	NB
HCM Control Delay, s	0.2	0	51.2
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	79	694	-	-	645	-	-	86	529
HCM Lane V/C Ratio	0.013	0.022	-	-	-	-	-	0.593	0.006
HCM Control Delay (s)	51.2	10.3	-	-	0	-	-	95.1	11.8
HCM Lane LOS	F	B	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	2.7	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	51	0	3
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	51	0	3

Major/Minor	Minor2		
Conflicting Flow All	1440	1937	457
Stage 1	913	913	-
Stage 2	527	1024	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	87	59	529
Stage 1	279	333	-
Stage 2	482	294	-
Platoon blocked, %			
Mov Cap-1 Maneuver	86	58	529
Mov Cap-2 Maneuver	86	58	-
Stage 1	273	333	-
Stage 2	472	288	-

Approach	SB
HCM Control Delay, s	90.5
HCM LOS	F

Minor Lane/Major Mvmt

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	1032	0	6	925	77	9	2	2	113	6	39
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	14	1032	0	6	925	77	9	2	2	117	0	39
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	2	0	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	19	1066	0	9	1045	444	198	44	44	579	0	259
Arrive On Green	0.01	0.37	0.00	0.01	0.36	0.36	0.21	0.21	0.21	0.21	0.00	0.21
Sat Flow, veh/h	1385	2909	0	1385	2909	1236	948	211	211	2771	0	1236
Grp Volume(v), veh/h	14	1032	0	6	925	77	13	0	0	117	0	39
Grp Sat Flow(s),veh/h/ln	1385	1455	0	1385	1455	1236	1370	0	0	1385	0	1236
Q Serve(g_s), s	0.8	26.7	0.0	0.3	22.9	3.3	0.6	0.0	0.0	2.7	0.0	2.0
Cycle Q Clear(g_c), s	0.8	26.7	0.0	0.3	22.9	3.3	0.6	0.0	0.0	2.7	0.0	2.0
Prop In Lane	1.00		0.00	1.00		1.00	0.69		0.15	1.00		1.00
Lane Grp Cap(c), veh/h	19	1066	0	9	1045	444	286	0	0	579	0	259
V/C Ratio(X)	0.75	0.97	0.00	0.69	0.89	0.17	0.05	0.00	0.00	0.20	0.00	0.15
Avail Cap(c_a), veh/h	72	1066	0	72	1065	452	286	0	0	579	0	259
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.6	23.8	0.0	37.9	23.0	16.8	24.2	0.0	0.0	25.0	0.0	24.7
Incr Delay (d2), s/veh	44.9	20.2	0.0	67.7	9.0	0.2	0.3	0.0	0.0	0.8	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	13.6	0.0	0.3	10.4	1.1	0.2	0.0	0.0	1.1	0.0	0.8
LnGrp Delay(d),s/veh	82.6	44.0	0.0	105.6	32.0	16.9	24.5	0.0	0.0	25.8	0.0	25.9
LnGrp LOS	F	D		F	C	B	C			C		C
Approach Vol, veh/h		1046			1008			13			156	
Approach Delay, s/veh		44.5			31.3			24.5			25.8	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	4.5	32.0		20.0	5.0	31.5
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	28.0		16.0	4.0	28.0
Max Q Clear Time (g_c+I1), s		2.6	2.3	28.7		4.7	2.8	24.9
Green Ext Time (p_c), s		0.0	0.0	0.0		0.4	0.0	2.6

Intersection Summary	
HCM 2010 Ctrl Delay	37.1
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	52	1019	37	14	806	284	68	71	23	1243	302	134
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	52	1019	37	14	806	0	68	71	23	1243	302	134
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	37	892	32	16	886	0	75	78	25	1077	628	534
Arrive On Green	0.03	0.32	0.32	0.01	0.30	0.00	0.13	0.13	0.13	0.43	0.43	0.43
Sat Flow, veh/h	1385	2790	101	1385	2909	0	584	609	197	2494	1455	1236
Grp Volume(v), veh/h	52	531	525	14	806	0	162	0	0	1243	302	134
Grp Sat Flow(s),veh/h/ln	1385	1455	1437	1385	1455	0	1391	0	0	1247	1455	1236
Q Serve(g_s), s	4.0	47.4	47.4	1.5	39.5	0.0	17.0	0.0	0.0	64.0	22.0	10.2
Cycle Q Clear(g_c), s	4.0	47.4	47.4	1.5	39.5	0.0	17.0	0.0	0.0	64.0	22.0	10.2
Prop In Lane	1.00		0.07	1.00		0.00	0.42		0.14	1.00		1.00
Lane Grp Cap(c), veh/h	37	465	460	16	886	0	178	0	0	1077	628	534
V/C Ratio(X)	1.39	1.14	1.14	0.85	0.91	0.00	0.91	0.00	0.00	1.15	0.48	0.25
Avail Cap(c_a), veh/h	37	465	460	37	923	0	178	0	0	1077	628	534
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	72.1	50.4	50.4	73.1	49.5	0.0	63.7	0.0	0.0	42.1	30.2	26.8
Incr Delay (d2), s/veh	282.3	86.7	87.0	68.3	12.5	0.0	46.8	0.0	0.0	80.1	2.6	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.5	30.2	29.9	0.9	17.4	0.0	8.9	0.0	0.0	34.0	9.3	3.7
LnGrp Delay(d),s/veh	354.3	137.1	137.3	141.4	62.0	0.0	110.6	0.0	0.0	122.1	32.8	27.9
LnGrp LOS	F	F	F	F	E		F			F	C	C
Approach Vol, veh/h		1108			820			162			1679	
Approach Delay, s/veh		147.4			63.4			110.6			98.6	
Approach LOS		F			E			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		23.0	5.8	51.4		68.0	8.0	49.1
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		19.0	4.0	47.0		64.0	4.0	47.0
Max Q Clear Time (g_c+I1), s		19.0	3.5	49.4		66.0	6.0	41.5
Green Ext Time (p_c), s		0.0	0.0	0.0		0.0	0.0	3.7

Intersection Summary	
HCM 2010 Ctrl Delay	105.8
HCM 2010 LOS	F

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	1183	948	0	774	155
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	1183	948	0	774	155
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	2864	2148	0	939	838
Arrive On Green	0.00	0.49	0.49	0.00	0.38	0.38
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	1183	948	0	774	155
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	7.9	8.6	0.0	17.1	2.8
Cycle Q Clear(g_c), s	0.0	7.9	8.6	0.0	17.1	2.8
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2864	2148	0	939	838
V/C Ratio(X)	0.00	0.41	0.44	0.00	0.82	0.18
Avail Cap(c_a), veh/h	0	2864	2148	0	1718	1533
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	9.9	10.0	0.0	17.2	12.7
Incr Delay (d2), s/veh	0.0	0.4	0.7	0.0	1.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.2	3.6	0.0	6.1	0.9
LnGrp Delay(d),s/veh	0.0	10.3	10.7	0.0	19.1	12.8
LnGrp LOS		B	B		B	B
Approach Vol, veh/h		1183	948		929	
Approach Delay, s/veh		10.3	10.7		18.0	
Approach LOS		B	B		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				53.0		27.0		53.0
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				30.0		42.0		30.0
Max Q Clear Time (g_c+I1), s				9.9		19.1		10.6
Green Ext Time (p_c), s				13.2		3.8		12.9

Intersection Summary	
HCM 2010 Ctrl Delay	12.8
HCM 2010 LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1719	0	0	998	594	628
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1719	0	0	998	594	628
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1964	0	0	1473	2104	695
Arrive On Green	0.34	0.00	0.00	0.34	0.56	0.56
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1719	0	0	998	594	628
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	22.2	0.0	0.0	15.7	6.6	36.1
Cycle Q Clear(g_c), s	22.2	0.0	0.0	15.7	6.6	36.1
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1964	0	0	1473	2104	695
V/C Ratio(X)	0.88	0.00	0.00	0.68	0.28	0.90
Avail Cap(c_a), veh/h	1964	0	0	1473	2104	695
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.9	0.0	0.0	22.8	9.1	15.6
Incr Delay (d2), s/veh	5.8	0.0	0.0	2.5	0.3	17.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.6	0.0	0.0	6.6	2.3	15.5
LnGrp Delay(d),s/veh	30.8	0.0	0.0	25.3	9.4	32.8
LnGrp LOS	C			C	A	C
Approach Vol, veh/h	1719			998	1222	
Approach Delay, s/veh	30.8			25.3	21.5	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		49.0		31.0				31.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		45.0		27.0				27.0
Max Q Clear Time (g_c+I1), s		38.1		24.2				17.7
Green Ext Time (p_c), s		3.1		2.6				8.2

Intersection Summary	
HCM 2010 Ctrl Delay	26.5
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	92	296	100	311	1379	97
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	92	296	100	311	1379	97
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	367	327	118	2625	1961	556
Arrive On Green	0.26	0.26	0.09	0.60	0.45	0.45
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	92	296	100	311	1379	97
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	3.1	13.8	4.3	1.8	15.2	2.8
Cycle Q Clear(g_c), s	3.1	13.8	4.3	1.8	15.2	2.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	367	327	118	2625	1961	556
V/C Ratio(X)	0.25	0.90	0.85	0.12	0.70	0.17
Avail Cap(c_a), veh/h	370	331	185	2625	1961	556
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.3	21.3	27.0	5.1	13.3	9.8
Incr Delay (d2), s/veh	0.4	26.7	18.6	0.1	2.1	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	10.9	2.2	0.7	6.4	1.0
LnGrp Delay(d),s/veh	17.7	48.0	45.6	5.2	15.4	10.5
LnGrp LOS	B	D	D	A	B	B
Approach Vol, veh/h	388			411	1476	
Approach Delay, s/veh	40.8			15.0	15.1	
Approach LOS	D			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		19.9	9.1	30.9		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	8.0	24.0		
Max Q Clear Time (g_c+I1), s		3.8		15.8	6.3	17.2		
Green Ext Time (p_c), s		15.1		0.0	0.0	5.1		

Intersection Summary	
HCM 2010 Ctrl Delay	19.5
HCM 2010 LOS	B

Intersection	
Intersection Delay, s/veh	8
Intersection LOS	A

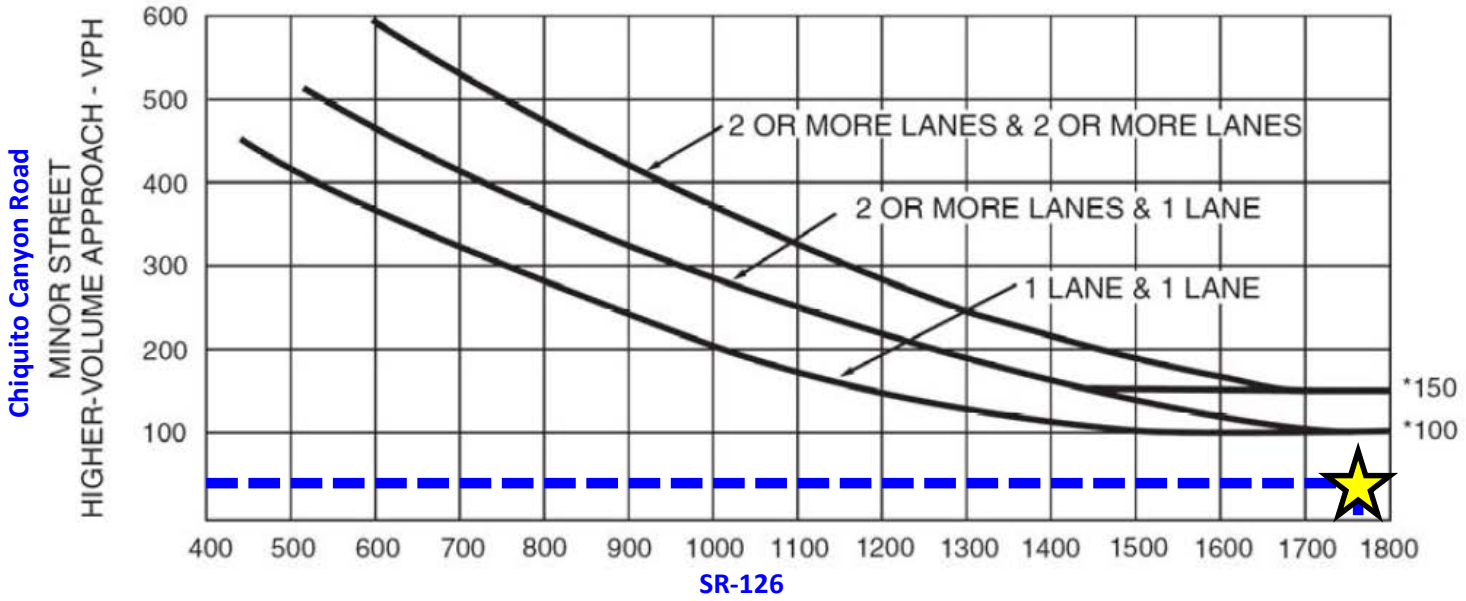
Movement	EBU	EBT	EBR	WBU	WBL	WBT	NBU	NBL	NBR
Vol, veh/h	0	1	112	0	46	1	0	81	12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	0	1	112	0	46	1	0	81	12
Number of Lanes	0	1	0	0	0	1	0	2	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	3	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	3	0	1
HCM Control Delay	7.6	8.6	8.2
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1
Vol Left, %	100%	100%	0%	0%	98%
Vol Thru, %	0%	0%	0%	1%	2%
Vol Right, %	0%	0%	100%	99%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	41	41	12	113	47
LT Vol	0	0	0	1	1
Through Vol	0	0	12	112	0
RT Vol	41	41	0	0	46
Lane Flow Rate	40	40	12	113	47
Geometry Grp	7	7	7	7	7
Degree of Util (X)	0.063	0.063	0.008	0.134	0.072
Departure Headway (Hd)	5.558	5.558	2.479	4.261	5.485
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	647	647	1446	845	656
Service Time	3.27	3.27	0.19	1.97	3.195
HCM Lane V/C Ratio	0.062	0.062	0.008	0.134	0.072
HCM Control Delay	8.6	8.6	5.2	7.6	8.6
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.2	0.2	0	0.5	0.2

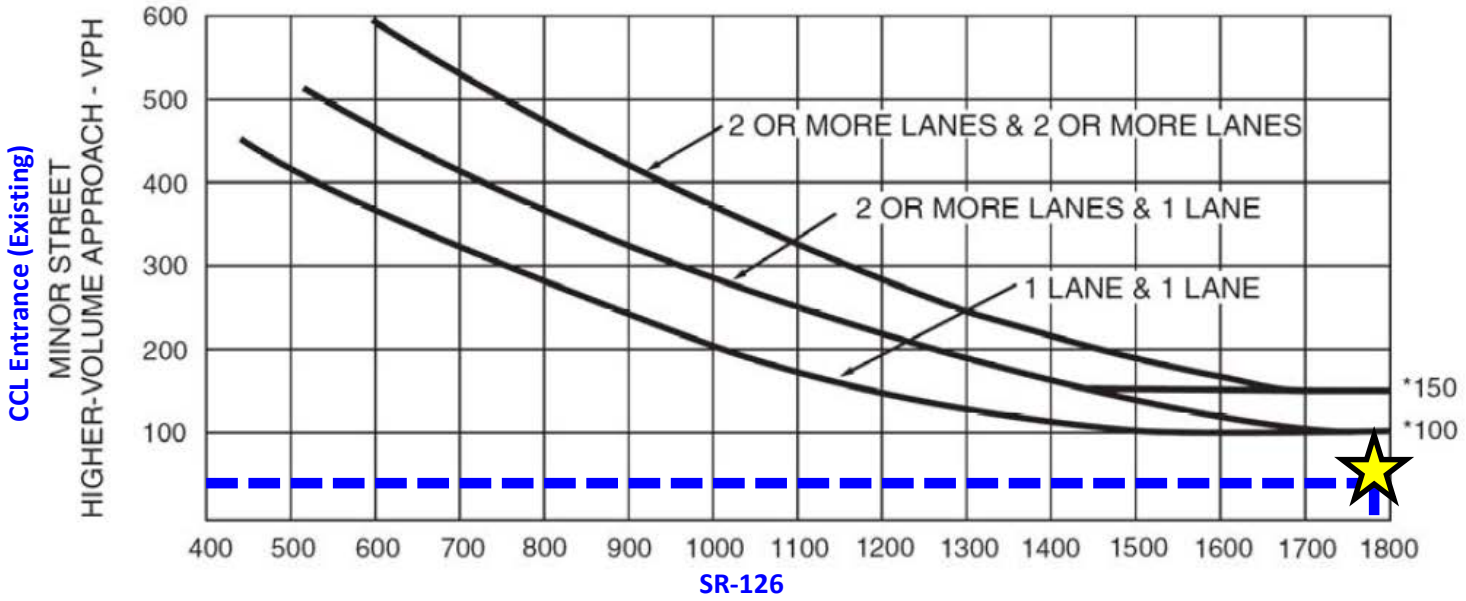
APPENDIX D
TRAFFIC SIGNAL WARRANT WORKSHEETS

Existing (2013) Highest Peak Hour = PM Peak Hour



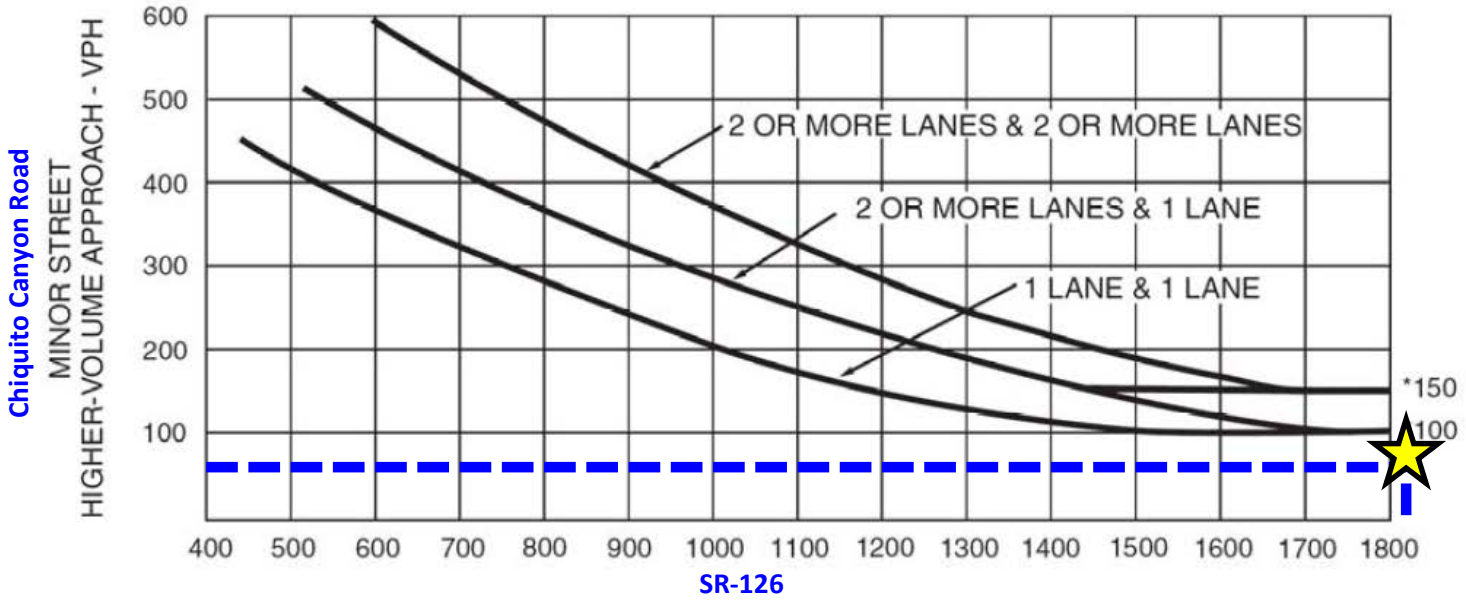
*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Existing (2013) Highest Peak Hour = PM Peak Hour



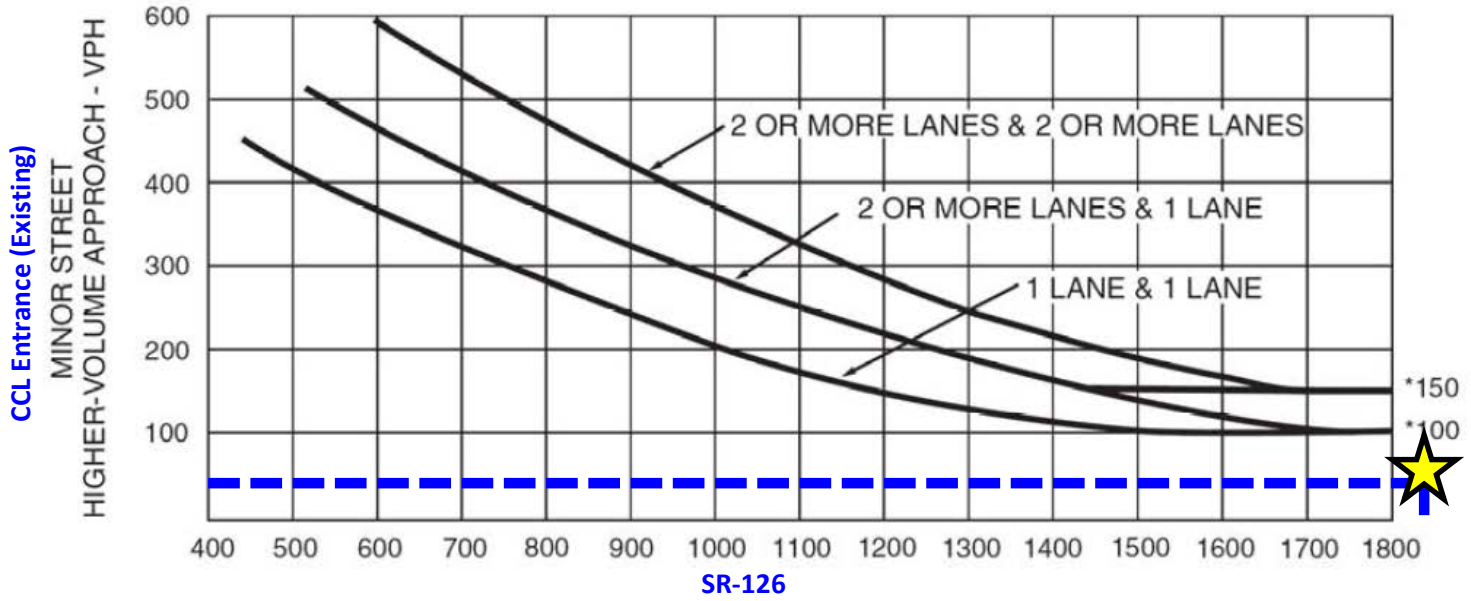
*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Existing plus Growth without Project Highest Peak Hour = PM Peak Hour



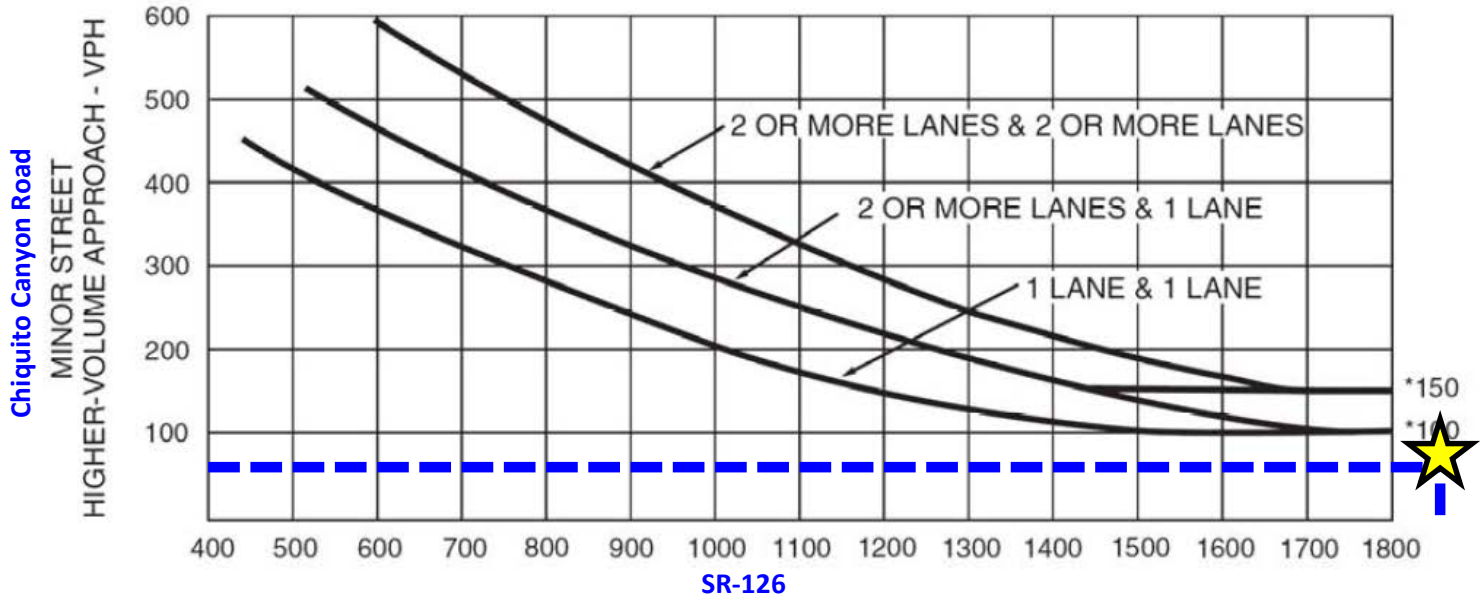
*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Existing plus Growth without Project Highest Peak Hour = PM Peak Hour



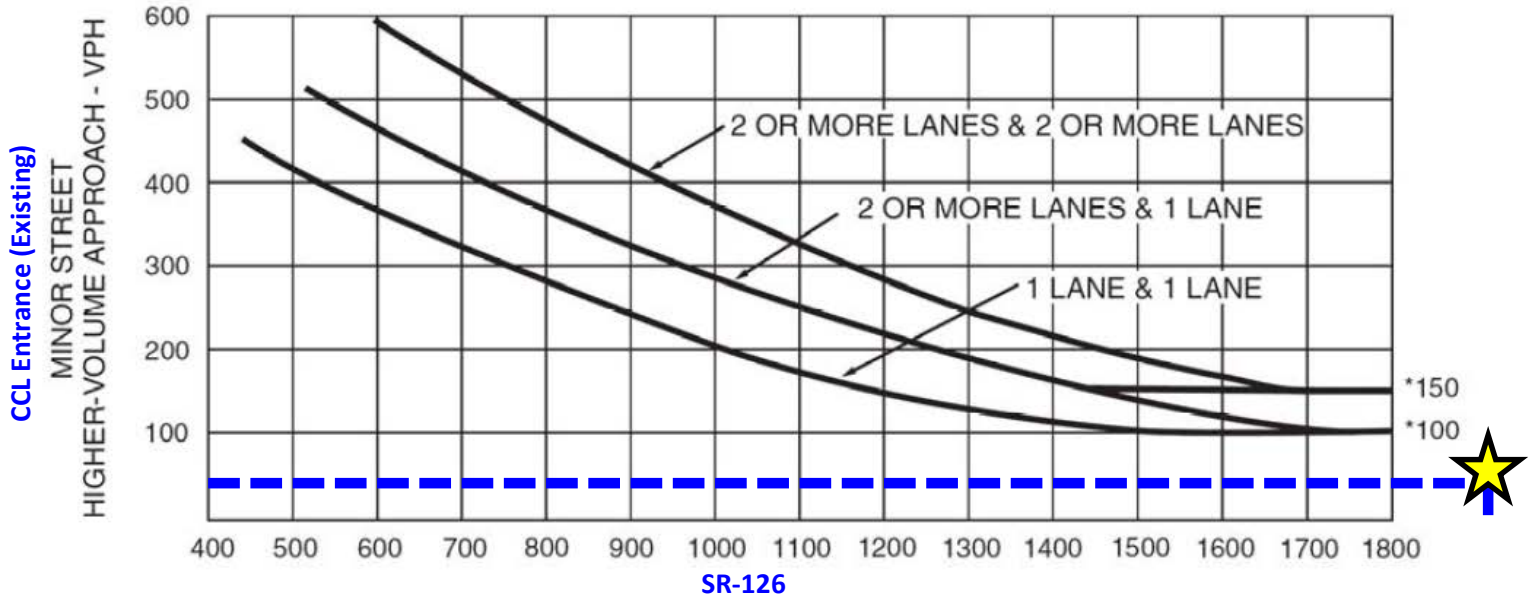
*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Existing plus Growth plus Other Development without Project Highest Peak Hour = PM Peak Hour



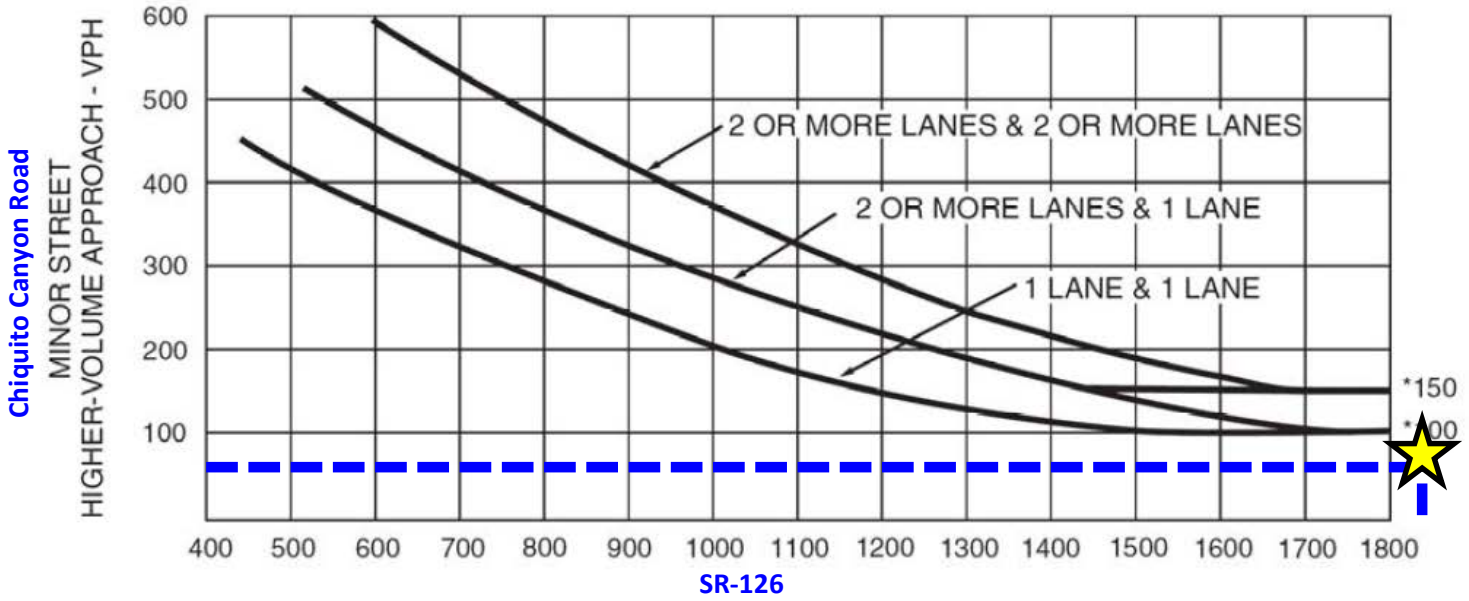
*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Existing plus Growth plus Other Development without Project Highest Peak Hour = PM Peak Hour



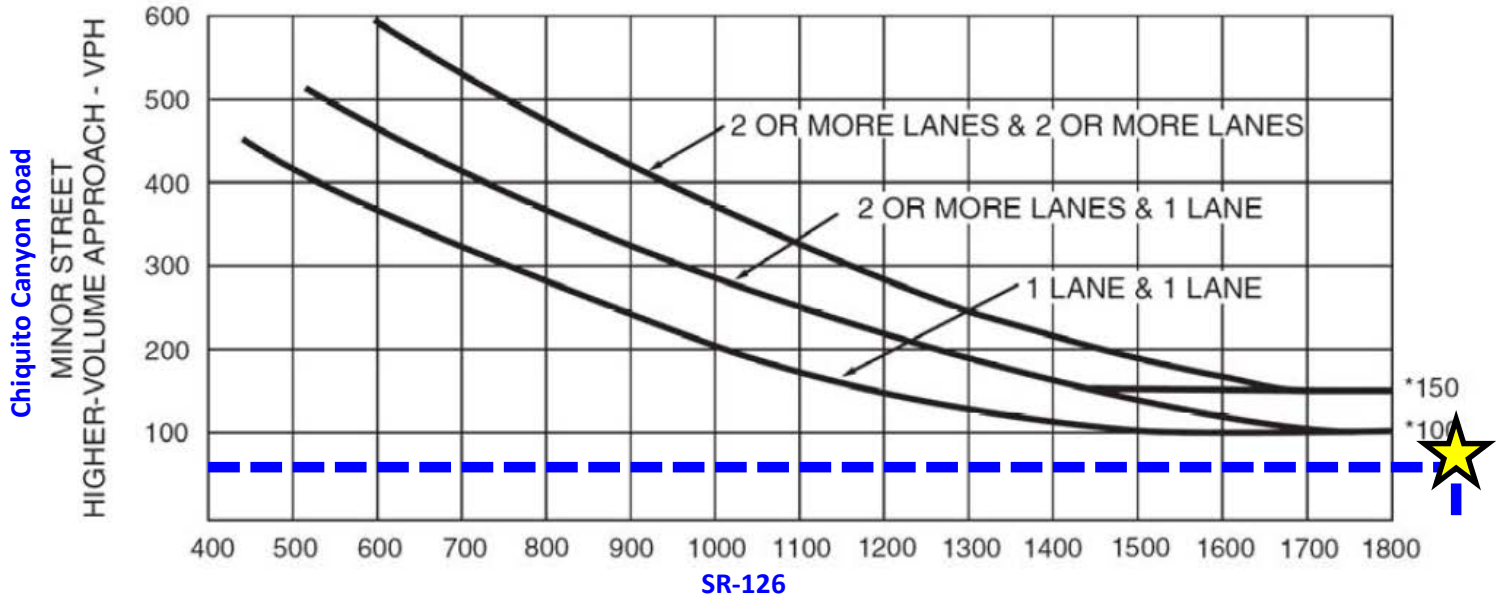
*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Existing plus Growth with Project Highest Peak Hour = PM Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Existing plus Growth plus Other Development with Project Highest Peak Hour = PM Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

APPENDIX E
TRAFFIC INDEX CALCULATION WORKSHEETS

10-Year Traffic Index Calculations

Roadway: SR-126 **Limits:** Wolcott Way to Commerce Center

	2014 without Project			10-Year		
	(A)	(B)	(C)	(D)	(E)	(F)
Axle	24-Hour TAB Volumes	EWL Constants	Existing EWL (A) x (B)	Ambient Growth*	24-Hour TAB Volumes (A) x $(1+D/100)^{10}$	10 Year EWL (E) x (B)
2	802	300	240,600	2.75	1052	315,600
3	593	920	545,560	2.75	778	715,760
4	373	1320	492,360	2.75	489	645,480
5	2601	4080	10,612,080	2.75	3412	13,920,960
Total			**11,890,600**			**15,597,800**

* Based on LA County CMP and signed MOU.

10-Year EWL = $\frac{\text{(C) Total + (F) Total}}{2}$ x 10 = 137,442,000

10-Year TI = 12.0 (based on 2014 without project volumes)

Roadway: Wolcott Way **Limits:** SR-126 to Franklin Pkwy

	2014 without Project			10-Year		
	(A)	(B)	(C)	(D)	(E)	(F)
Axle	24-Hour TAB Volumes	EWL Constants	Existing EWL (A) x (B)	Ambient Growth*	24-Hour TAB Volumes (A) x $(1+D/100)^{10}$	10 Year EWL (E) x (B)
2	13	300	3,900	2.75	17	5,100
3	10	920	9,200	2.75	13	11,960
4	6	1320	7,920	2.75	8	10,560
5	43	4080	175,440	2.75	56	228,480
Total			**196,460**			**256,100**

* Based on LA County CMP and signed MOU.

10-Year EWL = $\frac{\text{(C) Total + (F) Total}}{2}$ x 10 = 2,262,800

10-Year TI = 7.5 (based on 2014 without project volumes)

Roadway: SR-126 **Limits:** Wolcott Way to Commerce Center

	2014 with Project			10-Year		
	(A)	(B)	(C)	(D)	(E)	(F)
Axle	24-Hour TAB Volumes	EWL Constants	Existing EWL (A) x (B)	Ambient Growth*	24-Hour TAB Volumes (A) x $(1+D/100)^{10}$	10 Year EWL (E) x (B)
2	846	300	253,800	2.75	1110	333,000
3	626	920	575,920	2.75	821	755,320
4	394	1320	520,080	2.75	517	682,440
5	2745	4080	11,199,600	2.75	3600	14,688,000
Total			**12,549,400**			**16,458,760**

* Based on LA County CMP and signed MOU.

10-Year EWL = $\frac{\text{(C) Total + (F) Total}}{2}$ x 10 = 145,040,800

10-Year TI = 12.0 (based on 2014 with project volumes)

Roadway: Wolcott Way **Limits:** SR-126 to Franklin Pkwy

	2014 with Project			10-Year		
	(A)	(B)	(C)	(D)	(E)	(F)
Axle	24-Hour TAB Volumes	EWL Constants	Existing EWL (A) x (B)	Ambient Growth*	24-Hour TAB Volumes (A) x $(1+D/100)^{10}$	10 Year EWL (E) x (B)
2	76	300	22,800	2.75	100	30,000
3	56	920	51,520	2.75	73	67,160
4	35	1320	46,200	2.75	46	60,720
5	245	4080	999,600	2.75	321	1,309,680
Total			**1,120,120**			**1,467,560**

* Based on LA County CMP and signed MOU.

10-Year EWL = $\frac{\text{(C) Total + (F) Total}}{2}$ x 10 = 12,938,400

10-Year TI = 9.0 (based on 2014 with project volumes)

20-Year Traffic Index Calculations

Roadway: SR-126 **Limits:** Wolcott Way to Commerce Center

	2014 without Project			20-Year		
	(A)	(B)	(C)	(D)	(E)	(F)
Axle	24-Hour TAB Volumes	EWL Constants	Existing EWL (A) x (B)	Ambient Growth*	24-Hour TAB Volumes (A) x $(1+D/100)^{20}$	20 Year EWL (E) x (B)
2	802	300	240,600	2.75	1380	414,000
3	593	920	545,560	2.75	1020	938,400
4	373	1320	492,360	2.75	642	847,440
5	2601	4080	10,612,080	2.75	4475	18,258,000
Total			**11,890,600**			**20,457,840**

* Based on LA County CMP and signed MOU.

20-Year EWL = $\frac{\text{(C) Total + (F) Total}}{2}$ x 20 = 323,484,400

20-Year TI = 13.5 (based on 2014 without project volumes)

Roadway: Wolcott Way **Limits:** SR-126 to Franklin Pkwy

	2014 without Project			20-Year		
	(A)	(B)	(C)	(D)	(E)	(F)
Axle	24-Hour TAB Volumes	EWL Constants	Existing EWL (A) x (B)	Ambient Growth*	24-Hour TAB Volumes (A) x $(1+D/100)^{20}$	20 Year EWL (E) x (B)
2	13	300	3,900	2.75	22	6,600
3	10	920	9,200	2.75	17	15,640
4	6	1320	7,920	2.75	10	13,200
5	43	4080	175,440	2.75	74	301,920
Total			**196,460**			**337,360**

* Based on LA County CMP and signed MOU.

20-Year EWL = $\frac{\text{(C) Total + (F) Total}}{2}$ x 20 = 5,338,200

20-Year TI = 8.0 (based on 2014 without project volumes)

Roadway: SR-126 **Limits:** Wolcott Way to Commerce Center

	2014 with Project			20-Year		
	(A)	(B)	(C)	(D)	(E)	(F)
Axle	24-Hour TAB Volumes	EWL Constants	Existing EWL (A) x (B)	Ambient Growth*	24-Hour TAB Volumes (A) x $(1+D/100)^{20}$	20 Year EWL (E) x (B)
2	846	300	253,800	2.75	1455	436,500
3	626	920	575,920	2.75	1077	990,840
4	394	1320	520,080	2.75	678	894,960
5	2745	4080	11,199,600	2.75	4723	19,269,840
Total			**12,549,400**			**21,592,140**

* Based on LA County CMP and signed MOU.

20-Year EWL = $\frac{\text{(C) Total + (F) Total}}{2}$ x 20 = 341,415,400

20-Year TI = 13.5 (based on 2014 with project volumes)

Roadway: Wolcott Way **Limits:** SR-126 to Franklin Pkwy

	2014 with Project			20-Year		
	(A)	(B)	(C)	(D)	(E)	(F)
Axle	24-Hour TAB Volumes	EWL Constants	Existing EWL (A) x (B)	Ambient Growth*	24-Hour TAB Volumes (A) x $(1+D/100)^{20}$	20 Year EWL (E) x (B)
2	76	300	22,800	2.75	131	39,300
3	56	920	51,520	2.75	96	88,320
4	35	1320	46,200	2.75	60	79,200
5	245	4080	999,600	2.75	422	1,721,760
Total			**1,120,120**			**1,928,580**

* Based on LA County CMP and signed MOU.

20-Year EWL = $\frac{\text{(C) Total + (F) Total}}{2}$ x 20 = 30,487,000

20-Year TI = 10.0 (based on 2014 with project volumes)

Appendix G-2
Chiquita Canyon Landfill Master Plan Revision Traffic Supplement

Chiquita Canyon Landfill Master Plan Revision Traffic Supplement

PREPARED FOR:	Los Angeles County Department of Public Works, Traffic and Lighting
COPY TO:	Chiquita Canyon Landfill
PREPARED BY:	CH2M HILL
DATE:	November 7, 2016

Introduction

This Traffic Supplement for the Chiquita Canyon Landfill (CCL) Master Plan Revision (Supplement) clarifies baseline traffic for the Proposed Project and demonstrates that the clarified baseline does not affect the findings of the original Traffic Analysis prepared for the Proposed Project. This Supplement also provides an updated queuing analysis of the new site entrance for the Proposed Project using the clarified baseline for traffic, which does not change the findings of the original queuing analysis.

Clarification of Baseline Traffic

The following sections describe the baseline traffic disclosed in the Original Draft Environmental Impact Report (EIR) and the clarification of operational baseline for the Proposed Project as recently defined by Los Angeles County. The following discussion also demonstrates that the clarification of operational baseline, including baseline traffic, does not change the findings of the traffic analysis described in the Original Draft EIR, and included in the Traffic Analysis included in Appendix G of the Original Draft EIR.

Operational Baseline Traffic for Original Draft EIR

The Original Draft EIR considered traffic impacts of the Proposed Project. The Project Description for the Original Draft EIR included traffic tables that disclosed the number of trucks considered to be baseline and identified the number of additional trucks assumed to be required for the additional material to be received for the Proposed Project. The number of trucks shown in the traffic baseline in the Original Draft EIR was based on a hypothetical peak day – that is, the number of trucks that could be experienced at CCL on a peak day if the maximum quantity of different material types were received on a single day.

The *Chiquita Canyon Landfill Master Plan Revision Traffic Analysis* (Traffic Analysis) was prepared by CH2M HILL for the Proposed Project in 2014, using the traffic tables from the Original Draft EIR Project Description and included as Appendix G of the Original Draft EIR. The Traffic Analysis disclosed baseline truck trips and evaluated the potential traffic impacts from the number of additional trucks assumed to be required for the additional material to be received for the Proposed Project.

The Traffic Analysis assumed that there were 2,896 vehicles associated with the baseline and an additional 594 vehicles associated with the Proposed Project. Consequently, the Traffic Analysis EIR evaluated the potential impacts associated with the additional 594 vehicles. Of the 594 additional vehicles, 572 were assumed to be trucks associated with additional material to be received at the landfill and 22 were associated with additional employees.

Operational Baseline Traffic for Partially Recirculated Draft EIR

Chapter 1 of the Partially Recirculated Draft EIR clarifies the operational baseline for the Proposed Project.

As described in Chapter 1, notwithstanding the variability of rate of material received at CCL, including minimum and peak quantities for waste disposed and beneficial use material, the Los Angeles County Department of Regional Planning determined that the operational baseline for CCL is the average of all material received at CCL in 2011, which is 6,622 tons per day, based on 312 operating days per year, as summarized in Table 1. Table 1 also shows that there are 403 trucks associated with the 6,622 tons of material per day in the operational baseline.

Table 1. Operational Baseline Material Received
CCL Operation 2011

2011 (January – December)	Waste Disposed (tons)	Beneficial Use Material (tons)	All Inbound Material (tons)	Loads (trucks)
Annual Total	1,330,310	735,827	2,066,138	125,620
Daily Average	4,264	2,358	6,622	403
Percent of Total	64%	36%	100%	--

Table 2 describes the number and types of vehicles included in the operational baseline. Baseline traffic consists of the traffic associated with 6,622 tons per day of combined waste to be disposed and material to be diverted from waste disposal (Table 1), plus other baseline traffic that is not processed through the scale house, such as construction vehicles for special projects (primarily periodic cell construction) and employee and visitor-generated vehicles.

Table 2. Summary of Baseline Traffic
2011 Operational Baseline

Material/Vehicle Source	Operational Baseline (trucks per day)[a]
Inbound Materials	403
Special Projects[b]	100
Employees and Visitors	65
Total	568

[a.] Baseline vehicle count is based on the number of trucks associated with the operational baseline of 6,622 tons per day of inbound material.

[b.] Special projects could include entrance or cell construction, landfill gas system expansion, expansion of environmental monitoring systems, etc. Vehicles associated with special projects do not need to be processed through the scales, and instead can use the bypass lane.

Traffic Baseline and Proposed Project

The operational baseline for truck trips was considered in conjunction with the Proposed Project to determine if the traffic analysis for the Proposed Project remains valid. As described in Chapter 2, the rate of all inbound material for the Proposed Project is 13,182 tons per day. This equates to an additional 6,560 tons per day over the clarified baseline conditions (6,622 tons per day). Table 3 summarizes the environmental baseline for inbound material and trucks, the Proposed Project for inbound material and trucks, and the resulting change for inbound material and trucks.

Table 3. Environmental Baseline, Proposed Project, and Change Evaluated
Operational Baseline, Proposed Project, and Peak Change

Operational Baseline	Proposed Project	Change
6,622 tons per day inbound material[a]	13,182 tons per day	6,560 additional tons per day
568 vehicles per day	1,162 vehicles per day	594 additional vehicles per day

[a.] Based on an average of 312 operating days per year.

Table 4 provides additional detail regarding the vehicle source for the operational baseline, the Proposed Project, and the resulting net change in number of trucks. The Proposed Project consists of baseline traffic plus traffic associated with 6,560 tons per day of additional inbound material plus 22 additional employees. The net increase in traffic (i.e. Proposed Project minus baseline project) is 594 trucks per day. This net increase in daily traffic is the same as the net increase in daily traffic evaluated in the Original Draft EIR.

Table 4. Summary of Peak Potential Daily Traffic
Clarified Operational Baseline, Proposed Project, and Peak Change

Material/Vehicle Source	Operational Baseline[a] (trucks per day)	Proposed Project[b] (trucks per day)	Peak Change[c] (trucks per day)
Inbound Materials	403	975	
Transfer Trucks	--	--	272
Route Trucks	--	--	300
Special Projects[d]	100	100	0
Employees and Visitors	65	87	22
Total	568	1,162[e]	594[e]

[a.] Baseline vehicle count is based on the number of trucks associated with the operational baseline or all inbound material.

[b.] Proposed Project is the sum of baseline trucks plus the proposed vehicle increase for a peak day.

[c.] Number of trucks anticipated to be required for an additional 6,560 tons per day of additional inbound material for a peak day. Includes any combination of the transfer and route trucks, with an estimated peak of 272 transfer trucks and 300 route trucks. It is estimated that transfer trucks would carry an average of 22 tons per load and route trucks would carry an average of 10 tons per load. The tonnage per truck would be variable depending on material, and the type of truck would vary, but total additional trucks would not exceed 572 and total additional tonnage would not exceed 6,560 tons.

[d.] Special projects could include entrance or cell construction, landfill gas system expansion, expansion of environmental monitoring systems, etc.

[e.] The distribution of trucks per day are likely to correspond to the average hourly distribution shown in Table 5.

Summary of Traffic for Proposed Project Evaluated in Original Draft EIR and Partially Recirculated Draft EIR

While the number of trucks included in the baseline for the Original Draft EIR and the Partially Recirculated Draft EIR are different, the evaluation of potential traffic impacts for the Proposed Project is based on the number of estimated additional trucks associated with additional material to be received at CCL as part of the Proposed Project, plus additional employees. The number of additional vehicles associated with the Proposed Project (594) has not changed between the Original Draft EIR and the Proposed Project.

Therefore, despite the change in baseline vehicles as a result of the clarified operational baseline, there is no change to the findings of the Traffic Analysis included as Appendix G of the Original Draft EIR nor to the findings discussed in Chapter 10.0, Traffic and Transportation, of the Original Draft EIR.

Project Site Entrance Queuing Analysis

The Traffic Analysis included a queuing analysis of the new project entrance to confirm that the projected traffic resulting from the Proposed Project would not queue through the Wolcott Way/ Franklin Parkway intersection. The original queuing analysis was conducted to evaluate 1,638 trucks solely associated with waste to be received at CCL for the Proposed Project.

Subsequent to the Traffic Analysis included in the Original Draft EIR, an updated queuing analysis for the Proposed Project was conducted in September 2014 at the request of the County of Los Angeles Department of Public Works (LACDPW) to demonstrate that the projected traffic resulting from the Proposed Project would not queue through the Wolcott Way/Franklin Parkway intersection. On October 8, 2014, LACDPW, Traffic and Lighting Division, provided a response to the updated analysis, stating that they "generally agree with the Vehicular Queuing Analysis that the proposed site layout at the reconfigured Chiquita Canyon Landfill will be able to accommodate the projected number of vehicles arriving to the site throughout the day and will provide enough storage to accommodate projected Chiquita Canyon Landfill traffic without queuing onto public roadways."

As a result of the clarified operational baseline described previously in this Supplement, and in detail in Chapter 1, Introduction, of the Partially Recirculated Draft EIR, this revised queuing analysis has been prepared to reflect the 975 trucks associated with all inbound material to be received at CCL for the Proposed Project (Table 4), which is less than the number of trucks included in the September 2014 updated queuing analysis. The number of trucks included in the queuing analysis includes trucks associated with both the operational baseline and the additional material associated with the Proposed Project. All inbound material also includes both disposal waste and beneficial use material. By including all the trucks associated with inbound material, the revised queuing analysis conservatively addresses whether the proposed relocated site entrance can accommodate all vehicles associated with the Proposed Project without queuing through the Wolcott Way/Franklin Parkway intersection.

Project Location and Access

The Proposed Project will remove the existing CCL entrance, which is located on State Route 126 between Chiquito Canyon Road and Wolcott Way, and construct a new entrance on the corner of Wolcott Way and Franklin Parkway (Figure 1). It is assumed that the intersection of Wolcott Way and Franklin Parkway will operate as an all-way stop controlled intersection. The location and design of the Proposed Project entrance is the same as the entrance evaluated in the original Traffic Analysis.

The new entrance of the CCL facility will bring vehicles to the site from the Wolcott Way/Franklin Parkway intersection. Vehicles will enter the site and drive westbound to the scales and gatehouses located approximately 900 feet west of the Wolcott Way/Franklin Parkway intersection. A queuing analysis was performed to confirm that the projected project-related traffic will not queue through this intersection.

Project Trip Generation and Vehicle Mix

The Proposed Project would generate 1,162 vehicles trips (Table 4) based on the tonnage increase of 6,560 tons per day. This includes inbound trash (disposal) and other material (beneficial reuse) trips, special projects-related trips, employee/visitor generated trips, and outbound trips. Not all of these trips are required to be processed through the scales and could instead use the bypass lane at the entrance. Vehicles using the bypass lane include special construction-related trips, employee-generated and visitor trips and all outbound trips. Therefore, the queuing analysis is based on the vehicle storage needed for

inbound material only (including both trash disposal and beneficial use material), which would be an estimated maximum of 975 vehicles (Table 4). The trip distribution used for updated queuing analysis is the same trip distribution used for the previous queuing analysis.

Queuing Analysis Assumptions

The queuing calculations are based on the same assumptions used in the *CCL Master Plan Revision Traffic Analysis* (Appendix G of the Draft EIR) and include the following assumptions:

- The distance between the Wolcott Way and the limit line where vehicles must wait to enter the scales is 900 feet.
- There are two lanes of storage between the limit line where vehicles must wait to enter the scales and Wolcott Street (site entrance). The two lanes provide a total of 1,800 feet of storage.
- A third lane extends from the limit line to approximately 480 feet east.
- A fourth lane extends from the limit line to approximately 290 feet east.
- A fifth lane extends from the limit line to approximately 200 feet east.
- A sixth lane extends from the limit line to approximately 130 feet east.
- The combined storage of the six lanes is 2,900 feet. Lane lengths are shown on Figure 1.
- The average vehicle length is assumed to be 50 feet (truck).
- The proposed entrance can store 58 vehicles (50 feet per vehicle) at any given time.
- Based on historical gate receipt data, the average wait time at the scales is 1 minute per vehicle.
- The proposed entrance will have four scales on opening day and eventually six scales, one for each lane, if needed in the future. Each scale can process 60 vehicles per hour based on historical data. On opening day, the Proposed Project entrance would have the capability to process approximately 240 vehicles per hour (4 vehicles per minute).
- CCL is permitted to be open 24 hours per day, 6 days per week. Nearly all material is received at CCL between 3:00 a.m. and 6:00 p.m., which is reflected in the analysis.
- Historically, there has been material received between 6:00 p.m. and 3:00 a.m. for beneficial use and special projects. If needed, CCL could serve customers during this time as well. If this were to happen, the vehicles associated with the material would arrive at CCL during off-peak times, and would further diminish the number of vehicles arriving at CCL between 3:00 a.m. and 6:00 pm.
- The vehicle arrival rate is spread out over the course of each hour.

Summary of Findings

The queuing calculations for the projected inbound trips (975 trips) are summarized in Table 5. The analysis shows that the storage provided at the new CCL entrance will easily be able to accommodate the projected number of vehicles arriving to the site throughout the day and will provide enough storage to accommodate projected CCL traffic without queuing onto public roadways. This conclusion does not change the findings of the original queuing analysis and is based on the following reasons:

- There is no projected queue at any time during the day because the processing rate of the gates (240 vehicles per hour) exceeds the arrival rate at all hours of the day. Using the projected trip estimate of 975 trips the storage provided will be able to easily accommodate the projected number of inbound vehicles at all times of the day.

- The inbound trips (analyzed in the queue) are generally spread throughout a fifteen-hour period. At the peak arrival (112 vehicles), there is still capacity for an additional 128 vehicles. There are also 9 hours of the day when 100 percent of the storage capacity is available.
- CCL is permitted to be open 24 hours per day, 6 days per week. This provides CCL the operational flexibility to coordinate with customers and arrange to be open when loads are anticipated.
- Approximately 16 percent of the trips are not required to cross the scales, including special construction-related trips, employee-generated and visitor trips, and all outbound trips.
- Four scales will be provided on opening day, which would allow CCL to process 240 vehicles per hour. However, the site entrance has been designed with six lanes, each of which could have a scale, which would allow CCL to process up to 360 vehicles per hour if needed in the future.
- If, despite the findings document herein, actual operation of the Proposed Project were to result in queuing into the Wolcott Way/Franklin Parkway intersection, CCL has additional options for managing the queue at CCL's entrance. These options may include adding an additional scale, scheduling customers bringing beneficial use material so that they do not arrive during peak times, additional onsite management, and turning away customers.

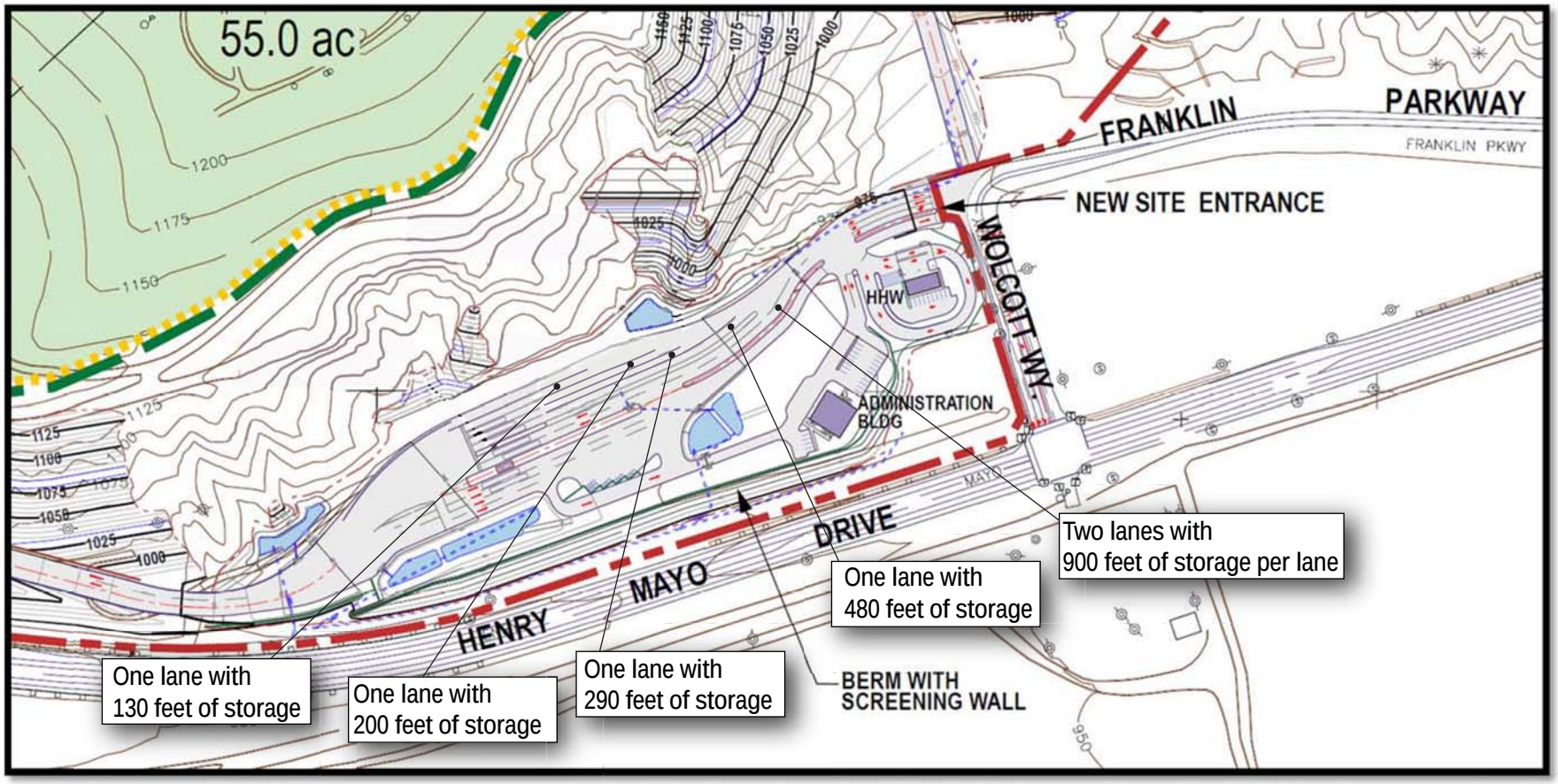
Table 5. Summary of Queuing Analysis of Estimated Peak Project Trip Generation (975 inbound trips)
New Chiquita Canyon Landfill Entrance on Opening Day (4 Scales)

Time of Day			Average Hourly Distribution*	Arrival Rate (veh per hour)	Processing Rate (veh per hour)	Queue at end of this period (veh)	Queue at end of this period (ft)	Available Storage (ft)	Will Demand Exceed Storage?
12:00 AM	to	1:00 AM	0.0%	0	240	0.0	0	2,900	No
1:00 AM	to	2:00 AM	0.0%	0	240	0.0	0	2,900	No
2:00 AM	to	3:00 AM	0.0%	0	240	0.0	0	2,900	No
3:00 AM	to	4:00 AM	0.9%	8	240	0.0	0	2,900	No
4:00 AM	to	5:00 AM	3.7%	36	240	0.0	0	2,900	No
5:00 AM	to	6:00 AM	5.4%	53	240	0.0	0	2,900	No
6:00 AM	to	7:00 AM	6.0%	59	240	0.0	0	2,900	No
7:00 AM	to	8:00 AM	6.0%	59	240	0.0	0	2,900	No
8:00 AM	to	9:00 AM	8.3%	81	240	0.0	0	2,900	No
9:00 AM	to	10:00 AM	7.7%	75	240	0.0	0	2,900	No
10:00 AM	to	11:00 AM	8.0%	78	240	0.0	0	2,900	No
11:00 AM	to	12:00 PM	11.5%	112	240	0.0	0	2,900	No
12:00 PM	to	1:00 PM	9.5%	92	240	0.0	0	2,900	No
1:00 PM	to	2:00 PM	7.4%	73	240	0.0	0	2,900	No
2:00 PM	to	3:00 PM	8.3%	81	240	0.0	0	2,900	No
3:00 PM	to	4:00 PM	7.2%	70	240	0.0	0	2,900	No
4:00 PM	to	5:00 PM	8.0%	78	240	0.0	0	2,900	No
5:00 PM	to	6:00 PM	2.0%	20	240	0.0	0	2,900	No
6:00 PM	to	7:00 PM	0.0%	0	240	0.0	0	2,900	No
7:00 PM	to	8:00 PM	0.0%	0	240	0.0	0	2,900	No
8:00 PM	to	9:00 PM	0.0%	0	240	0.0	0	2,900	No
9:00 PM	to	10:00 PM	0.0%	0	240	0.0	0	2,900	No
10:00 PM	to	11:00 PM	0.0%	0	240	0.0	0	2,900	No
11:00 PM	to	12:00 AM	0.0%	0	240	0.0	0	2,900	No
Total Number of Vehicles				**975**		**Maximum Queue Length (ft)**	**0**	**Will Queue Ever Exceed Storage**	**No**

* Average hourly distribution based on CCL gate receipt data collected in 2014. See Attachment A for copies of gate receipt data used to calculate average hourly distribution percentages. Days selected for gate receipt data based on days when CCL operation was at or near permitted daily limit of 6,000 tons per day of waste material.

Traffic Supplement Figure

FIGURE 1
Proposed CCL Entrance Plan



EN1030151026SCO CCL Entrance Plan Figure 1.ai 10/16

Attachment A
CCL Gate Receipt Data

Print Date: 8/18/2014

Chiquita Canyon Vehicle Count & Total Tons per Hour

Start Date: 1/13/2014 Stop Date: 1/13/2014

Time			Total Tons	Vehicle Count
Selected Grid(s): DISPOSAL				
1/13/2014				
4.00am	to	5.00am	264.60	12
5.00am	to	6.00am	241.54	13
6.00am	to	7.00am	220.23	13
7.00am	to	8.00am	333.17	22
8.00am	to	9.00am	546.69	33
9.00am	to	10.00am	433.84	33
10.00am	to	11.00am	457.69	36
11.00am	to	12.00pm	453.91	34
12.00pm	to	1.00pm	687.78	37
1.00pm	to	2.00pm	548.22	32
2.00pm	to	3.00pm	576.38	35
3.00pm	to	4.00pm	459.47	31
4.00pm	to	5.00pm	288.00	26
5.00pm	to	6.00pm	22.12	1
			5,533.64	**358**
		Report total:	**5,533.64**	**358**

Print Date: 8/18/2014

Chiquita Canyon Vehicle Count & Total Tons per Hour

Start Date: 1/14/2014 Stop Date: 1/14/2014

Time			Total Tons	Vehicle Count
Selected Grid(s): DISPOSAL				
1/14/2014				
3.00am	t	4.00am	41.50	2
4.00am	t	5.00am	93.00	4
5.00am	t	6.00am	322.26	14
6.00am	t	7.00am	605.49	33
7.00am	t	8.00am	372.53	23
8.00am	t	9.00am	399.47	20
9.00am	t	10.00am	544.75	27
10.00am	t	11.00am	488.72	32
11.00am	t	12.00pm	479.88	33
12.00pm	t	1.00pm	414.01	28
1.00pm	t	2.00pm	496.85	28
2.00pm	t	3.00pm	507.04	29
3.00pm	t	4.00pm	270.89	19
4.00pm	t	5.00pm	415.30	28
5.00pm	to	6.00pm	456.06	36
			5,907.75	**356**
		Report total:	**5,907.75**	**356**

Print Date: 8/18/2014

Chiquita Canyon Vehicle Count & Total Tons per Hour

Start Date: 1/15/2014 Stop Date: 1/15/2014

Time			Total Tons	Vehicle Count
Selected Grid(s): DISPOSAL				
1/15/2014				
3.00am	to	4.00am	112.84	5
4.00am	to	5.00am	514.13	22
5.00am	to	6.00am	858.80	39
6.00am	to	7.00am	415.18	26
7.00am	to	8.00am	507.71	25
8.00am	to	9.00am	788.02	47
9.00am	to	10.00am	379.05	24
10.00am	to	11.00am	234.50	18
11.00am	to	12.00pm	448.70	31
12.00pm	to	1.00pm	270.41	20
1.00pm	to	2.00pm	239.10	16
2.00pm	to	3.00pm	295.75	17
3.00pm	to	4.00pm	339.17	25
4.00pm	to	5.00pm	251.76	30
5.00pm	to	6.00pm	6.41	1
			5,661.53	**346**
		Report total:	**5,661.53**	**346**

Print Date: 8/18/2014

Chiquita Canyon Vehicle Count & Total Tons per Hour

Start Date: 2/20/2014 Stop Date: 2/20/2014

Time			Total Tons	Vehicle Count
Selected Grid(s): DISPOSAL				
2/20/2014				
3.00am	to	4.00am	163.86	7
4.00am	to	5.00am	406.90	18
5.00am	to	6.00am	276.04	15
6.00am	to	7.00am	262.27	17
7.00am	to	8.00am	330.76	20
8.00am	to	9.00am	487.03	29
9.00am	to	10.00am	581.50	34
10.00am	to	11.00am	381.80	24
11.00am	to	12.00pm	636.19	42
12.00pm	to	1.00pm	641.76	38
1.00pm	to	2.00pm	302.18	21
2.00pm	to	3.00pm	388.74	30
3.00pm	to	4.00pm	186.50	21
4.00pm	to	5.00pm	148.24	23
			5,193.77	**339**
		Report total:	**5,193.77**	**339**

Print Date: 8/18/2014

Chiquita Canyon Vehicle Count & Total Tons per Hour

Start Date: 4/30/2014 Stop Date: 4/30/2014

Time			Total Tons	Vehicle Count
Selected Grid(s): DISPOSAL				
4/30/2014				
3.00am	to	4.00am	108.19	5
4.00am	to	5.00am	249.68	12
5.00am	to	6.00am	321.76	17
6.00am	to	7.00am	125.45	16
7.00am	to	8.00am	217.52	16
8.00am	to	9.00am	231.73	18
9.00am	to	10.00am	237.72	17
10.00am	to	11.00am	458.34	34
11.00am	to	12.00pm	944.03	60
12.00pm	to	1.00pm	737.65	43
1.00pm	to	2.00pm	694.59	36
2.00pm	to	3.00pm	543.36	35
3.00pm	to	4.00pm	501.52	32
4.00pm	to	5.00pm	354.88	34
5.00pm	to	6.00pm	24.13	1
			5,750.55	**376**
		Report total:	**5,750.55**	**376**

Appendix G-3
Traffic Appendixes

Appendix A
Los Angeles County Traffic Study Memorandum of Understanding

SCOPING FOR TRAFFIC STUDY

Project Name:	Chiquita Canyon Landfill Master Plan Revision

This Memorandum of Understanding (MOU) acknowledges Los Angeles County Department of Public Works, Traffic and Lighting Division (TLD) requirements of traffic impact analysis for the project and is subject to change:

Project Address:	29201 Henry Mayo Drive, Castaic, CA 91384		
Project Description:	The Chiquita Canyon Landfill (CCL) Master Plan Revision (Proposed Project) would extend the waste footprint at CCL by approximately 143 acres, better utilize the landfill's remaining and potential disposal capacity, and allow for the disposal of all nonhazardous wastes acceptable at a Class III solid waste disposal landfill. The Proposed Project would also include the continued diversion of such materials as green waste, asphalt/concrete, and metal through ongoing landfill waste diversion programs on which numerous jurisdictions depend to comply with state-mandated waste diversion goals.		
City:	Castaic		
Project Buildout Year:	2014	**Ambient or CMP Growth Rate per Year:**	2.75%
Closest Intersection (Xtn) to the Project: SR-126/Chiquita Canyon Landfill Entrance			
Xtn N/S Street Name:	Chiquita Canyon Landfill Entrance		
Xtn E/W Street Name:	SR-126		
Thomas Guide Pg+Grid:	4549, D2	**Los Angeles County Supervisorial District:**	5

	Consultant	Developer
Company:	CH2M HILL	
Name:	Jim Roldan	
Address:	6 Hutton Centre Drive, Suite 700	
City, State, Zip Code:	Santa Ana, CA 92707	
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Email:	jim.roldan@ch2m.com	

By: J. Roldan **Reviewed By:**

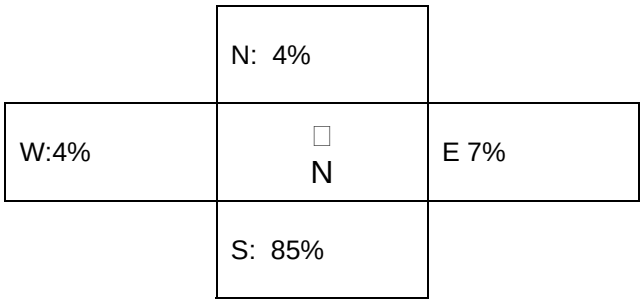
Print Name: JIM ROLDAN, CH2MHILL **Print Name:**

SCOPING FOR TRAFFIC STUDY

Project Name:	Chiquita Canyon Landfill Master Plan Revision

Consultant/Developer's Representative	**Date**	**TLD's Representative**	**Date**

1. Traffic Distribution: Figure(s) illustrating project trip distribution in percentages and volumes at the studied intersections analyzed.



SEE ATTACHED TRIP DISTRIBUTION ON FIGURE 1 FOR GREATER DETAIL. TRAFFIC DISTRUBUTIONS ARE BASED ON HISTORICAL GATE RECEIPT INFORMATION PROVIDED BY CCL.

Trip Credit: Exact amount of credit subject to approval by TLD.

Transportation Demand Management (TDM)	NO	
Existing Active Land Use	YES	Trip generation numbers in this MOU only reflect the net new trips. Existing land use trips accounted for in existing/background data.
Previous Land Use	NO	
Internal Trip Reduction	NO	
Pass-by Trip Reduction	NO	

Project Name:	Chiquita Canyon Landfill Master Plan Revision

2. Trip Generation

In addition to traffic at CCL that results from incoming waste, there are several other sources of in- and outbound traffic at CCL. A wide variety of material that is diverted from the waste stream is accepted at CCL for other uses, including alternative daily cover, road base, compost, and erosion control material. Material from CCL, including clean soil, compost products, and recycled materials, may also be trucked from the site to other locations. Additionally, periodic cell construction occurs at CCL, during which time additional traffic related to construction occurs. Table 1 details the potential maximum daily traffic volume at CCL under Baseline Conditions. Table 2 details the potential maximum daily traffic volume at CCL under Proposed Project Conditions. Table 3 details the potential maximum daily net new trips of the Proposed Project (i.e., Proposed Project minus Baseline Project). Although Tables 1 through 3 are based on historical records for different vehicle and material types, it does not represent a specific day.

AM and PM peak hour project trips (net new trips) will be developed in the traffic report to reflect the peak of the surrounding network system. Project peak hour trips will represent a percentage of the daily trips summarized in Table 3 and will be based on historical time of day data collected at CCL (i.e., CCL gate receipts).

SCOPING FOR TRAFFIC STUDY

Project Name:	Chiquita Canyon Landfill Master Plan Revision

Table 1
Summary of Baseline Peak Potential Daily
Inbound and Outbound Traffic
Chiquita Canyon Landfill

Traffic Source	Number of Vehicles Peak Potential Daily[a,b]	Number of Vehicles Peak Potential Daily - PCE	Number of Trip Ends Peak Potential Daily - PCE
Inbound			
Trash (Disposal)[c]			
Transfer	273	546	1092
Route	300	600	1200
Roll-offs	460	920	1840
Self Haul	500	500	1000
Other Materials (Beneficial Reuse)			
Shredded Curbside Green Waste	40	80	160
Clean Soil	200	400	800
Contaminated Soil[d]			
Large Trucks	300	600	1200
10-Wheelers	60	120	240
Protective Cover			
TASW	200	400	800
MRF Fines	40	80	160
Tire Shred	15	30	60
C&D Fines	25	50	100
Road Base			
Concrete	50	100	200
Asphalt	50	100	200
Processed C&D Material	30	60	120
Composting[e]	55	110	220
Outbound			
Clean Soil	100	200	400
Compost Products	8	16	32
Other	25	50	100
Special Projects[f]			
Cell Construction			
Mobilize/Demobilize Traffic	20	20	40
Contractor Employees	80	80	160
Employees			
Landfill – Permanent	34	34	68
Landfill – Temporary	25	25	50
LFGTE Plant	2	2	4
Transfer Drivers	4	4	8
Total	**2,896**	**5,127**	**10,254**

Notes:
[a] These numbers are one-way trips and based on 5
[b] The maximum number of trash vehicles in each category does not happen simultaneously. The daily
[c] Regardless of actual vehicle mix, incoming waste tonnage would not exceed 6,000 tons per day per
[d] Contaminated soils may also be disposed and not
[e] The existing CUP allows for operation of up to a 560-tons-per-day composting facility for windrow or
[f] These projects occur periodically. Typically once
TASW = treated auto shredder waste

Table 2
Summary of Proposed Peak Potential Daily
Inbound and Outbound Traffic
Chiquita Canyon Landfill

Traffic Source	Number of Vehicles Peak Potential Daily[a,b]	Number of Vehicles Peak Potential Daily - PCE	Number of Trip Ends Peak Potential Daily - PCE
Inbound			
Trash (Disposal)[c]			
Transfer	545	1090	2180
Route	600	1200	2400
Roll-offs	460	920	1840
Self Haul	500	500	1000
Other Materials (Beneficial Reuse)			
Shredded Curbside Green Waste	40	80	160
Clean Soil	200	400	800
Contaminated Soil[d]			
Large Trucks	300	600	1200
10-Wheelers	60	120	240
Protective Cover			
TASW	200	400	800
MRF Fines	40	80	160
Tire Shred	15	30	60
C&D Fines	25	50	100
Road Base			
Concrete	50	100	200
Asphalt	50	100	200
Processed C&D Material	30	60	120
Composting[e]	55	110	220
Outbound			
Clean Soil	100	200	400
Compost Products	8	16	32
Other	25	50	100
Special Projects[f]			
Cell Construction			
Mobilize/Demobilize Traffic	20	20	40
Contractor Employees	80	80	160
Employees			
Landfill – Permanent	55	55	110
Landfill – Temporary	25	25	50
LFGTE Plant	3	3	6
Transfer Drivers	4	4	8
Total	**3,490**	**6,293**	**12,586**

Notes:
[a] These numbers are one-way trips and based on 5
[b] The maximum number of trash vehicles in each category does not happen simultaneously. The daily
[c] Regardless of actual vehicle mix, incoming waste tonnage would not exceed 12,000 tons per day.
[d] Contaminated soils may also be disposed and not
[e] The existing CUP allows for operation of up to a 560-tons-per-day composting facility for windrow or
[f] These projects occur periodically. Typically once

Table 3
Summary of Proposed Net New Peak Potential
Daily Inbound and Outbound Traffic
Chiquita Canyon Landfill

Traffic Source	Number of Vehicles Peak Potential Daily[a,b]	Number of Vehicles Peak Potential Daily - PCE	Number of Trip Ends Peak Potential Daily - PCE
Inbound			
Trash (Disposal)[c]			
Transfer	272	544	1088
Route	300	600	1200
Roll-offs	0	0	0
Self Haul	0	0	0
Other Materials (Beneficial Reuse)			
Shredded Curbside Green Waste	0	0	0
Clean Soil	0	0	0
Contaminated Soil[d]			
Large Trucks	0	0	0
10-Wheelers	0	0	0
Protective Cover			
TASW	0	0	0
MRF Fines	0	0	0
Tire Shred	0	0	0
C&D Fines	0	0	0
Road Base			
Concrete	0	0	0
Asphalt	0	0	0
Processed C&D Material	0	0	0
Composting[e]	0	0	0
Outbound			
Clean Soil	0	0	0
Compost Products	0	0	0
Other	0	0	0
Special Projects[f]			
Cell Construction			
Mobilize/Demobilize Traffic	0	0	0
Contractor Employees	0	0	0
Employees			
Landfill – Permanent	21	21	42
Landfill – Temporary	0	0	0
LFGTE Plant	1	1	2
Transfer Drivers	0	0	0
Total	**594**	**1,166**	**2,332**

Notes:
[a] These numbers are one-way trips and based on 5
[b] The maximum number of trash vehicles in each category does not happen simultaneously. The daily
[c] Regardless of actual vehicle mix, incoming waste tonnage would not exceed 12,000 tons per day.
[d] Contaminated soils may also be disposed and not
[e] The existing CUP allows for operation of up to a 560-tons-per-day composting facility for windrow or
[f] These projects occur periodically. Typically once

SCOPING FOR TRAFFIC STUDY

Project Name:	Chiquita Canyon Landfill Master Plan Revision

3. Study Intersections: At minimum, the study shall include the following intersections. The list is subject to change after related projects, trip generation and distribution are determined. Consultant should check with adjoining Cities regarding their requirements in addition to the following County/City intersections. Documentation of the consultation from these agencies shall be included in the traffic study.

Xtn #	% County	Thomas Guide Page+Grid	N/S/E/W Street Name	City	Signalized	CMP
1	0%	4549, C3	Chiquito Canyon Road @ SR-126	LA County	NO	YES
2	0%	4549, D2	CCL Entrance @ SR-126	LA County	NO	NO
3	0%	4549, F2	Wolcott Way @ SR-126	LA County	YES	NO
4	0%	4549, H1	Commerce Center Drive @ SR-126	LA County	YES	NO
5	0%	4459, J7	I-5 SB Ramps @ SR-126	LA County	YES	NO
6	0%	4460, A6	I-5 NB Ramps @ SR-126	Santa Clarita	YES	NO
7	100%	4549, F2	Wolcott Way @ Franklin Parkway (future project entrance)	LA County	NO	NO
8	100%	4549, H1	Franklin Parkway @ Commerce Center Drive	LA County	YES	NO
9						
10						

Cites to be consulted: Santa Clarita and CALTRANS

SCOPING FOR TRAFFIC STUDY

Project Name:	Chiquita Canyon Landfill Master Plan Revision

4. Related Projects: Consultant should check with Los Angeles County Department of Regional Planning and planning departments of adjoining Cities. Documentation of the consultation from these agencies shall be included in the traffic study. Related projects list shall be submitted to TLD for our review and approval before being incorporated in the study.

5. Congested Management Program (CMP): A CMP TIA is required for all projects required to prepare an Environmental Assessment based on local determination or projects requiring a traffic study. Where the project meets the criteria established in the Transportation Impact Analysis (TIA section of the County of Los Angeles' CMP TIA Land Use Analysis Guidelines, a CMP analysis must be prepared. At a minimum, the geographic area examined in the TIA must include the following:

- All CMP arterial monitoring intersections (see Appendix A, exhibit A-2, page A-15 of the 2002 Guidelines), including freeway on- or off-ramp intersections, where the proposed project will add 50 or more trips during either the a.m. or p.m. peak hours.
- Main line freeway monitoring locations (see Chapter 2, exhibit 2-4, page 16 of the 2002 Guidelines) where the project will add 150 or more trips, in either direction, during the a.m. or p.m. weekday peak hours.

A copy of the 2002 CMP Land Use Analysis Guidelines can be obtained by calling the CMP Hotline at (213) 922-2830.

6. Freeway Analysis: The potential traffic impact on the following Freeway(s) must be considered.

Queuing analysis at the I-5 SB Ramps/SR-126 and I-5 NB Ramp/SR-126 intersections

will be included in the analysis.

The applicant shall consult with the State of California Department of Transportation (Caltrans) to determine the California Environmental Quality Act levels of significance with regard to traffic impacts on Caltrans' freeway facilities. This consultation shall also include a determination of Caltrans requirements for the study of traffic impacts to its facilities and the mitigation of any such impacts. This analysis must follow the most current Caltrans' Guide for the Preparation of Traffic Impact Studies (December 2002) and can be obtained from http://www.dot.ca.gov/hq/traffops/developserv/operationalsystems/reports/tiguide.pdf. If Caltrans finds that the project has a significant impact on the freeway, Caltrans shall be requested to include the basis for this finding in their response. If fees are proposed to mitigate the freeway impact, Caltrans shall be requested to identify the specific project to which the fees will apply. These written comments from Caltrans shall be included with the traffic study and submitted to Public Works for review and approval. If a documented good faith effort is made to consult with Caltrans and written comments cannot be obtained from within a reasonable amount of time, an analysis of the freeway impact shall be made using the County of Los Angeles' CMP Land Use Analysis Guidelines.

SCOPING FOR TRAFFIC STUDY

Project Name:	Chiquita Canyon Landfill Master Plan Revision

7. Other:

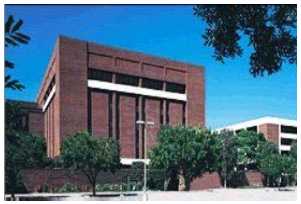
Traffic counts may be conducted immediately per the following:
• Must be taken on Tuesdays, Wednesdays or Thursdays.
• Must exclude holidays, and the first weekdays before and after the holiday.
• Must be taken on days when local schools or colleges are in session.
• Must be taken on days of good weather, and avoid atypical conditions (e.g., road construction, detours, or major traffic incidents).
• Traffic counts used for other traffic studies in the area shall **NOT** be reused again, unless 25% of the counts conducted for that particular traffic study are validated with new counts. The difference in volumes between the old and new counts at each corresponding movement should not be more than 10%.
• New traffic counts shall be checked to ensure the difference in volumes at corresponding approaches, if applicable, between two adjacent intersections is no more than 10% unless the difference can be justified.
For all proposed mitigation measures, a conceptual plan for the improvements shall be submitted to our Traffic Studies section for review and approval prior to the approval of the Traffic Impact Analysis. All proposed improvements shall be within the right-of-way.
For all cumulative mitigation measures, a cost estimate for the improvement shall be submitted.
Traffic Indices Calculations shall be conducted along Wolcott Way and SR-126
On-sites as well as I-5 Off Ramp and SR-126 Queuing Analyses shall be included in the Traffic Impact Analysis

This analysis must follow the most current Traffic Impact Analysis Report Guidelines.

SCOPING FOR TRAFFIC STUDY

Project Name:	Chiquita Canyon Landfill Master Plan Revision

Please return signed page 1 of 9 in person, by Mail or by Fax

In Person	By Mail
Los Angeles County Department of Public Works Traffic and Lighting Division, **Traffic Studies Section, Traffic Studies Unit** **1000 South Fremont Avenue** **Building A-9E, 4th Floor** **Alhambra, CA 91803-8800** **Our building, on the left with parking structure on the right.** **Check the following web site, for additional information:** **http://www.thealhambra.net** 	**Los Angeles County Department of Public Works** **Traffic and Lighting Division,** **Traffic Studies Section, Traffic Studies Unit** **P.O. Box 1460** **Alhambra, CA 91802-1460**

By Fax

	Processing Engineer	Telephone No.	Fax No.	E-Mail Address
	Jeffrey PLETYAK	(626) 300-4721	(626) 300-4736	JPlety@dpw.lacounty.gov
	Suen Fei LAU	(626) 300-4820		SFLau@dpw.lacounty.gov
	Gerald LEY	(626) 300-4822		GLey@dpw.lacounty.gov
	Thanh LE	(626) 300-4730		TLe@dpw.lacounty.gov
	Diran YANIKIAN	(626) 300-4756		DYanikian@dpw.lacounty.gov
	Lindsay SAGORSKI	(626) 300-4784		LSagorski@dpw.lacounty.gov
	Isaac WONG	(626) 300-4796		IsWong@dpw.lacounty.gov
	Virgilio (Gil) LAZATIN	(626) 300-4866		VLazatin@dpw.lacounty.gov

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
TRAFFIC AND LIGHTING DIVISION
APPLICATION FOR ENVIRONMENTAL IMPACT REPORT
TRAFFIC STUDY REVIEW SERVICES, ORDINANCE NO. 91-0101

Road Fund No:	B03	Revenue Source	9254	Program No:	R291

Department Receipt No.:		**Date:**	
Project No.:	R2004-00559-(5)	**Studies No.:**	
Project Name:	Chiquita Canyon Landfill Master Plan Revision		
Applicant/Engineer:	Chiquita Canyon Landfill LLC	**Telephone No.:**	(661) 257-3655
Company:		**Fax No.:**	
Address:	29201 Henry Mayo Drive		
City, State:	Castaic, CA	**Zip:**	91384

The traffic study (TS), required as part of the environmental review process, has been received. **Before a traffic study review can begin, the indicated fee must be paid to this Department.** The fee may be paid in person or mailed to:

In Person	By Mail
Cashier, Mezzanine Level (626) 458-6399 **Los Angeles County Department of Public Works** **900 South Fremont Avenue** **Alhambra, CA 91803-1331**	**Cashier, Mezzanine Level** **Los Angeles County Department of Public Works** **P.O. Box 1460** **Alhambra, CA 91802-1460**

Please **return this form** along with your payment to insure proper credit to your account. Make check payable to the **Los Angeles County Department of Public Works.**

TS review fees are based on the number of Average Daily Trips (ADT's) generated by the project and for six traffic conditions as indicated on page 5 of our 1997 guidelines, as follows:

ADT's	**FEE (Effective March 1, 2012)*
1 - 1,000	**$1,662**
1,001 - 5,000	**$3,322**
5,001 - 10,000	**$4,154**
10,001 and over	**$4,984**
ADT For This Project:	Fee:

* For additional information, http://planning.co.la.ca.us/
** Additional fee is required for additional traffic conditions/phases

Processing Engineer	Telephone No.	Fax No.	E-Mail Address
Jeffrey PLETYAK	(626) 300-4721	(626) 300-4736	JPlety@dpw.lacounty.gov
Suen Fei LAU	(626) 300-4820		SFLau@dpw.lacounty.gov
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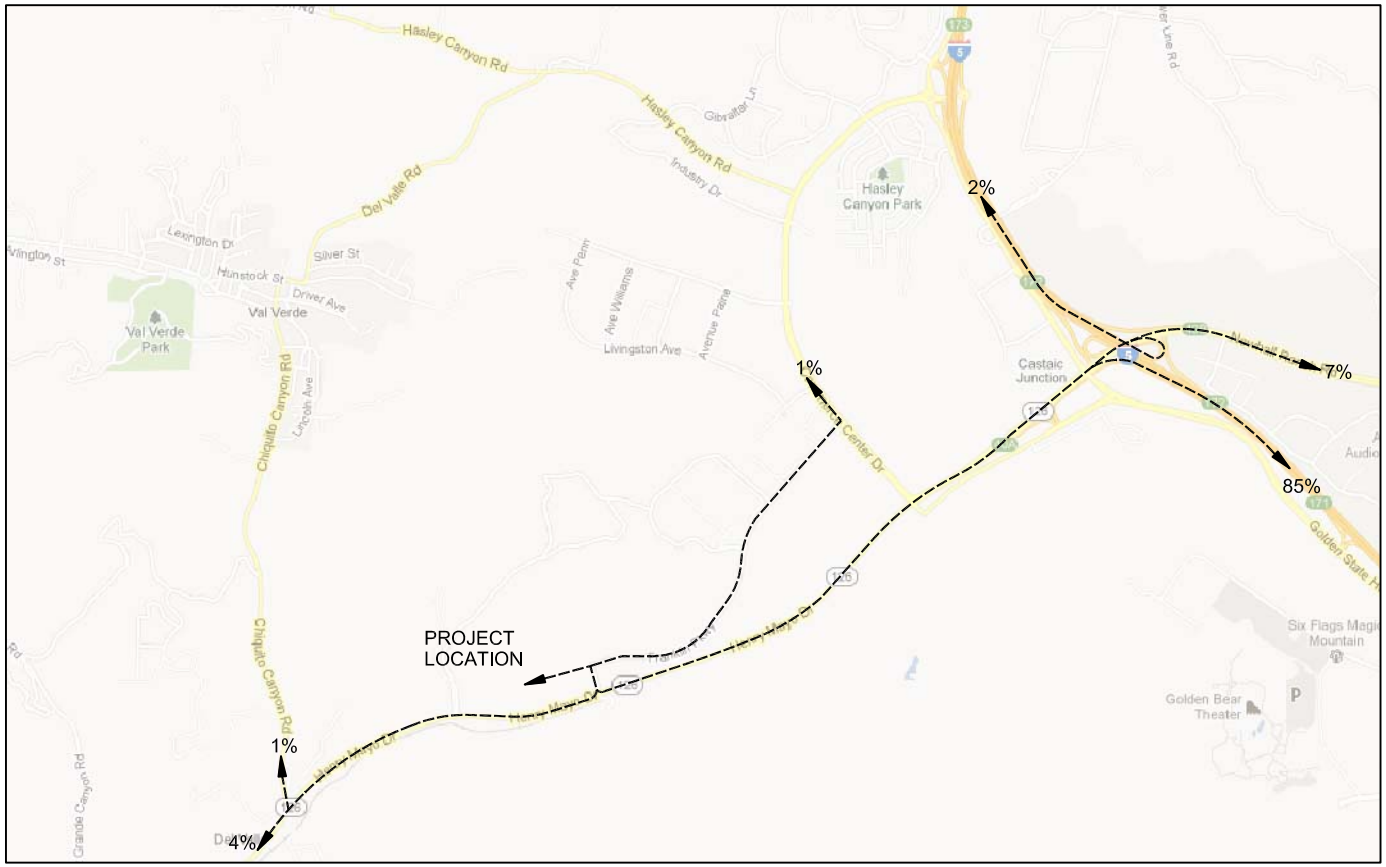
Virgilio (Gil) LAZATIN	(626) 300-4866		VLazatin@dpw.lacounty.gov

cc: Cashier Note: Normal review time is 6-8 weeks after review fee is paid and receipt is received by Studies Unit.
P:\tlpub\WPFILES\FILES\STU\VL\MOU\LA County MOU 03-01-11 Blank.docx Updated 03/01/11

NOT TO SCALE



LEGEND:

XX% Project Distribution (to/from distribution assumed to be identical)

CH2MHILL

CHIQUITA CANYON LANDFILL MASTER PLAN REVISION

PROPOSED PROJECT TRIP DISTRIBUTION

FIGURE 1

Appendix B
Existing Turning Movement Data Collection Sheets

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_001 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

AM

NS/EW Streets:	Chiquito Canyon Rd			Chiquito Canyon Rd			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	1	1	1	1	2	0	0	2	1	
7:00 AM	0		0	26		5	0	134	0		200	6	371
7:15 AM	1		2	21		2	1	135	0		171	5	338
7:30 AM	1		0	23		0	1	159	0		183	4	371
7:45 AM	0		0	12		1	0	157	0		186	2	358
8:00 AM	0		0	11		3	0	134	0		183	2	333
8:15 AM	0		0	13		2	0	109	0		171	9	304
8:30 AM	0		0	11		1	0	137	1		151	3	304
8:45 AM	0		0	14		1	1	134	0		109	3	262
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	2	0	2	131	0	15	3	1099	1	0	1354	34	2641
APPROACH %'s :	50.00%	0.00%	50.00%	89.73%	0.00%	10.27%	0.27%	99.64%	0.09%	0.00%	97.55%	2.45%	
PEAK HR START TIME :	700 AM												TOTAL
PEAK HR VOL :	2	0	2	82	0	8	2	585	0	0	740	17	1438
PEAK HR FACTOR :		0.333			0.726			0.917			0.919		0.969

CONTROL : 1-Way Stop (SB)

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_001 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

PM

NS/EW Streets:	Chiquito Canyon Rd			Chiquito Canyon Rd			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	1	1	1	1	2	0	0	2	1	
4:00 PM	0		1	15	2	0	3	198	0		184	11	414
4:15 PM	1		1	15	0	6	9	184	0		186	12	414
4:30 PM	0		0	11	0	2	1	213	1		191	7	426
4:45 PM	0		0	11	0	0	4	244	0		216	16	491
5:00 PM	0		0	9	0	2	3	214	0		190	14	432
5:15 PM	1		0	13	0	0	4	213	0		193	18	442
5:30 PM	0		0	14	0	1	3	238	0		181	10	447
5:45 PM	0		0	12	0	2	4	242	0		161	11	432
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	2	0	2	100	2	13	31	1746	1	0	1502	99	3498
APPROACH %'s :	50.00%	0.00%	50.00%	86.96%	1.74%	11.30%	1.74%	98.20%	0.06%	0.00%	93.82%	6.18%	
PEAK HR START TIME :	445 PM												TOTAL
PEAK HR VOL :	1	0	0	47	0	3	14	909	0	0	780	58	1812
PEAK HR FACTOR :		0.250			0.833			0.930			0.903		0.923

CONTROL : 1-Way Stop (SB)

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_002 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

AM

NS/EW Streets:	Chiquito Canyon Landfill Entrance			Chiquito Canyon Landfill Entrance			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	0	1	1	1	2	0	0	2	1	
7:00 AM				6		2	0	154			200	6	368
7:15 AM				7		1	3	149			179	10	349
7:30 AM				9		2	1	173			182	7	374
7:45 AM				5		1	2	176			190	6	380
8:00 AM				4		2	0	144			179	9	338
8:15 AM				7		0	0	123			184	7	321
8:30 AM				5		0	1	143			147	12	308
8:45 AM				6		0	1	151			119	7	284
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	49	0	8	8	1213	0	0	1380	64	2722
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	85.96%	0.00%	14.04%	0.66%	99.34%	0.00%	0.00%	95.57%	4.43%	
PEAK HR START TIME :	700 AM												TOTAL
PEAK HR VOL :	0	0	0	27	0	6	6	652	0	0	751	29	1471
PEAK HR FACTOR :		0.000			0.750			0.924			0.947		0.968

CONTROL : 1-Way Stop (SB)

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_002 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

PM

NS/EW Streets:	Chiquito Canyon Landfill Entrance			Chiquito Canyon Landfill Entrance			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	0	1	1	1	2	0	0	2	1	
4:00 PM				13		0	0	208			189	10	420
4:15 PM				8		0	1	205			203	8	425
4:30 PM				10		2	0	218			190	7	427
4:45 PM				9		0	1	252			225	5	492
5:00 PM				4		0	0	225			211	0	440
5:15 PM				13		1	0	222			209	0	445
5:30 PM				10		0	0	256			191	0	457
5:45 PM				0		0	0	249			169	0	418
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	67	0	3	2	1835	0	0	1587	30	3524
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	95.71%	0.00%	4.29%	0.11%	99.89%	0.00%	0.00%	98.14%	1.86%	
PEAK HR START TIME :	445 PM												TOTAL
PEAK HR VOL :	0	0	0	36	0	1	1	955	0	0	836	5	1834
PEAK HR FACTOR :		0.000			0.661			0.934			0.914		0.932

CONTROL : 1-Way Stop (SB)

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_003 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

AM

NS/EW Streets:	Wolcott Way			Wolcott Way			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	1.5	.5	1	1	2	0	1	2	1	
7:00 AM				0		1	3	150	0	0	199	1	354
7:15 AM				0		2	4	159	0	0	193	0	358
7:30 AM				1		2	13	165	1	0	187	0	369
7:45 AM				0		3	5	179	0	0	193	2	382
8:00 AM				0		5	3	141	0	0	178	0	327
8:15 AM				1		4	1	133	0	0	192	2	333
8:30 AM				0		0	1	140	1	0	156	0	298
8:45 AM				0		0	4	159	0	1	129	1	294
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	2	0	17	34	1226	2	1	1427	6	2715
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	10.53%	0.00%	89.47%	2.69%	97.15%	0.16%	0.07%	99.51%	0.42%	

PEAK HR START TIME :	700 AM												TOTAL
PEAK HR VOL :	0	0	0	1	0	8	25	653	1	0	772	3	1463
PEAK HR FACTOR :		0.000			0.750			0.923			0.969		0.957

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_003 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

PM

NS/EW Streets:	Wolcott Way			Wolcott Way			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	1.5	.5	1	1	2	0	1	2	1	
4:00 PM	1			0		12	3	214	1	1	182	0	414
4:15 PM	0			0		3	1	215	0	0	211	0	430
4:30 PM	0			5		19	5	220	0	0	174	0	423
4:45 PM	2			3		13	5	249	0	0	214	1	487
5:00 PM	0			3		9	2	234	0	0	203	0	451
5:15 PM	1			0		8	2	225	0	0	193	0	429
5:30 PM	6			0		2	0	274	0	0	189	0	471
5:45 PM	0			1		1	2	243	0	0	161	1	409
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	10	0	0	12	0	67	20	1874	1	1	1527	2	3514
APPROACH %'s :	100.00%	0.00%	0.00%	15.19%	0.00%	84.81%	1.06%	98.89%	0.05%	0.07%	99.80%	0.13%	
PEAK HR START TIME :	445 PM												TOTAL
PEAK HR VOL :	9	0	0	6	0	32	9	982	0	0	799	1	1838
PEAK HR FACTOR :		0.375			0.594			0.904			0.930		0.944

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_004 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

AM

NS/EW Streets:	Commerce Center Dr			Commerce Center Dr			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	1	2	1	1	1	2	0	1	2	2	
7:00 AM	14	13	1	57	10	14	17	142	6	2	156	196	628
7:15 AM	13	18	1	31	6	5	12	117	6	2	181	281	673
7:30 AM	9	17	3	73	9	6	15	150	13	1	189	297	782
7:45 AM	10	20	1	76	7	10	21	150	5	2	173	357	832
8:00 AM	12	17	3	58	8	10	17	126	4	3	168	275	701
8:15 AM	5	10	2	49	10	5	8	116	5	5	174	209	598
8:30 AM	6	15	1	74	9	7	7	141	6	5	147	187	605
8:45 AM	12	7	4	46	5	7	12	136	7	4	120	159	519
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	81	117	16	464	64	64	109	1078	52	24	1308	1961	5338
APPROACH %'s :	37.85%	54.67%	7.48%	78.38%	10.81%	10.81%	8.80%	87.01%	4.20%	0.73%	39.72%	59.55%	
PEAK HR START TIME :	715 AM												TOTAL
PEAK HR VOL :	44	72	8	238	30	31	65	543	28	8	711	1210	2988
PEAK HR FACTOR :		0.969			0.804			0.893			0.906		0.898

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_004 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

PM

NS/EW Streets:	Commerce Center Dr			Commerce Center Dr			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	1	1	2	1	1	1	2	0	1	2	2	
4:00 PM	31	8	6	234	40	15	6	186	5	2	166	48	747
4:15 PM	10	7	2	184	18	6	5	216	6	4	175	60	693
4:30 PM	23	10	7	324	74	12	6	185	9	3	156	63	872
4:45 PM	18	6	4	204	36	15	6	262	10	4	188	58	811
5:00 PM	13	11	9	274	67	22	14	221	10	2	162	40	845
5:15 PM	19	9	4	188	26	11	6	208	7	1	164	44	687
5:30 PM	18	3	6	228	19	16	11	237	7	2	163	31	741
5:45 PM	14	7	2	129	15	7	8	230	7	3	148	35	605
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	146	61	40	1765	295	104	62	1745	61	21	1322	379	6001
APPROACH %'s :	59.11%	24.70%	16.19%	81.56%	13.63%	4.81%	3.32%	93.42%	3.27%	1.22%	76.77%	22.01%	
PEAK HR START TIME :	415 PM												TOTAL
PEAK HR VOL :	64	34	22	986	195	55	31	884	35	13	681	221	3221
PEAK HR FACTOR :		0.750			0.754			0.854			0.915		0.923

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_005 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

AM

NS/EW Streets:	I-5 SB Ramps			I-5 SB Ramps			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	2	0	2	0	4	1	0	3	1	
7:00 AM				99		33		111	113		321	61	738
7:15 AM				171		40		69	90		428	70	868
7:30 AM				276		42		93	142		435	64	1052
7:45 AM				202		44		103	136		488	90	1063
8:00 AM				134		34		92	107		407	95	869
8:15 AM				128		40		82	109		353	69	781
8:30 AM				134		35		99	125		296	70	759
8:45 AM				111		32		103	89		249	82	666
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	1255	0	300	0	752	911	0	2977	601	6796
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	80.71%	0.00%	19.29%	0.00%	45.22%	54.78%	0.00%	83.20%	16.80%	
PEAK HR START TIME :	715 AM												TOTAL
PEAK HR VOL :	0	0	0	783	0	160	0	357	475	0	1758	319	3852
PEAK HR FACTOR :		0.000			0.741			0.870			0.898		0.906

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_005 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

PM

NS/EW Streets:	I-5 SB Ramps			I-5 SB Ramps			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	2	0	2	0	4	1	0	3	1	
4:00 PM				173		52		175	322		171	99	992
4:15 PM				160		39		187	233		213	76	908
4:30 PM				187		36		249	333		197	209	1211
4:45 PM				148		45		245	268		204	126	1036
5:00 PM				187		34		271	299		176	137	1104
5:15 PM				163		30		231	245		176	130	975
5:30 PM				131		30		256	265		162	127	971
5:45 PM				116		31		210	178		144	108	787
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	1265	0	297	0	1824	2143	0	1443	1012	7984
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	80.99%	0.00%	19.01%	0.00%	45.98%	54.02%	0.00%	58.78%	41.22%	
PEAK HR START TIME :	430 PM												TOTAL
PEAK HR VOL :	0	0	0	685	0	145	0	996	1145	0	753	602	4326
PEAK HR FACTOR :		0.000			0.930			0.920			0.834		0.893

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_006 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

AM

NS/EW Streets:	I-5 NB Ramps			I-5 NB Ramps			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	3	0	1	0	0	0	0	4	1	0	3	1	
7:00 AM	197		122					190	26		191	92	818
7:15 AM	215		129					215	19		278	134	990
7:30 AM	246		174					356	17		262	134	1189
7:45 AM	281		190					282	19		287	207	1266
8:00 AM	218		168					204	28		288	151	1057
8:15 AM	174		173					183	21		244	140	935
8:30 AM	166		158					215	23		202	116	880
8:45 AM	147		162					191	18		182	82	782
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	1644	0	1276	0	0	0	0	1836	171	0	1934	1056	7917
APPROACH %'s :	56.30%	0.00%	43.70%	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	91.48%	8.52%	0.00%	64.68%	35.32%	
PEAK HR START TIME :	715 AM												TOTAL
PEAK HR VOL :	960	0	661	0	0	0	0	1057	83	0	1115	626	4502
PEAK HR FACTOR :		0.860			0.000			0.764			0.881		0.889

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_006 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

PM

NS/EW Streets:	I-5 NB Ramps			I-5 NB Ramps			SR-126			SR-126			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	3	0	1	0	0	0	0	4	1	0	3	1	
4:00 PM	100		149					323	34		174	151	931
4:15 PM	118		128					293	46		167	182	934
4:30 PM	126		133					399	46		284	190	1178
4:45 PM	118		143					354	46		213	194	1068
5:00 PM	104		164					394	56		209	230	1157
5:15 PM	95		155					345	51		214	215	1075
5:30 PM	102		148					333	52		184	199	1018
5:45 PM	88		186					283	52		173	177	959
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	851	0	1206	0	0	0	0	2724	383	0	1618	1538	8320
APPROACH %'s :	41.37%	0.00%	58.63%	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	87.67%	12.33%	0.00%	51.27%	48.73%	
PEAK HR START TIME :	430 PM												TOTAL
PEAK HR VOL :	443	0	595	0	0	0	0	1492	199	0	920	829	4478
PEAK HR FACTOR :		0.968			0.000			0.939			0.922		0.950

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_007 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

AM

NS/EW Streets:	Commerce Center Dr			Commerce Center Dr			Franklin Parkway			Franklin Parkway			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	3	0	0	3	1	1	0	1	0	0	0	
7:00 AM	30	203			47	5	4		34				323
7:15 AM	62	246			43	3	9		6				369
7:30 AM	80	249			83	10	7		14				443
7:45 AM	102	291			77	8	11		10				499
8:00 AM	62	254			67	7	6		14				410
8:15 AM	43	192			60	2	2		3				302
8:30 AM	20	196			75	8	4		8				311
8:45 AM	17	168			58	3	8		5				259
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	416	1799	0	0	510	46	51	0	94	0	0	0	2916
APPROACH %'s :	18.78%	81.22%	0.00%	0.00%	91.73%	8.27%	35.17%	0.00%	64.83%	#DIV/0!	#DIV/0!	#DIV/0!	
PEAK HR START TIME :	715 AM												TOTAL
PEAK HR VOL :	306	1040	0	0	270	28	33	0	44	0	0	0	1721
PEAK HR FACTOR :		0.856			0.801			0.917			0.000		0.862

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: CA13_5149_007 **Day:** TUESDAY

City: City of Castaic **Date:** 03/26/2013

PM

NS/EW Streets:	Commerce Center Dr			Commerce Center Dr			Franklin Parkway			Franklin Parkway			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	3	0	0	3	1	1	0	1	0	0	0	
4:00 PM	18	48			203	29	21		81				400
4:15 PM	28	46			182	20	13		37				326
4:30 PM	24	45			286	24	28		123				530
4:45 PM	30	48			195	25	25		47				370
5:00 PM	11	58			291	16	18		72				466
5:15 PM	14	46			174	10	13		42				299
5:30 PM	10	33			226	10	3		32				314
5:45 PM	8	45			120	9	4		31				217
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	143	369	0	0	1677	143	125	0	465	0	0	0	2922
APPROACH %'s :	27.93%	72.07%	0.00%	0.00%	92.14%	7.86%	21.19%	0.00%	78.81%	#DIV/0!	#DIV/0!	#DIV/0!	
PEAK HR START TIME :	415 PM												TOTAL
PEAK HR VOL :	93	197	0	0	954	85	84	0	279	0	0	0	1692
PEAK HR FACTOR :		0.929			0.838			0.601			0.000		0.798

CONTROL : Signalized

Appendix C
Traffic Analysis Worksheets

INTERSECTION CAPACITY UTILIZATION WORKSHEET

INTERSECTION: 1 **N / S:** Chiquito Canyon Road **E / W:** SR-126

AM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	0.0	0	2	0.000	0	0.0	0	2	0.000	0	0.0	0	2	0.000	0	0.0	0	2	0.000	0	0.0	0	2	0.000	0
NR	0.0	0	2	0.000	0	0.0	0	2	0.000	0	0.0	0	2	0.000	0	0.0	0	2	0.000	0	0.0	0	2	0.000	0
NT	1.0	1600	0	0.003	1	1.0	1600	0	0.003	1	1.0	1600	0	0.003	1	1.0	1600	0	0.003	1	1.0	1600	0	0.003	1
SL	1.0	1600	82	0.051	1	1.0	1600	87	0.054	1	1.0	1600	87	0.054	1	1.0	1600	88	0.055	1	1.0	1600	88	0.055	1
SR	1.0	1600	8	0.005	1	1.0	1600	8	0.005	1	1.0	1600	8	0.005	1	1.0	1600	8	0.005	1	1.0	1600	8	0.005	1
ST	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
EL	1.0	1600	2	0.001	1	1.0	1600	2	0.001	1	1.0	1600	2	0.001	1	1.0	1600	2	0.001	1	1.0	1600	2	0.001	1
ER	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
ET	2.0	3200	585	0.183	0	2.0	3200	617	0.193	0	2.0	3200	696	0.218	0	2.0	3200	620	0.194	0	2.0	3200	699	0.218	0
WL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WR	1.0	1600	17	0.011	0	1.0	1600	18	0.011	0	1.0	1600	18	0.011	0	1.0	1600	19	0.012	0	1.0	1600	19	0.012	0
WT	2.0	3200	740	0.231	1	2.0	3200	781	0.244	1	2.0	3200	797	0.249	1	2.0	3200	784	0.245	1	2.0	3200	800	0.250	1
N/S component					0.054	N/S component				0.057	N/S component				0.057	N/S component				0.058	N/S component				0.058
E/W component					0.233	E/W component				0.245	E/W component				0.250	E/W component				0.246	E/W component				0.251
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU	0.386				ICU	0.402				ICU	0.407				ICU	0.404				ICU	0.409
				LOS	A				LOS	A				LOS	A				LOS	A				LOS	A

PM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	0.0	0	1	0.000	0	0.0	0	1	0.000	0	0.0	0	1	0.000	0	0.0	0	1	0.000	0	0.0	0	1	0.000	0
NR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
NT	1.0	1600	0	0.001	1	1.0	1600	0	0.001	1	1.0	1600	0	0.001	1	1.0	1600	Z	0.001	1	1.0	1600	0	0.001	1
SL	1.0	1600	47	0.029	1	1.0	1600	50	0.031	1	1.0	1600	50	0.031	1	1.0	1600	51	0.032	1	1.0	1600	51	0.032	1
SR	1.0	1600	3	0.002	0	1.0	1600	3	0.002	0	1.0	1600	3	0.002	0	1.0	1600	3	0.002	0	1.0	1600	3	0.002	0
ST	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
EL	1.0	1600	14	0.009	0	1.0	1600	15	0.009	0	1.0	1600	15	0.009	0	1.0	1600	15	0.009	0	1.0	1600	15	0.009	0
ER	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
ET	2.0	3200	909	0.284	1	2.0	3200	959	0.300	1	2.0	3200	991	0.310	1	2.0	3200	962	0.301	1	2.0	3200	994	0.311	1
WL	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
WR	1.0	1600	58	0.036	0	1.0	1600	61	0.038	0	1.0	1600	61	0.038	0	1.0	1600	62	0.039	0	1.0	1600	62	0.039	0
WT	2.0	3200	780	0.244	0	2.0	3200	823	0.257	0	2.0	3200	910	0.284	0	2.0	3200	826	0.258	0	2.0	3200	913	0.285	0
N/S component					0.030	N/S component				0.032	N/S component				0.032	N/S component				0.033	N/S component				0.033
E/W component					0.284	E/W component				0.300	E/W component				0.310	E/W component				0.301	E/W component				0.311
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU	0.414				ICU	0.432				ICU	0.442				ICU	0.433				ICU	0.443
				LOS	A				LOS	A				LOS	A				LOS	A				LOS	A

Critical movement identified by a 1.

Ten lanes for a right turn indicates free movement.

INTERSECTION CAPACITY UTILIZATION WORKSHEET

INTERSECTION: 2 **N / S:** Chiquita Canyon Landfill Entrance **E / W:** SR-126

AM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0										
NR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0										
NT	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1										
SL	1.0	1600	27	0.017	1	1.0	1600	28	0.018	1	1.0	1600	28	0.018	1										
SR	1.0	1600	6	0.004	0	1.0	1600	6	0.004	0	1.0	1600	6	0.004	0										
ST	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0										
EL	1.0	1600	6	0.004	1	1.0	1600	6	0.004	1	1.0	1600	6	0.004	1										
ER	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0										
ET	2.0	3200	652	0.204	0	2.0	3200	688	0.215	0	2.0	3200	767	0.240	0										
WL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0										
WR	1.0	1600	29	0.018	0	1.0	1600	31	0.019	0	1.0	1600	31	0.019	0										
WT	2.0	3200	751	0.235	1	2.0	3200	792	0.248	1	2.0	3200	808	0.253	1										
N/S component					0.017	N/S component				0.018	N/S component				0.018										
E/W component					0.238	E/W component				0.251	E/W component				0.256										
Clearance					0.100	Clearance				0.100	Clearance				0.100										
				ICU LOS	**0.355 A**				**ICU LOS**	**0.369 A**				**ICU LOS**	**0.374 A**										

Intersection does not exist with project

Intersection does not exist with project

PM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0										
NR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0										
NT	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1										
SL	1.0	1600	36	0.023	1	1.0	1600	38	0.024	1	1.0	1600	38	0.024	1										
SR	1.0	1600	1	0.001	0	1.0	1600	1	0.001	0	1.0	1600	1	0.001	0										
ST	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0										
EL	1.0	1600	1	0.001	0	1.0	1600	1	0.001	0	1.0	1600	1	0.001	0										
ER	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0										
ET	2.0	3200	955	0.298	1	2.0	3200	1008	0.315	1	2.0	3200	1040	0.325	1										
WL	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1										
WR	1.0	1600	5	0.003	0	1.0	1600	5	0.003	0	1.0	1600	5	0.003	0										
WT	2.0	3200	836	0.261	0	2.0	3200	882	0.276	0	2.0	3200	969	0.303	0										
N/S component					0.023	N/S component				0.024	N/S component				0.024										
E/W component					0.298	E/W component				0.315	E/W component				0.325										
Clearance					0.100	Clearance				0.100	Clearance				0.100										
				ICU LOS	**0.421 A**				**ICU LOS**	**0.439 A**				**ICU LOS**	**0.449 A**										

Intersection does not exist with project

Intersection does not exist with project

Critical movement identified by a 1.

Ten lanes for a right turn indicates free movement.

INTERSECTION CAPACITY UTILIZATION WORKSHEET

INTERSECTION: 3 **N / S:** Wolcott Way **E / W:** SR-126

AM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
NR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	7	0.000	0	0.0	0	0	0.000	0	0.0	0	7	0.000	0
NT	1.0	1600	0	0.000	1	1.0	1600	0	0.000	1	1.0	1600	7	0.009	1	1.0	1600	0	0.000	1	1.0	1600	7	0.009	1
SL	1.5	2400	1	0.000	1	1.5	2400	1	0.000	1	1.5	2400	1	0.000	1	1.5	2400	99	0.041	1	1.5	2400	99	0.041	1
SR	1.0	1600	8	0.005	0	1.0	1600	8	0.005	0	1.0	1600	8	0.005	0	1.0	1600	18	0.011	0	1.0	1600	18	0.011	0
ST	0.5	800	0	0.000	0	0.5	800	0	0.000	0	0.5	800	1	0.001	0	0.5	800	0	0.000	0	0.5	800	1	0.001	0
EL	1.0	1600	25	0.016	1	1.0	1600	26	0.016	1	1.0	1600	26	0.016	1	1.0	1600	36	0.023	1	1.0	1600	36	0.023	1
ER	0.0	0	1	0.000	0	0.0	0	1	0.000	0	0.0	0	1	0.000	0	0.0	0	1	0.000	0	0.0	0	1	0.000	0
ET	2.0	3200	653	0.204	0	2.0	3200	689	0.216	0	2.0	3200	768	0.240	0	2.0	3200	662	0.207	0	2.0	3200	741	0.232	0
WL	1.0	1600	0	0.000	0	1.0	1600	0	0.000	0	1.0	1600	1	0.001	0	1.0	1600	0	0.000	0	1.0	1600	1	0.001	0
WR	1.0	1600	3	0.002	0	1.0	1600	3	0.002	0	1.0	1600	3	0.002	0	1.0	1600	103	0.064	0	1.0	1600	103	0.064	0
WT	2.0	3200	772	0.241	1	2.0	3200	814	0.254	1	2.0	3200	830	0.259	1	2.0	3200	785	0.245	1	2.0	3200	801	0.250	1
N/S component					0.000	N/S component				0.000	N/S component				0.009	N/S component				0.041	N/S component				0.050
E/W component					0.257	E/W component				0.271	E/W component				0.276	E/W component				0.268	E/W component				0.273
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU LOS	0.357 A				ICU LOS	0.371 A				ICU LOS	0.385 A				ICU LOS	0.409 A				ICU LOS	0.423 A

PM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	0.0	0	9	0.000	0	0.0	0	9	0.000	0	0.0	0	9	0.000	0	0.0	0	9	0.000	0	0.0	0	9	0.000	0
NR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	2	0.000	0	0.0	0	0	0.000	0	0.0	0	2	0.000	0
NT	1.0	1600	0	0.006	1	1.0	1600	0	0.006	1	1.0	1600	2	0.008	1	1.0	1600	0	0.006	1	1.0	1600	2	0.008	1
SL	1.5	2400	6	0.003	1	1.5	2400	6	0.003	1	1.5	2400	6	0.003	1	1.5	2400	113	0.047	1	1.5	2400	113	0.047	1
SR	1.0	1600	32	0.020	1	1.0	1600	34	0.021	1	1.0	1600	34	0.021	1	1.0	1600	39	0.024	1	1.0	1600	39	0.024	1
ST	0.5	800	0	0.000	0	0.5	800	0	0.000	0	0.5	800	6	0.008	0	0.5	800	0	0.000	0	0.5	800	6	0.008	0
EL	1.0	1600	9	0.006	0	1.0	1600	9	0.006	0	1.0	1600	9	0.006	0	1.0	1600	14	0.009	0	1.0	1600	14	0.009	0
ER	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
ET	2.0	3200	982	0.307	1	2.0	3200	1036	0.324	1	2.0	3200	1068	0.334	1	2.0	3200	1000	0.313	1	2.0	3200	1032	0.323	1
WL	1.0	1600	0	0.000	1	1.0	1600	0	0.000	1	1.0	1600	6	0.004	1	1.0	1600	0	0.000	1	1.0	1600	6	0.004	1
WR	1.0	1600	1	0.001	0	1.0	1600	1	0.001	0	1.0	1600	1	0.001	0	1.0	1600	77	0.048	0	1.0	1600	77	0.048	0
WT	2.0	3200	799	0.250	0	2.0	3200	843	0.263	0	2.0	3200	930	0.291	0	2.0	3200	838	0.262	0	2.0	3200	925	0.289	0
N/S component					0.008	N/S component				0.008	N/S component				0.011	N/S component				0.053	N/S component				0.055
E/W component					0.307	E/W component				0.324	E/W component				0.338	E/W component				0.313	E/W component				0.326
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU LOS	0.415 A				ICU LOS	0.432 A				ICU LOS	0.448 A				ICU LOS	0.465 A				ICU LOS	0.481 A

Critical movement identified by a 1.

Ten lanes for a right turn indicates free movement.

INTERSECTION CAPACITY UTILIZATION WORKSHEET

INTERSECTION: 4 **N / S:** Commerce Center Drive **E / W:** SR-126

AM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	1.0	1600	44	0.028	0	0.0	0	46	0.000	0	0.0	0	46	0.000	0	0.0	0	46	0.000	0	0.0	0	46	0.000	0
NR	1.0	1600	8	0.005	0	0.0	0	8	0.000	0	0.0	0	8	0.000	0	0.0	0	8	0.000	0	0.0	0	8	0.000	0
NT	1.0	1600	72	0.045	1	1.0	1600	76	0.081	1	1.0	1600	166	0.138	1	1.0	1600	76	0.081	1	1.0	1600	166	0.138	1
SL	2.0	2880	238	0.083	1	2.0	2880	251	0.087	1	2.0	2880	290	0.101	1	2.0	2880	251	0.087	1	2.0	2880	290	0.101	1
SR	1.0	1600	31	0.019	0	1.0	1600	33	0.021	0	1.0	1600	48	0.030	0	1.0	1600	33	0.021	0	1.0	1600	48	0.030	0
ST	1.0	1600	30	0.019	0	1.0	1600	32	0.020	0	1.0	1600	53	0.033	0	1.0	1600	32	0.020	0	1.0	1600	53	0.033	0
EL	1.0	1600	65	0.041	1	1.0	1600	69	0.043	1	1.0	1600	150	0.094	1	1.0	1600	69	0.043	1	1.0	1600	150	0.094	1
ER	0.0	0	28	0.000	0	0.0	0	30	0.000	0	0.0	0	30	0.000	0	0.0	0	30	0.000	0	0.0	0	30	0.000	0
ET	2.0	3200	543	0.178	0	2.0	3200	573	0.188	0	2.0	3200	578	0.190	0	2.0	3200	644	0.211	0	2.0	3200	649	0.212	0
WL	1.0	1600	8	0.005	0	1.0	1600	8	0.005	0	1.0	1600	8	0.005	0	1.0	1600	8	0.005	0	1.0	1600	8	0.005	0
WR	1.0	1600	1210	0.756	1	1.0	1600	1277	0.798	1	1.0	1600	1492	0.933	1	1.0	1600	1277	0.798	1	1.0	1600	1492	0.933	1
WT	2.0	3200	711	0.222	1	2.0	3200	750	0.234	1	2.0	3200	753	0.235	1	2.0	3200	821	0.257	1	2.0	3200	824	0.258	1
N/S component					0.128	N/S component				0.168	N/S component				0.238	N/S component				0.168	N/S component				0.238
E/W component					0.263	E/W component				0.278	E/W component				0.329	E/W component				0.300	E/W component				0.351
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU	0.490				ICU	0.546				ICU	0.667				ICU	0.568				ICU	0.689
				LOS	A				LOS	A				LOS	B				LOS	A				LOS	B

PM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	1.0	1600	64	0.040	0	0.0	0	68	0.000	0	0.0	0	68	0.000	0	0.0	0	68	0.000	0	0.0	0	68	0.000	0
NR	1.0	1600	22	0.014	0	0.0	0	23	0.000	0	0.0	0	23	0.000	0	0.0	0	23	0.000	0	0.0	0	23	0.000	0
NT	1.0	1600	34	0.021	1	1.0	1600	36	0.079	1	1.0	1600	71	0.101	1	1.0	1600	36	0.079	1	1.0	1600	71	0.101	1
SL	2.0	2880	986	0.342	1	2.0	2880	1040	0.361	1	2.0	2880	1243	0.432	1	2.0	2880	1040	0.361	1	2.0	2880	1243	0.432	1
SR	1.0	1600	55	0.034	0	1.0	1600	58	0.036	0	1.0	1600	134	0.084	0	1.0	1600	58	0.036	0	1.0	1600	134	0.084	0
ST	1.0	1600	195	0.122	0	1.0	1600	206	0.129	0	1.0	1600	302	0.189	0	1.0	1600	206	0.129	0	1.0	1600	302	0.189	0
EL	1.0	1600	31	0.019	0	1.0	1600	33	0.021	0	1.0	1600	52	0.033	0	1.0	1600	33	0.021	0	1.0	1600	52	0.033	0
ER	0.0	0	35	0.000	0	0.0	0	37	0.000	0	0.0	0	37	0.000	0	0.0	0	37	0.000	0	0.0	0	37	0.000	0
ET	2.0	3200	884	0.287	1	2.0	3200	933	0.303	1	2.0	3200	948	0.308	1	2.0	3200	1004	0.325	1	2.0	3200	1019	0.330	1
WL	1.0	1600	13	0.008	1	1.0	1600	14	0.009	1	1.0	1600	14	0.009	1	1.0	1600	14	0.009	1	1.0	1600	14	0.009	1
WR	1.0	1600	221	0.138	0	1.0	1600	233	0.146	0	1.0	1600	284	0.178	0	1.0	1600	233	0.146	0	1.0	1600	284	0.178	0
WT	2.0	3200	681	0.213	0	2.0	3200	718	0.224	0	2.0	3200	735	0.230	0	2.0	3200	789	0.247	0	2.0	3200	806	0.252	0
N/S component					0.364	N/S component				0.440	N/S component				0.533	N/S component				0.440	N/S component				0.533
E/W component					0.295	E/W component				0.312	E/W component				0.317	E/W component				0.334	E/W component				0.339
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU	0.759				ICU	0.852				ICU	0.949				ICU	0.875				ICU	0.972
				LOS	C				LOS	D				LOS	E				LOS	D				LOS	E

Critical movement identified by a 1.

Ten lanes for a right turn indicates free movement.

INTERSECTION CAPACITY UTILIZATION WORKSHEET

INTERSECTION: 5 **N / S:** I-5 SB Ramps **E / W:** SR-126

AM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
NR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
NT	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
SL	2.0	2880	783	0.272	1	2.0	2880	826	0.287	1	2.0	2880	836	0.290	1	2.0	2880	826	0.287	1	2.0	2880	836	0.290	1
SR	2.0	3200	160	0.050	1	2.0	3200	169	0.053	1	2.0	3200	169	0.053	1	2.0	3200	171	0.053	1	2.0	3200	171	0.053	1
ST	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
EL	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
ER	10.0	16000	475	0.030	0	10.0	16000	501	0.031	0	10.0	16000	523	0.033	0	10.0	16000	565	0.035	0	10.0	16000	587	0.037	0
ET	4.0	6400	357	0.056	0	4.0	6400	377	0.059	0	4.0	6400	402	0.063	0	4.0	6400	384	0.060	0	4.0	6400	409	0.064	0
WL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WR	10.0	16000	319	0.020	0	10.0	16000	337	0.021	0	10.0	16000	337	0.021	0	10.0	16000	337	0.021	0	10.0	16000	337	0.021	0
WT	3.0	4800	1758	0.366	1	3.0	4800	1855	0.386	1	3.0	4800	2081	0.434	1	3.0	4800	1924	0.401	1	3.0	4800	2150	0.448	1
N/S component					0.272	N/S component				0.287	N/S component				0.290	N/S component				0.287	N/S component				0.290
E/W component					0.366	E/W component				0.386	E/W component				0.434	E/W component				0.401	E/W component				0.448
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU LOS	0.738 C				ICU LOS	0.773 C				ICU LOS	0.824 D				ICU LOS	0.788 C				ICU LOS	0.838 D

PM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
NR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
NT	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
SL	2.0	2880	685	0.238	1	2.0	2880	723	0.251	1	2.0	2880	774	0.269	1	2.0	2880	723	0.251	1	2.0	2880	774	0.269	1
SR	2.0	3200	145	0.045	1	2.0	3200	153	0.048	1	2.0	3200	153	0.048	1	2.0	3200	155	0.048	1	2.0	3200	155	0.048	1
ST	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
EL	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	0	0.0	0	0	0.000	1	0.0	0	0	0.000	1
ER	10.0	16000	1145	0.072	0	10.0	16000	1208	0.076	0	10.0	16000	1322	0.083	0	10.0	16000	1273	0.080	0	10.0	16000	1387	0.087	0
ET	4.0	6400	996	0.156	0	4.0	6400	1051	0.164	0	4.0	6400	1176	0.184	1	4.0	6400	1058	0.165	0	4.0	6400	1183	0.185	0
WL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	1	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WR	10.0	16000	602	0.038	0	10.0	16000	635	0.040	0	10.0	16000	635	0.040	0	10.0	16000	635	0.040	0	10.0	16000	635	0.040	0
WT	3.0	4800	753	0.157	1	3.0	4800	794	0.165	1	3.0	4800	878	0.183	0	3.0	4800	864	0.180	1	3.0	4800	948	0.198	1
N/S component					0.238	N/S component				0.251	N/S component				0.269	N/S component				0.251	N/S component				0.269
E/W component					0.157	E/W component				0.165	E/W component				0.184	E/W component				0.180	E/W component				0.198
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU LOS	0.495 A				ICU LOS	0.516 A				ICU LOS	0.553 A				ICU LOS	0.531 A				ICU LOS	0.566 A

Critical movement identified by a 1.

Ten lanes for a right turn indicates free movement.

INTERSECTION CAPACITY UTILIZATION WORKSHEET

INTERSECTION: 6 **N / S:** I-5 NB Ramps **E / W:** SR-126

AM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	3.0	4800	960	0.200	1	3.0	4800	1013	0.211	1	3.0	4800	1145	0.239	1	3.0	4800	1077	0.224	1	3.0	4800	1209	0.252	1
NR	1.0	1600	661	0.413	1	1.0	1600	697	0.436	1	1.0	1600	697	0.436	1	1.0	1600	697	0.436	1	1.0	1600	697	0.436	1
NT	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
SL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
SR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
ST	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
EL	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
ER	10.0	16000	83	0.005	0	10.0	16000	88	0.006	0	10.0	16000	96	0.006	0	10.0	16000	90	0.006	0	10.0	16000	98	0.006	0
ET	4.0	6400	1057	0.165	0	4.0	6400	1115	0.174	0	4.0	6400	1142	0.178	0	4.0	6400	1120	0.175	0	4.0	6400	1147	0.179	0
WL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WR	10.0	16000	626	0.039	0	10.0	16000	660	0.041	0	10.0	16000	714	0.045	0	10.0	16000	660	0.041	0	10.0	16000	714	0.045	0
WT	3.0	4800	1115	0.232	1	3.0	4800	1176	0.245	1	3.0	4800	1270	0.265	1	3.0	4800	1181	0.246	1	3.0	4800	1275	0.266	1
N/S component					0.200	N/S component				0.211	N/S component				0.239	N/S component				0.224	N/S component				0.252
E/W component					0.232	E/W component				0.245	E/W component				0.265	E/W component				0.246	E/W component				0.266
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU LOS	0.532 A				ICU LOS	0.556 A				ICU LOS	0.603 A				ICU LOS	0.570 A				ICU LOS	0.618 B

PM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	3.0	4800	443	0.092	1	3.0	4800	467	0.097	1	3.0	4800	529	0.110	1	3.0	4800	532	0.111	1	3.0	4800	594	0.124	1
NR	1.0	1600	595	0.372	1	1.0	1600	628	0.393	1	1.0	1600	628	0.393	1	1.0	1600	628	0.393	1	1.0	1600	628	0.393	1
NT	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
SL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
SR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
ST	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
EL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
ER	10.0	16000	199	0.012	0	10.0	16000	210	0.013	0	10.0	16000	246	0.015	0	10.0	16000	212	0.013	0	10.0	16000	248	0.016	0
ET	4.0	6400	1492	0.233	1	4.0	6400	1574	0.246	1	4.0	6400	1714	0.268	1	4.0	6400	1579	0.247	1	4.0	6400	1719	0.269	1
WL	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
WR	10.0	16000	829	0.052	0	10.0	16000	875	0.055	0	10.0	16000	888	0.056	0	10.0	16000	875	0.055	0	10.0	16000	888	0.056	0
WT	3.0	4800	920	0.192	0	3.0	4800	971	0.202	0	3.0	4800	993	0.207	0	3.0	4800	976	0.203	0	3.0	4800	998	0.208	0
N/S component					0.092	N/S component				0.097	N/S component				0.110	N/S component				0.111	N/S component				0.124
E/W component					0.233	E/W component				0.246	E/W component				0.268	E/W component				0.247	E/W component				0.269
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU LOS	0.425 A				ICU LOS	0.443 A				ICU LOS	0.478 A				ICU LOS	0.458 A				ICU LOS	0.492 A

Critical movement identified by a 1.

Ten lanes for a right turn indicates free movement.

INTERSECTION CAPACITY UTILIZATION WORKSHEET

INTERSECTION: 7 **N / S:** Commerce Center Drive **E / W:** Franklin Parkway

AM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	1.0	1600	306	0.191	1	1.0	1600	323	0.202	1	1.0	1600	324	0.203	0	1.0	1600	323	0.202	1	1.0	1600	324	0.203	0
NR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
NT	3.0	4800	1040	0.217	0	3.0	4800	1097	0.229	0	3.0	4800	1482	0.309	1	3.0	4800	1097	0.229	0	3.0	4800	1482	0.309	1
SL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	1	0.0	0	0	0.000	0	0.0	0	0	0.000	1
SR	1.0	1600	28	0.018	0	1.0	1600	30	0.019	0	1.0	1600	31	0.019	0	1.0	1600	31	0.019	0	1.0	1600	32	0.020	0
ST	3.0	4800	270	0.056	1	3.0	4800	285	0.059	1	3.0	4800	359	0.075	0	3.0	4800	285	0.059	1	3.0	4800	359	0.075	0
EL	1.0	1600	33	0.021	1	1.0	1600	35	0.022	1	1.0	1600	42	0.026	1	1.0	1600	36	0.023	1	1.0	1600	43	0.027	1
ER	1.0	1600	44	0.028	0	1.0	1600	46	0.029	0	1.0	1600	47	0.029	0	1.0	1600	46	0.029	0	1.0	1600	47	0.029	0
ET	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WT	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
N/S component					0.248	N/S component				0.261	N/S component				0.309	N/S component				0.261	N/S component				0.309
E/W component					0.021	E/W component				0.022	E/W component				0.026	E/W component				0.023	E/W component				0.027
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU	0.368				ICU	0.383				ICU	0.435				ICU	0.384				ICU	0.436
				LOS	A				LOS	A				LOS	A				LOS	A				LOS	A

PM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL	1.0	1600	93	0.058	1	1.0	1600	98	0.061	1	1.0	1600	100	0.063	1	1.0	1600	98	0.061	1	1.0	1600	100	0.063	1
NR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
NT	3.0	4800	197	0.041	0	3.0	4800	208	0.043	0	3.0	4800	311	0.065	0	3.0	4800	208	0.043	0	3.0	4800	311	0.065	0
SL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
SR	1.0	1600	85	0.053	0	1.0	1600	90	0.056	0	1.0	1600	96	0.060	0	1.0	1600	91	0.057	0	1.0	1600	97	0.061	0
ST	3.0	4800	954	0.199	1	3.0	4800	1006	0.210	1	3.0	4800	1379	0.287	1	3.0	4800	1006	0.210	1	3.0	4800	1379	0.287	1
EL	1.0	1600	84	0.053	1	1.0	1600	89	0.056	1	1.0	1600	91	0.057	1	1.0	1600	90	0.056	1	1.0	1600	92	0.058	1
ER	1.0	1600	279	0.174	1	1.0	1600	294	0.184	1	1.0	1600	296	0.185	1	1.0	1600	294	0.184	1	1.0	1600	296	0.185	1
ET	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WL	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WR	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0	0.0	0	0	0.000	0
WT	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1	0.0	0	0	0.000	1
N/S component					0.257	N/S component				0.271	N/S component				0.350	N/S component				0.271	N/S component				0.350
E/W component					0.053	E/W component				0.056	E/W component				0.057	E/W component				0.056	E/W component				0.058
Clearance					0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100	Clearance				0.100
				ICU	0.409				ICU	0.426				ICU	0.507				ICU	0.427				ICU	0.507
				LOS	A				LOS	A				LOS	A				LOS	A				LOS	A

Critical movement identified by a 1.

Ten lanes for a right turn indicates free movement.

INTERSECTION CAPACITY UTILIZATION WORKSHEET

INTERSECTION: 8 **N / S:** Wolcott Way **E / W:** Franklin Parkway

AM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL																2.0	2880	110	0.038	1	2.0	2880	110	0.038	1
NR																1.0	1600	29	0.018	1	1.0	1600	36	0.023	1
NT																0.0	0	0	0.000	0	0.0	0	0	0.000	0
SL																0.0	0	0	0.000	0	0.0	0	0	0.000	0
SR																0.0	0	0	0.000	0	0.0	0	0	0.000	0
ST																0.0	0	0	0.000	1	0.0	0	0	0.000	1
EL																0.0	0	0	0.000	0	0.0	0	0	0.000	0
ER																0.0	0	108	0.000	0	0.0	0	108	0.000	0
ET	Intersection does not exist without project					Intersection does not exist without project					Intersection does not exist without project					1.0	1600	1	0.068	1	1.0	1600	1	0.068	1
WL																0.0	0	9	0.000	1	0.0	0	10	0.000	1
WR																0.0	0	0	0.000	0	0.0	0	0	0.000	0
WT																1.0	1600	1	0.006	0	1.0	1600	1	0.007	0
																		N/S component		0.038			N/S component		0.038
																		E/W component		0.068			E/W component		0.068
																		Clearance		0.100			Clearance		0.100
																			ICU LOS	0.206 A				ICU LOS	0.206 A

PM PEAK HOUR

Move-ment	Existing Conditions					Existing plus Growth Conditions					Existing plus Growth plus Other Dev. Conditions					Existing plus Growth plus Project Conditions					Existing plus Growth plus Other Dev. plus Proj. Conditions				
	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.	No. Lanes	Cap.	Volume	V/C	Crit. Mvmt.
NL																2.0	2880	81	0.028	1	2.0	2880	81	0.028	1
NR																1.0	1600	10	0.006	1	1.0	1600	12	0.008	1
NT																0.0	0	0	0.000	0	0.0	0	0	0.000	0
SL																0.0	0	0	0.000	0	0.0	0	0	0.000	0
SR																0.0	0	0	0.000	0	0.0	0	0	0.000	0
ST																0.0	0	0	0.000	1	0.0	0	0	0.000	1
EL																0.0	0	0	0.000	0	0.0	0	0	0.000	0
ER																0.0	0	112	0.000	0	0.0	0	112	0.000	0
ET	Intersection does not exist without project					Intersection does not exist without project					Intersection does not exist without project					1.0	1600	1	0.071	1	1.0	1600	1	0.071	1
WL																0.0	0	39	0.000	1	0.0	0	46	0.000	1
WR																0.0	0	0	0.000	0	0.0	0	0	0.000	0
WT																1.0	1600	1	0.025	0	1.0	1600	1	0.029	0
																		N/S component		0.028			N/S component		0.028
																		E/W component		0.071			E/W component		0.071
																		Clearance		0.100			Clearance		0.100
																			ICU LOS	0.199 A				ICU LOS	0.199 A

Critical movement identified by a 1.

Ten lanes for a right turn indicates free movement.

Existing Conditions

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	2	585	0	0	740	17	2	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	2	585	0	0	740	17	2	0	2

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	740	0	0	585	0	0	959	1329	293
Stage 1	-	-	-	-	-	-	589	589	-
Stage 2	-	-	-	-	-	-	370	740	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	812	-	-	933	-	-	200	144	680
Stage 1	-	-	-	-	-	-	442	474	-
Stage 2	-	-	-	-	-	-	601	403	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	812	-	-	933	-	-	197	144	680
Mov Cap-2 Maneuver	-	-	-	-	-	-	197	144	-
Stage 1	-	-	-	-	-	-	441	473	-
Stage 2	-	-	-	-	-	-	593	403	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	17
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	305	812	-	-	933	-	-	174	605
HCM Lane V/C Ratio	0.013	0.002	-	-	-	-	-	0.471	0.013
HCM Control Delay (s)	17	9.4	-	-	0	-	-	42.9	11
HCM Lane LOS	C	A	-	-	A	-	-	E	B
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	2.2	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	82	0	8
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	82	0	8

Major/Minor	Minor2		
Conflicting Flow All	1037	1329	370
Stage 1	740	740	-
Stage 2	297	589	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	175	144	605
Stage 1	357	403	-
Stage 2	665	474	-
Platoon blocked, %			
Mov Cap-1 Maneuver	174	144	605
Mov Cap-2 Maneuver	174	144	-
Stage 1	356	403	-
Stage 2	661	473	-

Approach	SB
HCM Control Delay, s	40.1
HCM LOS	E

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	6	652	751	29	27	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	200	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	6	652	751	29	27	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	751	0	-	0	1089	376
Stage 1	-	-	-	-	751	-
Stage 2	-	-	-	-	338	-
Critical Hdwy	4.3	-	-	-	7	7.1
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	2.3	-	-	-	3.6	3.4
Pot Cap-1 Maneuver	804	-	-	-	198	599
Stage 1	-	-	-	-	407	-
Stage 2	-	-	-	-	671	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	804	-	-	-	197	599
Mov Cap-2 Maneuver	-	-	-	-	197	-
Stage 1	-	-	-	-	407	-
Stage 2	-	-	-	-	666	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	23.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	804	-	-	-	197	599
HCM Lane V/C Ratio	0.007	-	-	-	0.137	0.01
HCM Control Delay (s)	9.5	-	-	-	26.2	11.1
HCM Lane LOS	A	-	-	-	D	B
HCM 95th %tile Q(veh)	0	-	-	-	0.5	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	25	653	1	0	772	3	0	0	0	1	0	8
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	25	653	1	0	772	3	0	0	0	1	0	8
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	2	0	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	33	1307	2	3	973	414	0	3	0	1016	0	453
Arrive On Green	0.02	0.45	0.45	0.00	0.33	0.33	0.00	0.00	0.00	0.37	0.00	0.37
Sat Flow, veh/h	1385	2904	4	1385	2909	1236	0	1455	0	2771	0	1236
Grp Volume(v), veh/h	25	327	327	0	772	3	0	0	0	1	0	8
Grp Sat Flow(s),veh/h/ln	1385	1455	1454	1385	1455	1236	0	1455	0	1385	0	1236
Q Serve(g_s), s	0.8	7.0	7.0	0.0	10.5	0.1	0.0	0.0	0.0	0.0	0.0	0.2
Cycle Q Clear(g_c), s	0.8	7.0	7.0	0.0	10.5	0.1	0.0	0.0	0.0	0.0	0.0	0.2
Prop In Lane	1.00		0.00	1.00		1.00	0.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	33	655	654	3	973	414	0	3	0	1016	0	453
V/C Ratio(X)	0.75	0.50	0.50	0.00	0.79	0.01	0.00	0.00	0.00	0.00	0.00	0.02
Avail Cap(c_a), veh/h	127	655	654	127	1200	510	0	533	0	1016	0	453
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.2	8.5	8.5	0.0	13.2	9.7	0.0	0.0	0.0	8.8	0.0	8.8
Incr Delay (d2), s/veh	28.5	0.6	0.6	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	2.8	2.8	0.0	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.1
LnGrp Delay(d),s/veh	49.6	9.1	9.1	0.0	16.2	9.7	0.0	0.0	0.0	8.8	0.0	8.9
LnGrp LOS	D	A	A		B	A				A		A
Approach Vol, veh/h		679			775			0			9	
Approach Delay, s/veh		10.6			16.2			0.0			8.9	
Approach LOS		B			B						A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		0.0	0.0	23.6		20.0	5.0	18.6
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	4.0	18.0
Max Q Clear Time (g_c+I1), s		0.0	0.0	9.0		2.2	2.8	12.5
Green Ext Time (p_c), s		0.0	0.0	5.1		0.0	0.0	2.1

Intersection Summary	
HCM 2010 Ctrl Delay	13.5
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	65	543	28	8	711	1210	44	72	8	238	30	31
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	65	543	28	8	711	0	44	72	8	238	30	31
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	76	1082	56	11	1011	0	104	170	19	486	284	241
Arrive On Green	0.05	0.39	0.39	0.01	0.35	0.00	0.21	0.21	0.21	0.20	0.20	0.20
Sat Flow, veh/h	1385	2743	141	1385	2909	0	502	821	91	2494	1455	1236
Grp Volume(v), veh/h	65	288	283	8	711	0	124	0	0	238	30	31
Grp Sat Flow(s),veh/h/ln	1385	1455	1430	1385	1455	0	1413	0	0	1247	1455	1236
Q Serve(g_s), s	3.8	12.2	12.3	0.5	17.3	0.0	6.3	0.0	0.0	7.0	1.4	1.7
Cycle Q Clear(g_c), s	3.8	12.2	12.3	0.5	17.3	0.0	6.3	0.0	0.0	7.0	1.4	1.7
Prop In Lane	1.00		0.10	1.00		0.00	0.35		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	76	574	564	11	1011	0	293	0	0	486	284	241
V/C Ratio(X)	0.85	0.50	0.50	0.71	0.70	0.00	0.42	0.00	0.00	0.49	0.11	0.13
Avail Cap(c_a), veh/h	118	1720	1691	68	3334	0	293	0	0	486	284	241
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.4	18.7	18.8	40.6	23.1	0.0	28.2	0.0	0.0	29.4	27.1	27.2
Incr Delay (d2), s/veh	28.5	0.7	0.7	58.5	0.9	0.0	4.4	0.0	0.0	3.5	0.7	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	5.0	4.9	0.4	7.0	0.0	2.8	0.0	0.0	2.6	0.6	0.7
LnGrp Delay(d),s/veh	67.0	19.4	19.5	99.1	24.0	0.0	32.7	0.0	0.0	32.9	27.9	28.3
LnGrp LOS	E	B	B	F	C		C			C	C	C
Approach Vol, veh/h		636			719			124			299	
Approach Delay, s/veh		24.3			24.8			32.7			31.9	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	4.7	36.3		20.0	8.5	32.5
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	97.0		16.0	7.0	94.0
Max Q Clear Time (g_c+I1), s		8.3	2.5	14.3		9.0	5.8	19.3
Green Ext Time (p_c), s		0.3	0.0	9.2		0.6	0.0	9.2

Intersection Summary	
HCM 2010 Ctrl Delay	26.4
HCM 2010 LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	357	1758	0	783	160
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	357	1758	0	783	160
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	3121	2341	0	888	793
Arrive On Green	0.00	0.54	0.54	0.00	0.36	0.36
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	357	1758	0	783	160
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	2.3	23.3	0.0	22.0	3.7
Cycle Q Clear(g_c), s	0.0	2.3	23.3	0.0	22.0	3.7
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	3121	2341	0	888	793
V/C Ratio(X)	0.00	0.11	0.75	0.00	0.88	0.20
Avail Cap(c_a), veh/h	0	3121	2341	0	1070	955
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	8.5	13.4	0.0	22.5	16.6
Incr Delay (d2), s/veh	0.0	0.1	2.3	0.0	7.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.9	9.8	0.0	8.4	1.1
LnGrp Delay(d),s/veh	0.0	8.6	15.7	0.0	30.2	16.8
LnGrp LOS		A	B		C	B
Approach Vol, veh/h		357	1758		943	
Approach Delay, s/veh		8.6	15.7		27.9	
Approach LOS		A	B		C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				49.4		30.6		49.4
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				40.0		32.0		40.0
Max Q Clear Time (g_c+I1), s				4.3		24.0		25.3
Green Ext Time (p_c), s				19.4		2.6		10.7

Intersection Summary	
HCM 2010 Ctrl Delay	18.6
HCM 2010 LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1057	0	0	1115	960	661
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1057	0	0	1115	960	661
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1745	0	0	1309	2244	742
Arrive On Green	0.30	0.00	0.00	0.30	0.60	0.60
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1057	0	0	1115	960	661
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	12.4	0.0	0.0	19.2	11.0	36.8
Cycle Q Clear(g_c), s	12.4	0.0	0.0	19.2	11.0	36.8
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1745	0	0	1309	2244	742
V/C Ratio(X)	0.61	0.00	0.00	0.85	0.43	0.89
Avail Cap(c_a), veh/h	1745	0	0	1309	2244	742
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.0	0.0	0.0	26.3	8.6	13.8
Incr Delay (d2), s/veh	1.6	0.0	0.0	7.1	0.6	15.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.2	0.0	0.0	8.5	3.9	15.4
LnGrp Delay(d),s/veh	25.5	0.0	0.0	33.5	9.2	28.9
LnGrp LOS	C			C	A	C
Approach Vol, veh/h	1057			1115	1621	
Approach Delay, s/veh	25.5			33.5	17.2	
Approach LOS	C			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		52.0		28.0				28.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		48.0		24.0				24.0
Max Q Clear Time (g_c+I1), s		38.8		14.4				21.2
Green Ext Time (p_c), s		4.8		7.5				2.4

Intersection Summary	
HCM 2010 Ctrl Delay	24.3
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	33	44	306	1040	270	28
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	33	44	306	1040	270	28
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	75	67	355	3377	1882	533
Arrive On Green	0.05	0.05	0.26	0.77	0.43	0.43
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	33	44	306	1040	270	28
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	1.1	1.6	9.8	3.3	1.7	0.6
Cycle Q Clear(g_c), s	1.1	1.6	9.8	3.3	1.7	0.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	75	67	355	3377	1882	533
V/C Ratio(X)	0.44	0.66	0.86	0.31	0.14	0.05
Avail Cap(c_a), veh/h	476	425	476	3377	1882	533
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.3	21.6	16.5	1.6	8.0	7.7
Incr Delay (d2), s/veh	4.0	10.4	11.6	0.2	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	1.3	4.9	1.3	0.7	0.2
LnGrp Delay(d),s/veh	25.3	32.0	28.1	1.8	8.2	7.9
LnGrp LOS	C	C	C	A	A	A
Approach Vol, veh/h	77			1346	298	
Approach Delay, s/veh	29.1			7.8	8.2	
Approach LOS	C			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		6.5	15.9	24.1		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	16.0	16.0		
Max Q Clear Time (g_c+I1), s		5.3		3.6	11.8	3.7		
Green Ext Time (p_c), s		10.3		0.1	0.4	6.5		

Intersection Summary	
HCM 2010 Ctrl Delay	8.8
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	14	909	0	0	780	58	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	14	909	0	0	780	58	1	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	780	0	0	909	0	0	1327	1717	455
Stage 1	-	-	-	-	-	-	937	937	-
Stage 2	-	-	-	-	-	-	390	780	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	783	-	-	697	-	-	106	82	531
Stage 1	-	-	-	-	-	-	269	324	-
Stage 2	-	-	-	-	-	-	584	385	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	783	-	-	697	-	-	104	81	531
Mov Cap-2 Maneuver	-	-	-	-	-	-	104	81	-
Stage 1	-	-	-	-	-	-	264	318	-
Stage 2	-	-	-	-	-	-	581	385	-

Approach	EB	WB	NB
HCM Control Delay, s	0.1	0	40
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	104	783	-	-	697	-	-	116	587
HCM Lane V/C Ratio	0.01	0.018	-	-	-	-	-	0.405	0.005
HCM Control Delay (s)	40	9.7	-	-	0	-	-	55.7	11.2
HCM Lane LOS	E	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	1.7	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	47	0	3
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	47	0	3

Major/Minor	Minor2		
Conflicting Flow All	1263	1717	390
Stage 1	780	780	-
Stage 2	483	937	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	118	82	587
Stage 1	337	385	-
Stage 2	513	324	-
Platoon blocked, %			
Mov Cap-1 Maneuver	116	81	587
Mov Cap-2 Maneuver	116	81	-
Stage 1	331	385	-
Stage 2	504	318	-

Approach	SB
HCM Control Delay, s	53
HCM LOS	F

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	955	836	5	36	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	200	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	1	955	836	5	36	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	836	0	-	0	1316	418
Stage 1	-	-	-	-	836	-
Stage 2	-	-	-	-	480	-
Critical Hdwy	4.3	-	-	-	7	7.1
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	2.3	-	-	-	3.6	3.4
Pot Cap-1 Maneuver	744	-	-	-	139	562
Stage 1	-	-	-	-	366	-
Stage 2	-	-	-	-	566	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	744	-	-	-	139	562
Mov Cap-2 Maneuver	-	-	-	-	139	-
Stage 1	-	-	-	-	366	-
Stage 2	-	-	-	-	565	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	38.9
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	744	-	-	-	139	562
HCM Lane V/C Ratio	0.001	-	-	-	0.259	0.002
HCM Control Delay (s)	9.8	-	-	-	39.7	11.4
HCM Lane LOS	A	-	-	-	E	B
HCM 95th %tile Q(veh)	0	-	-	-	1	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	982	0	0	799	1	9	0	0	6	0	32
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	9	982	0	0	799	1	9	0	0	6	0	32
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	2	0	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	13	1159	0	2	974	414	303	0	0	606	0	270
Arrive On Green	0.01	0.40	0.00	0.00	0.33	0.33	0.22	0.00	0.00	0.22	0.00	0.22
Sat Flow, veh/h	1385	2909	0	1385	2909	1236	1385	0	0	2771	0	1236
Grp Volume(v), veh/h	9	982	0	0	799	1	9	0	0	6	0	32
Grp Sat Flow(s),veh/h/ln	1385	1455	0	1385	1455	1236	1385	0	0	1385	0	1236
Q Serve(g_s), s	0.5	22.4	0.0	0.0	18.4	0.0	0.4	0.0	0.0	0.1	0.0	1.5
Cycle Q Clear(g_c), s	0.5	22.4	0.0	0.0	18.4	0.0	0.4	0.0	0.0	0.1	0.0	1.5
Prop In Lane	1.00		0.00	1.00		1.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	13	1159	0	2	974	414	303	0	0	606	0	270
V/C Ratio(X)	0.71	0.85	0.00	0.00	0.82	0.00	0.03	0.00	0.00	0.01	0.00	0.12
Avail Cap(c_a), veh/h	76	1159	0	76	1114	473	303	0	0	606	0	270
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.1	20.0	0.0	0.0	22.3	16.2	22.5	0.0	0.0	22.4	0.0	22.9
Incr Delay (d2), s/veh	53.5	6.0	0.0	0.0	4.5	0.0	0.2	0.0	0.0	0.0	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	9.8	0.0	0.0	7.9	0.0	0.2	0.0	0.0	0.1	0.0	0.6
LnGrp Delay(d),s/veh	89.7	26.0	0.0	0.0	26.8	16.2	22.7	0.0	0.0	22.4	0.0	23.8
LnGrp LOS	F	C			C	B	C			C		C
Approach Vol, veh/h		991			800			9			38	
Approach Delay, s/veh		26.6			26.8			22.7			23.6	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	0.0	33.2		20.0	4.7	28.5
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	28.0		16.0	4.0	28.0
Max Q Clear Time (g_c+I1), s		2.4	0.0	24.4		3.5	2.5	20.4
Green Ext Time (p_c), s		0.0	0.0	2.8		0.0	0.0	4.1

Intersection Summary	
HCM 2010 Ctrl Delay	26.6
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	31	884	35	13	681	221	64	34	22	986	195	55
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	31	884	35	13	681	0	64	34	22	986	195	55
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	35	852	34	16	854	0	112	60	39	977	570	485
Arrive On Green	0.03	0.31	0.31	0.01	0.29	0.00	0.15	0.15	0.15	0.39	0.39	0.39
Sat Flow, veh/h	1385	2780	110	1385	2909	0	733	389	252	2494	1455	1236
Grp Volume(v), veh/h	31	463	456	13	681	0	120	0	0	986	195	55
Grp Sat Flow(s),veh/h/ln	1385	1455	1435	1385	1455	0	1373	0	0	1247	1455	1236
Q Serve(g_s), s	2.6	36.0	36.0	1.1	25.3	0.0	9.5	0.0	0.0	46.0	11.1	3.3
Cycle Q Clear(g_c), s	2.6	36.0	36.0	1.1	25.3	0.0	9.5	0.0	0.0	46.0	11.1	3.3
Prop In Lane	1.00		0.08	1.00		0.00	0.53		0.18	1.00		1.00
Lane Grp Cap(c), veh/h	35	446	440	16	854	0	211	0	0	977	570	485
V/C Ratio(X)	0.89	1.04	1.04	0.80	0.80	0.00	0.57	0.00	0.00	1.01	0.34	0.11
Avail Cap(c_a), veh/h	47	446	440	47	892	0	211	0	0	977	570	485
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.1	40.7	40.7	57.9	38.3	0.0	46.1	0.0	0.0	35.7	25.1	22.7
Incr Delay (d2), s/veh	77.2	52.5	52.8	57.5	5.0	0.0	10.7	0.0	0.0	31.0	1.6	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	20.9	20.6	0.7	10.8	0.0	4.2	0.0	0.0	20.0	4.7	1.2
LnGrp Delay(d),s/veh	134.3	93.2	93.5	115.3	43.2	0.0	56.8	0.0	0.0	66.7	26.7	23.2
LnGrp LOS	F	F	F	F	D		E			F	C	C
Approach Vol, veh/h		950			694			120			1236	
Approach Delay, s/veh		94.7			44.6			56.8			58.5	
Approach LOS		F			D			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		22.0	5.4	40.0		50.0	6.9	38.4
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		18.0	4.0	36.0		46.0	4.0	36.0
Max Q Clear Time (g_c+I1), s		11.5	3.1	38.0		48.0	4.6	27.3
Green Ext Time (p_c), s		0.2	0.0	0.0		0.0	0.0	5.4

Intersection Summary	
HCM 2010 Ctrl Delay	66.7
HCM 2010 LOS	E

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	996	753	0	685	145
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	996	753	0	685	145
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	2957	2217	0	864	771
Arrive On Green	0.00	0.51	0.51	0.00	0.35	0.35
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	996	753	0	685	145
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	5.6	5.7	0.0	13.6	2.5
Cycle Q Clear(g_c), s	0.0	5.6	5.7	0.0	13.6	2.5
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2957	2217	0	864	771
V/C Ratio(X)	0.00	0.34	0.34	0.00	0.79	0.19
Avail Cap(c_a), veh/h	0	2957	2217	0	1991	1777
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	8.0	8.1	0.0	16.2	12.6
Incr Delay (d2), s/veh	0.0	0.3	0.4	0.0	1.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.3	2.3	0.0	4.9	0.8
LnGrp Delay(d),s/veh	0.0	8.3	8.5	0.0	17.9	12.7
LnGrp LOS		A	A		B	B
Approach Vol, veh/h		996	753		830	
Approach Delay, s/veh		8.3	8.5		17.0	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				56.9		23.1		56.9
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				28.0		44.0		28.0
Max Q Clear Time (g_c+I1), s				7.6		15.6		7.7
Green Ext Time (p_c), s				11.0		3.5		11.0

Intersection Summary	
HCM 2010 Ctrl Delay	11.2
HCM 2010 LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1492	0	0	920	443	595
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1492	0	0	920	443	595
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1818	0	0	1364	2197	726
Arrive On Green	0.31	0.00	0.00	0.31	0.59	0.59
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1492	0	0	920	443	595
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	19.0	0.0	0.0	14.7	4.4	30.6
Cycle Q Clear(g_c), s	19.0	0.0	0.0	14.7	4.4	30.6
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1818	0	0	1364	2197	726
V/C Ratio(X)	0.82	0.00	0.00	0.67	0.20	0.82
Avail Cap(c_a), veh/h	1818	0	0	1364	2197	726
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.4	0.0	0.0	24.0	7.7	13.1
Incr Delay (d2), s/veh	4.3	0.0	0.0	2.7	0.2	10.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.1	0.0	0.0	6.2	1.6	12.3
LnGrp Delay(d),s/veh	29.7	0.0	0.0	26.6	7.9	23.1
LnGrp LOS	C			C	A	C
Approach Vol, veh/h	1492			920	1038	
Approach Delay, s/veh	29.7			26.6	16.6	
Approach LOS	C			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		51.0		29.0				29.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		47.0		25.0				25.0
Max Q Clear Time (g_c+I1), s		32.6		21.0				16.7
Green Ext Time (p_c), s		3.9		3.6				7.1

Intersection Summary	
HCM 2010 Ctrl Delay	25.0
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	84	279	93	197	954	85
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	84	279	93	197	954	85
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	351	314	110	2665	2023	573
Arrive On Green	0.25	0.25	0.08	0.61	0.46	0.46
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	84	279	93	197	954	85
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	2.8	12.8	3.9	1.1	8.8	2.3
Cycle Q Clear(g_c), s	2.8	12.8	3.9	1.1	8.8	2.3
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	351	314	110	2665	2023	573
V/C Ratio(X)	0.24	0.89	0.85	0.07	0.47	0.15
Avail Cap(c_a), veh/h	376	336	235	2665	2023	573
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.5	21.2	26.8	4.7	10.9	9.1
Incr Delay (d2), s/veh	0.3	23.2	16.0	0.1	0.8	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	9.9	2.0	0.5	3.7	0.9
LnGrp Delay(d),s/veh	17.8	44.4	42.8	4.7	11.6	9.7
LnGrp LOS	B	D	D	A	B	A
Approach Vol, veh/h	363			290	1039	
Approach Delay, s/veh	38.3			17.0	11.5	
Approach LOS	D			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		19.0	8.7	31.3		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	10.0	22.0		
Max Q Clear Time (g_c+I1), s		3.1		14.8	5.9	10.8		
Green Ext Time (p_c), s		9.2		0.2	0.1	5.6		

Intersection Summary	
HCM 2010 Ctrl Delay	18.2
HCM 2010 LOS	B

Existing Plus Growth Without Project Conditions

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	2	617	0	0	781	18	2	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	2	617	0	0	781	18	2	0	2

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	781	0	0	617	0	0	1012	1402	309
Stage 1	-	-	-	-	-	-	621	621	-
Stage 2	-	-	-	-	-	-	391	781	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	782	-	-	906	-	-	183	129	664
Stage 1	-	-	-	-	-	-	423	458	-
Stage 2	-	-	-	-	-	-	584	385	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	782	-	-	906	-	-	180	129	664
Mov Cap-2 Maneuver	-	-	-	-	-	-	180	129	-
Stage 1	-	-	-	-	-	-	422	457	-
Stage 2	-	-	-	-	-	-	576	385	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	17.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	283	782	-	-	906	-	-	157	586
HCM Lane V/C Ratio	0.014	0.003	-	-	-	-	-	0.554	0.014
HCM Control Delay (s)	17.9	9.6	-	-	0	-	-	53.2	11.2
HCM Lane LOS	C	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	2.8	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	87	0	8
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	87	0	8

Major/Minor	Minor2		
Conflicting Flow All	1094	1402	391
Stage 1	781	781	-
Stage 2	313	621	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	158	129	586
Stage 1	337	385	-
Stage 2	650	458	-
Platoon blocked, %			
Mov Cap-1 Maneuver	157	129	586
Mov Cap-2 Maneuver	157	129	-
Stage 1	336	385	-
Stage 2	646	457	-

Approach	SB
HCM Control Delay, s	49.7
HCM LOS	E

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	6	688	792	31	28	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	200	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	6	688	792	31	28	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	792	0	-	0	1148	396
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	356	-
Critical Hdwy	4.3	-	-	-	7	7.1
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	2.3	-	-	-	3.6	3.4
Pot Cap-1 Maneuver	774	-	-	-	180	581
Stage 1	-	-	-	-	387	-
Stage 2	-	-	-	-	657	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	774	-	-	-	179	581
Mov Cap-2 Maneuver	-	-	-	-	179	-
Stage 1	-	-	-	-	387	-
Stage 2	-	-	-	-	652	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	25.7
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	774	-	-	-	179	581
HCM Lane V/C Ratio	0.008	-	-	-	0.156	0.01
HCM Control Delay (s)	9.7	-	-	-	28.8	11.3
HCM Lane LOS	A	-	-	-	D	B
HCM 95th %tile Q(veh)	0	-	-	-	0.5	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	26	689	1	0	814	3	0	0	0	1	0	8
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	26	689	1	0	814	3	0	0	0	1	0	8
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	2	0	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	34	1324	2	3	991	421	0	3	0	1005	0	448
Arrive On Green	0.02	0.46	0.46	0.00	0.34	0.34	0.00	0.00	0.00	0.36	0.00	0.36
Sat Flow, veh/h	1385	2904	4	1385	2909	1236	0	1455	0	2771	0	1236
Grp Volume(v), veh/h	26	345	345	0	814	3	0	0	0	1	0	8
Grp Sat Flow(s),veh/h/ln	1385	1455	1454	1385	1455	1236	0	1455	0	1385	0	1236
Q Serve(g_s), s	0.8	7.5	7.5	0.0	11.3	0.1	0.0	0.0	0.0	0.0	0.0	0.2
Cycle Q Clear(g_c), s	0.8	7.5	7.5	0.0	11.3	0.1	0.0	0.0	0.0	0.0	0.0	0.2
Prop In Lane	1.00		0.00	1.00		1.00	0.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	34	663	663	3	991	421	0	3	0	1005	0	448
V/C Ratio(X)	0.76	0.52	0.52	0.00	0.82	0.01	0.00	0.00	0.00	0.00	0.00	0.02
Avail Cap(c_a), veh/h	126	663	663	126	1187	504	0	528	0	1005	0	448
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.4	8.6	8.6	0.0	13.3	9.6	0.0	0.0	0.0	9.0	0.0	9.0
Incr Delay (d2), s/veh	28.3	0.7	0.7	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	3.1	3.1	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
LnGrp Delay(d),s/veh	49.7	9.3	9.3	0.0	17.4	9.6	0.0	0.0	0.0	9.0	0.0	9.1
LnGrp LOS	D	A	A		B	A				A		A
Approach Vol, veh/h		716			817			0			9	
Approach Delay, s/veh		10.8			17.3			0.0			9.1	
Approach LOS		B			B						A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		0.0	0.0	24.1		20.0	5.1	19.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	4.0	18.0
Max Q Clear Time (g_c+I1), s		0.0	0.0	9.5		2.2	2.8	13.3
Green Ext Time (p_c), s		0.0	0.0	5.1		0.0	0.0	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	14.2
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	69	573	30	8	750	1277	46	76	8	251	32	33
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	69	573	30	8	750	0	46	76	8	251	32	33
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	81	1133	59	11	1056	0	100	166	17	471	275	233
Arrive On Green	0.06	0.41	0.41	0.01	0.36	0.00	0.20	0.20	0.20	0.19	0.19	0.19
Sat Flow, veh/h	1385	2741	143	1385	2909	0	500	827	87	2494	1455	1236
Grp Volume(v), veh/h	69	304	299	8	750	0	130	0	0	251	32	33
Grp Sat Flow(s),veh/h/ln	1385	1455	1429	1385	1455	0	1414	0	0	1247	1455	1236
Q Serve(g_s), s	4.2	13.1	13.2	0.5	18.7	0.0	6.9	0.0	0.0	7.7	1.5	1.9
Cycle Q Clear(g_c), s	4.2	13.1	13.2	0.5	18.7	0.0	6.9	0.0	0.0	7.7	1.5	1.9
Prop In Lane	1.00		0.10	1.00		0.00	0.35		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	81	602	591	11	1056	0	284	0	0	471	275	233
V/C Ratio(X)	0.85	0.50	0.51	0.71	0.71	0.00	0.46	0.00	0.00	0.53	0.12	0.14
Avail Cap(c_a), veh/h	114	1665	1636	65	3228	0	284	0	0	471	275	233
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.5	18.4	18.4	41.9	23.2	0.0	29.8	0.0	0.0	31.0	28.5	28.6
Incr Delay (d2), s/veh	32.0	0.7	0.7	59.0	0.9	0.0	5.3	0.0	0.0	4.3	0.9	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	5.3	5.3	0.4	7.6	0.0	3.1	0.0	0.0	2.9	0.7	0.7
LnGrp Delay(d),s/veh	71.5	19.1	19.1	100.9	24.1	0.0	35.1	0.0	0.0	35.3	29.4	29.9
LnGrp LOS	E	B	B	F	C		D			D	C	C
Approach Vol, veh/h		672			758			130			316	
Approach Delay, s/veh		24.5			24.9			35.1			34.1	
Approach LOS		C			C			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	4.7	39.0		20.0	9.0	34.8
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	97.0		16.0	7.0	94.0
Max Q Clear Time (g_c+I1), s		8.9	2.5	15.2		9.7	6.2	20.7
Green Ext Time (p_c), s		0.3	0.0	10.0		0.6	0.0	10.0

Intersection Summary	
HCM 2010 Ctrl Delay	27.0
HCM 2010 LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	377	1855	0	826	169
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	377	1855	0	826	169
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	3058	2294	0	921	822
Arrive On Green	0.00	0.53	0.53	0.00	0.37	0.37
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	377	1855	0	826	169
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	2.5	26.7	0.0	23.8	3.9
Cycle Q Clear(g_c), s	0.0	2.5	26.7	0.0	23.8	3.9
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	3058	2294	0	921	822
V/C Ratio(X)	0.00	0.12	0.81	0.00	0.90	0.21
Avail Cap(c_a), veh/h	0	3058	2294	0	1049	936
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	9.2	14.9	0.0	22.6	16.4
Incr Delay (d2), s/veh	0.0	0.1	3.2	0.0	9.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.0	11.3	0.0	9.4	1.2
LnGrp Delay(d),s/veh	0.0	9.2	18.1	0.0	32.1	16.5
LnGrp LOS		A	B		C	B
Approach Vol, veh/h		377	1855		995	
Approach Delay, s/veh		9.2	18.1		29.4	
Approach LOS		A	B		C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				47.9		32.1		47.9
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				40.0		32.0		40.0
Max Q Clear Time (g_c+I1), s				4.5		25.8		28.7
Green Ext Time (p_c), s				20.8		2.3		9.0

Intersection Summary	
HCM 2010 Ctrl Delay	20.6
HCM 2010 LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1115	0	0	1176	1013	697
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1115	0	0	1176	1013	697
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1818	0	0	1364	2197	726
Arrive On Green	0.31	0.00	0.00	0.31	0.59	0.59
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1115	0	0	1176	1013	697
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	13.0	0.0	0.0	20.3	12.3	42.6
Cycle Q Clear(g_c), s	13.0	0.0	0.0	20.3	12.3	42.6
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1818	0	0	1364	2197	726
V/C Ratio(X)	0.61	0.00	0.00	0.86	0.46	0.96
Avail Cap(c_a), veh/h	1818	0	0	1364	2197	726
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.4	0.0	0.0	25.9	9.3	15.6
Incr Delay (d2), s/veh	1.6	0.0	0.0	7.4	0.7	24.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	0.0	0.0	9.0	4.3	19.3
LnGrp Delay(d),s/veh	24.9	0.0	0.0	33.3	10.0	40.5
LnGrp LOS	C			C	B	D
Approach Vol, veh/h	1115			1176	1710	
Approach Delay, s/veh	24.9			33.3	22.4	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		51.0		29.0				29.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		47.0		25.0				25.0
Max Q Clear Time (g_c+I1), s		44.6		15.0				22.3
Green Ext Time (p_c), s		1.7		8.0				2.4

Intersection Summary	
HCM 2010 Ctrl Delay	26.3
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	35	46	323	1097	285	30
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	35	46	323	1097	285	30
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	77	69	372	3371	1824	517
Arrive On Green	0.06	0.06	0.27	0.77	0.42	0.42
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	35	46	323	1097	285	30
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	1.1	1.7	10.4	3.6	1.9	0.7
Cycle Q Clear(g_c), s	1.1	1.7	10.4	3.6	1.9	0.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	77	69	372	3371	1824	517
V/C Ratio(X)	0.45	0.67	0.87	0.33	0.16	0.06
Avail Cap(c_a), veh/h	476	425	476	3371	1824	517
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.3	21.6	16.3	1.6	8.4	8.1
Incr Delay (d2), s/veh	4.1	10.6	13.0	0.3	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	1.4	5.3	1.4	0.8	0.3
LnGrp Delay(d),s/veh	25.4	32.1	29.2	1.9	8.6	8.3
LnGrp LOS	C	C	C	A	A	A
Approach Vol, veh/h	81			1420	315	
Approach Delay, s/veh	29.2			8.1	8.6	
Approach LOS	C			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		6.6	16.5	23.5		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	16.0	16.0		
Max Q Clear Time (g_c+I1), s		5.6		3.7	12.4	3.9		
Green Ext Time (p_c), s		11.0		0.1	0.4	6.8		

Intersection Summary	
HCM 2010 Ctrl Delay	9.1
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	15	959	0	0	823	61	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	15	959	0	0	823	61	1	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	823	0	0	959	0	0	1401	1812	480
Stage 1	-	-	-	-	-	-	989	989	-
Stage 2	-	-	-	-	-	-	412	823	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	753	-	-	666	-	-	93	71	511
Stage 1	-	-	-	-	-	-	250	306	-
Stage 2	-	-	-	-	-	-	567	368	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	753	-	-	666	-	-	91	70	511
Mov Cap-2 Maneuver	-	-	-	-	-	-	91	70	-
Stage 1	-	-	-	-	-	-	245	300	-
Stage 2	-	-	-	-	-	-	564	368	-

Approach	EB	WB	NB
HCM Control Delay, s	0.2	0	45
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	91	753	-	-	666	-	-	103	567
HCM Lane V/C Ratio	0.011	0.02	-	-	-	-	-	0.485	0.005
HCM Control Delay (s)	45	9.9	-	-	0	-	-	69.2	11.4
HCM Lane LOS	E	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	2.1	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	50	0	3
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	50	0	3

Major/Minor	Minor2		
Conflicting Flow All	1333	1812	412
Stage 1	823	823	-
Stage 2	510	989	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	105	71	567
Stage 1	317	368	-
Stage 2	494	306	-
Platoon blocked, %			
Mov Cap-1 Maneuver	103	70	567
Mov Cap-2 Maneuver	103	70	-
Stage 1	311	368	-
Stage 2	484	300	-

Approach	SB
HCM Control Delay, s	65.9
HCM LOS	F

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	1008	882	5	38	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	200	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	1	1008	882	5	38	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	882	0	-	0	1388	441
Stage 1	-	-	-	-	882	-
Stage 2	-	-	-	-	506	-
Critical Hdwy	4.3	-	-	-	7	7.1
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	2.3	-	-	-	3.6	3.4
Pot Cap-1 Maneuver	714	-	-	-	124	543
Stage 1	-	-	-	-	346	-
Stage 2	-	-	-	-	548	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	714	-	-	-	124	543
Mov Cap-2 Maneuver	-	-	-	-	124	-
Stage 1	-	-	-	-	346	-
Stage 2	-	-	-	-	547	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	45.5
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	714	-	-	-	124	543
HCM Lane V/C Ratio	0.001	-	-	-	0.306	0.002
HCM Control Delay (s)	10	-	-	-	46.4	11.6
HCM Lane LOS	B	-	-	-	E	B
HCM 95th %tile Q(veh)	0	-	-	-	1.2	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	1036	0	0	843	1	9	0	0	6	0	34
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	9	1036	0	0	843	1	9	0	0	6	0	34
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	2	0	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	13	1167	0	2	982	417	302	0	0	603	0	269
Arrive On Green	0.01	0.40	0.00	0.00	0.34	0.34	0.22	0.00	0.00	0.22	0.00	0.22
Sat Flow, veh/h	1385	2909	0	1385	2909	1236	1385	0	0	2771	0	1236
Grp Volume(v), veh/h	9	1036	0	0	843	1	9	0	0	6	0	34
Grp Sat Flow(s),veh/h/ln	1385	1455	0	1385	1455	1236	1385	0	0	1385	0	1236
Q Serve(g_s), s	0.5	24.3	0.0	0.0	19.9	0.0	0.4	0.0	0.0	0.1	0.0	1.6
Cycle Q Clear(g_c), s	0.5	24.3	0.0	0.0	19.9	0.0	0.4	0.0	0.0	0.1	0.0	1.6
Prop In Lane	1.00		0.00	1.00		1.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	13	1167	0	2	982	417	302	0	0	603	0	269
V/C Ratio(X)	0.71	0.89	0.00	0.00	0.86	0.00	0.03	0.00	0.00	0.01	0.00	0.13
Avail Cap(c_a), veh/h	75	1167	0	75	1109	471	302	0	0	603	0	269
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.3	20.5	0.0	0.0	22.7	16.1	22.6	0.0	0.0	22.5	0.0	23.1
Incr Delay (d2), s/veh	53.6	8.6	0.0	0.0	6.3	0.0	0.2	0.0	0.0	0.0	0.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	11.0	0.0	0.0	8.8	0.0	0.2	0.0	0.0	0.1	0.0	0.6
LnGrp Delay(d),s/veh	89.9	29.1	0.0	0.0	29.0	16.1	22.8	0.0	0.0	22.6	0.0	24.1
LnGrp LOS	F	C			C	B	C			C		C
Approach Vol, veh/h		1045			844			9			40	
Approach Delay, s/veh		29.6			29.0			22.8			23.8	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	0.0	33.5		20.0	4.7	28.8
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	28.0		16.0	4.0	28.0
Max Q Clear Time (g_c+I1), s		2.4	0.0	26.3		3.6	2.5	21.9
Green Ext Time (p_c), s		0.0	0.0	1.4		0.1	0.0	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	29.2
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	33	933	37	14	718	233	68	36	23	1040	206	58
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	33	933	37	14	718	0	68	36	23	1040	206	58
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	38	893	35	17	892	0	98	52	33	1016	593	504
Arrive On Green	0.03	0.32	0.32	0.01	0.31	0.00	0.13	0.13	0.13	0.41	0.41	0.41
Sat Flow, veh/h	1385	2779	110	1385	2909	0	736	389	249	2494	1455	1236
Grp Volume(v), veh/h	33	488	482	14	718	0	127	0	0	1040	206	58
Grp Sat Flow(s),veh/h/ln	1385	1455	1435	1385	1455	0	1374	0	0	1247	1455	1236
Q Serve(g_s), s	3.0	41.0	41.0	1.3	29.0	0.0	11.3	0.0	0.0	52.0	12.5	3.7
Cycle Q Clear(g_c), s	3.0	41.0	41.0	1.3	29.0	0.0	11.3	0.0	0.0	52.0	12.5	3.7
Prop In Lane	1.00		0.08	1.00		0.00	0.54		0.18	1.00		1.00
Lane Grp Cap(c), veh/h	38	468	461	17	892	0	183	0	0	1016	593	504
V/C Ratio(X)	0.88	1.04	1.04	0.82	0.81	0.00	0.69	0.00	0.00	1.02	0.35	0.12
Avail Cap(c_a), veh/h	43	468	461	43	935	0	183	0	0	1016	593	504
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.8	43.3	43.3	62.9	40.7	0.0	52.8	0.0	0.0	37.8	26.1	23.5
Incr Delay (d2), s/veh	84.1	53.7	54.0	60.7	5.0	0.0	19.5	0.0	0.0	34.2	1.6	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	23.3	23.1	0.8	12.3	0.0	5.3	0.0	0.0	22.6	5.2	1.3
LnGrp Delay(d),s/veh	146.0	97.0	97.3	123.6	45.8	0.0	72.3	0.0	0.0	72.0	27.7	23.9
LnGrp LOS	F	F	F	F	D		E			F	C	C
Approach Vol, veh/h		1003			732			127			1304	
Approach Delay, s/veh		98.7			47.2			72.3			62.9	
Approach LOS		F			D			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	5.6	45.0		56.0	7.5	43.1
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	41.0		52.0	4.0	41.0
Max Q Clear Time (g_c+I1), s		13.3	3.3	43.0		54.0	5.0	31.0
Green Ext Time (p_c), s		0.2	0.0	0.0		0.0	0.0	6.3

Intersection Summary	
HCM 2010 Ctrl Delay	71.0
HCM 2010 LOS	E

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	1051	794	0	723	153
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	1051	794	0	723	153
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	2921	2191	0	896	800
Arrive On Green	0.00	0.50	0.50	0.00	0.36	0.36
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	1051	794	0	723	153
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	6.3	6.4	0.0	15.1	2.7
Cycle Q Clear(g_c), s	0.0	6.3	6.4	0.0	15.1	2.7
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2921	2191	0	896	800
V/C Ratio(X)	0.00	0.36	0.36	0.00	0.81	0.19
Avail Cap(c_a), veh/h	0	2921	2191	0	1856	1657
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	8.7	8.8	0.0	16.7	12.7
Incr Delay (d2), s/veh	0.0	0.3	0.5	0.0	1.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.6	2.6	0.0	5.3	0.8
LnGrp Delay(d),s/veh	0.0	9.1	9.2	0.0	18.5	12.8
LnGrp LOS		A	A		B	B
Approach Vol, veh/h		1051	794		876	
Approach Delay, s/veh		9.1	9.2		17.5	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				55.2		24.8		55.2
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				29.0		43.0		29.0
Max Q Clear Time (g_c+I1), s				8.3		17.1		8.4
Green Ext Time (p_c), s				11.7		3.7		11.7

Intersection Summary	
HCM 2010 Ctrl Delay	11.8
HCM 2010 LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1574	0	0	971	467	628
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1574	0	0	971	467	628
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1818	0	0	1364	2197	726
Arrive On Green	0.31	0.00	0.00	0.31	0.59	0.59
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1574	0	0	971	467	628
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	20.4	0.0	0.0	15.7	4.7	34.1
Cycle Q Clear(g_c), s	20.4	0.0	0.0	15.7	4.7	34.1
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1818	0	0	1364	2197	726
V/C Ratio(X)	0.87	0.00	0.00	0.71	0.21	0.86
Avail Cap(c_a), veh/h	1818	0	0	1364	2197	726
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.9	0.0	0.0	24.3	7.8	13.8
Incr Delay (d2), s/veh	5.8	0.0	0.0	3.2	0.2	13.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.9	0.0	0.0	6.7	1.6	14.1
LnGrp Delay(d),s/veh	31.7	0.0	0.0	27.5	8.0	26.9
LnGrp LOS	C			C	A	C
Approach Vol, veh/h	1574			971	1095	
Approach Delay, s/veh	31.7			27.5	18.8	
Approach LOS	C			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		51.0		29.0				29.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		47.0		25.0				25.0
Max Q Clear Time (g_c+I1), s		36.1		22.4				17.7
Green Ext Time (p_c), s		3.6		2.4				6.4

Intersection Summary	
HCM 2010 Ctrl Delay	26.7
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	89	294	98	208	1006	90
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	89	294	98	208	1006	90
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	365	326	116	2629	1971	558
Arrive On Green	0.26	0.26	0.08	0.60	0.45	0.45
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	89	294	98	208	1006	90
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	3.0	13.7	4.2	1.2	9.8	2.6
Cycle Q Clear(g_c), s	3.0	13.7	4.2	1.2	9.8	2.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	365	326	116	2629	1971	558
V/C Ratio(X)	0.24	0.90	0.84	0.08	0.51	0.16
Avail Cap(c_a), veh/h	371	331	255	2629	1971	558
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.3	21.3	27.0	5.0	11.7	9.7
Incr Delay (d2), s/veh	0.3	26.3	14.8	0.1	0.9	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	10.8	2.1	0.5	4.1	1.0
LnGrp Delay(d),s/veh	17.7	47.6	41.8	5.0	12.6	10.3
LnGrp LOS	B	D	D	A	B	B
Approach Vol, veh/h	383			306	1096	
Approach Delay, s/veh	40.6			16.8	12.4	
Approach LOS	D			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		19.7	9.0	31.0		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	11.0	21.0		
Max Q Clear Time (g_c+I1), s		3.2		15.7	6.2	11.8		
Green Ext Time (p_c), s		9.9		0.0	0.1	5.1		

Intersection Summary	
HCM 2010 Ctrl Delay	19.2
HCM 2010 LOS	B

Existing Plus Growth Plus Other Development Without Project Conditions

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	2	696	0	0	797	18	2	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	2	696	0	0	797	18	2	0	2

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	797	0	0	696	0	0	1099	1497	348
Stage 1	-	-	-	-	-	-	700	700	-
Stage 2	-	-	-	-	-	-	399	797	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	771	-	-	844	-	-	157	113	625
Stage 1	-	-	-	-	-	-	378	421	-
Stage 2	-	-	-	-	-	-	577	378	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	771	-	-	844	-	-	155	113	625
Mov Cap-2 Maneuver	-	-	-	-	-	-	155	113	-
Stage 1	-	-	-	-	-	-	377	420	-
Stage 2	-	-	-	-	-	-	569	378	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	19.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	248	771	-	-	844	-	-	143	579
HCM Lane V/C Ratio	0.016	0.003	-	-	-	-	-	0.608	0.014
HCM Control Delay (s)	19.8	9.7	-	-	0	-	-	63.1	11.3
HCM Lane LOS	C	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	3.2	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	87	0	8
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	87	0	8

Major/Minor	Minor2		
Conflicting Flow All	1149	1497	399
Stage 1	797	797	-
Stage 2	352	700	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	144	113	579
Stage 1	329	378	-
Stage 2	616	421	-
Platoon blocked, %			
Mov Cap-1 Maneuver	143	113	579
Mov Cap-2 Maneuver	143	113	-
Stage 1	328	378	-
Stage 2	612	420	-

Approach	SB
HCM Control Delay, s	58.7
HCM LOS	F

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	6	767	808	31	28	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	200	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	6	767	808	31	28	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	808	0	-	0	1204	404
Stage 1	-	-	-	-	808	-
Stage 2	-	-	-	-	396	-
Critical Hdwy	4.3	-	-	-	7	7.1
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	2.3	-	-	-	3.6	3.4
Pot Cap-1 Maneuver	763	-	-	-	165	574
Stage 1	-	-	-	-	379	-
Stage 2	-	-	-	-	626	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	763	-	-	-	164	574
Mov Cap-2 Maneuver	-	-	-	-	164	-
Stage 1	-	-	-	-	379	-
Stage 2	-	-	-	-	621	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	27.9
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	763	-	-	-	164	574
HCM Lane V/C Ratio	0.008	-	-	-	0.171	0.01
HCM Control Delay (s)	9.8	-	-	-	31.4	11.3
HCM Lane LOS	A	-	-	-	D	B
HCM 95th %tile Q(veh)	0	-	-	-	0.6	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	26	768	1	1	830	3	0	7	7	1	1	8
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	26	768	1	1	830	3	0	7	7	1	1	8
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	1	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	31	963	1	2	902	383	0	149	149	308	324	275
Arrive On Green	0.02	0.33	0.33	0.00	0.31	0.31	0.00	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	1385	2905	4	1385	2909	1236	0	668	668	1385	1455	1236
Grp Volume(v), veh/h	26	385	384	1	830	3	0	0	14	1	1	8
Grp Sat Flow(s),veh/h/ln	1385	1455	1454	1385	1455	1236	0	0	1337	1385	1455	1236
Q Serve(g_s), s	1.3	17.3	17.3	0.1	19.8	0.1	0.0	0.0	0.6	0.0	0.0	0.4
Cycle Q Clear(g_c), s	1.3	17.3	17.3	0.1	19.8	0.1	0.0	0.0	0.6	0.0	0.0	0.4
Prop In Lane	1.00		0.00	1.00		1.00	0.00		0.50	1.00		1.00
Lane Grp Cap(c), veh/h	31	482	482	2	902	383	0	0	297	308	324	275
V/C Ratio(X)	0.83	0.80	0.80	0.52	0.92	0.01	0.00	0.00	0.05	0.00	0.00	0.03
Avail Cap(c_a), veh/h	77	482	482	77	930	395	0	0	297	308	324	275
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.0	21.8	21.8	35.9	24.0	17.2	0.0	0.0	22.0	21.8	21.8	21.9
Incr Delay (d2), s/veh	40.4	9.1	9.1	134.4	13.8	0.0	0.0	0.0	0.3	0.0	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	8.2	8.2	0.1	9.7	0.0	0.0	0.0	0.2	0.0	0.0	0.1
LnGrp Delay(d),s/veh	75.4	31.0	31.0	170.3	37.8	17.2	0.0	0.0	22.3	21.8	21.8	22.1
LnGrp LOS	E	C	C	F	D	B			C	C	C	C
Approach Vol, veh/h		795			834			14			10	
Approach Delay, s/veh		32.4			37.9			22.3			22.0	
Approach LOS		C			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	4.1	27.8		20.0	5.6	26.3
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	23.0		16.0	4.0	23.0
Max Q Clear Time (g_c+I1), s		2.6	2.1	19.3		2.4	3.3	21.8
Green Ext Time (p_c), s		0.0	0.0	2.7		0.0	0.0	0.5

Intersection Summary	
HCM 2010 Ctrl Delay	35.0
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	150	578	30	8	753	1492	46	166	8	290	53	48
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	150	578	30	8	753	0	46	166	8	290	53	48
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	172	1272	66	11	1011	0	63	226	11	397	232	197
Arrive On Green	0.12	0.46	0.46	0.01	0.35	0.00	0.21	0.21	0.21	0.16	0.16	0.16
Sat Flow, veh/h	1385	2742	142	1385	2909	0	299	1079	52	2494	1455	1236
Grp Volume(v), veh/h	150	306	302	8	753	0	220	0	0	290	53	48
Grp Sat Flow(s),veh/h/ln	1385	1455	1429	1385	1455	0	1430	0	0	1247	1455	1236
Q Serve(g_s), s	10.7	14.3	14.4	0.6	22.9	0.0	14.4	0.0	0.0	11.1	3.2	3.4
Cycle Q Clear(g_c), s	10.7	14.3	14.4	0.6	22.9	0.0	14.4	0.0	0.0	11.1	3.2	3.4
Prop In Lane	1.00		0.10	1.00		0.00	0.21		0.04	1.00		1.00
Lane Grp Cap(c), veh/h	172	675	663	11	1011	0	299	0	0	397	232	197
V/C Ratio(X)	0.87	0.45	0.45	0.72	0.74	0.00	0.74	0.00	0.00	0.73	0.23	0.24
Avail Cap(c_a), veh/h	179	1348	1324	55	2434	0	299	0	0	397	232	197
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.1	18.3	18.3	49.7	28.8	0.0	37.1	0.0	0.0	40.1	36.8	36.9
Incr Delay (d2), s/veh	33.2	0.5	0.5	61.9	1.1	0.0	14.8	0.0	0.0	11.2	2.3	2.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	5.8	5.7	0.4	9.4	0.0	6.9	0.0	0.0	4.4	1.4	1.3
LnGrp Delay(d),s/veh	76.3	18.7	18.8	111.6	29.9	0.0	51.9	0.0	0.0	51.3	39.1	39.8
LnGrp LOS	E	B	B	F	C		D			D	D	D
Approach Vol, veh/h		758			761			220			391	
Approach Delay, s/veh		30.1			30.8			51.9			48.3	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		25.0	4.8	50.6		20.0	16.5	38.9
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		21.0	4.0	93.0		16.0	13.0	84.0
Max Q Clear Time (g_c+I1), s		16.4	2.6	16.4		13.1	12.7	24.9
Green Ext Time (p_c), s		0.4	0.0	10.1		0.4	0.0	10.0

Intersection Summary	
HCM 2010 Ctrl Delay	36.0
HCM 2010 LOS	D

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	402	2081	0	836	169
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	402	2081	0	836	169
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	3114	2335	0	905	808
Arrive On Green	0.00	0.54	0.54	0.00	0.36	0.36
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	402	2081	0	836	169
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	2.7	33.3	0.0	25.2	4.1
Cycle Q Clear(g_c), s	0.0	2.7	33.3	0.0	25.2	4.1
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	3114	2335	0	905	808
V/C Ratio(X)	0.00	0.13	0.89	0.00	0.92	0.21
Avail Cap(c_a), veh/h	0	3114	2335	0	953	851
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	9.1	16.2	0.0	24.0	17.2
Incr Delay (d2), s/veh	0.0	0.1	5.7	0.0	13.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.1	14.3	0.0	10.3	1.3
LnGrp Delay(d),s/veh	0.0	9.2	21.9	0.0	37.8	17.4
LnGrp LOS		A	C		D	B
Approach Vol, veh/h		402	2081		1005	
Approach Delay, s/veh		9.2	21.9		34.4	
Approach LOS		A	C		C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				47.5		32.5		47.5
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				42.0		30.0		42.0
Max Q Clear Time (g_c+I1), s				4.7		27.2		35.3
Green Ext Time (p_c), s				24.6		1.3		6.0

Intersection Summary	
HCM 2010 Ctrl Delay	24.0
HCM 2010 LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1142	0	0	1270	1145	697
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1142	0	0	1270	1145	697
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1891	0	0	1418	2151	711
Arrive On Green	0.32	0.00	0.00	0.32	0.57	0.57
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1142	0	0	1270	1145	697
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	13.2	0.0	0.0	22.2	15.0	43.9
Cycle Q Clear(g_c), s	13.2	0.0	0.0	22.2	15.0	43.9
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1891	0	0	1418	2151	711
V/C Ratio(X)	0.60	0.00	0.00	0.90	0.53	0.98
Avail Cap(c_a), veh/h	1891	0	0	1418	2151	711
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.7	0.0	0.0	25.7	10.4	16.6
Incr Delay (d2), s/veh	1.4	0.0	0.0	9.1	0.9	29.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	0.0	0.0	10.0	5.3	20.5
LnGrp Delay(d),s/veh	24.1	0.0	0.0	34.8	11.4	45.9
LnGrp LOS	C			C	B	D
Approach Vol, veh/h	1142			1270	1842	
Approach Delay, s/veh	24.1			34.8	24.4	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		50.0		30.0				30.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		46.0		26.0				26.0
Max Q Clear Time (g_c+I1), s		45.9		15.2				24.2
Green Ext Time (p_c), s		0.1		8.9				1.7

Intersection Summary	
HCM 2010 Ctrl Delay	27.4
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	42	47	324	1482	359	31
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	42	47	324	1482	359	31
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	81	72	373	3361	1813	514
Arrive On Green	0.06	0.06	0.27	0.77	0.42	0.42
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	42	47	324	1482	359	31
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	1.4	1.7	10.4	5.5	2.4	0.7
Cycle Q Clear(g_c), s	1.4	1.7	10.4	5.5	2.4	0.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	81	72	373	3361	1813	514
V/C Ratio(X)	0.52	0.65	0.87	0.44	0.20	0.06
Avail Cap(c_a), veh/h	474	423	474	3361	1813	514
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.4	21.5	16.3	1.9	8.7	8.2
Incr Delay (d2), s/veh	5.0	9.3	13.1	0.4	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	1.4	5.3	2.2	1.0	0.3
LnGrp Delay(d),s/veh	26.4	30.9	29.4	2.3	8.9	8.4
LnGrp LOS	C	C	C	A	A	A
Approach Vol, veh/h	89			1806	390	
Approach Delay, s/veh	28.7			7.2	8.9	
Approach LOS	C			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		6.7	16.6	23.4		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	16.0	16.0		
Max Q Clear Time (g_c+I1), s		7.5		3.7	12.4	4.4		
Green Ext Time (p_c), s		15.4		0.2	0.3	8.3		

Intersection Summary	
HCM 2010 Ctrl Delay	8.3
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	15	991	0	0	910	61	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	15	991	0	0	910	61	1	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	910	0	0	991	0	0	1476	1931	496
Stage 1	-	-	-	-	-	-	1021	1021	-
Stage 2	-	-	-	-	-	-	455	910	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	696	-	-	647	-	-	81	60	499
Stage 1	-	-	-	-	-	-	239	295	-
Stage 2	-	-	-	-	-	-	534	334	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	696	-	-	647	-	-	79	59	499
Mov Cap-2 Maneuver	-	-	-	-	-	-	79	59	-
Stage 1	-	-	-	-	-	-	234	289	-
Stage 2	-	-	-	-	-	-	531	334	-

Approach	EB	WB	NB
HCM Control Delay, s	0.2	0	51.2
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	79	696	-	-	647	-	-	86	531
HCM Lane V/C Ratio	0.013	0.022	-	-	-	-	-	0.581	0.006
HCM Control Delay (s)	51.2	10.3	-	-	0	-	-	93.5	11.8
HCM Lane LOS	F	B	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	2.6	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	50	0	3
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	50	0	3

Major/Minor	Minor2		
Conflicting Flow All	1436	1931	455
Stage 1	910	910	-
Stage 2	526	1021	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	87	60	531
Stage 1	280	334	-
Stage 2	483	295	-
Platoon blocked, %			
Mov Cap-1 Maneuver	86	59	531
Mov Cap-2 Maneuver	86	59	-
Stage 1	274	334	-
Stage 2	473	289	-

Approach	SB
HCM Control Delay, s	88.9
HCM LOS	F

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	1040	969	5	38	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	200	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	1	1040	969	5	38	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	969	0	-	0	1491	485
Stage 1	-	-	-	-	969	-
Stage 2	-	-	-	-	522	-
Critical Hdwy	4.3	-	-	-	7	7.1
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	2.3	-	-	-	3.6	3.4
Pot Cap-1 Maneuver	660	-	-	-	106	507
Stage 1	-	-	-	-	311	-
Stage 2	-	-	-	-	538	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	660	-	-	-	106	507
Mov Cap-2 Maneuver	-	-	-	-	106	-
Stage 1	-	-	-	-	311	-
Stage 2	-	-	-	-	537	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	55.7
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	660	-	-	-	106	507
HCM Lane V/C Ratio	0.002	-	-	-	0.358	0.002
HCM Control Delay (s)	10.5	-	-	-	56.8	12.1
HCM Lane LOS	B	-	-	-	F	B
HCM 95th %tile Q(veh)	0	-	-	-	1.4	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	1068	0	6	930	1	9	2	2	6	6	34
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	9	1068	0	6	930	1	9	2	2	6	6	34
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	1	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	13	1065	0	9	1057	449	198	44	44	290	304	259
Arrive On Green	0.01	0.37	0.00	0.01	0.36	0.36	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1385	2909	0	1385	2909	1236	948	211	211	1385	1455	1236
Grp Volume(v), veh/h	9	1068	0	6	930	1	13	0	0	6	6	34
Grp Sat Flow(s),veh/h/ln	1385	1455	0	1385	1455	1236	1370	0	0	1385	1455	1236
Q Serve(g_s), s	0.5	28.0	0.0	0.3	22.9	0.0	0.6	0.0	0.0	0.3	0.3	1.7
Cycle Q Clear(g_c), s	0.5	28.0	0.0	0.3	22.9	0.0	0.6	0.0	0.0	0.3	0.3	1.7
Prop In Lane	1.00		0.00	1.00		1.00	0.69		0.15	1.00		1.00
Lane Grp Cap(c), veh/h	13	1065	0	9	1057	449	287	0	0	290	304	259
V/C Ratio(X)	0.71	1.00	0.00	0.69	0.88	0.00	0.05	0.00	0.00	0.02	0.02	0.13
Avail Cap(c_a), veh/h	72	1065	0	72	1065	453	287	0	0	290	304	259
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.8	24.2	0.0	37.9	22.8	15.5	24.1	0.0	0.0	24.0	24.0	24.6
Incr Delay (d2), s/veh	54.1	28.2	0.0	67.7	8.6	0.0	0.3	0.0	0.0	0.1	0.1	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	15.3	0.0	0.3	10.4	0.0	0.2	0.0	0.0	0.1	0.1	0.7
LnGrp Delay(d),s/veh	91.9	52.5	0.0	105.6	31.4	15.5	24.4	0.0	0.0	24.1	24.1	25.6
LnGrp LOS	F	F		F	C	B	C			C	C	C
Approach Vol, veh/h		1077			937			13			46	
Approach Delay, s/veh		52.8			31.9			24.4			25.2	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	4.5	32.0		20.0	4.7	31.8
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	28.0		16.0	4.0	28.0
Max Q Clear Time (g_c+I1), s		2.6	2.3	30.0		3.7	2.5	24.9
Green Ext Time (p_c), s		0.0	0.0	0.0		0.1	0.0	2.6

Intersection Summary	
HCM 2010 Ctrl Delay	42.6
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	52	948	37	14	735	284	68	71	23	1243	302	134
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	52	948	37	14	735	0	68	71	23	1243	302	134
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	38	847	33	16	842	0	75	78	25	1114	650	552
Arrive On Green	0.03	0.30	0.30	0.01	0.29	0.00	0.13	0.13	0.13	0.45	0.45	0.45
Sat Flow, veh/h	1385	2781	109	1385	2909	0	584	609	197	2494	1455	1236
Grp Volume(v), veh/h	52	496	489	14	735	0	162	0	0	1243	302	134
Grp Sat Flow(s),veh/h/ln	1385	1455	1435	1385	1455	0	1391	0	0	1247	1455	1236
Q Serve(g_s), s	4.0	45.0	45.0	1.5	35.5	0.0	17.0	0.0	0.0	66.0	21.4	9.9
Cycle Q Clear(g_c), s	4.0	45.0	45.0	1.5	35.5	0.0	17.0	0.0	0.0	66.0	21.4	9.9
Prop In Lane	1.00		0.08	1.00		0.00	0.42		0.14	1.00		1.00
Lane Grp Cap(c), veh/h	38	443	437	16	842	0	179	0	0	1114	650	552
V/C Ratio(X)	1.39	1.12	1.12	0.85	0.87	0.00	0.91	0.00	0.00	1.12	0.46	0.24
Avail Cap(c_a), veh/h	38	443	437	38	886	0	179	0	0	1114	650	552
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	71.9	51.4	51.4	72.9	49.9	0.0	63.5	0.0	0.0	40.9	28.5	25.4
Incr Delay (d2), s/veh	280.6	79.4	79.6	68.2	9.3	0.0	46.3	0.0	0.0	64.7	2.4	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	27.7	27.4	0.9	15.4	0.0	8.8	0.0	0.0	32.6	9.0	3.5
LnGrp Delay(d),s/veh	352.5	130.7	131.0	141.0	59.2	0.0	109.8	0.0	0.0	105.6	30.9	26.4
LnGrp LOS	F	F	F	F	E		F			F	C	C
Approach Vol, veh/h		1037			749			162			1679	
Approach Delay, s/veh		142.0			60.7			109.8			85.8	
Approach LOS		F			E			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		23.0	5.7	49.0		70.0	8.0	46.7
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		19.0	4.0	45.0		66.0	4.0	45.0
Max Q Clear Time (g_c+I1), s		19.0	3.5	47.0		68.0	6.0	37.5
Green Ext Time (p_c), s		0.0	0.0	0.0		0.0	0.0	5.2

Intersection Summary	
HCM 2010 Ctrl Delay	97.8
HCM 2010 LOS	F

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	1176	878	0	774	153
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	1176	878	0	774	153
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	2834	2126	0	944	842
Arrive On Green	0.00	0.49	0.49	0.00	0.38	0.38
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	1176	878	0	774	153
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	7.7	7.7	0.0	16.7	2.7
Cycle Q Clear(g_c), s	0.0	7.7	7.7	0.0	16.7	2.7
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2834	2126	0	944	842
V/C Ratio(X)	0.00	0.41	0.41	0.00	0.82	0.18
Avail Cap(c_a), veh/h	0	2834	2126	0	1801	1607
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	9.8	9.8	0.0	16.7	12.3
Incr Delay (d2), s/veh	0.0	0.4	0.6	0.0	1.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.2	3.2	0.0	5.9	0.8
LnGrp Delay(d),s/veh	0.0	10.3	10.4	0.0	18.5	12.4
LnGrp LOS		B	B		B	B
Approach Vol, veh/h		1176	878		927	
Approach Delay, s/veh		10.3	10.4		17.5	
Approach LOS		B	B		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				53.5		26.5		53.5
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				29.0		43.0		29.0
Max Q Clear Time (g_c+I1), s				9.7		18.7		9.7
Green Ext Time (p_c), s				12.4		3.9		12.5

Intersection Summary	
HCM 2010 Ctrl Delay	12.6
HCM 2010 LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1714	0	0	993	529	628
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1714	0	0	993	529	628
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1964	0	0	1473	2104	695
Arrive On Green	0.34	0.00	0.00	0.34	0.56	0.56
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1714	0	0	993	529	628
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	22.1	0.0	0.0	15.6	5.8	36.1
Cycle Q Clear(g_c), s	22.1	0.0	0.0	15.6	5.8	36.1
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1964	0	0	1473	2104	695
V/C Ratio(X)	0.87	0.00	0.00	0.67	0.25	0.90
Avail Cap(c_a), veh/h	1964	0	0	1473	2104	695
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.9	0.0	0.0	22.7	8.9	15.6
Incr Delay (d2), s/veh	5.7	0.0	0.0	2.5	0.3	17.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.6	0.0	0.0	6.6	2.0	15.5
LnGrp Delay(d),s/veh	30.6	0.0	0.0	25.2	9.2	32.8
LnGrp LOS	C			C	A	C
Approach Vol, veh/h	1714			993	1157	
Approach Delay, s/veh	30.6			25.2	22.0	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		49.0		31.0				31.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		45.0		27.0				27.0
Max Q Clear Time (g_c+I1), s		38.1		24.1				17.6
Green Ext Time (p_c), s		2.9		2.7				8.3

Intersection Summary	
HCM 2010 Ctrl Delay	26.7
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	91	296	100	311	1379	96
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	91	296	100	311	1379	96
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	367	327	118	2625	1961	556
Arrive On Green	0.26	0.26	0.09	0.60	0.45	0.45
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	91	296	100	311	1379	96
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	3.1	13.8	4.3	1.8	15.2	2.8
Cycle Q Clear(g_c), s	3.1	13.8	4.3	1.8	15.2	2.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	367	327	118	2625	1961	556
V/C Ratio(X)	0.25	0.90	0.85	0.12	0.70	0.17
Avail Cap(c_a), veh/h	370	331	185	2625	1961	556
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.3	21.3	27.0	5.1	13.3	9.8
Incr Delay (d2), s/veh	0.3	26.7	18.6	0.1	2.1	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	10.9	2.2	0.7	6.4	1.0
LnGrp Delay(d),s/veh	17.7	48.0	45.6	5.2	15.4	10.5
LnGrp LOS	B	D	D	A	B	B
Approach Vol, veh/h	387			411	1475	
Approach Delay, s/veh	40.9			15.0	15.1	
Approach LOS	D			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		19.8	9.1	30.9		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	8.0	24.0		
Max Q Clear Time (g_c+I1), s		3.8		15.8	6.3	17.2		
Green Ext Time (p_c), s		15.1		0.0	0.0	5.1		

Intersection Summary	
HCM 2010 Ctrl Delay	19.5
HCM 2010 LOS	B

Existing Plus Growth With Project Conditions

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	2	620	0	0	784	19	2	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	2	620	0	0	784	19	2	0	2

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	784	0	0	620	0	0	1016	1408	310
Stage 1	-	-	-	-	-	-	624	624	-
Stage 2	-	-	-	-	-	-	392	784	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	780	-	-	904	-	-	181	128	663
Stage 1	-	-	-	-	-	-	421	457	-
Stage 2	-	-	-	-	-	-	583	384	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	780	-	-	904	-	-	178	128	663
Mov Cap-2 Maneuver	-	-	-	-	-	-	178	128	-
Stage 1	-	-	-	-	-	-	420	456	-
Stage 2	-	-	-	-	-	-	575	384	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	18
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	281	780	-	-	904	-	-	156	585
HCM Lane V/C Ratio	0.014	0.003	-	-	-	-	-	0.564	0.014
HCM Control Delay (s)	18	9.6	-	-	0	-	-	54.4	11.2
HCM Lane LOS	C	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	2.9	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	88	0	8
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	88	0	8

Major/Minor	Minor2		
Conflicting Flow All	1098	1408	392
Stage 1	784	784	-
Stage 2	314	624	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	157	128	585
Stage 1	335	384	-
Stage 2	650	457	-
Platoon blocked, %			
Mov Cap-1 Maneuver	156	128	585
Mov Cap-2 Maneuver	156	128	-
Stage 1	334	384	-
Stage 2	646	456	-

Approach	SB
HCM Control Delay, s	50.8
HCM LOS	F

Minor Lane/Major Mvmt

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	36	662	1	0	785	103	0	0	0	99	0	18
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	36	662	1	0	785	103	0	0	0	99	0	18
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	2	0	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	45	1330	2	3	975	414	0	3	0	1001	0	447
Arrive On Green	0.03	0.46	0.46	0.00	0.34	0.34	0.00	0.00	0.00	0.36	0.00	0.36
Sat Flow, veh/h	1385	2904	4	1385	2909	1236	0	1455	0	2771	0	1236
Grp Volume(v), veh/h	36	332	331	0	785	103	0	0	0	99	0	18
Grp Sat Flow(s),veh/h/ln	1385	1455	1454	1385	1455	1236	0	1455	0	1385	0	1236
Q Serve(g_s), s	1.1	7.1	7.1	0.0	10.9	2.7	0.0	0.0	0.0	1.0	0.0	0.4
Cycle Q Clear(g_c), s	1.1	7.1	7.1	0.0	10.9	2.7	0.0	0.0	0.0	1.0	0.0	0.4
Prop In Lane	1.00		0.00	1.00		1.00	0.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	45	666	666	3	975	414	0	3	0	1001	0	447
V/C Ratio(X)	0.80	0.50	0.50	0.00	0.81	0.25	0.00	0.00	0.00	0.10	0.00	0.04
Avail Cap(c_a), veh/h	125	666	666	125	1183	503	0	526	0	1001	0	447
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.3	8.4	8.4	0.0	13.4	10.7	0.0	0.0	0.0	9.4	0.0	9.2
Incr Delay (d2), s/veh	27.2	0.6	0.6	0.0	3.5	0.3	0.0	0.0	0.0	0.2	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	2.9	2.9	0.0	4.8	1.0	0.0	0.0	0.0	0.4	0.0	0.2
LnGrp Delay(d),s/veh	48.5	9.0	9.0	0.0	16.9	11.0	0.0	0.0	0.0	9.6	0.0	9.3
LnGrp LOS	D	A	A		B	B				A		A
Approach Vol, veh/h		699			888			0			117	
Approach Delay, s/veh		11.0			16.2			0.0			9.5	
Approach LOS		B			B						A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		0.0	0.0	24.3		20.0	5.4	18.8
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	4.0	18.0
Max Q Clear Time (g_c+I1), s		0.0	0.0	9.1		3.0	3.1	12.9
Green Ext Time (p_c), s		0.0	0.0	5.3		0.3	0.0	2.0

Intersection Summary	
HCM 2010 Ctrl Delay	13.6
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	69	644	30	8	821	1277	46	76	8	251	32	33
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	69	644	30	8	821	0	46	76	8	251	32	33
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	82	1218	57	11	1137	0	99	164	17	439	256	218
Arrive On Green	0.06	0.44	0.44	0.01	0.39	0.00	0.20	0.20	0.20	0.18	0.18	0.18
Sat Flow, veh/h	1385	2758	128	1385	2909	0	500	827	87	2494	1455	1236
Grp Volume(v), veh/h	69	339	335	8	821	0	130	0	0	251	32	33
Grp Sat Flow(s),veh/h/ln	1385	1455	1432	1385	1455	0	1414	0	0	1247	1455	1236
Q Serve(g_s), s	4.5	15.4	15.5	0.5	21.8	0.0	7.4	0.0	0.0	8.4	1.7	2.1
Cycle Q Clear(g_c), s	4.5	15.4	15.5	0.5	21.8	0.0	7.4	0.0	0.0	8.4	1.7	2.1
Prop In Lane	1.00		0.09	1.00		0.00	0.35		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	82	642	632	11	1137	0	280	0	0	439	256	218
V/C Ratio(X)	0.85	0.53	0.53	0.72	0.72	0.00	0.46	0.00	0.00	0.57	0.12	0.15
Avail Cap(c_a), veh/h	91	1537	1513	61	3010	0	280	0	0	439	256	218
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.4	18.5	18.5	45.0	23.5	0.0	32.2	0.0	0.0	34.3	31.5	31.7
Incr Delay (d2), s/veh	45.2	0.7	0.7	60.1	0.9	0.0	5.4	0.0	0.0	5.3	1.0	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	6.2	6.2	0.4	8.8	0.0	3.3	0.0	0.0	3.2	0.7	0.8
LnGrp Delay(d),s/veh	87.6	19.1	19.2	105.1	24.4	0.0	37.6	0.0	0.0	39.6	32.5	33.2
LnGrp LOS	F	B	B	F	C		D			D	C	C
Approach Vol, veh/h		743			829			130			316	
Approach Delay, s/veh		25.5			25.1			37.6			38.2	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		22.0	4.7	44.1		20.0	9.3	39.5
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		18.0	4.0	96.0		16.0	6.0	94.0
Max Q Clear Time (g_c+I1), s		9.4	2.5	17.5		10.4	6.5	23.8
Green Ext Time (p_c), s		0.3	0.0	11.8		0.6	0.0	11.8

Intersection Summary	
HCM 2010 Ctrl Delay	28.1
HCM 2010 LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	384	1924	0	826	171
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	384	1924	0	826	171
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	3058	2293	0	921	822
Arrive On Green	0.00	0.53	0.53	0.00	0.37	0.37
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	384	1924	0	826	171
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	2.6	28.5	0.0	23.8	4.0
Cycle Q Clear(g_c), s	0.0	2.6	28.5	0.0	23.8	4.0
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	3058	2293	0	921	822
V/C Ratio(X)	0.00	0.13	0.84	0.00	0.90	0.21
Avail Cap(c_a), veh/h	0	3058	2293	0	1048	936
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	9.2	15.3	0.0	22.6	16.4
Incr Delay (d2), s/veh	0.0	0.1	3.9	0.0	9.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.0	12.0	0.0	9.4	1.2
LnGrp Delay(d),s/veh	0.0	9.3	19.2	0.0	32.1	16.5
LnGrp LOS		A	B		C	B
Approach Vol, veh/h		384	1924		997	
Approach Delay, s/veh		9.3	19.2		29.4	
Approach LOS		A	B		C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				47.9		32.1		47.9
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				40.0		32.0		40.0
Max Q Clear Time (g_c+I1), s				4.6		25.8		30.5
Green Ext Time (p_c), s				21.7		2.3		7.9

Intersection Summary	
HCM 2010 Ctrl Delay	21.1
HCM 2010 LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1120	0	0	1181	1077	697
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1120	0	0	1181	1077	697
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1818	0	0	1364	2197	726
Arrive On Green	0.31	0.00	0.00	0.31	0.59	0.59
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1120	0	0	1181	1077	697
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	13.1	0.0	0.0	20.4	13.3	42.6
Cycle Q Clear(g_c), s	13.1	0.0	0.0	20.4	13.3	42.6
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1818	0	0	1364	2197	726
V/C Ratio(X)	0.62	0.00	0.00	0.87	0.49	0.96
Avail Cap(c_a), veh/h	1818	0	0	1364	2197	726
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.4	0.0	0.0	25.9	9.6	15.6
Incr Delay (d2), s/veh	1.6	0.0	0.0	7.6	0.8	24.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	0.0	0.0	9.2	4.6	19.3
LnGrp Delay(d),s/veh	25.0	0.0	0.0	33.5	10.3	40.5
LnGrp LOS	C			C	B	D
Approach Vol, veh/h	1120			1181	1774	
Approach Delay, s/veh	25.0			33.5	22.2	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		51.0		29.0				29.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		47.0		25.0				25.0
Max Q Clear Time (g_c+I1), s		44.6		15.1				22.4
Green Ext Time (p_c), s		1.7		8.0				2.3

Intersection Summary	
HCM 2010 Ctrl Delay	26.2
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	36	46	323	1097	285	31
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	36	46	323	1097	285	31
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	78	69	372	3370	1823	517
Arrive On Green	0.06	0.06	0.27	0.77	0.42	0.42
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	36	46	323	1097	285	31
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	1.2	1.7	10.4	3.6	1.9	0.7
Cycle Q Clear(g_c), s	1.2	1.7	10.4	3.6	1.9	0.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	78	69	372	3370	1823	517
V/C Ratio(X)	0.46	0.66	0.87	0.33	0.16	0.06
Avail Cap(c_a), veh/h	475	424	475	3370	1823	517
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.3	21.6	16.3	1.6	8.5	8.1
Incr Delay (d2), s/veh	4.2	10.3	13.0	0.3	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	1.3	5.3	1.4	0.8	0.3
LnGrp Delay(d),s/veh	25.6	31.9	29.2	1.9	8.6	8.3
LnGrp LOS	C	C	C	A	A	A
Approach Vol, veh/h	82			1420	316	
Approach Delay, s/veh	29.1			8.1	8.6	
Approach LOS	C			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		6.6	16.5	23.5		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	16.0	16.0		
Max Q Clear Time (g_c+I1), s		5.6		3.7	12.4	3.9		
Green Ext Time (p_c), s		11.0		0.1	0.4	6.8		

Intersection Summary	
HCM 2010 Ctrl Delay	9.1
HCM 2010 LOS	A

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Movement	EBU	EBT	EBR	WBU	WBL	WBT	NBU	NBL	NBR
Vol, veh/h	0	1	108	0	9	1	0	110	29
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	0	1	108	0	9	1	0	110	29
Number of Lanes	0	1	0	0	0	1	0	2	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	3	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	3	0	1
HCM Control Delay	7.7	8.3	7.9
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1
Vol Left, %	100%	100%	0%	0%	90%
Vol Thru, %	0%	0%	0%	1%	10%
Vol Right, %	0%	0%	100%	99%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	55	55	29	109	10
LT Vol	0	0	0	1	1
Through Vol	0	0	29	108	0
RT Vol	55	55	0	0	9
Lane Flow Rate	55	55	29	109	10
Geometry Grp	7	7	7	7	7
Degree of Util (X)	0.082	0.082	0.019	0.131	0.015
Departure Headway (Hd)	5.379	5.379	2.303	4.322	5.543
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	661	661	1513	835	649
Service Time	3.157	3.157	0.08	2.022	3.246
HCM Lane V/C Ratio	0.083	0.083	0.019	0.131	0.015
HCM Control Delay	8.6	8.6	5.1	7.7	8.3
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.3	0.3	0.1	0.5	0

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	15	962	0	0	826	62	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	15	962	0	0	826	62	1	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	826	0	0	962	0	0	1405	1818	481
Stage 1	-	-	-	-	-	-	992	992	-
Stage 2	-	-	-	-	-	-	413	826	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	751	-	-	664	-	-	92	71	510
Stage 1	-	-	-	-	-	-	249	305	-
Stage 2	-	-	-	-	-	-	566	366	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	751	-	-	664	-	-	90	70	510
Mov Cap-2 Maneuver	-	-	-	-	-	-	90	70	-
Stage 1	-	-	-	-	-	-	244	299	-
Stage 2	-	-	-	-	-	-	563	366	-

Approach	EB	WB	NB
HCM Control Delay, s	0.2	0	45.4
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	90	751	-	-	664	-	-	102	566
HCM Lane V/C Ratio	0.011	0.02	-	-	-	-	-	0.5	0.005
HCM Control Delay (s)	45.4	9.9	-	-	0	-	-	71.3	11.4
HCM Lane LOS	E	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	2.2	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	51	0	3
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	51	0	3

Major/Minor	Minor2		
Conflicting Flow All	1337	1818	413
Stage 1	826	826	-
Stage 2	511	992	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	104	71	566
Stage 1	316	366	-
Stage 2	493	305	-
Platoon blocked, %			
Mov Cap-1 Maneuver	102	70	566
Mov Cap-2 Maneuver	102	70	-
Stage 1	310	366	-
Stage 2	483	299	-

Approach	SB
HCM Control Delay, s	68
HCM LOS	F

Minor Lane/Major Mvmt

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	1000	0	0	838	77	9	0	0	113	0	39
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	14	1000	0	0	838	77	9	0	0	113	0	39
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	2	0	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	19	1172	0	2	975	414	301	0	0	601	0	268
Arrive On Green	0.01	0.40	0.00	0.00	0.34	0.34	0.22	0.00	0.00	0.22	0.00	0.22
Sat Flow, veh/h	1385	2909	0	1385	2909	1236	1385	0	0	2771	0	1236
Grp Volume(v), veh/h	14	1000	0	0	838	77	9	0	0	113	0	39
Grp Sat Flow(s),veh/h/ln	1385	1455	0	1385	1455	1236	1385	0	0	1385	0	1236
Q Serve(g_s), s	0.7	23.0	0.0	0.0	19.8	3.3	0.4	0.0	0.0	2.5	0.0	1.9
Cycle Q Clear(g_c), s	0.7	23.0	0.0	0.0	19.8	3.3	0.4	0.0	0.0	2.5	0.0	1.9
Prop In Lane	1.00		0.00	1.00		1.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	19	1172	0	2	975	414	301	0	0	601	0	268
V/C Ratio(X)	0.75	0.85	0.00	0.00	0.86	0.19	0.03	0.00	0.00	0.19	0.00	0.15
Avail Cap(c_a), veh/h	75	1172	0	75	1105	470	301	0	0	601	0	268
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.2	20.0	0.0	0.0	22.9	17.4	22.7	0.0	0.0	23.5	0.0	23.3
Incr Delay (d2), s/veh	44.2	6.3	0.0	0.0	6.4	0.2	0.2	0.0	0.0	0.7	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	10.2	0.0	0.0	8.8	1.1	0.2	0.0	0.0	1.0	0.0	0.7
LnGrp Delay(d),s/veh	80.4	26.3	0.0	0.0	29.2	17.6	22.9	0.0	0.0	24.2	0.0	24.5
LnGrp LOS	F	C			C	B	C			C		C
Approach Vol, veh/h		1014			915			9			152	
Approach Delay, s/veh		27.0			28.3			22.9			24.3	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	0.0	33.7		20.0	5.0	28.7
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	28.0		16.0	4.0	28.0
Max Q Clear Time (g_c+I1), s		2.4	0.0	25.0		4.5	2.7	21.8
Green Ext Time (p_c), s		0.0	0.0	2.4		0.3	0.0	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	27.3
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	33	1004	37	14	789	233	68	36	23	1040	206	58
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	33	1004	37	14	789	0	68	36	23	1040	206	58
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	38	962	35	16	960	0	85	45	29	1046	610	519
Arrive On Green	0.03	0.35	0.35	0.01	0.33	0.00	0.12	0.12	0.12	0.42	0.42	0.42
Sat Flow, veh/h	1385	2788	103	1385	2909	0	736	389	249	2494	1455	1236
Grp Volume(v), veh/h	33	524	517	14	789	0	127	0	0	1040	206	58
Grp Sat Flow(s),veh/h/ln	1385	1455	1436	1385	1455	0	1374	0	0	1247	1455	1236
Q Serve(g_s), s	3.5	51.0	51.0	1.5	36.8	0.0	13.3	0.0	0.0	61.4	14.1	4.2
Cycle Q Clear(g_c), s	3.5	51.0	51.0	1.5	36.8	0.0	13.3	0.0	0.0	61.4	14.1	4.2
Prop In Lane	1.00		0.07	1.00		0.00	0.54		0.18	1.00		1.00
Lane Grp Cap(c), veh/h	38	502	496	16	960	0	158	0	0	1046	610	519
V/C Ratio(X)	0.88	1.04	1.04	0.85	0.82	0.00	0.80	0.00	0.00	0.99	0.34	0.11
Avail Cap(c_a), veh/h	38	502	496	38	1004	0	158	0	0	1046	610	519
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	71.6	48.4	48.4	72.9	45.5	0.0	63.7	0.0	0.0	42.7	29.0	26.1
Incr Delay (d2), s/veh	100.1	51.9	52.1	68.2	5.4	0.0	33.7	0.0	0.0	26.4	1.5	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	27.6	27.3	0.9	15.5	0.0	6.6	0.0	0.0	24.9	5.9	1.5
LnGrp Delay(d),s/veh	171.7	100.2	100.5	141.0	50.9	0.0	97.4	0.0	0.0	69.1	30.5	26.5
LnGrp LOS	F	F	F	F	D		F			E	C	C
Approach Vol, veh/h		1074			803			127			1304	
Approach Delay, s/veh		102.6			52.5			97.4			61.1	
Approach LOS		F			D			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	5.7	55.0		66.0	8.0	52.7
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	51.0		62.0	4.0	51.0
Max Q Clear Time (g_c+I1), s		15.3	3.5	53.0		63.4	5.5	38.8
Green Ext Time (p_c), s		0.1	0.0	0.0		0.0	0.0	7.8

Intersection Summary	
HCM 2010 Ctrl Delay	73.9
HCM 2010 LOS	E

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	1058	864	0	723	155
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	1058	864	0	723	155
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	2951	2213	0	892	796
Arrive On Green	0.00	0.51	0.51	0.00	0.36	0.36
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	1058	864	0	723	155
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	6.5	7.2	0.0	15.5	2.8
Cycle Q Clear(g_c), s	0.0	6.5	7.2	0.0	15.5	2.8
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2951	2213	0	892	796
V/C Ratio(X)	0.00	0.36	0.39	0.00	0.81	0.19
Avail Cap(c_a), veh/h	0	2951	2213	0	1770	1580
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	8.8	9.0	0.0	17.2	13.1
Incr Delay (d2), s/veh	0.0	0.3	0.5	0.0	1.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.6	3.0	0.0	5.5	0.9
LnGrp Delay(d),s/veh	0.0	9.1	9.5	0.0	19.0	13.2
LnGrp LOS		A	A		B	B
Approach Vol, veh/h		1058	864		878	
Approach Delay, s/veh		9.1	9.5		18.0	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				54.8		25.2		54.8
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				30.0		42.0		30.0
Max Q Clear Time (g_c+I1), s				8.5		17.5		9.2
Green Ext Time (p_c), s				12.5		3.6		12.2

Intersection Summary	
HCM 2010 Ctrl Delay	12.0
HCM 2010 LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1579	0	0	976	532	628
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1579	0	0	976	532	628
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1818	0	0	1364	2197	726
Arrive On Green	0.31	0.00	0.00	0.31	0.59	0.59
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1579	0	0	976	532	628
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	20.5	0.0	0.0	15.8	5.5	34.1
Cycle Q Clear(g_c), s	20.5	0.0	0.0	15.8	5.5	34.1
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1818	0	0	1364	2197	726
V/C Ratio(X)	0.87	0.00	0.00	0.72	0.24	0.86
Avail Cap(c_a), veh/h	1818	0	0	1364	2197	726
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.9	0.0	0.0	24.4	7.9	13.8
Incr Delay (d2), s/veh	5.9	0.0	0.0	3.2	0.3	13.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.0	0.0	0.0	6.7	1.9	14.1
LnGrp Delay(d),s/veh	31.9	0.0	0.0	27.6	8.2	26.9
LnGrp LOS	C			C	A	C
Approach Vol, veh/h	1579			976	1160	
Approach Delay, s/veh	31.9			27.6	18.3	
Approach LOS	C			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		51.0		29.0				29.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		47.0		25.0				25.0
Max Q Clear Time (g_c+I1), s		36.1		22.5				17.8
Green Ext Time (p_c), s		3.9		2.3				6.3

Intersection Summary	
HCM 2010 Ctrl Delay	26.5
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	90	294	98	208	1006	91
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	90	294	98	208	1006	91
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	365	326	116	2629	1971	558
Arrive On Green	0.26	0.26	0.08	0.60	0.45	0.45
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	90	294	98	208	1006	91
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	3.1	13.7	4.2	1.2	9.8	2.6
Cycle Q Clear(g_c), s	3.1	13.7	4.2	1.2	9.8	2.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	365	326	116	2629	1971	558
V/C Ratio(X)	0.25	0.90	0.84	0.08	0.51	0.16
Avail Cap(c_a), veh/h	371	331	255	2629	1971	558
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.3	21.3	27.0	5.0	11.7	9.7
Incr Delay (d2), s/veh	0.3	26.3	14.8	0.1	0.9	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	10.8	2.1	0.5	4.1	1.0
LnGrp Delay(d),s/veh	17.7	47.6	41.8	5.0	12.6	10.3
LnGrp LOS	B	D	D	A	B	B
Approach Vol, veh/h	384			306	1097	
Approach Delay, s/veh	40.6			16.8	12.4	
Approach LOS	D			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		19.7	9.0	31.0		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	11.0	21.0		
Max Q Clear Time (g_c+I1), s		3.2		15.7	6.2	11.8		
Green Ext Time (p_c), s		9.9		0.0	0.1	5.1		

Intersection Summary	
HCM 2010 Ctrl Delay	19.2
HCM 2010 LOS	B

Intersection	
Intersection Delay, s/veh	8
Intersection LOS	A

Movement	EBU	EBT	EBR	WBU	WBL	WBT	NBU	NBL	NBR
Vol, veh/h	0	1	112	0	39	1	0	81	10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	0	1	112	0	39	1	0	81	10
Number of Lanes	0	1	0	0	0	1	0	2	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	3	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	3	0	1
HCM Control Delay	7.6	8.5	8.2
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1
Vol Left, %	100%	100%	0%	0%	97%
Vol Thru, %	0%	0%	0%	1%	3%
Vol Right, %	0%	0%	100%	99%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	41	41	10	113	40
LT Vol	0	0	0	1	1
Through Vol	0	0	10	112	0
RT Vol	41	41	0	0	39
Lane Flow Rate	40	40	10	113	40
Geometry Grp	7	7	7	7	7
Degree of Util (X)	0.062	0.062	0.007	0.133	0.061
Departure Headway (Hd)	5.54	5.54	2.46	4.253	5.481
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	650	650	1459	848	657
Service Time	3.247	3.247	0.168	1.957	3.187
HCM Lane V/C Ratio	0.062	0.062	0.007	0.133	0.061
HCM Control Delay	8.6	8.6	5.2	7.6	8.5
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.2	0.2	0	0.5	0.2

Existing Plus Growth Plus Other Development With Project Conditions

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	2	699	0	0	800	19	2	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	2	699	0	0	800	19	2	0	2

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	800	0	0	699	0	0	1103	1503	350
Stage 1	-	-	-	-	-	-	703	703	-
Stage 2	-	-	-	-	-	-	400	800	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	769	-	-	842	-	-	156	112	624
Stage 1	-	-	-	-	-	-	376	419	-
Stage 2	-	-	-	-	-	-	576	377	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	769	-	-	842	-	-	154	112	624
Mov Cap-2 Maneuver	-	-	-	-	-	-	154	112	-
Stage 1	-	-	-	-	-	-	375	418	-
Stage 2	-	-	-	-	-	-	568	377	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	19.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	247	769	-	-	842	-	-	142	578
HCM Lane V/C Ratio	0.016	0.003	-	-	-	-	-	0.62	0.014
HCM Control Delay (s)	19.8	9.7	-	-	0	-	-	64.8	11.3
HCM Lane LOS	C	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	3.3	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	88	0	8
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	88	0	8

Major/Minor	Minor2		
Conflicting Flow All	1154	1503	400
Stage 1	800	800	-
Stage 2	354	703	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	143	112	578
Stage 1	328	377	-
Stage 2	614	419	-
Platoon blocked, %			
Mov Cap-1 Maneuver	142	112	578
Mov Cap-2 Maneuver	142	112	-
Stage 1	327	377	-
Stage 2	610	418	-

Approach	SB
HCM Control Delay, s	60.3
HCM LOS	F

Minor Lane/Major Mvmt

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	36	741	1	1	801	103	0	7	7	99	1	18
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	36	741	1	1	801	103	0	7	7	100	0	18
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	2	0	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	40	850	1	2	770	327	0	157	157	652	0	291
Arrive On Green	0.03	0.29	0.29	0.00	0.26	0.26	0.00	0.24	0.24	0.24	0.00	0.24
Sat Flow, veh/h	1385	2904	4	1385	2909	1236	0	668	668	2771	0	1236
Grp Volume(v), veh/h	36	371	371	1	801	103	0	0	14	100	0	18
Grp Sat Flow(s),veh/h/ln	1385	1455	1454	1385	1455	1236	0	0	1337	1385	0	1236
Q Serve(g_s), s	1.8	16.5	16.5	0.0	18.0	4.5	0.0	0.0	0.6	1.9	0.0	0.8
Cycle Q Clear(g_c), s	1.8	16.5	16.5	0.0	18.0	4.5	0.0	0.0	0.6	1.9	0.0	0.8
Prop In Lane	1.00		0.00	1.00		1.00	0.00		0.50	1.00		1.00
Lane Grp Cap(c), veh/h	40	426	426	2	770	327	0	0	315	652	0	291
V/C Ratio(X)	0.90	0.87	0.87	0.49	1.04	0.31	0.00	0.00	0.04	0.15	0.00	0.06
Avail Cap(c_a), veh/h	82	426	426	82	770	327	0	0	315	652	0	291
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.9	22.8	22.8	33.9	25.0	20.0	0.0	0.0	20.1	20.6	0.0	20.2
Incr Delay (d2), s/veh	43.2	17.6	17.6	120.5	43.2	0.5	0.0	0.0	0.3	0.5	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	8.7	8.7	0.1	11.8	1.6	0.0	0.0	0.2	0.8	0.0	0.3
LnGrp Delay(d),s/veh	76.1	40.4	40.4	154.4	68.2	20.6	0.0	0.0	20.3	21.1	0.0	20.6
LnGrp LOS	E	D	D	F	F	C			C	C		C
Approach Vol, veh/h		778			905			14			118	
Approach Delay, s/veh		42.0			62.9			20.3			21.0	
Approach LOS		D			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	4.1	23.9		20.0	6.0	22.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	4.0	18.0
Max Q Clear Time (g_c+I1), s		2.6	2.0	18.5		3.9	3.8	20.0
Green Ext Time (p_c), s		0.0	0.0	0.0		0.3	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	50.9
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	150	649	30	8	824	1492	46	166	8	290	53	48
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	150	649	30	8	824	0	46	166	8	290	53	48
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	159	1336	62	11	1098	0	60	217	10	382	223	190
Arrive On Green	0.11	0.48	0.48	0.01	0.38	0.00	0.20	0.20	0.20	0.15	0.15	0.15
Sat Flow, veh/h	1385	2759	127	1385	2909	0	299	1079	52	2494	1455	1236
Grp Volume(v), veh/h	150	342	337	8	824	0	220	0	0	290	53	48
Grp Sat Flow(s),veh/h/ln	1385	1455	1432	1385	1455	0	1430	0	0	1247	1455	1236
Q Serve(g_s), s	11.2	16.5	16.6	0.6	25.7	0.0	15.2	0.0	0.0	11.6	3.3	3.6
Cycle Q Clear(g_c), s	11.2	16.5	16.6	0.6	25.7	0.0	15.2	0.0	0.0	11.6	3.3	3.6
Prop In Lane	1.00		0.09	1.00		0.00	0.21		0.04	1.00		1.00
Lane Grp Cap(c), veh/h	159	704	694	11	1098	0	288	0	0	382	223	190
V/C Ratio(X)	0.94	0.49	0.49	0.73	0.75	0.00	0.76	0.00	0.00	0.76	0.24	0.25
Avail Cap(c_a), veh/h	159	1296	1276	53	2369	0	288	0	0	382	223	190
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.8	18.1	18.2	51.7	28.2	0.0	39.4	0.0	0.0	42.3	38.8	38.9
Incr Delay (d2), s/veh	54.2	0.5	0.5	62.6	1.1	0.0	17.4	0.0	0.0	13.2	2.5	3.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.7	6.7	6.7	0.4	10.5	0.0	7.4	0.0	0.0	4.7	1.5	1.4
LnGrp Delay(d),s/veh	100.1	18.7	18.7	114.3	29.3	0.0	56.8	0.0	0.0	55.6	41.3	42.1
LnGrp LOS	F	B	B	F	C		E			E	D	D
Approach Vol, veh/h		829			832			220			391	
Approach Delay, s/veh		33.4			30.1			56.8			52.0	
Approach LOS		C			C			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		25.0	4.8	54.6		20.0	16.0	43.4
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		21.0	4.0	93.0		16.0	12.0	85.0
Max Q Clear Time (g_c+I1), s		17.2	2.6	18.6		13.6	13.2	27.7
Green Ext Time (p_c), s		0.4	0.0	11.9		0.4	0.0	11.7

Intersection Summary	
HCM 2010 Ctrl Delay	37.7
HCM 2010 LOS	D

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	409	2150	0	836	171
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	409	2150	0	836	171
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	3153	2365	0	891	795
Arrive On Green	0.00	0.54	0.54	0.00	0.36	0.36
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	409	2150	0	836	171
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	2.7	35.3	0.0	25.7	4.2
Cycle Q Clear(g_c), s	0.0	2.7	35.3	0.0	25.7	4.2
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	3153	2365	0	891	795
V/C Ratio(X)	0.00	0.13	0.91	0.00	0.94	0.22
Avail Cap(c_a), veh/h	0	3153	2365	0	911	813
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	9.0	16.4	0.0	24.7	17.8
Incr Delay (d2), s/veh	0.0	0.1	6.6	0.0	16.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.1	15.4	0.0	10.9	1.3
LnGrp Delay(d),s/veh	0.0	9.0	23.0	0.0	41.4	17.9
LnGrp LOS		A	C		D	B
Approach Vol, veh/h		409	2150		1007	
Approach Delay, s/veh		9.0	23.0		37.4	
Approach LOS		A	C		D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				47.6		32.4		47.6
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				43.0		29.0		43.0
Max Q Clear Time (g_c+I1), s				4.7		27.7		37.3
Green Ext Time (p_c), s				26.0		0.6		5.2

Intersection Summary	
HCM 2010 Ctrl Delay	25.4
HCM 2010 LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1147	0	0	1275	1209	697
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1147	0	0	1275	1209	697
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1891	0	0	1418	2151	711
Arrive On Green	0.32	0.00	0.00	0.32	0.57	0.57
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1147	0	0	1275	1209	697
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	13.3	0.0	0.0	22.3	16.2	43.9
Cycle Q Clear(g_c), s	13.3	0.0	0.0	22.3	16.2	43.9
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1891	0	0	1418	2151	711
V/C Ratio(X)	0.61	0.00	0.00	0.90	0.56	0.98
Avail Cap(c_a), veh/h	1891	0	0	1418	2151	711
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.7	0.0	0.0	25.7	10.7	16.6
Incr Delay (d2), s/veh	1.5	0.0	0.0	9.4	1.1	29.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	0.0	0.0	10.1	5.7	20.5
LnGrp Delay(d),s/veh	24.2	0.0	0.0	35.1	11.7	45.9
LnGrp LOS	C			D	B	D
Approach Vol, veh/h	1147			1275	1906	
Approach Delay, s/veh	24.2			35.1	24.2	
Approach LOS	C			D	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		50.0		30.0				30.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		46.0		26.0				26.0
Max Q Clear Time (g_c+I1), s		45.9		15.3				24.3
Green Ext Time (p_c), s		0.1		8.8				1.6

Intersection Summary	
HCM 2010 Ctrl Delay	27.4
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	43	47	324	1482	359	32
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	43	47	324	1482	359	32
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	82	73	373	3360	1812	513
Arrive On Green	0.06	0.06	0.27	0.77	0.42	0.42
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	43	47	324	1482	359	32
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	1.4	1.7	10.4	5.5	2.5	0.7
Cycle Q Clear(g_c), s	1.4	1.7	10.4	5.5	2.5	0.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	82	73	373	3360	1812	513
V/C Ratio(X)	0.53	0.64	0.87	0.44	0.20	0.06
Avail Cap(c_a), veh/h	474	423	474	3360	1812	513
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.4	21.5	16.3	1.9	8.7	8.2
Incr Delay (d2), s/veh	5.2	9.2	13.2	0.4	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	1.4	5.3	2.2	1.0	0.3
LnGrp Delay(d),s/veh	26.5	30.7	29.4	2.3	9.0	8.4
LnGrp LOS	C	C	C	A	A	A
Approach Vol, veh/h	90			1806	391	
Approach Delay, s/veh	28.7			7.2	8.9	
Approach LOS	C			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		6.8	16.6	23.4		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	16.0	16.0		
Max Q Clear Time (g_c+I1), s		7.5		3.7	12.4	4.5		
Green Ext Time (p_c), s		15.4		0.2	0.3	8.3		

Intersection Summary	
HCM 2010 Ctrl Delay	8.3
HCM 2010 LOS	A

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBU	EBT	EBR	WBU	WBL	WBT	NBU	NBL	NBR
Vol, veh/h	0	1	108	0	10	1	0	110	36
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	0	1	108	0	10	1	0	110	36
Number of Lanes	0	1	0	0	0	1	0	2	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	3	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	3	0	1
HCM Control Delay	7.7	8.4	7.7
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1
Vol Left, %	100%	100%	0%	0%	91%
Vol Thru, %	0%	0%	0%	1%	9%
Vol Right, %	0%	0%	100%	99%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	55	55	36	109	11
LT Vol	0	0	0	1	1
Through Vol	0	0	36	108	0
RT Vol	55	55	0	0	10
Lane Flow Rate	55	55	36	109	11
Geometry Grp	7	7	7	7	7
Degree of Util (X)	0.082	0.082	0.023	0.131	0.017
Departure Headway (Hd)	5.38	5.38	2.305	4.33	5.556
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	660	660	1511	833	648
Service Time	3.16	3.16	0.083	2.03	3.258
HCM Lane V/C Ratio	0.083	0.083	0.024	0.131	0.017
HCM Control Delay	8.6	8.6	5.1	7.7	8.4
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.3	0.3	0.1	0.5	0.1

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	15	994	0	0	913	62	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	15	994	0	0	913	62	1	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	913	0	0	994	0	0	1481	1937	497
Stage 1	-	-	-	-	-	-	1024	1024	-
Stage 2	-	-	-	-	-	-	457	913	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.7	6.7	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.7	5.7	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.7	5.7	-
Follow-up Hdwy	2.3	-	-	2.3	-	-	3.6	4.1	3.4
Pot Cap-1 Maneuver	694	-	-	645	-	-	81	59	498
Stage 1	-	-	-	-	-	-	238	294	-
Stage 2	-	-	-	-	-	-	532	333	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	694	-	-	645	-	-	79	58	498
Mov Cap-2 Maneuver	-	-	-	-	-	-	79	58	-
Stage 1	-	-	-	-	-	-	233	288	-
Stage 2	-	-	-	-	-	-	529	333	-

Approach	EB	WB	NB
HCM Control Delay, s	0.2	0	51.2
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	79	694	-	-	645	-	-	86	529
HCM Lane V/C Ratio	0.013	0.022	-	-	-	-	-	0.593	0.006
HCM Control Delay (s)	51.2	10.3	-	-	0	-	-	95.1	11.8
HCM Lane LOS	F	B	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	2.7	0

Intersection	
Int Delay, s/veh	

Movement	SBL	SBT	SBR
Vol, veh/h	51	0	3
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	0	-	200
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	100	100	100
Heavy Vehicles, %	10	10	10
Mvmt Flow	51	0	3

Major/Minor	Minor2		
Conflicting Flow All	1440	1937	457
Stage 1	913	913	-
Stage 2	527	1024	-
Critical Hdwy	7.7	6.7	7.1
Critical Hdwy Stg 1	6.7	5.7	-
Critical Hdwy Stg 2	6.7	5.7	-
Follow-up Hdwy	3.6	4.1	3.4
Pot Cap-1 Maneuver	87	59	529
Stage 1	279	333	-
Stage 2	482	294	-
Platoon blocked, %			
Mov Cap-1 Maneuver	86	58	529
Mov Cap-2 Maneuver	86	58	-
Stage 1	273	333	-
Stage 2	472	288	-

Approach	SB
HCM Control Delay, s	90.5
HCM LOS	F

Minor Lane/Major Mvmt

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	1032	0	6	925	77	9	2	2	113	6	39
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1455	1600	1455	1600	1455	1455	1455
Adj Flow Rate, veh/h	14	1032	0	6	925	77	9	2	2	117	0	39
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	2	0	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	19	1066	0	9	1045	444	198	44	44	579	0	259
Arrive On Green	0.01	0.37	0.00	0.01	0.36	0.36	0.21	0.21	0.21	0.21	0.00	0.21
Sat Flow, veh/h	1385	2909	0	1385	2909	1236	948	211	211	2771	0	1236
Grp Volume(v), veh/h	14	1032	0	6	925	77	13	0	0	117	0	39
Grp Sat Flow(s),veh/h/ln	1385	1455	0	1385	1455	1236	1370	0	0	1385	0	1236
Q Serve(g_s), s	0.8	26.7	0.0	0.3	22.9	3.3	0.6	0.0	0.0	2.7	0.0	2.0
Cycle Q Clear(g_c), s	0.8	26.7	0.0	0.3	22.9	3.3	0.6	0.0	0.0	2.7	0.0	2.0
Prop In Lane	1.00		0.00	1.00		1.00	0.69		0.15	1.00		1.00
Lane Grp Cap(c), veh/h	19	1066	0	9	1045	444	286	0	0	579	0	259
V/C Ratio(X)	0.75	0.97	0.00	0.69	0.89	0.17	0.05	0.00	0.00	0.20	0.00	0.15
Avail Cap(c_a), veh/h	72	1066	0	72	1065	452	286	0	0	579	0	259
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.6	23.8	0.0	37.9	23.0	16.8	24.2	0.0	0.0	25.0	0.0	24.7
Incr Delay (d2), s/veh	44.9	20.2	0.0	67.7	9.0	0.2	0.3	0.0	0.0	0.8	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	13.6	0.0	0.3	10.4	1.1	0.2	0.0	0.0	1.1	0.0	0.8
LnGrp Delay(d),s/veh	82.6	44.0	0.0	105.6	32.0	16.9	24.5	0.0	0.0	25.8	0.0	25.9
LnGrp LOS	F	D		F	C	B	C			C		C
Approach Vol, veh/h		1046			1008			13			156	
Approach Delay, s/veh		44.5			31.3			24.5			25.8	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	4.5	32.0		20.0	5.0	31.5
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	28.0		16.0	4.0	28.0
Max Q Clear Time (g_c+I1), s		2.6	2.3	28.7		4.7	2.8	24.9
Green Ext Time (p_c), s		0.0	0.0	0.0		0.4	0.0	2.6

Intersection Summary	
HCM 2010 Ctrl Delay	37.1
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	52	1019	37	14	806	284	68	71	23	1243	302	134
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1600	1455	1455	1600	1600	1455	1600	1309	1455	1455
Adj Flow Rate, veh/h	52	1019	37	14	806	0	68	71	23	1243	302	134
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	2	1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10	10	10	10	10	10	10
Cap, veh/h	37	892	32	16	886	0	75	78	25	1077	628	534
Arrive On Green	0.03	0.32	0.32	0.01	0.30	0.00	0.13	0.13	0.13	0.43	0.43	0.43
Sat Flow, veh/h	1385	2790	101	1385	2909	0	584	609	197	2494	1455	1236
Grp Volume(v), veh/h	52	531	525	14	806	0	162	0	0	1243	302	134
Grp Sat Flow(s),veh/h/ln	1385	1455	1437	1385	1455	0	1391	0	0	1247	1455	1236
Q Serve(g_s), s	4.0	47.4	47.4	1.5	39.5	0.0	17.0	0.0	0.0	64.0	22.0	10.2
Cycle Q Clear(g_c), s	4.0	47.4	47.4	1.5	39.5	0.0	17.0	0.0	0.0	64.0	22.0	10.2
Prop In Lane	1.00		0.07	1.00		0.00	0.42		0.14	1.00		1.00
Lane Grp Cap(c), veh/h	37	465	460	16	886	0	178	0	0	1077	628	534
V/C Ratio(X)	1.39	1.14	1.14	0.85	0.91	0.00	0.91	0.00	0.00	1.15	0.48	0.25
Avail Cap(c_a), veh/h	37	465	460	37	923	0	178	0	0	1077	628	534
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	72.1	50.4	50.4	73.1	49.5	0.0	63.7	0.0	0.0	42.1	30.2	26.8
Incr Delay (d2), s/veh	282.3	86.7	87.0	68.3	12.5	0.0	46.8	0.0	0.0	80.1	2.6	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.5	30.2	29.9	0.9	17.4	0.0	8.9	0.0	0.0	34.0	9.3	3.7
LnGrp Delay(d),s/veh	354.3	137.1	137.3	141.4	62.0	0.0	110.6	0.0	0.0	122.1	32.8	27.9
LnGrp LOS	F	F	F	F	E		F			F	C	C
Approach Vol, veh/h		1108			820			162			1679	
Approach Delay, s/veh		147.4			63.4			110.6			98.6	
Approach LOS		F			E			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		23.0	5.8	51.4		68.0	8.0	49.1
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		19.0	4.0	47.0		64.0	4.0	47.0
Max Q Clear Time (g_c+I1), s		19.0	3.5	49.4		66.0	6.0	41.5
Green Ext Time (p_c), s		0.0	0.0	0.0		0.0	0.0	3.7

Intersection Summary	
HCM 2010 Ctrl Delay	105.8
HCM 2010 LOS	F

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰↰	↱↱
Volume (veh/h)	0	1183	948	0	774	155
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1455	1455	0	1309	1309
Adj Flow Rate, veh/h	0	1183	948	0	774	155
Adj No. of Lanes	0	4	3	0	2	2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	0	10	10	0	10	10
Cap, veh/h	0	2864	2148	0	939	838
Arrive On Green	0.00	0.49	0.49	0.00	0.38	0.38
Sat Flow, veh/h	0	5818	4364	0	2494	2225
Grp Volume(v), veh/h	0	1183	948	0	774	155
Grp Sat Flow(s),veh/h/ln	0	1455	1455	0	1247	1113
Q Serve(g_s), s	0.0	7.9	8.6	0.0	17.1	2.8
Cycle Q Clear(g_c), s	0.0	7.9	8.6	0.0	17.1	2.8
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2864	2148	0	939	838
V/C Ratio(X)	0.00	0.41	0.44	0.00	0.82	0.18
Avail Cap(c_a), veh/h	0	2864	2148	0	1718	1533
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	9.9	10.0	0.0	17.2	12.7
Incr Delay (d2), s/veh	0.0	0.4	0.7	0.0	1.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.2	3.6	0.0	6.1	0.9
LnGrp Delay(d),s/veh	0.0	10.3	10.7	0.0	19.1	12.8
LnGrp LOS		B	B		B	B
Approach Vol, veh/h		1183	948		929	
Approach Delay, s/veh		10.3	10.7		18.0	
Approach LOS		B	B		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				53.0		27.0		53.0
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				30.0		42.0		30.0
Max Q Clear Time (g_c+I1), s				9.9		19.1		10.6
Green Ext Time (p_c), s				13.2		3.8		12.9

Intersection Summary	
HCM 2010 Ctrl Delay	12.8
HCM 2010 LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1719	0	0	998	594	628
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	0	0	1455	1309	1455
Adj Flow Rate, veh/h	1719	0	0	998	594	628
Adj No. of Lanes	4	0	0	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	0	0	10	10	10
Cap, veh/h	1964	0	0	1473	2104	695
Arrive On Green	0.34	0.00	0.00	0.34	0.56	0.56
Sat Flow, veh/h	5818	0	0	4364	3740	1236
Grp Volume(v), veh/h	1719	0	0	998	594	628
Grp Sat Flow(s),veh/h/ln	1455	0	0	1455	1247	1236
Q Serve(g_s), s	22.2	0.0	0.0	15.7	6.6	36.1
Cycle Q Clear(g_c), s	22.2	0.0	0.0	15.7	6.6	36.1
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1964	0	0	1473	2104	695
V/C Ratio(X)	0.88	0.00	0.00	0.68	0.28	0.90
Avail Cap(c_a), veh/h	1964	0	0	1473	2104	695
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.9	0.0	0.0	22.8	9.1	15.6
Incr Delay (d2), s/veh	5.8	0.0	0.0	2.5	0.3	17.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.6	0.0	0.0	6.6	2.3	15.5
LnGrp Delay(d),s/veh	30.8	0.0	0.0	25.3	9.4	32.8
LnGrp LOS	C			C	A	C
Approach Vol, veh/h	1719			998	1222	
Approach Delay, s/veh	30.8			25.3	21.5	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		49.0		31.0				31.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		45.0		27.0				27.0
Max Q Clear Time (g_c+I1), s		38.1		24.2				17.7
Green Ext Time (p_c), s		3.1		2.6				8.2

Intersection Summary	
HCM 2010 Ctrl Delay	26.5
HCM 2010 LOS	C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	92	296	100	311	1379	97
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1455	1455	1455	1455	1455	1455
Adj Flow Rate, veh/h	92	296	100	311	1379	97
Adj No. of Lanes	1	1	1	3	3	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	10	10	10	10	10	10
Cap, veh/h	367	327	118	2625	1961	556
Arrive On Green	0.26	0.26	0.09	0.60	0.45	0.45
Sat Flow, veh/h	1385	1236	1385	4364	4364	1236
Grp Volume(v), veh/h	92	296	100	311	1379	97
Grp Sat Flow(s),veh/h/ln	1385	1236	1385	1455	1455	1236
Q Serve(g_s), s	3.1	13.8	4.3	1.8	15.2	2.8
Cycle Q Clear(g_c), s	3.1	13.8	4.3	1.8	15.2	2.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	367	327	118	2625	1961	556
V/C Ratio(X)	0.25	0.90	0.85	0.12	0.70	0.17
Avail Cap(c_a), veh/h	370	331	185	2625	1961	556
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.3	21.3	27.0	5.1	13.3	9.8
Incr Delay (d2), s/veh	0.4	26.7	18.6	0.1	2.1	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	10.9	2.2	0.7	6.4	1.0
LnGrp Delay(d),s/veh	17.7	48.0	45.6	5.2	15.4	10.5
LnGrp LOS	B	D	D	A	B	B
Approach Vol, veh/h	388			411	1476	
Approach Delay, s/veh	40.8			15.0	15.1	
Approach LOS	D			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		40.0		19.9	9.1	30.9		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	8.0	24.0		
Max Q Clear Time (g_c+I1), s		3.8		15.8	6.3	17.2		
Green Ext Time (p_c), s		15.1		0.0	0.0	5.1		

Intersection Summary	
HCM 2010 Ctrl Delay	19.5
HCM 2010 LOS	B

Intersection	
Intersection Delay, s/veh	8
Intersection LOS	A

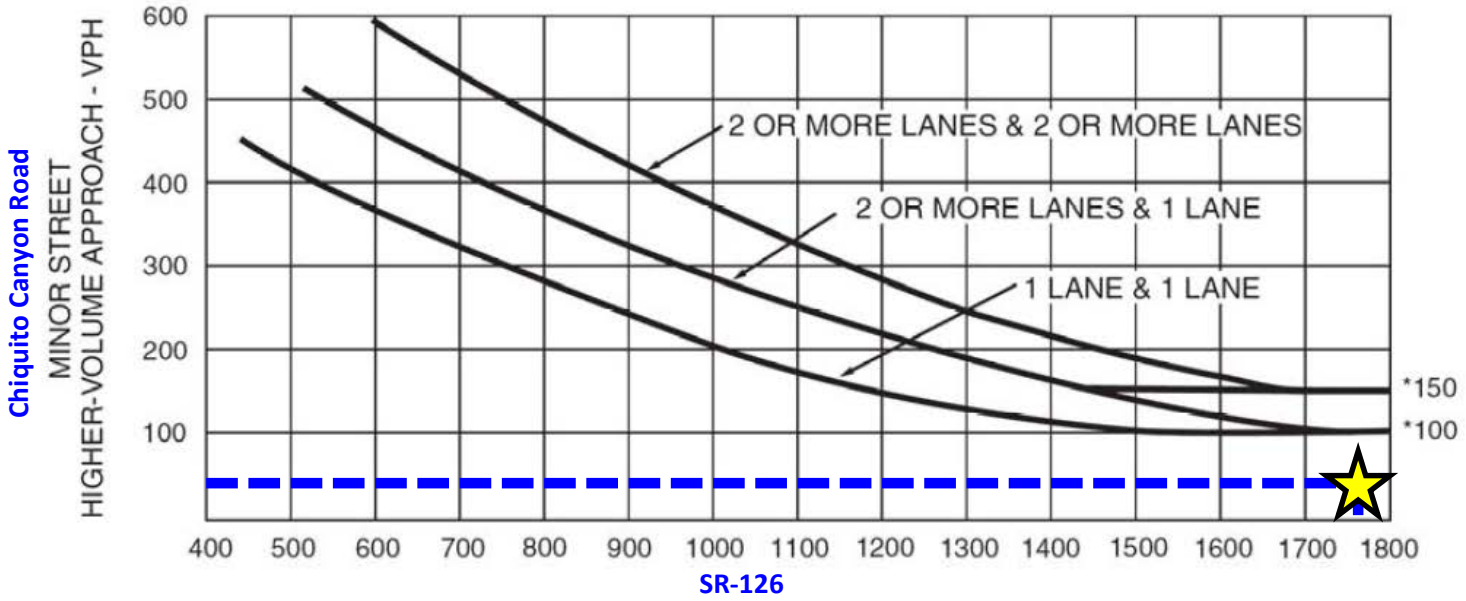
Movement	EBU	EBT	EBR	WBU	WBL	WBT	NBU	NBL	NBR
Vol, veh/h	0	1	112	0	46	1	0	81	12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10
Mvmt Flow	0	1	112	0	46	1	0	81	12
Number of Lanes	0	1	0	0	0	1	0	2	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	3	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	3	0	1
HCM Control Delay	7.6	8.6	8.2
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1
Vol Left, %	100%	100%	0%	0%	98%
Vol Thru, %	0%	0%	0%	1%	2%
Vol Right, %	0%	0%	100%	99%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	41	41	12	113	47
LT Vol	0	0	0	1	1
Through Vol	0	0	12	112	0
RT Vol	41	41	0	0	46
Lane Flow Rate	40	40	12	113	47
Geometry Grp	7	7	7	7	7
Degree of Util (X)	0.063	0.063	0.008	0.134	0.072
Departure Headway (Hd)	5.558	5.558	2.479	4.261	5.485
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	647	647	1446	845	656
Service Time	3.27	3.27	0.19	1.97	3.195
HCM Lane V/C Ratio	0.062	0.062	0.008	0.134	0.072
HCM Control Delay	8.6	8.6	5.2	7.6	8.6
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.2	0.2	0	0.5	0.2

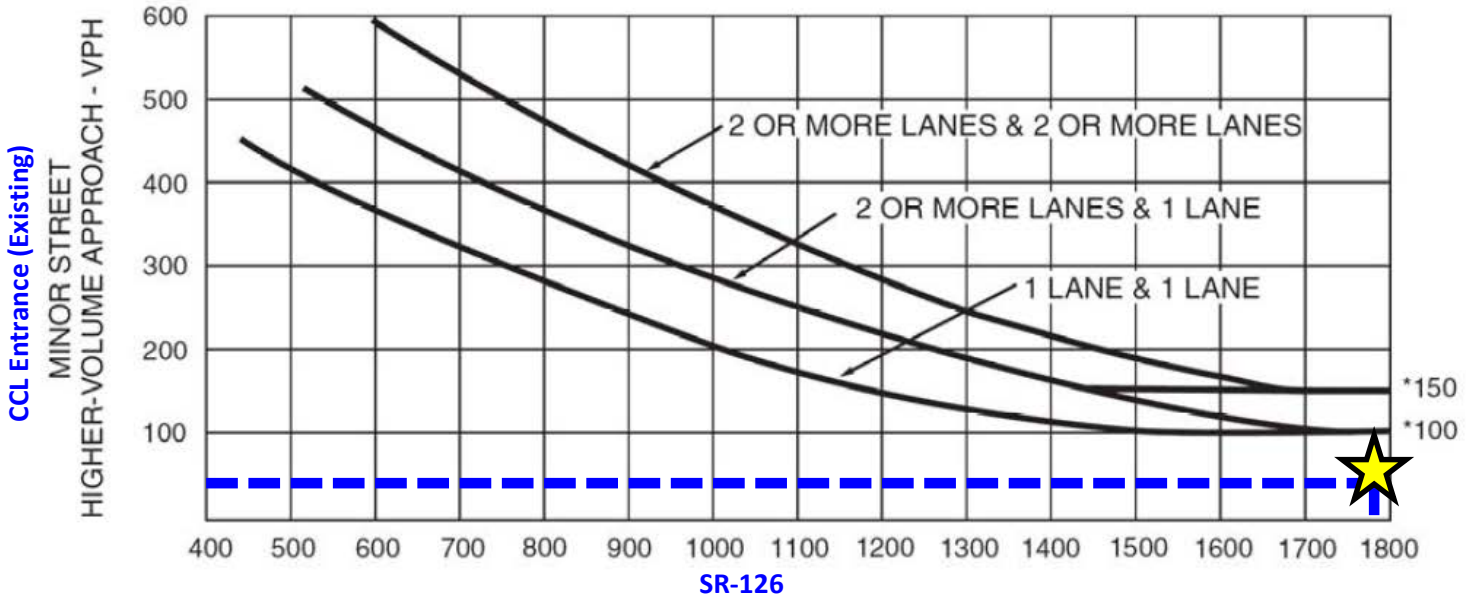
Appendix D
Traffic Signal Warrant Worksheets

Existing (2013) Highest Peak Hour = PM Peak Hour



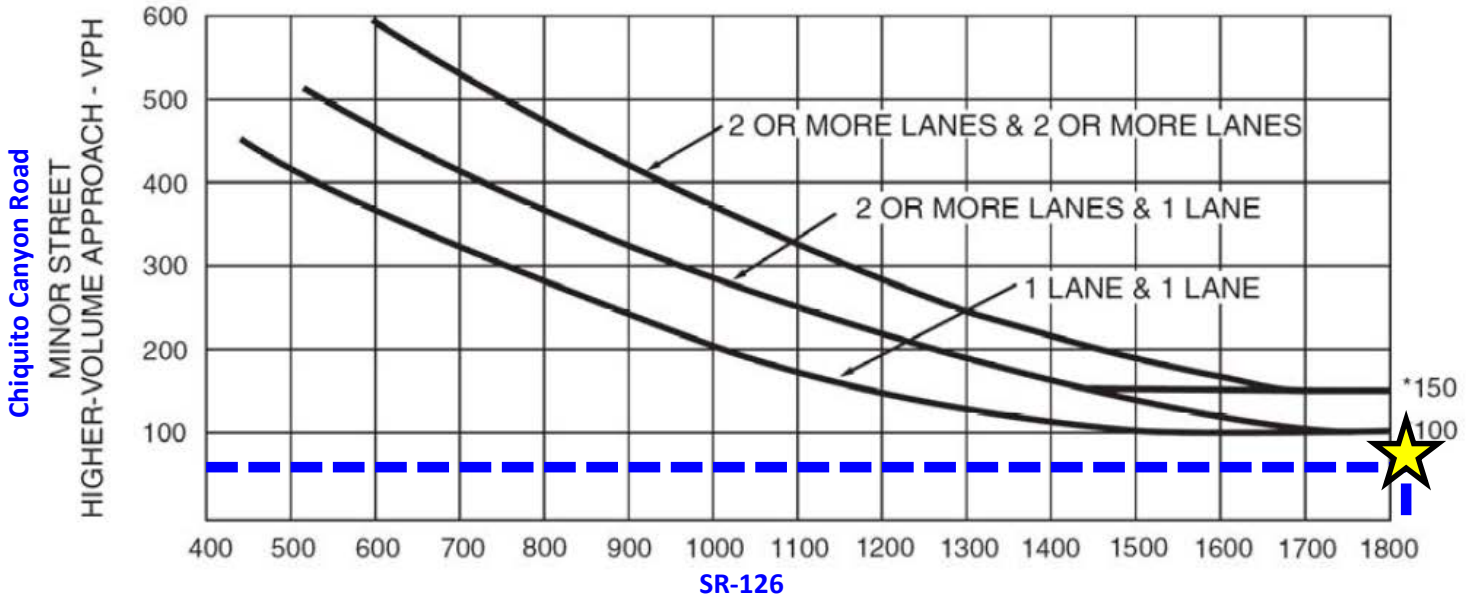
*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Existing (2013) Highest Peak Hour = PM Peak Hour



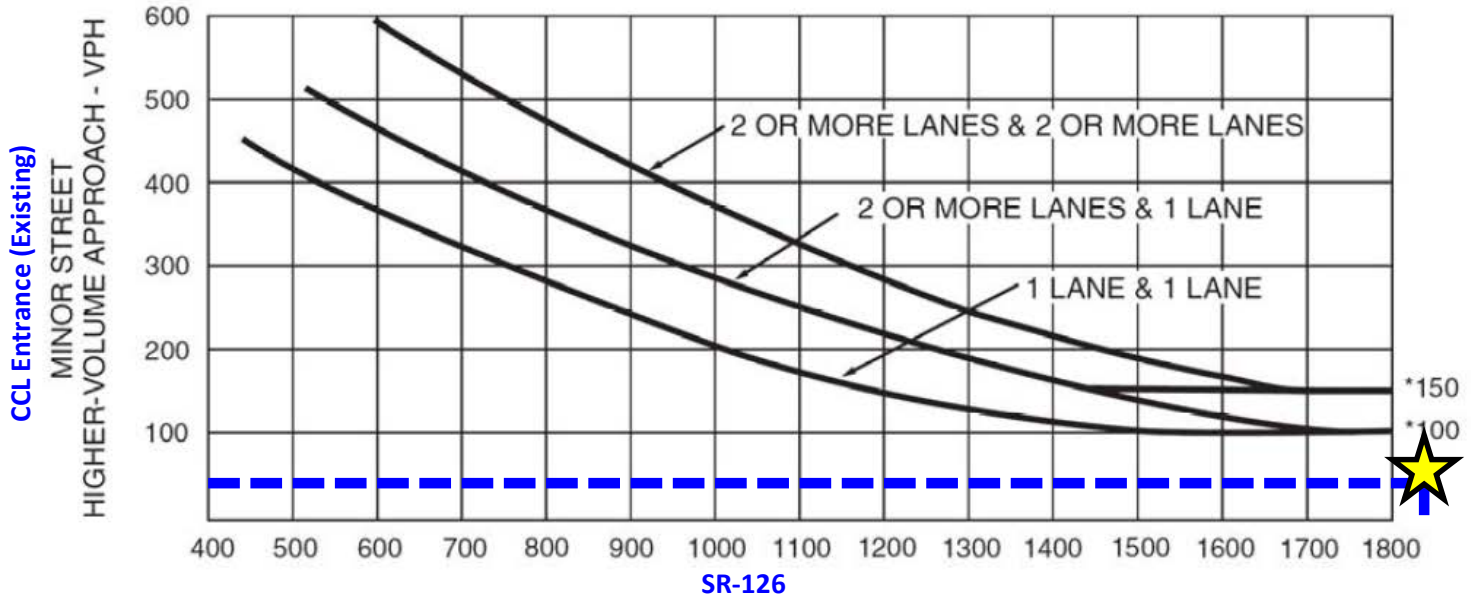
*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Existing plus Growth without Project Highest Peak Hour = PM Peak Hour



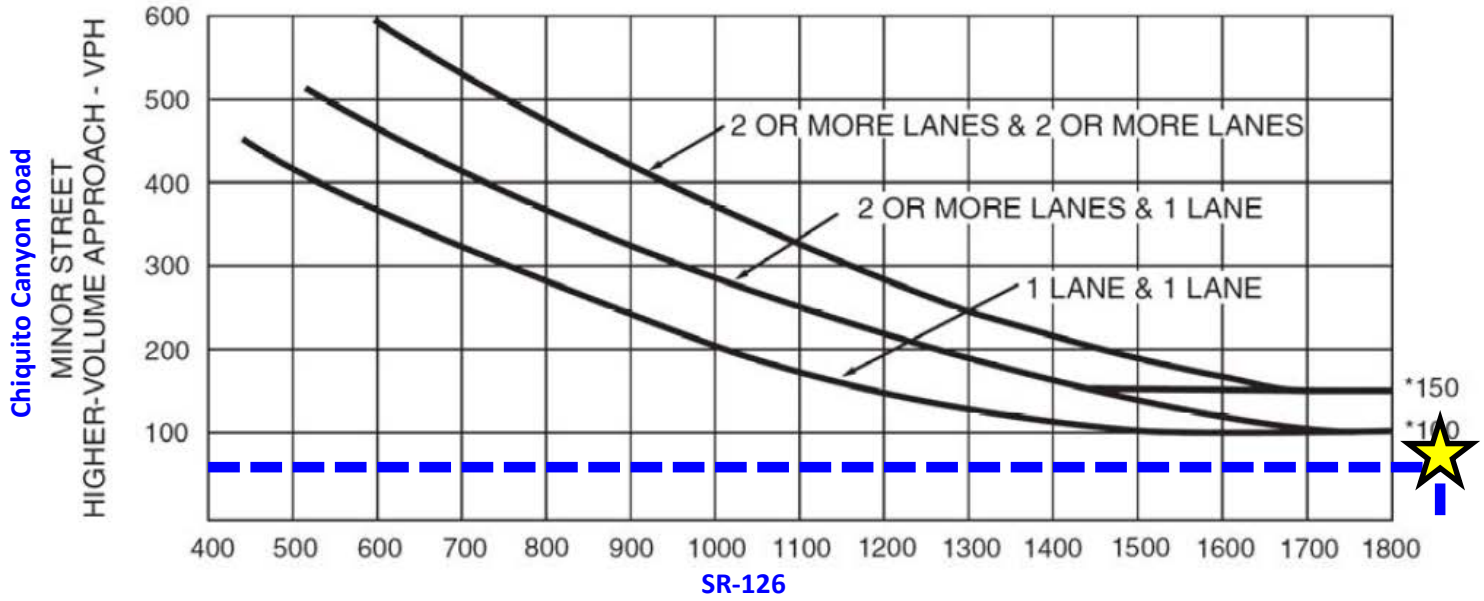
*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Existing plus Growth without Project Highest Peak Hour = PM Peak Hour



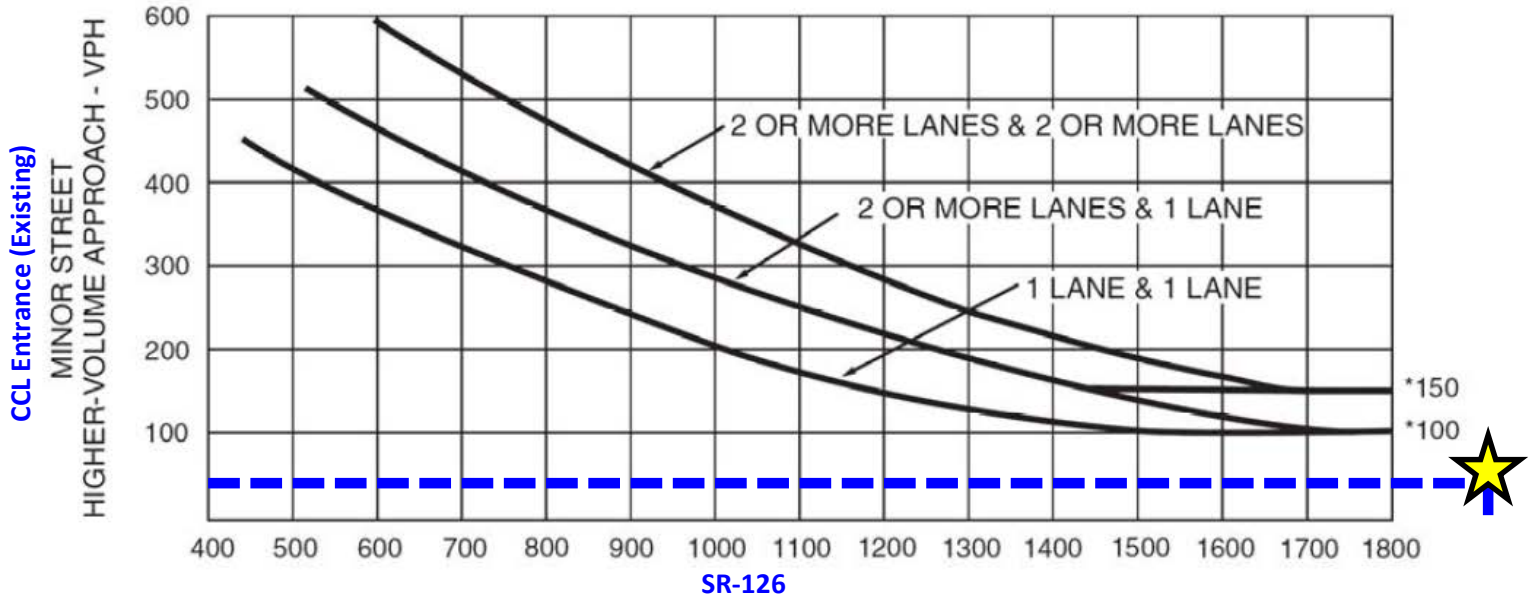
*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Existing plus Growth plus Other Development without Project Highest Peak Hour = PM Peak Hour



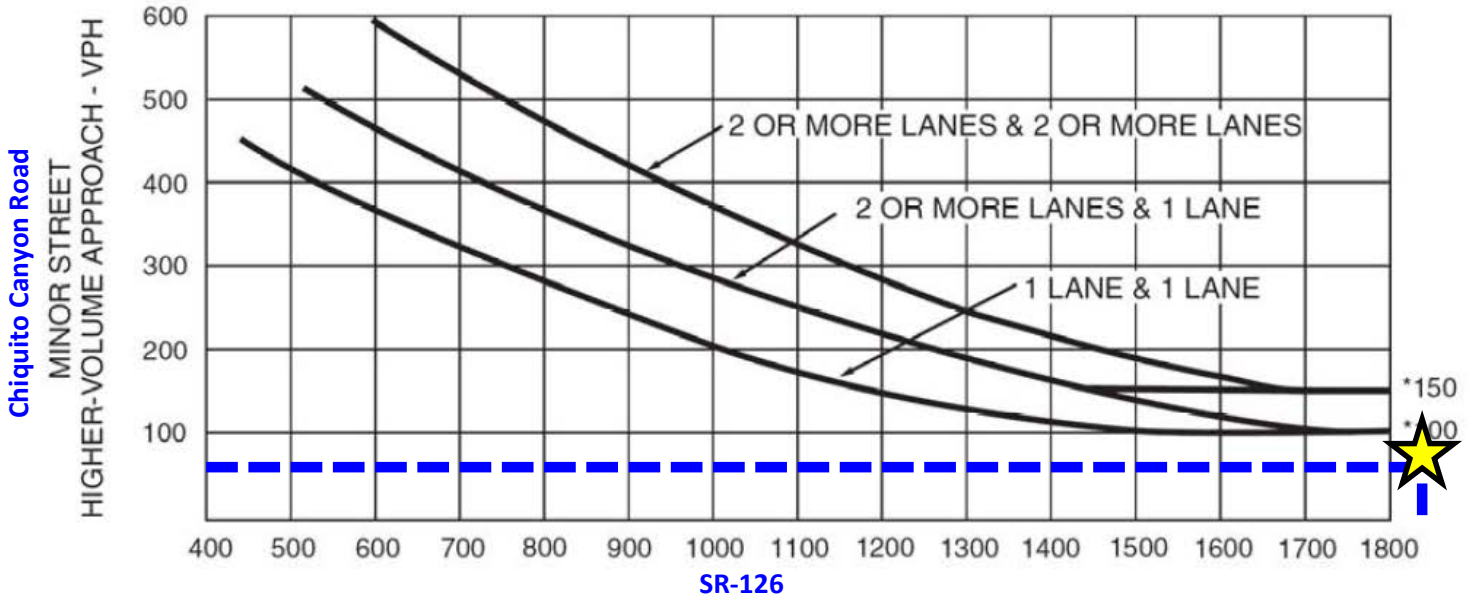
*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Existing plus Growth plus Other Development without Project Highest Peak Hour = PM Peak Hour



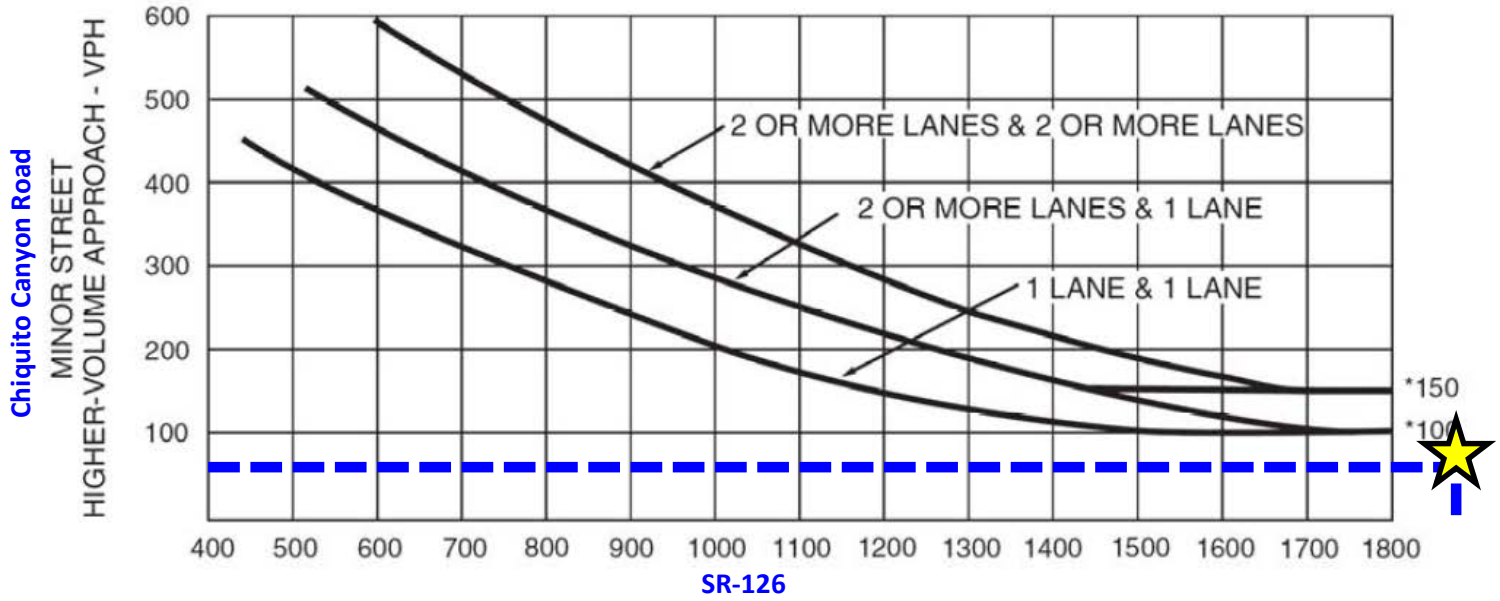
*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Existing plus Growth with Project Highest Peak Hour = PM Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Existing plus Growth plus Other Development with Project Highest Peak Hour = PM Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Appendix E
Other Project Trip Distributions

Appendix F
Traffic Index Calculation Worksheets

10-Year Traffic Index Calculations

Roadway: SR-126 **Limits:** Wolcott Way to Commerce Center

	2014 without Project			10-Year		
	(A)	(B)	(C)	(D)	(E)	(F)
Axle	24-Hour TAB Volumes	EWL Constants	Existing EWL (A) x (B)	Ambient Growth*	24-Hour TAB Volumes (A) x $(1+D/100)^{10}$	10 Year EWL (E) x (B)
2	802	300	240,600	2.75	1052	315,600
3	593	920	545,560	2.75	778	715,760
4	373	1320	492,360	2.75	489	645,480
5	2601	4080	10,612,080	2.75	3412	13,920,960
Total			**11,890,600**			**15,597,800**

* Based on LA County CMP and signed MOU.

10-Year EWL = $\frac{\text{(C) Total + (F) Total}}{2}$ x 10 = 137,442,000

10-Year TI = 12.0 (based on 2014 without project volumes)

Roadway: Wolcott Way **Limits:** SR-126 to Franklin Pkwy

	2014 without Project			10-Year		
	(A)	(B)	(C)	(D)	(E)	(F)
Axle	24-Hour TAB Volumes	EWL Constants	Existing EWL (A) x (B)	Ambient Growth*	24-Hour TAB Volumes (A) x $(1+D/100)^{10}$	10 Year EWL (E) x (B)
2	13	300	3,900	2.75	17	5,100
3	10	920	9,200	2.75	13	11,960
4	6	1320	7,920	2.75	8	10,560
5	43	4080	175,440	2.75	56	228,480
Total			**196,460**			**256,100**

* Based on LA County CMP and signed MOU.

10-Year EWL = $\frac{\text{(C) Total + (F) Total}}{2}$ x 10 = 2,262,800

10-Year TI = 7.5 (based on 2014 without project volumes)

Roadway: SR-126 **Limits:** Wolcott Way to Commerce Center

	2014 with Project			10-Year		
	(A)	(B)	(C)	(D)	(E)	(F)
Axle	24-Hour TAB Volumes	EWL Constants	Existing EWL (A) x (B)	Ambient Growth*	24-Hour TAB Volumes (A) x $(1+D/100)^{10}$	10 Year EWL (E) x (B)
2	846	300	253,800	2.75	1110	333,000
3	626	920	575,920	2.75	821	755,320
4	394	1320	520,080	2.75	517	682,440
5	2745	4080	11,199,600	2.75	3600	14,688,000
Total			**12,549,400**			**16,458,760**

* Based on LA County CMP and signed MOU.

10-Year EWL = $\frac{\text{(C) Total + (F) Total}}{2}$ x 10 = 145,040,800

10-Year TI = 12.0 (based on 2014 with project volumes)

Roadway: Wolcott Way **Limits:** SR-126 to Franklin Pkwy

	2014 with Project			10-Year		
	(A)	(B)	(C)	(D)	(E)	(F)
Axle	24-Hour TAB Volumes	EWL Constants	Existing EWL (A) x (B)	Ambient Growth*	24-Hour TAB Volumes (A) x $(1+D/100)^{10}$	10 Year EWL (E) x (B)
2	76	300	22,800	2.75	100	30,000
3	56	920	51,520	2.75	73	67,160
4	35	1320	46,200	2.75	46	60,720
5	245	4080	999,600	2.75	321	1,309,680
Total			**1,120,120**			**1,467,560**

* Based on LA County CMP and signed MOU.

10-Year EWL = $\frac{\text{(C) Total + (F) Total}}{2}$ x 10 = 12,938,400

10-Year TI = 9.0 (based on 2014 with project volumes)

20-Year Traffic Index Calculations

Roadway: SR-126 **Limits:** Wolcott Way to Commerce Center

	2014 without Project			20-Year		
	(A)	(B)	(C)	(D)	(E)	(F)
Axle	24-Hour TAB Volumes	EWL Constants	Existing EWL (A) x (B)	Ambient Growth*	24-Hour TAB Volumes (A) x $(1+D/100)^{20}$	20 Year EWL (E) x (B)
2	802	300	240,600	2.75	1380	414,000
3	593	920	545,560	2.75	1020	938,400
4	373	1320	492,360	2.75	642	847,440
5	2601	4080	10,612,080	2.75	4475	18,258,000
Total			**11,890,600**			**20,457,840**

* Based on LA County CMP and signed MOU.

20-Year EWL = $\frac{\text{(C) Total + (F) Total}}{2}$ x 20 = 323,484,400

20-Year TI = 13.5 (based on 2014 without project volumes)

Roadway: Wolcott Way **Limits:** SR-126 to Franklin Pkwy

	2014 without Project			20-Year		
	(A)	(B)	(C)	(D)	(E)	(F)
Axle	24-Hour TAB Volumes	EWL Constants	Existing EWL (A) x (B)	Ambient Growth*	24-Hour TAB Volumes (A) x $(1+D/100)^{20}$	20 Year EWL (E) x (B)
2	13	300	3,900	2.75	22	6,600
3	10	920	9,200	2.75	17	15,640
4	6	1320	7,920	2.75	10	13,200
5	43	4080	175,440	2.75	74	301,920
Total			**196,460**			**337,360**

* Based on LA County CMP and signed MOU.

20-Year EWL = $\frac{\text{(C) Total + (F) Total}}{2}$ x 20 = 5,338,200

20-Year TI = 8.0 (based on 2014 without project volumes)

Roadway: SR-126 **Limits:** Wolcott Way to Commerce Center

	2014 with Project			20-Year		
	(A)	(B)	(C)	(D)	(E)	(F)
Axle	24-Hour TAB Volumes	EWL Constants	Existing EWL (A) x (B)	Ambient Growth*	24-Hour TAB Volumes (A) x $(1+D/100)^{20}$	20 Year EWL (E) x (B)
2	846	300	253,800	2.75	1455	436,500
3	626	920	575,920	2.75	1077	990,840
4	394	1320	520,080	2.75	678	894,960
5	2745	4080	11,199,600	2.75	4723	19,269,840
Total			**12,549,400**			**21,592,140**

* Based on LA County CMP and signed MOU.

20-Year EWL = $\frac{\text{(C) Total + (F) Total}}{2}$ x 20 = 341,415,400

20-Year TI = 13.5 (based on 2014 with project volumes)

Roadway: Wolcott Way **Limits:** SR-126 to Franklin Pkwy

	2014 with Project			20-Year		
	(A)	(B)	(C)	(D)	(E)	(F)
Axle	24-Hour TAB Volumes	EWL Constants	Existing EWL (A) x (B)	Ambient Growth*	24-Hour TAB Volumes (A) x $(1+D/100)^{20}$	20 Year EWL (E) x (B)
2	76	300	22,800	2.75	131	39,300
3	56	920	51,520	2.75	96	88,320
4	35	1320	46,200	2.75	60	79,200
5	245	4080	999,600	2.75	422	1,721,760
Total			**1,120,120**			**1,928,580**

* Based on LA County CMP and signed MOU.

20-Year EWL = $\frac{\text{(C) Total + (F) Total}}{2}$ x 20 = 30,487,000

20-Year TI = 10.0 (based on 2014 with project volumes)