COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"Enriching Lives"

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IN REPLY PLEASE
REFER TO FILE: PD-4

January 5, 2004

TO: Each Supervisor

FROM: James A. Noyes
Director of Public Works

NOVEMBER 12, 2003, STORM
FLOOD CONTROL SYSTEM EVALUATION REPORT

Attached for your information is the Flood Control System Evaluation Report for the November 12, 2003, storm. The storm severely impacted the Cities of Compton, Los Angeles, Lynwood, and South Gate and the unincorporated County areas of Rosewood and Willowbrook. This report provides an evaluation of the flooding event that occurred.

Please call me if you have any questions, or your staff may contact Gary J. Hartley, Deputy Director, at (626) 458-4016.

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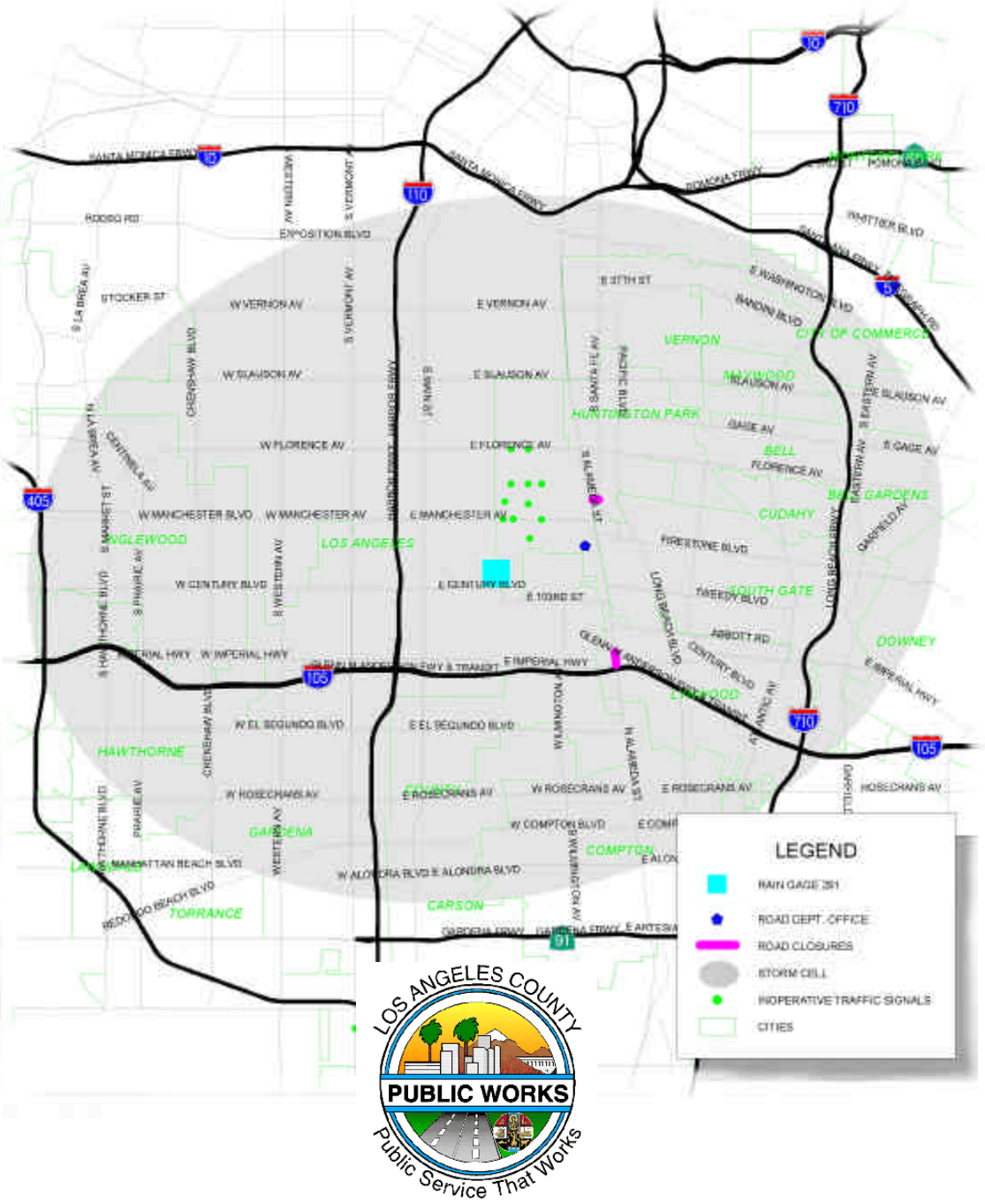
Attach.

cc: Chief Administrative Office
County Counsel
Executive Office
Office of Emergency Management

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS

FLOOD CONTROL SYSTEM EVALUATION REPORT

NOVEMBER 12, 2003, STORM



LOS ANGELES COUNTY PUBLIC WORKS
Public Service That Works

FLOOD CONTROL SYSTEM EVALUATION REPORT
NOVEMBER 12, 2003, STORM

PREPARED FOR:

The Board of Supervisors

Supervisor Don Knabe, Chairman

Supervisor Gloria Molina

Supervisor Yvonne Brathwaite Burke

Supervisor Zev Yaroslavsky

Supervisor Michael D. Antonovich

PREPARED BY:

Department of Public Works
James A. Noyes, Director

December 29, 2003

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EXECUTIVE SUMMARY

On November 12, 2003, a low-pressure storm system moved through the County of Los Angeles from the southwest and stalled over the southern portion of the County bringing thunderstorms with localized areas of intense rainfall. Outside of the affected area, only light rainfall amounts fell.

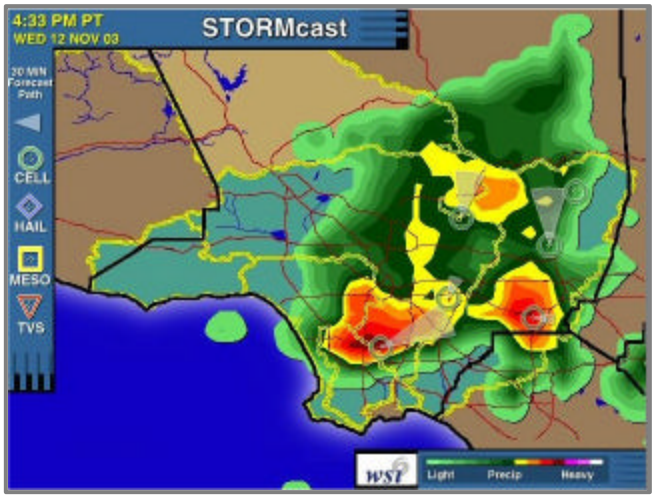


Figure 1: Los Angeles County Radar Imagery at 4:33 p.m., provided by Weather Services International.

The storm cell lingered over the Compton and Willowbrook areas from approximately 3:30 p.m. to 6:30 p.m. producing over 5 inches of rainfall and over one foot of hail. Rainfall intensities exceeded the 500-year event resulting in significant localized flooding.

The County's flood control facilities generally performed as designed but were temporarily overwhelmed by the runoff, which exceeded the design capacity of the facilities. Lightning strikes damaged Southern California Edison power lines and transformers resulting in loss of electricity to thousands of homes and disruption of signalized intersections.

The most severely affected areas include the neighborhood of Watts in the City of Los Angeles; the unincorporated County areas of Rosewood and Willowbrook; and the Cities of Compton, Lynwood, and South Gate. Over 250 structures were damaged and over 100 vehicles were reportedly abandoned due to localized flooding. The County and the Cities of Compton and Los Angeles declared local emergencies.

OVERVIEW

A. Purpose of the Report

This report provides an evaluation of the flooding event that occurred on November 12, 2003. The operation of the County's flood control facilities within the flood-damaged areas was also evaluated.

B. The Storm

On November 12, 2003, a 50-square-mile storm cell stalled over the southern portion of the County and severely affected the urbanized communities in the Watts area of the City of Los Angeles; the neighboring Cities of Compton, Lynwood, and South Gate; and the unincorporated areas of Rosewood and Willowbrook. As a result, approximately 5.4 inches of rainfall accumulated in the area, most of which fell during a three-hour period. This storm cell resulted in a rainfall frequency in excess of a 500-year storm. In contrast, the rain gages in the surrounding areas recorded significantly less rainfall amounts ranging from 0.12 inches at Ballona Creek to 0.72 inches in Downtown Los Angeles during the same period.

Significant flooding occurred because the high intensity rainfall resulted in runoff, temporarily exceeding the capacity of the local storm drain facilities. Damages in the local area included over 250 flooded structures and over 100 abandoned vehicles. The estimated damage to private property totaled almost $4 million.

C. Findings and Recommendations

The unusual and severe intensity of rainfall generated runoff in the area which temporarily exceeded the capacity of the local storm drain facilities. While additional storm drain facilities in the area would have reduced some of the flooding, the runoff generated far exceeded our design standards and would have also overwhelmed any additional facilities.

Continuing the Catch Basin Cleaning Program, which provides inspection and cleaning of catch basins prior to October 15, will help ensure that the existing storm drains are ready for winter storms.

FLOOD CONTROL SYSTEM

A. Purpose of the Flood Control System

The Los Angeles County Flood Control District was formed by the State Legislature in 1915 as a result of a major flooding event that occurred in 1914. The responsibilities and authority vested in the Flood Control District were transferred to the County of Los Angeles Department of Public Works in 1985.

Successful early bond issues financed construction of the 15 dams which the District built in the San Gabriel Mountains and adjacent foothills to impound storm waters until they could be safely released. Debris basins were constructed to trap eroded materials which had caused terrible damage in the past. Major channel improvements were undertaken to confine the flood waters and convey them safely through the urbanized areas to the ocean.

District engineers prepared a Comprehensive Plan in the early 1930s which would control flooding and save as much of the water as practicable when fully implemented. Federal Legislation in 1936 brought the United States Army Corps of Engineers into the local flood control picture. Since that time, the two agencies have been jointly pursuing implementation of the Comprehensive Plan.

Continued major storm activities in the 1950s and 1960s prompted the construction of local storm drains to deliver surface runoff to the main channels. Bond Issue programs were approved in 1952, 1958, 1964, and 1970 by the voters to expand the local flood control system. In 1993, the Board of Supervisors approved a $217 million bond issue program to design and construct additional storm drain facilities.

B. Design Standards

Public Works' policy is to provide a uniform level of protection throughout the County. In order to implement this policy, standard levels of protection were set and uniform design of flood control facilities was implemented on all projects. The standards have been adjusted over the years to reflect the experiences of major storm events and to ensure reliability of operation.

C. Description of the Flood Control System

1. Countywide

The County has developed much of the existing flood control system within the past 50 years. The system consists mostly of gravity flow channels and storm drains. However, mechanical systems, including pump stations, are used to intercept and pump flows from low lying areas. Although the flood control system is continuously maintained, unexpected occurrences of heavy trash and debris, power outages, or severe storm intensities can cause temporary system interruptions.

The majority of the existing system was built to adequately convey storm flows from development either built or anticipated to be built at the time of construction. Development occurred beyond what was anticipated and has rendered portions of the system to be under capacity by today's standards. Public Works continues to maintain and enhance existing facilities in an effort to provide a uniform level of flood protection for the community and the environment.

2. Southern Portion of the County of Los Angeles

There is an extensive system of underground storm drains in the southern portion of the County. On December 2001, the Los Angeles County Drainage Area project was completed. This project consisted of the design and construction of 21 miles of levee improvements (see Figure 2), modifications to 24 bridge crossings, and multi-use enhancements such as bike trails, equestrian trails, and landscaping.

The levee improvements along Compton Creek and the Los Angeles River increased the level of protection to residents from potential catastrophic levee failures in major storm events. Mandatory Flood Insurance Zone requirements along these two channels were lifted as a result of the Los Angeles County Drainage Area project improvements as shown in Appendix A. However, the Los Angeles County Drainage Area project itself did not increase the level of flood protection provided by local storm drains.

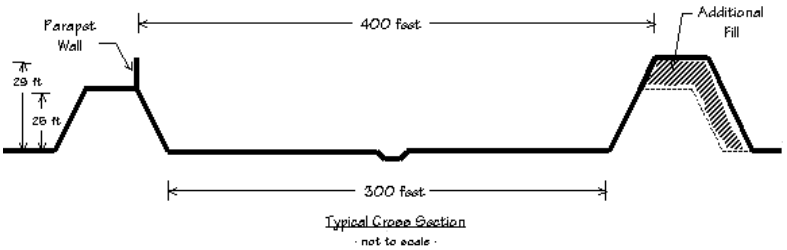


Figure 1: Los Angeles County Drainage Area Improvements completed in December 2001.

Many communities impacted by the storm event of November 12, 2003, are within the watersheds serviced by the Hooper and Glen Avenue drainage systems. These drainage systems provide flood relief to an area of approximately 10 square miles and outlet into Compton Creek which then outlets into the Los Angeles River. The Hooper and Glen Avenue drains were originally constructed in the 1930s. As a result of the continued urbanization in the areas tributary to these drainage systems,

runoff during storm events has greatly increased causing a diminished effectiveness of these systems during major storm events. The flat geography and extensive underground utility network already in place present major obstacles to modifying these drainage systems to increase their effectiveness. Improvements over the years have been localized and limited to minor storm drain extensions and street improvements without major alterations to the backbone drainage systems.

Over the years, Public Works has recognized the need for providing flood protection to the communities in the County of Los Angeles. In 1997, Public Works proposed to conduct studies for 29 regional drains as part of a Regional Relief Program in the County of Los Angeles. A feasibility study is currently being proposed for both the Hooper and Glen Avenue drainage systems as part of this Program. The feasibility study may identify potential cost effective watershed management concepts that could improve the effectiveness of the existing drainage systems when implemented.

STORM EVENT OF NOVEMBER 12, 2003

A. Meteorological Overview (Weather Forecast)

The early morning forecast for the day consisted of *"an upper lowpressure system developing southwest of the County of Los Angeles brought some moisture into the eastern section of the County in the early morning including a few thunderstorms. Most areas of the County have remained dry; however, up to .40" have fallen in isolated areas in the northeast corner of the County including the San Dimas Dam area. Light showers and few thunderstorms were expected to continue through the day with isolated areas of up to 1" due to the thunderstorms with .25" to .50" elsewhere. Rainfall rates in the vicinity of the thunderstorms were expected to be .25" to .40" per hour."*[1]

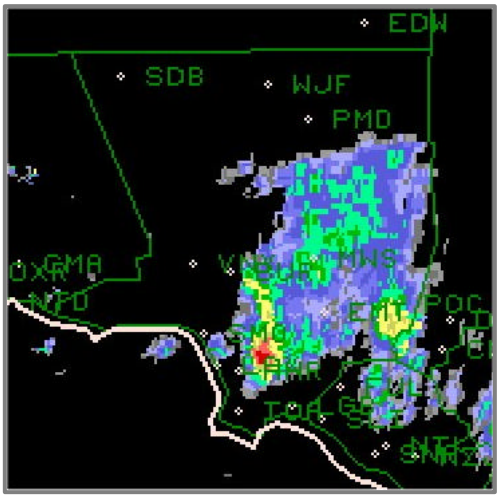


Figure 2: Radar Map of L. A. County (http://www.ncdc.noaa.gov/oa/climate/research/hazards/)

At approximately 2 p.m., the weather forecast was as follows:

"Scattered showers and isolated thundershowers will continue over the County through 7 p.m. to 9 p.m. PST. Amounts will be light, except near any isolated thunderstorms. In general, amounts where showers do fall will be from a trace to .15" in lower elevations as well as in the mountains. Thunderstorms will produce heavier amounts with .50" up to 1.00" possible. These will be isolated… Tonight, the showers will end by 9 p.m. to midnight."[2]

B. Rainfall Amounts and Frequency

Rainfall amounts shown on Figure 4 for the affected area indicate that the total accumulated rainfall was 5.40 inches. The map further indicates that the rainfall was concentrated in area measured by Rain Gage 291 (Los Angeles at 96th Street). A few miles north of this area, in the City of Los Angeles at Ducommun Street, the rain gage measured rainfall amounts of only 0.72 inches. Surrounding areas only measured from 0.04 inches to as much as 0.28 inches, indicating a very localized and concentrated storm system.

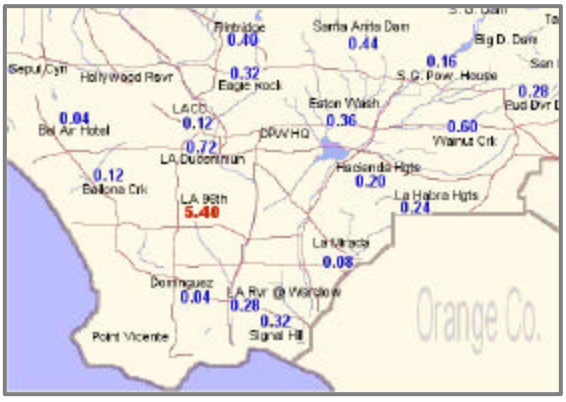


Figure 3: L. A. County 24-Hour Precipitation Map 11/12/03

[1] L. A. Weather Update, 5:45 a.m. 11/12/03, submitted to Public Works by Dan Risch of Meteorological Solutions, Inc.

[2] Weather Update - Wednesday November 12, 2003 - 1400 PST, submitted to Public Works by Dan Rische, Meteorological Solutions, Inc

From the storm intensity data, most of the rainfall occurred over a three-hour time frame. Thunderstorms in the County of Los Angeles are typically lesser intensity and shorter duration. The 1-hour, 2-hour, and 3-hour rainfall totals were much higher than the corresponding 500-year frequency analysis at 96th Street and Central Avenue. The table below compares the peak rainfall totals from this storm for the durations indicated to the corresponding 500-year frequency analysis for this rain gage.

TABLE 1
Rain Gage No. 291 (Los Angeles–96th Street and Central Avenue)
November 12, 2003, Storm Frequency

Duration:	Rainfall (in.) 11/12/03 Storm	Frequency (Yr)
15 minutes	0.86	500-year
30 minutes	1.52	Over 500-year
1 hour	2.58	Over 500-year
3 hours	4.96	Over 500-year
6 hours	5.31	Over 500-year
12 hours	5.35	100-year

C. Flood-Damaged Areas

Field reports and reports from the Cities were used to compile a list of flood-damaged areas. Southern California Edison also reported power interruption to 115,000 customers.

Appendix B shows the area affected by the storm cell as well as road closures and traffic signals that malfunctioned.

1. Flood-Damaged Structures

   The total number of flood-damaged structures for each jurisdiction is shown in Table 2 below. A table listing the flood-damaged properties within the unincorporated County areas of Rosewood and Willowbrook is included as Appendix C.

TABLE 2
FLOOD-DAMAGED STRUCTURES BY JURISDICTION

JURISDICTION	STRUCTURES WITH DAMAGE
City of Carson	1
City of Compton	42
City of Huntington Park	2
City of Los Angeles	68
City of Lynwood	110
Unincorporated Los Angeles County Rosewood and Willowbrook	36
Total	**259**

2. Street Flooding

Street flooding occurred at several locations. Public Works' flood maintenance crews responded to calls in the Willowbrook area to clear catch basins. Road maintenance crews responded to flooded street complaints in the East Rancho Dominguez, Florence-Firestone, Walnut Park, and Willowbrook areas. The Willowbrook area was the most heavily impacted unincorporated County area.

The City of Lynwood reported flooded intersections occurred along Imperial Highway, Martin Luther King Jr. Boulevard, and Long Beach Boulevard as well as a flooded underpass at Long Beach Boulevard and the 105 Freeway.

The City of South Gate also reported flooding at major intersections of the City.

3. Road Closures

The following locations and intersections were closed as a result of the storm:

a. Intersection of Alameda Street and 115th Street
b. Intersection of Short Street and Alameda Street East
c. Alameda Street from Imperial Highway to Santa Ana Boulevard and westbound Imperial Highway at Alameda Street.

4. Pump Stations

No Public Works storm water pumping stations were adversely impacted by this storm event.

5. Catch Basins

Catch basin inlets were inspected and cleaned by Public Works prior to October 15.

Overflowing storm water was observed at the following catch basins:

- Northwest and northeast corners of Stockwell Street and Mona Boulevard
- Northeast corner of Willowbrook Avenue and 120th Street
- Northeast corner of Mona Boulevard and 126th Street
- Southwest corner of 118th Street and Mona Boulevard
- Northwest and northeast corners of Compton Avenue and 126th Street
- Northwest corner of 118th Street and Compton Avenue
- Northeast corner of Compton Avenue and 124th Street
- Northeast corner of Mona Boulevard and 132nd Street
- East curb of 12708 Elva Avenue, south of 127th Street

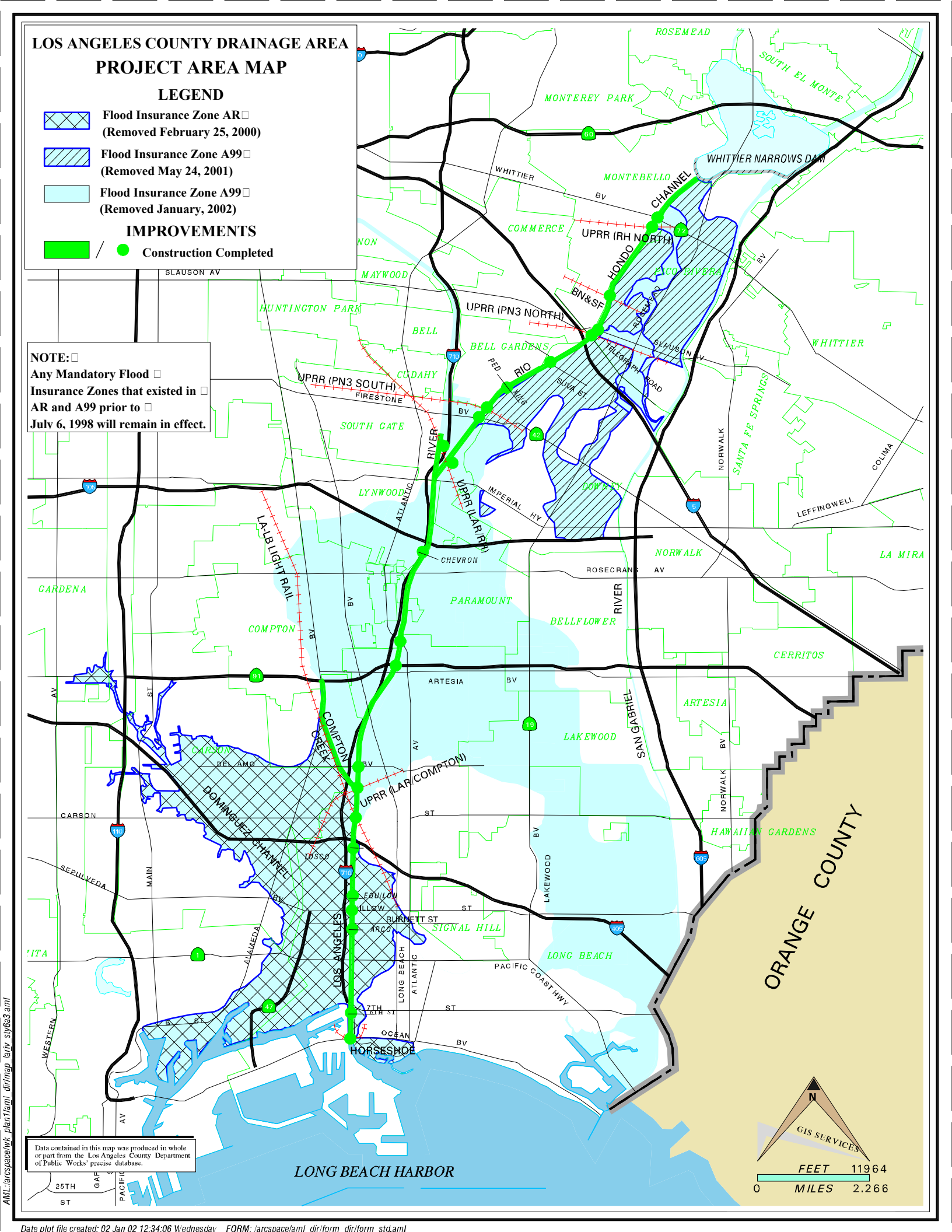
D. Conclusion

The November 12, 2003, storm was clearly an unusual event that created extremely high intensity rainfall amounts with a greater than 500-year frequency. The storm also delivered over a foot of hail to parts of the area. The high-intensity storm resulted in storm water runoff which temporarily overwhelmed the existing local storm drain facilities in this area. The result was flooding and damage to property in the immediate area.

Although the existing flood control facilities in the project area have insufficient capacity to meet our current design standards, these facilities functioned properly and as designed. Any additional storm drain facilities would also have been overwhelmed. Public Works will continue its storm-readiness routines including the Catch Basin Cleaning Program to ensure that the existing flood control system is ready for the winter storms.

APPENDIX A

Los Angeles County Drainage Area
Project Area Map


LOS ANGELES COUNTY DRAINAGE AREA
PROJECT AREA MAP
LEGEND
Flood Insurance Zone AR
(Removed February 25, 2000)
Flood Insurance Zone A99
(Removed May 24, 2001)
Flood Insurance Zone A99
(Removed January, 2002)
IMPROVEMENTS
Construction Completed
NOTE:
Any Mandatory Flood
Insurance Zones that existed in
AR and A99 prior to
July 6, 1998 will remain in effect.
ROSEMEAD
SOUTH EL MONTE
MONTEREY PARK
WHITTIER NARROWS DAM
WHITTIER
MONTEBELLO
CHANNEL
COMMERCE
UPRR (RH NORTH)
HONDO
PICO RIVERA
BN&SF
SLAUSON AV
MAYWOOD
HUNTINGTON PARK
UPRR (PN3 NORTH)
BELL
BELL GARDENS
WHITTIER
CUDAHY
UPRR (PN3 SOUTH)
FIRESTONE
SOUTH GATE
RIVER
NORWALK
SANTA FE SPRINGS
COLIMA
LYNWOOD
ATLANTIC
IMPERIAL HY
DOWNEY
LEFFINGWELL
LA-LB LIGHT RAIL
UPRR (LAR/RH)
CHEVRON
NORWALK
LA MIRA
ROSECRANS AV
CARDENA
PARAMOUNT
BELLFLOWER
COMPTON
CERRITOS
ARTESIA
COMPTON CREEK
LAKEWOOD
SAN GABRIEL
CARSON
DEL AMO
DOMINGUEZ CHANNEL
UPRR (LAR/COMPTON)
HAWAIIAN GARDENS
TOSCO
SEPULVEDA
MAIN
FOULOW
ILLOW
BURNETT ST
ARCO
SIGNAL HILL
ALAMEDA
LOS ANGELES
LONG BEACH
LONG BEACH
PACIFIC COAST HWY
7TH ST
OCEAN
HORSESHOE
ORANGE COUNTY
WESTERN
25TH ST
LONG BEACH HARBOR
Data contained in this map was produced in whole or part from the Los Angeles County Department of Public Works' precise database.
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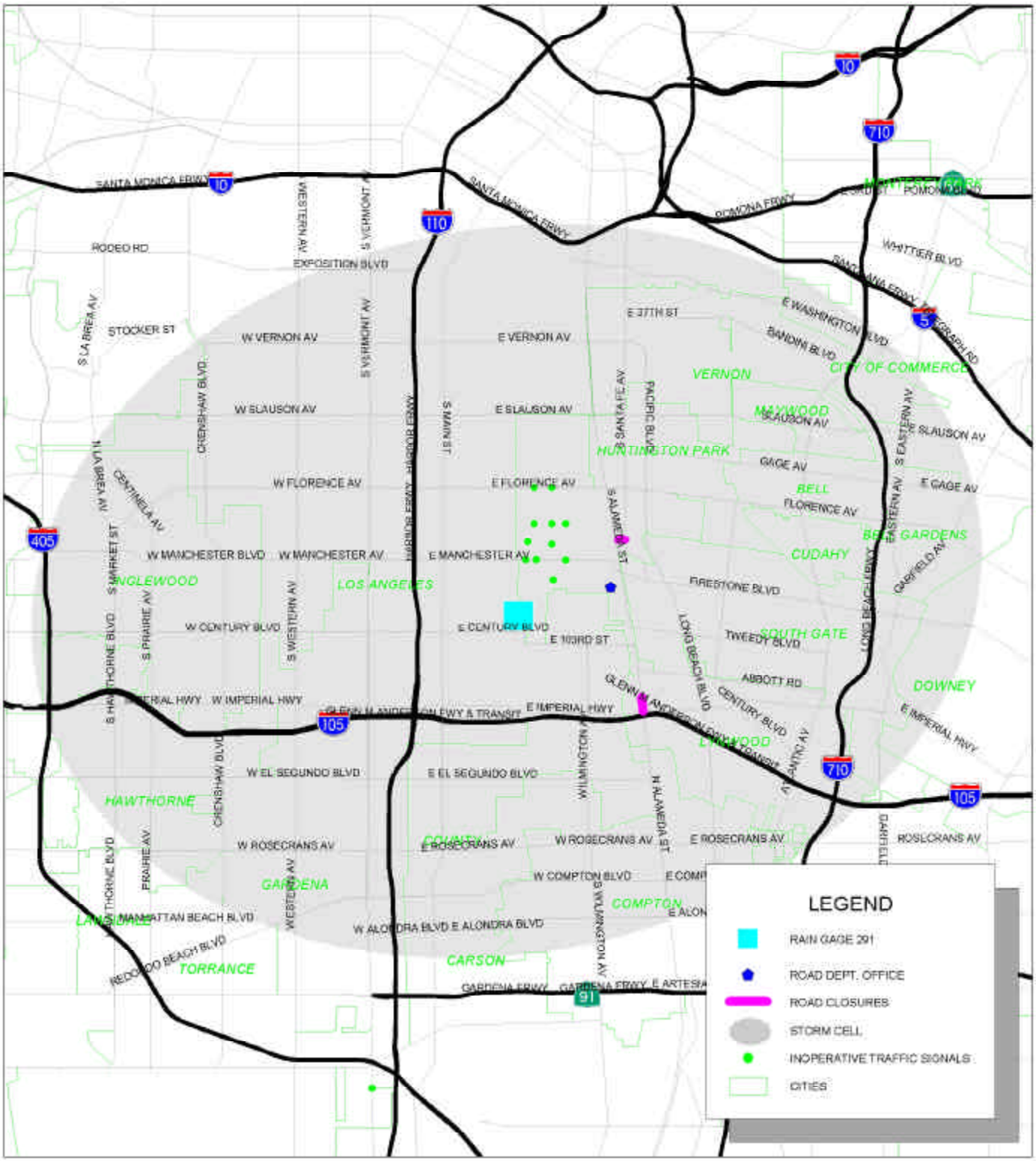
APPENDIX B

NOVEMBER 12, 2003, STORM MAP

NOVEMBER 12, 2003 STORM
Los Angeles County Department of Public Works

1 INCH = 10,000 FEET



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APPENDIX C

FLOOD-DAMAGED PROPERTIES IN THE UNINCORPORATED COUNTY AREAS OF ROSEWOOD AND WILLOWBROOK

COUNTY OF LOS ANGELES
WILLOWBROOK / ROSEWOOD AREA - FLOOD DAMAGE REPORT
(DUE TO STORM ON NOVEMBER 12, 2003)

REPORT AS OF NOVEMBER 17, 2003

Property Address	Owner / Occupant	Property Owner Address	Assessor No.	Sq. Ft.	Residential	Commercial	Description of Damage	Date Reported	Estimate - $20 per Sq. Ft.
2452 E. 114th Street	Miguel Chia	Same	6067-020-004	1,089	X		Porch	11/13/2003	$21,780
2212 E. 118th Street	Cynthia Hooks	944 E. 42nd Pl, Los Angeles 90011	6150-020-015	812	X		Roof	11/13/2003	$16,240
2108 1/2 E. 124th Street	Jimmie Grisom	16507 War Cloud Dr, Moreno Vly 92551	6150-002-003	1,006	X		Carpet, drywall, & wood floor	11/14/2003	$20,120
2108 1/2 E. 124th Street	Jimmie Grisom	16507 War Cloud Dr, Moreno Vly 92551	6150-002-003	601	X		Carpet, drywall, & wood floor	"	$12,020
2108 1/2 E. 124th Street	Jimmie Grisom	16507 War Cloud Dr, Moreno Vly 92551	6150-002-003	317	X		Carpet, drywall, & wood floor	"	$6,340
2411 E. 126th Street	Isaac Hernandez and Daniel Solis	Same	6150-030-017	1,304	X		Carpet, drywall, & wood floor	11/13/2003	$26,080
1923 E. 126th Street	Lucille Weaver and Alvin Butler	1935 E. 126th St, Compton 90222	6150-001-031	2,200	X		Carpet, drywall, & wood floor	11/13/2003	$44,000
1270 E. 127th Street	Levorn and Fay Rich	Same	6147-005-005	676	X		Carpet, drywall, & wood floor	11/14/2003	$13,520
1273 E. 127th Street	Johnny and Rosemary	Same	6147-004-032	976	X		Carpet, drywall, & wood floor	11/14/2003	$19,520
1274 E. 127th Street	Gloria Smith	Same	6147-005-004	676	X		Carpet, drywall, & wood floor	11/14/2003	$13,520
1279 E. 127th Street	Clotiel Hogan	Same	6147-004-033	1,087	X		Carpet, drywall, & wood floor	11/14/2003	$21,740
1280 E. 127th Street	Patricia Gutierrez and Lorenzo Mendez	Same	6147-005-003	676	X		Carpet, drywall, & wood floor	11/14/2003	$13,520
1284 E. 127th Street	Ermal Crump Graham	1278 E. 107th St, Los Angeles 90002	6147-005-002	676	X		Carpet, drywall, & wood floor	11/14/2003	$13,520
1285 E. 127th Street	Gloria Smith	Same	6147-004-034	676	X		Carpet, drywall, & wood floor	11/14/2003	$13,520
1290 E. 127th Street	Maribel Cabrera	Same	6147-005-001	1,357	X		Carpet, drywall, & wood floor	11/14/2003	$27,140
11813 S. Antwerp Avenue	Khisha Ross	Same	6148-017-021	600	X		Roof fell in	11/15/2003	$12,000
11913 Elva Street	Braxton	Same	6148-014-007	1,640	X		Roof	11/13/2003	$32,800
11926 Elva Street	James Mitchell	11928 Elva Ave, Los Angeles 90059	6148-013-002	1,644	X		Roof	11/13/2003	$32,880
12504 Elva Street	Evelyn Moses	Same	6147-008-028	676	X		Carpet, drywall, & wood floor	11/14/2003	$13,520
12510 Elva Street	Opal Smith	Same	6147-008-027	676	X		Carpet, drywall, & wood floor	11/14/2003	$13,520
12514 Elva Street	Leopold and Elvira Lozano	5526 Via Corona St, Los Angeles 90022	6147-008-026	1,025	X		Carpet, drywall, & wood floor	11/14/2003	$20,500
12520 Elva Street	Henry and Choya Juarez	Same	6147-008-025	1,311	X		Carpet, drywall, & wood floor	11/14/2003	$26,220
12524 Elva Street	Francisco Flores	Same	6147-008-024	676	X		Carpet, drywall, & wood floor	11/14/2003	$13,520

COUNTY OF LOS ANGELES
WILLOWBROOK / ROSEWOOD AREA - FLOOD DAMAGE REPORT
(DUE TO STORM ON NOVEMBER 12, 2003)

REPORT AS OF NOVEMBER 17, 2003

Property Address	Owner / Occupant	Property Owner Address	Assessor No.	Sq. Ft.	Residential	Commercial	Description of Damage	Date Reported	Estimate - $20 per Sq. Ft.
12602 Elva Street	Maria and Elizabeth Venegas	Same	6147-008-023	871	X		Carpet, drywall, & wood floor	11/14/2003	$17,420
12608 Elva Street	Donna Diaz	Same	6147-008-022	1,112	X		Carpet, drywall, & wood floor	11/14/2003	$22,240
12612 Elva Street	Martha and Henry Duron	Same	6147-008-021	676	X		Carpet, drywall, & wood floor	11/14/2003	$13,520
12618 Elva Street	Ruth Walker and Dorothy Brown	Same	6147-008-020	1,835	X		Carpet, drywall, & wood floor	11/14/2003	$36,700
12624 Elva Street	Nancy and Bertha Motan	Same	6147-008-019	676	X		Carpet, drywall, & wood floor	11/14/2003	$13,520
12700 Elva Street	Adam and Gloria Papillion	Same	6147-008-018	1,468	X		Carpet, drywall, & wood floor	11/14/2003	$29,360
13234 S.Penrose Avenue	Connie Callegari	Same	6154-008-005	648	X		Carpet, drywall, & water heater	11/14/2003	$12,960
11702 Success Avenue	Mary Tate and Rhonda Burley	11704 Success Ave, Los Angeles 90059	6148-002-020	963	X		Carpet, drywall, & wood floor	11/14/2003	$19,260
11702 Success Avenue	Mary Tate and Rhonda Burley	11704 Success Ave, Los Angeles 90059	6148-002-020	837	X		"	"	$16,740
11708 Success Avenue	Oscar Garcia	Same	6148-002-021	1,226	X		Carpet, drywall, & wood floor	11/14/2003	$24,520
11709 Success Avenue	Marshall and Ruby Lee Swafford	Same	6148-003-010	1,236	X		Carpet, drywall, & wood floor	11/14/2003	$24,720
11712 Success Avenue	Emilio Ruiz	Same	6148-002-022	520	X		Failed sewer line	11/16/2003	$10,400
11712 Success Avenue	Emilio Ruiz	Same	6148-002-022	866	X		"	"	$17,320
Totals				**35,311**	**36**	**0**			**$706,220**

NOTE: The above properties reflect response to calls received by Building and Safety and inspections performed for damage assessment. Following the properties listed above, an additional twenty-seven (27) calls were received by Building and Safety for non-structural damage of a minor nature. All calls were referred to the Community Development Commission for assistance through their grant program.