Appendix A

Ornamental Trees to be Removed

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TEL	TELEPHONE VAULT (SIZED)
Ⓜ	UNKNOWN MANHOLE
SS	SANITARY SEWER MANHOLE
ST	STORM SEWER MANHOLE
Ⓔ	ELECTRIC MANHOLE
Ⓣ	TELEPHONE MANHOLE
CB	CURB INLET
W	WATER VALVE
WR	WATER VALVE (RECLAIMED)
BO	BLOW-OFF VALVE
G	GAS VALVE
—o—	SINGLE POST SIGN (NOTED)
☼	LIGHT POLE
☼—o—☼	DOUBLE LIGHT POLE
Ⓟ	POWER POLE
□	WOOD POST (SIZED)
◎	STEEL BOLLARD
⊙#"	DECIDUOUS TREE (SIZE NOTED)
✲#"	EVERGREEN TREE (SIZE NOTED)

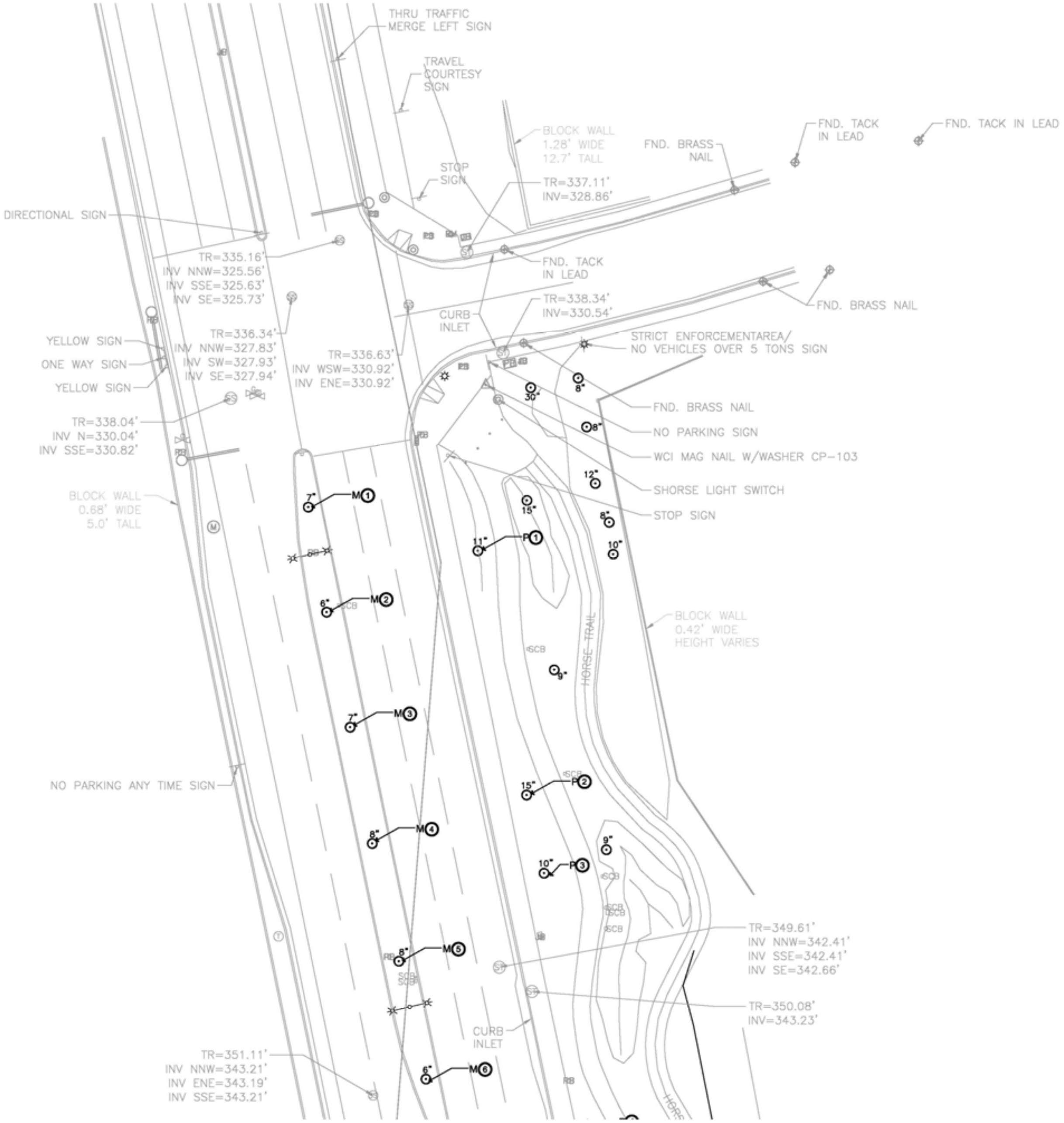
REVISIONS:
(1) Added V-ROAD-MRKG-LANE with DASHED linetype and se
striping into two layers. JD 20120621
(2) Moved legend to C-ANNO-NOTE and table to C-ANNO-N
could be turned off in the sheet files. JD 20120622

Ornamental Trees to be Removed Legend

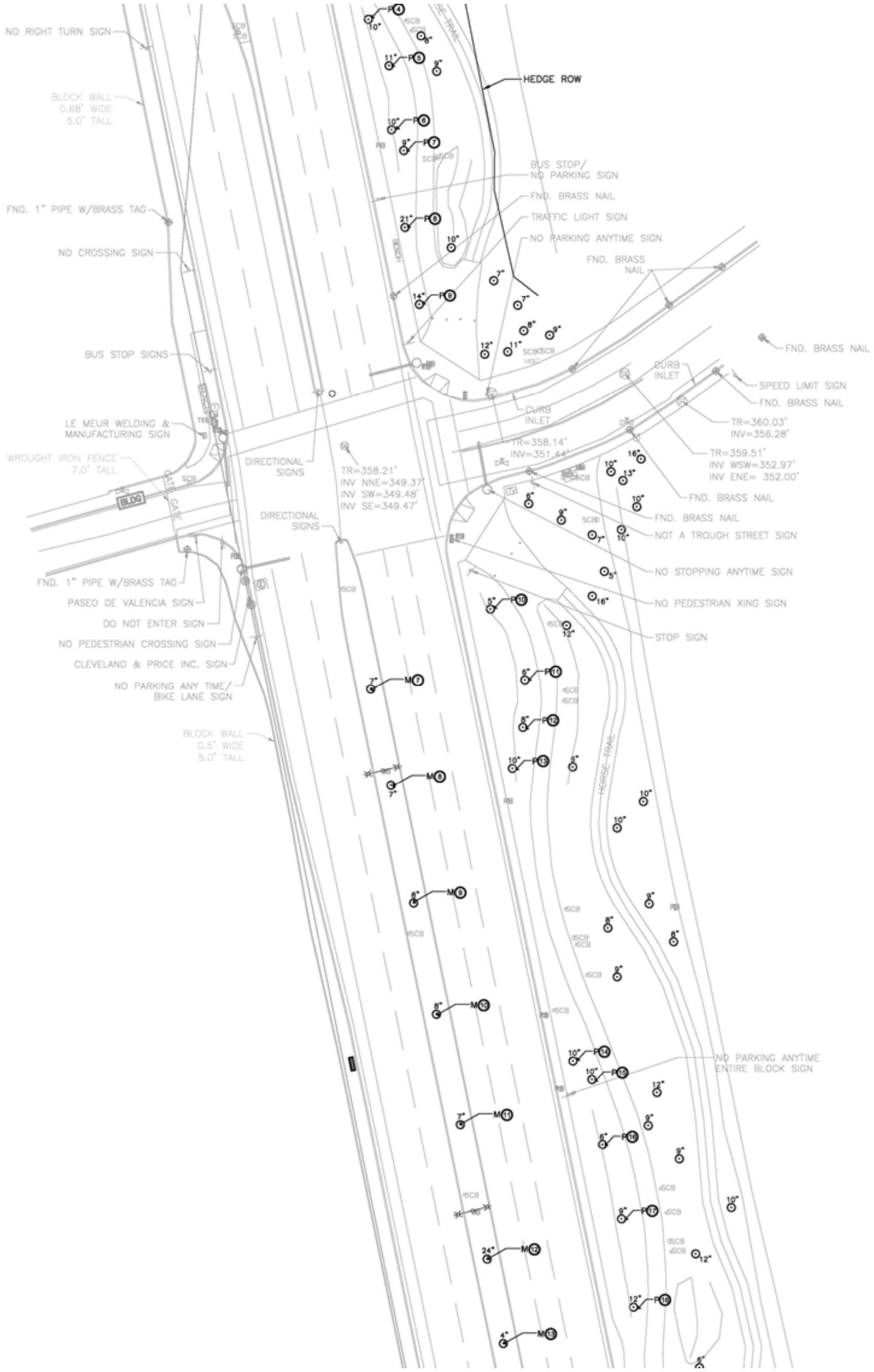
Ornamental Trees to be Removed
Legend (Cont.)

EXISTING TREES LEGEND

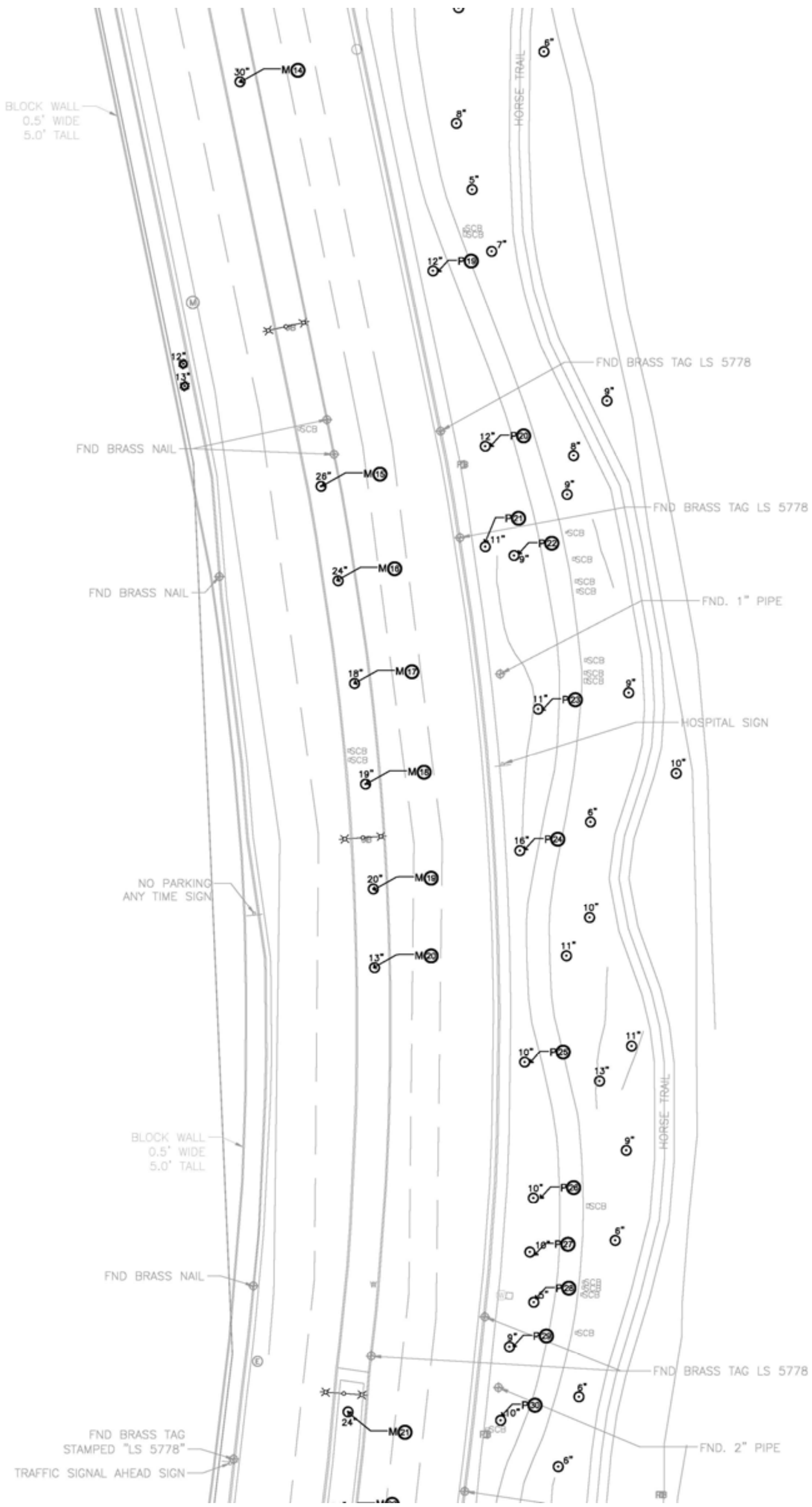
MEDIAN		GREENBELT	
M①	LAGERSTROEMIA - CRAPE MYRTLE	P①	BRACHYCHITON - BOTTLE TREE
M②	LAGERSTROEMIA - CRAPE MYRTLE	P②	LIQUIDAMBAR - SWEET GUM
M③	LAGERSTROEMIA - CRAPE MYRTLE	P③	LIQUIDAMBAR - SWEET GUM
M④	LAGERSTROEMIA - CRAPE MYRTLE	P④	MAGNOLIA - SOUTHERN MAGNOLIA
M⑤	LAGERSTROEMIA - CRAPE MYRTLE	P⑤	NEW REPLACEMENT TREE HAS BEEN PLANTED
M⑥	LAGERSTROEMIA - CRAPE MYRTLE	P⑥	MAGNOLIA - SOUTHERN MAGNOLIA
M⑦	LAGERSTROEMIA - CRAPE MYRTLE	P⑦	NEW REPLACEMENT TREE HAS BEEN PLANTED
M⑧	LAGERSTROEMIA - CRAPE MYRTLE	P⑧	CHORISIA - SILK FLOSS TREE
M⑨	LAGERSTROEMIA - CRAPE MYRTLE	P⑨	LIQUIDAMBAR - SWEET GUM
M⑩	LAGERSTROEMIA - CRAPE MYRTLE	P⑩	LIQUIDAMBAR - SWEET GUM
M⑪	LAGERSTROEMIA - CRAPE MYRTLE	P⑪	NEW REPLACEMENT TREE HAS BEEN PLANTED
M⑫	FICUS	P⑫	NEW REPLACEMENT TREE HAS BEEN PLANTED
M⑬	FICUS	P⑬	BRACHYCHITON - BOTTLE TREE
M⑭	FICUS	P⑭	NEW REPLACEMENT TREE HAS BEEN PLANTED
M⑮	FICUS	P⑮	LIQUIDAMBAR - SWEET GUM
M⑯	FICUS	P⑯	LIQUIDAMBAR - SWEET GUM
M⑰	FICUS	P⑰	MAGNOLIA - SOUTHERN MAGNOLIA
M⑱	FICUS	P⑱	MAGNOLIA - SOUTHERN MAGNOLIA
M⑲	FICUS	P⑲	LIQUIDAMBAR - SWEET GUM
M⑳	CUPANIOPSIS - CARROTWOOD	P⑳	LIQUIDAMBAR - SWEET GUM
M㉑	FICUS	P㉑	LIQUIDAMBAR - SWEET GUM
M㉒	FICUS	P㉒	NEW REPLACEMENT TREE HAS BEEN PLANTED
M㉓	FICUS	P㉓	BRACHYCHITON - BOTTLE TREE
M㉔	FICUS	P㉔	LIQUIDAMBAR - SWEET GUM
M㉕	FICUS	P㉕	LIQUIDAMBAR - SWEET GUM
M㉖	LAGERSTROEMIA - CRAPE MYRTLE	P㉖	LIQUIDAMBAR - SWEET GUM
M㉗	LAGERSTROEMIA - CRAPE MYRTLE	P㉗	MAGNOLIA - SOUTHERN MAGNOLIA
M㉘	LAGERSTROEMIA - CRAPE MYRTLE	P㉘	LIQUIDAMBAR - SWEET GUM
		P㉙	LIQUIDAMBAR - SWEET GUM
		P㉚	LIQUIDAMBAR - SWEET GUM
		P㉛	LIQUIDAMBAR - SWEET GUM
		P㉜	LIQUIDAMBAR - SWEET GUM
		P㉝	NEW REPLACEMENT TREE HAS BEEN PLANTED
		P㉞	NEW REPLACEMENT TREE HAS BEEN PLANTED
		P㉟	LIQUIDAMBAR - SWEET GUM
		P㊱	NEW REPLACEMENT TREE HAS BEEN PLANTED



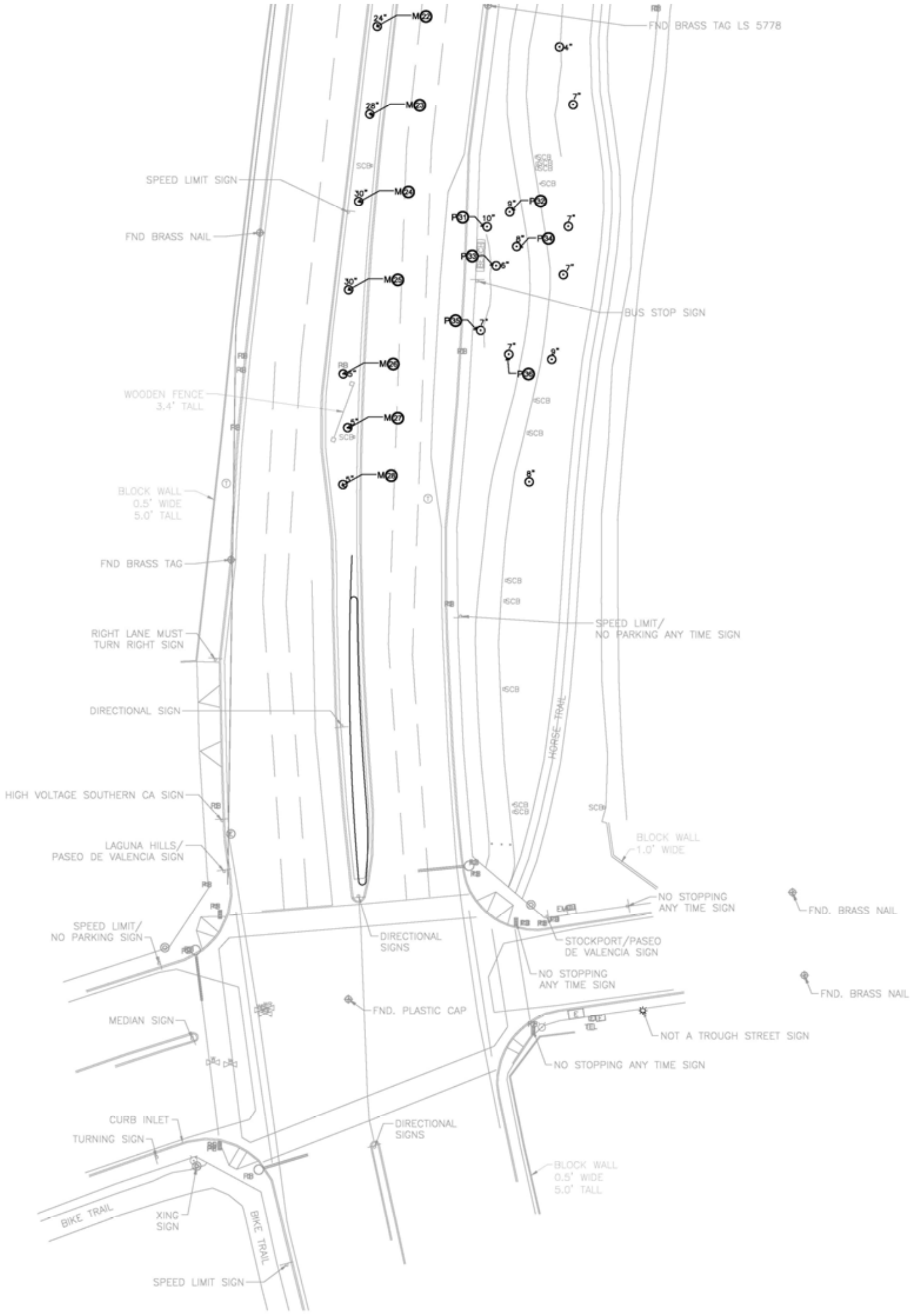
From North to South Exhibit 1 of 4



From North to South Exhibit 2 of 4



From North to South Exhibit 3 of 4



From North to South Exhibit 4 of 4

Appendix B

Summary of Traffic Data Used for the Calibration and Design-Year Conditions

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Table B-1. Short-Term (15-minute) Concurrent Traffic Counts

Receiver ID	Segment	Auto	Auto %	MT	MT %	HT	HT %	Total
ST-1	Paseo de Valencia NB	226	99.6	1	0.44	0	0.0	227
	Paseo de Valencia SB	164	98.8	1	0.60	1	0.6	166
	Kennington Dr WB	7	100.0	0	0.00	0	0.0	7
	Kennington Dr EB	9	81.8	2	18.18	0	0.0	11
ST-3	Paseo de Valencia NB	206	100.0	0	0.00	0	0.0	206
	Paseo de Valencia SB	184	96.8	5	2.63	1	0.5	190
ST-4	Paseo de Valencia NB	265	98.5	3	1.12	1	0.4	269
	Paseo de Valencia SB	171	98.8	0	0.00	2	1.2	173
	Stockport Street WB	22	100.0	0	0.00	0	0.0	22

Source: Entech Consulting Group, November 2012

1) Traffic counts represent 15 minutes of traffic. Traffic volumes were normalized to one hour for model calibration purposes.
2) MT = Medium Trucks
3) HT = Heavy Trucks

Table B-2. Existing Traffic Data

Roadway Segment	Total Vehicles	Auto %	Total Autos	Medium Truck %	Total Medium Truck	Heavy Truck %	Heavy Truck %	Speed
Beckenham Street EB	94	100%	94	0%	0	0%	0	30
Beckenham Street WB	136	100%	136	0%	0	0%	0	30
Avenida Sevilla EB	62	100%	62	0%	0	0%	0	30
Kennington Drive EB	31	100%	31	0%	0	0%	0	30
Kennington Drive WB	38	100%	38	0%	0	0%	0	30
Paseo de Valencia SB-Inside Lanes(2)-1	1791	98%	1755	1%	18	1%	18	45
Paseo de Valencia SB-Inside Lanes(2)-2	1776	98%	1740	1%	18	1%	18	45
Paseo de Valencia SB-Inside lanes(2)-3	1807	98%	1771	1%	18	1%	18	45
Paseo de Valencia NB-Inside lanes(2)-1	781	98%	765	1%	8	1%	8	45
Paseo de Valencia NB-Inside lanes(2)-2	827	98%	811	1%	8	1%	8	45
Paseo de Valencia NB-Inside lanes(2)-3	841	98%	825	1%	8	1%	8	45
Paseo de Valencia NB-Outside lane(1)-1	390	98%	383	1%	4	1%	3	45
Paseo de Valencia NB-Outside lane(1)-2	414	98%	406	1%	4	1%	4	45
Paseo de Valencia NB-Outside lane(1)-3	421	98%	413	1%	4	1%	4	45

Source: LIN Consulting, Inc., May 2012

Table B-3. No Build Traffic Data

Roadway Segment	Total Vehicles	Auto %	Total Autos	Medium Truck %	Total Medium Truck	Heavy Truck %	Heavy Truck %	Speed
Beckenham Street EB	118	100%	118	0%	0	0%	0	30
Beckenham Street WB	171	100%	171	0%	0	0%	0	30
Avenida Sevilla EB	78	100%	78	0%	0	0%	0	30
Kennington Drive EB	39	100%	39	0%	0	0%	0	30
Kennington Drive WB	48	100%	48	0%	0	0%	0	30
Paseo de Valencia SB-Inside Lanes(2)-1	2251	98%	2206	1%	23	1%	22	45
Paseo de Valencia SB-Inside Lanes(2)-2	2232	98%	2188	1%	22	1%	22	45
Paseo de Valencia SB-Inside lanes(2)-3	2272	98%	2227	1%	23	1%	22	45
Paseo de Valencia NB-Inside lanes(2)-1	981	98%	962	1%	10	1%	9	45
Paseo de Valencia NB-Inside lanes(2)-2	1041	98%	1021	1%	10	1%	10	45
Paseo de Valencia NB-Inside lanes(2)-3	1058	98%	1037	1%	11	1%	10	45
Paseo de Valencia NB-Outside lane(1)-1	491	98%	481	1%	5	1%	5	45
Paseo de Valencia NB-Outside lane(1)-2	520	98%	510	1%	5	1%	5	45
Paseo de Valencia NB-Outside lane(1)-3	529	98%	519	1%	5	1%	5	45

Source: LIN Consulting, Inc., May 2012

Table B-4. Build Traffic Data

Roadway Segment	Total Vehicles	Auto %	Total Autos	Medium Truck %	Total Medium Truck	Heavy Truck %	Heavy Truck %	Speed
Beckenham Street EB	118	100%	118	0%	0	0%	0	30
Beckenham Street WB	171	100%	171	0%	0	0%	0	30
Avenida Sevilla EB	78	100%	78	0%	0	0%	0	30
Kennington Drive EB	39	100%	39	0%	0	0%	0	30
Kennington Drive WB	48	100%	48	0%	0	0%	0	30
Paseo de Valencia SB-Inside Lanes(2)-1	2251	98%	2206	1%	23	1%	22	45
Paseo de Valencia SB-Inside Lanes(2)-2	1488	98%	1458	1%	15	1%	15	45
Paseo de Valencia SB-Inside lanes(2)-3	1515	98%	1485	1%	15	1%	15	45
Paseo de Valencia NB-Inside lanes(2)-1	981	98%	962	1%	10	1%	9	45
Paseo de Valencia NB-Inside lanes(2)-2	1041	98%	1021	1%	10	1%	10	45
Paseo de Valencia NB-Inside lanes(2)-3	1058	98%	1037	1%	11	1%	10	45
Paseo de Valencia NB-Outside lane(1)-1	491	98%	481	1%	5	1%	5	45
Paseo de Valencia NB-Outside lane(1)-2	520	98%	510	1%	5	1%	5	45
Paseo de Valencia NB-Outside lane(1)-3	529	98%	519	1%	5	1%	5	45
Paseo de Valencia SB-OutsideLane(1)-1	744	98%	730	1%	7	1%	7	45
Paseo de Valencia SB-OutsideLane(1)-2	757	98%	742	1%	8	1%	7	45

Source: LIN Consulting, Inc., May 2012

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Appendix C

Noise Measurement Field Monitoring Forms

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Noise Monitoring Field Report
Paseo de Valencia Widening Project between Laguna Hills Drive and Kennington Drive

SITE PHOTOS

Short-Term

01
Meas

SITE INFORMATION

Analysis Date: 7/12/2012 9:24 AM
Noise Analyst: J. Burnam
Ambient Temperature: 70° F
Humidity: 72%
Wind Speed: 0 mph
Wind Direction: Calm

Project Distance: 190 ft
Address: 24566 Ashland Drive
Existing Land Use: Single-Family Residence
Planned Land Use: Single-Family Residence

NOISE RESULTS

Sound Level (L_{eq}) 53.0
dBA

ENTECH SLM 1: Larson Davis Model 824 / Serial 824A3517
Microphone: 0.5" PCB Electronics 377B02 / Serial
Preamp: Larson Davis PRM902 0.5" 7 pin/ Serial

FIELD COMMENTS

Single-family residence located east of Paseo de Valencia and south of Kennington Drive. Elevation at this location is approximately 20 feet higher than Paseo de Valencia roadway. SLM was placed on the front sidewalk of the single-family residence. The SLM was placed approximately 24 feet east of the residence. Currently, the backyard is shielded by a brick wall that is approximately 8 feet in height. The dominant noise source for this location is traffic traveling on Paseo de Valencia.

Noise Monitoring Field Report

Paseo de Valencia Widening Project between Laguna Hills Drive and Kennington Drive

SITE PHOTOS

Short-Term

02

Meas

SITE INFORMATION

Analysis Date: 7/12/2012 9:53 AM
Noise Analyst: J. Burnam
Ambient Temperature: 70° F
Humidity: 72%
Wind Speed: 0 mph
Wind Direction: Calm

Project Distance: 220 ft
Address: 24971 Sunset Place
Existing Land Use: Single-Family Residence
Planned Land Use: Single-Family Residence

NOISE RESULTS

Sound Level **50.0**
dBA

ENTECH SLM 1: Larson Davis Model 824 / Serial 824A3517
Microphone: 0.5" PCB Electronics 377B02 / Serial
Preamp: Larson Davis PRM902 0.5" 7 pin/ Serial

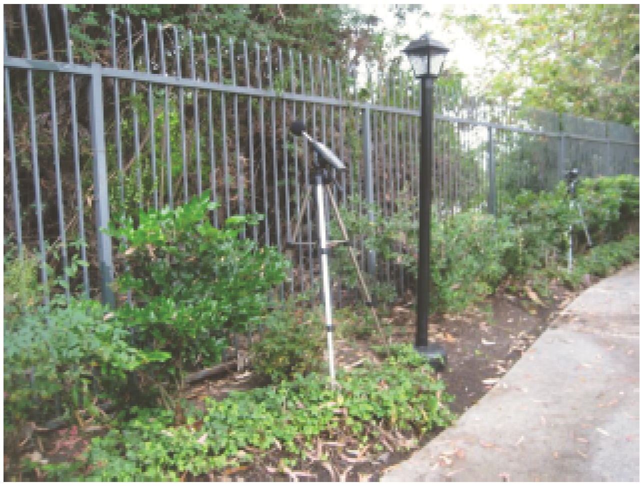
FIELD COMMENTS

Single-family residence located east of Paseo de Valencia and south of Beckenham Street. Elevation at this location is approximately 25 feet higher in elevation than Paseo de Valencia. The SLM was placed in the middle of the front yard, approximately 10 feet east of the front of the residence. Currently, the residence is not shielded from the dominant noise source of traffic traveling on Paseo de Valencia.

Noise Monitoring Field Report

Paseo de Valencia Widening Project between Laguna Hills Drive and Kennington Drive

SITE PHOTOS



Short-Term

03
Meas

SITE INFORMATION

Analysis Date: 7/12/2012 10:22 AM
Noise Analyst: J. Burnam
Ambient Temperature: 73° F
Humidity: 65%
Wind Speed: 0 mph
Wind Direction: Calm

Project Distance: 115 ft
Address: 25211 Stockport Street Apt. 301
Existing Land Use: Single-Family Residence
Planned Land Use: Single-Family Residence

NOISE RESULTS

Sound Level **60.8**
dBA

ENTECH SLM 1: Larson Davis Model 824 / Serial 824A3517
Microphone: 0.5" PCB Electronics 377B02 / Serial
Preamp: Larson Davis PRM902 0.5" 7 pin/ Serial

FIELD COMMENTS

Multi-family residence, located at Alicia Village Apartments, east of Paseo de Valencia and north of Stockport Street. Elevation at this location is approximately 15 feet higher than Paseo de Valencia. The SLM was placed along the private property line western private property line of the Alicia Village Apartments near apartment 301. The SLM was placed approximately 20 feet west of the nearest building. Currently, there is no barrier shielding the measurement location from the dominant noise source of traffic traveling on Paseo de Valencia.

Noise Monitoring Field Report

Paseo de Valencia Widening Project between Laguna Hills Drive and Kennington Drive

SITE PHOTOS

Short-Term

04
Meas

SITE INFORMATION

Analysis Date: 7/12/2012 10:52 AM
Noise Analyst: J. Bumam
Ambient Temperature: 73° F
Humidity: 65%
Wind Speed: 0 mph
Wind Direction: Calm

Project Distance: 110 ft
Address: 25211 Stockport Street Apartment 337
Existing Land Use: Single-Family Residence
Planned Land Use: Single-Family Residence

NOISE RESULTS

Sound Level **62.7**
dBA

ENTECH SLM 1: Larson Davis Model 824 / Serial 824A3517
Microphone: 0.5" PCB Electronics 377B02 / Serial
Preamp: Larson Davis PRM902 0.5" 7 pin/ Serial

FIELD COMMENTS

Multi-family residence, located east of Paseo de Valencia and north of Stockport Street. Elevation at this location is approximately 15 feet higher than Paseo de Valencia. The SLM was placed approximately 15 feet west of the nearest building. Currently, there is no barrier shielding the measurement location from the dominant noise source of traffic traveling on Paseo de Valencia.

Noise Monitoring Field Report

Paseo de Valencia Widening Project between Laguna Hills Drive and Kennington Drive

SITE PHOTOS

Short-Term

05
Meas

SITE INFORMATION

Analysis Date: 7/12/2012 11:46 AM
Noise Analyst: J. Burnam
Ambient Temperature: 75° F
Humidity: 63%
Wind Speed: 3 mph
Wind Direction: West

Project Distance: 30 ft
Address: 24351 El Toro Road – Laguna Woods Retirement Village – Unit 792 to 800
Existing Land Use: Single-Family Residence
Planned Land Use: Single-Family Residence

NOISE RESULTS

Sound Level **55.2**
dBA

ENTECH SLM 1: Larson Davis Model 824 / Serial 824A3517
Microphone: 0.5" PCB Electronics 377B02 / Serial
Preamp: Larson Davis PRM902 0.5" 7 pin/ Serial

FIELD COMMENTS

A mixture of multi-family and single-family residences located along the entire western limit of the proposed project of Paseo de Valencia, between Laguna Hills Drive and Kennington Drive. This community is known as the Laguna Woods Retirement Village. Elevation at this location is approximately 5 feet lower than Paseo de Valencia. The SLM was placed approximately 20 feet east from the nearest building. There is a barrier approximately 5 feet in height shielding these receivers.

Noise Monitoring Field Report
Paseo de Valencia Widening Project between Laguna Hills Drive and Kennington Drive

SITE PHOTOS

Short-Term

06
Meas

SITE INFORMATION

Analysis Date: 7/12/2012 12:15 PM
Noise Analyst: J. Burnam
Ambient Temperature: 75° F
Humidity: 63%
Wind Speed: 3 mph
Wind Direction: West

Project Distance: 30 ft
Address: 24351 El Toro Road – Laguna Woods Retirement Village – Unit 776
Existing Land Use: Single-Family Residence
Planned Land Use: Single-Family Residence

NOISE RESULTS

Sound Level 58.6
dBA

ENTECH SLM 1: Larson Davis Model 824 / Serial 824A3517
Microphone: 0.5" PCB Electronics 377B02 / Serial
Preamp: Larson Davis PRM902 0.5" 7 pin/ Serial

FIELD COMMENTS

A mixture of multi-family and single-family residences located along the entire western limit of the proposed project of Paseo de Valencia, between Laguna Hills Drive and Kennington Drive. This community is known as the Laguna Woods Retirement Village. Elevation at this location is approximately 2 feet lower than Paseo de Valencia. The SLM was placed approximately 50 feet east of Unit 776. There is a barrier approximately 5 feet in height shielding these receivers.

Appendix D

Traffic Impact Analysis Report – Paseo de Valencia Widening prepared by LIN Consulting, Inc., July 30, 2012

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TRAFFIC IMPACT ANALYSIS REPORT

Paseo De Valencia Widening

From Kennington Drive to Laguna Hills Drive

City of Laguna Hills, California

Prepared For:

City of Laguna Hills
24035 El Toro Rd.
Laguna Hills, CA 92653

Prepared By:

LIN Consulting, Inc.
21660 E. Copley Drive, Suite 270
Diamond Bar, CA 91765

July 30, 2012

LIN Consulting, Inc.
Traffic, Civil, Electrical Consulting Engineers

21660 E. Copley Dr, Suite 270
Diamond Bar, CA 91765
Tel:(909) 396-6850 Fax:(909) 396-8150
E-mail: inbox@LinConsulting.com

July 30, 2012

Mr. Kenneth Rosenfield
Director of Public Services
City of Laguna Hills
24035 El Toro Rd.
Laguna Hills, CA 92653

Subject: Paseo De Valencia Widening from Kennington Drive to Laguna Hills Drive
Traffic Impact Analysis Report

Dear Mr. Rosenfield:

LIN Consulting is pleased to submit the Traffic Impact Analysis Report for the proposed Paseo De Valencia widening project between Kennington Drive and Laguna Hills Drive. This report incorporated traffic data and cumulative projects. The report addresses the impact of the proposed project on intersections within the study area.

A summary of findings and recommendations can be found in the "Executive Summary" section of the report.

If further assistance or information is required, please feel free to contact us.

Sincerely,

LIN Consulting, Inc.

A California Corporation

Ray Kommidi, P.E., T.E.
Transportation Engineer

REGISTERED PROFESSIONAL ENGINEER
R. KOMMIDI
C 76481
EXP. 12/31/12
CIVIL
STATE OF CALIFORNIA

TABLE OF CONTENTS

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INTRODUCTION

The purpose of this traffic impact analysis report is to identify potential traffic impacts on the study area intersections of the proposed widening of Paseo De Valencia from Kennington Drive to Laguna Hills Drive in the City of Laguna Hills (City). The traffic impact study will identify traffic volumes at each study intersection and perform intersection level of service analysis. This traffic impact study analyzes the study area for the following scenarios.

1. Existing Conditions.
2. Opening Year (2014) Without Project.
3. Opening Year (2014) With Project.
4. Horizon Year (2035) Without Project.
5. Horizon Year (2035) With Project.

The City of Laguna Hills General Plan Mobility Element identifies Paseo De Valencia as a major arterial highway between El Toro Road and La Paz Road. Major arterial highways are defined in the City's General Plan as, "…6 lane divided roadways, with a typical right-of-way of 120 feet and raised landscaped median islands. The function of major arterials is to carry a large volume of regional traffic not handled by the freeway system." (City of Laguna Hills General Plan, page M-4.). Currently, Paseo De Valencia between El Toro Road and Laguna Hills Drive has two southbound lanes and three north bound lanes along with a Class II bike lane in the southbound direction and a Class I bike lane in the northbound direction. As such, this segment of Paseo De Valencia does not meet the City's 6 lane requirement for major arterial highways. The proposed project will widen Paseo De Valencia between Kennington Drive and Laguna Hills Drive by adding a third southbound lane, which will correct the lane imbalance and bring this segment of the roadway into compliance with the City's General Plan. See Exhibit A for the proposed project location.

EXHIBIT A

LIN Consulting, Inc.

Traffic, Civil, and Electrical Consulting Engineers

Paseo De Valencia Widening
From Kennington Drive to
Laguna Hills Drive
City of Laguna Hills

PROJECT
LOCATION MAP

EXECUTIVE SUMMARY

The purpose of this traffic impact analysis report is to identify potential traffic impacts on the study area intersections due to the proposed widening of Paseo De Valencia between Kennington Drive and Laguna Hills Drive in the City. The traffic impact study will identify current (2012), opening year (2014) and horizon year (2035) traffic volumes at each study intersection and perform intersection level of service analysis.

The City of Laguna Hills General Plan Mobility Element identifies Paseo De Valencia as a major arterial highway between El Toro Road and La Paz Road. Major arterial highways are defined in the City's General Plan as, "…6 lane divided roadways, with a typical right-of-way of 120 feet and raised landscaped median islands. The function of major arterials is to carry a large volume of regional traffic not handled by the freeway system." (City of Laguna Hills General Plan, page M-4.). Currently, Paseo De Valencia between El Toro Road and Laguna Hills Drive has two southbound lanes and three north bound lanes along with a Class II bike lane in the southbound direction and a Class I bike lane in the northbound direction. As such, this segment of Paseo De Valencia does not meet the City's 6 lane requirement for major arterial highways. The proposed project will widen Paseo De Valencia between Kennington Drive and Laguna Hills Drive by adding a third southbound lane, which will correct the lane imbalance and bring this segment of the roadway into compliance with the City's General Plan. To accommodate the third southbound lane, the contiguous Class II bikes lanes in each direction and a new sidewalk in southbound direction, the proposed project would shift the roadway to the east and, as necessary, reconstruct the landscaped median island.

As per the City General Plan, the technical evaluation of the roadway system in the City of Laguna Hills is performed using volume-to-capacity (V/C) ratios. V/C ratios are calculated based on current or future average daily traffic (ADT) volumes and daily capacity values for the various types of arterials. A level of service (LOS) scale is used to evaluate roadway performance based on V/C ratios. The LOS levels range from "A" to "F," with LOS "A" representing free flow conditions and LOS "F" representing severe traffic congestion. Descriptions of traffic flow characteristics associated with each LOS are provided in Table 1. The performance of intersections within City of Laguna Hills jurisdiction is evaluated using peak hour intersection capacity utilization (ICU) values. To calculate an ICU, the volume of traffic using the intersection is compared with the capacity of the intersection, usually expressed by percent. The percent represents that portion of the hour required to provide sufficient capacity to accommodate all intersection traffic if all approaches operate at capacity. The ICU methodology makes adjustment for lost time by adding 0.1 to the sum of critical Volume to Capacity (V/C) ratios to calculate the ICU. A Level of Service (LOS) scale is used to evaluate intersection performance based on ICU values. The LOS levels range from “A” to “F”, with LOS “A” representing the free flow conditions and LOS “F” representing severe traffic congestion. Table 1 lists the traffic flow characteristics associated with each LOS.

Table 1. Level of Service Descriptions

Level of Service (LOS)	V/C or ICU	Description
A	0.00 - 0.60	Excellent operation. All approaches to the intersection appear quite open, turning movements are easily made, and nearly all drivers find freedom of operation.
B	0.61 - 0.70	Very good operation. An occasional approach phase is fully utilized. Many drivers feel somewhat restricted within platoons of vehicles.
C	0.71 - 0.80	Good operation. Major approach phases fully utilized. Most drivers feel somewhat restricted.
D	0.81 - 0.90	Fair operation. Drivers may have to wait through more than one red signal indication. Queues may develop but dissipate rapidly, without excessive delays.
E	0.91 - 1.00	Poor operation. Volumes at or near capacity. Vehicle may wait through several signal cycles. Long queues form upstream from intersection.
F	>1.00	Forced flow. Represents jammed conditions. Intersection operates below capacity with low volumes. Queues may block upstream intersections.

Source –Laguna Hills General Plan, 2009.

The City of Laguna Hills performance standard for intersections is LOS “D” which is an ICU value of 0.90 or less. Per the City General Plan, the LOS “D” policy represents a desirable threshold for attaining acceptable mobility on the City’s arterial street system over time. This study revealed that under existing conditions, all the study area intersections operate at LOS “C” or better, except the intersection of Paseo De Valencia at Laguna Hills Drive, which operates at LOS “D” during the weekday PM peak hour. The roadway segment analysis of Paseo De Valencia between Kennington Drive and Laguna Hills Drive revealed that under existing traffic conditions northbound Paseo De Valencia operates at LOS “B” and southbound Paseo De Valencia operates at LOS “F”.

The study analyzed the traffic conditions in Year 2014 (Assumed Project Opening Year) and 2035 (Horizon Year) with and without the proposed project improvements. To assess future traffic conditions in years 2014 and 2035, existing traffic is combined with ambient growth. This traffic analysis contains estimated regional growth based upon the ambient growth rate of one (1) percent per year as recommended by the City. In addition to the ambient growth, the study analyzes the impact of cumulative developments which are known by the City and are expected to be developed by Year 2014.

Table 2 shows the change in ICU as a percentage due to the proposed project improvements along Paseo De Valencia at the study area intersections in Year 2014 and Year 2035. There is no change in the Level of Service (LOS) or ICU at the study area intersections except for the intersection of Paseo De Valencia and Beckenham Street where the LOS during the PM peak hour improves from LOS “B” to LOS “A” and from LOS “D” to LOS “B” in the Year 2014 and Year 2035, respectively. The improvement in traffic conditions is indicated by a decrease in ICU rating which decreases by 2.68% and 25.33% during AM and PM peak hours, respectively in Year 2014 and by 2.92% and 25.92% during AM and PM peak hours, respectively in Year 2035.

Table 2. Change in ICU/LOS for Years 2014 and 2035 due to Proposed Project

Intersection	**Year 2014**				**Year 2035**			
	AM Peak Hour		**PM Peak Hour**		**AM Peak Hour**		**PM Peak Hour**	
	ICU	**LOS**	**ICU**	**LOS**	**ICU**	**LOS**	**ICU**	**LOS**
Paseo De Valencia at Kennington Drive	NC	NC	NC	NC	NC	NC	NC	NC
Paseo De Valencia at Beckenham St/Avenida	-2.68%	NC	-25.33%	B to A	-2.92%	NC	-25.92%	D to B
Paseo De Valencia at Laguna Hills Dr/Stockport	NC	NC	NC	NC	NC	NC	NC	NC

ICU - Intersection Capacity Utilization, LOS – Level of Service, NC – No Change

Table 3 shows the change in V/C ratio (percentage change) and LOS on Paseo De Valencia due to the addition of the third southbound through lane on Paseo De Valencia from Kennington Drive to just north of Laguna Hills Drive. The addition of the third southbound lane along Paseo De Valencia increases the overall capacity of the roadway from 37,500 Vehicle Per Day (VPD) to 45,000 VPD. The roadway segment analysis shows that LOS along southbound Paseo De Valencia between Kennington Drive and Laguna Hills Drive improves from LOS “F” to LOS “C” and LOS “F” to LOS “E” in Year 2014 and 2035, respectively. The improvement in traffic conditions is indicated by a decrease in V/C ratio on southbound Paseo De Valencia, which decreases by 33% Year 2014 and Year 2035.

Table 3. Change in V/C/LOS for Years 2014 and 2035 due to Proposed Project

Roadway Segment	**Direction**	**Year 2014**		**Year 2035**	
		V/C	**LOS**	**V/C**	**LOS**
Paseo De Valencia Between Kennington Dr. and Beckenham St.	NB	NC	NC	NC	NC
	SB	-33%	F to C	-33%	F to E
Paseo De Valencia Beckenham St. and Laguna Hills Dr.	NB	NC	NC	NC	NC
	SB	-33%	F to C	-33%	F to E

V/C – Volume to Capacity Ratio, LOS – Level of Service, NC – No Change

EXISTING CONDITIONS

San Diego (I-5) Freeway is a north-south freeway located less than one mile to the east of the study area. There are four lanes in each direction along with High-Occupancy-Vehicle (HOV) Only lanes in the vicinity of the project site.

Paseo De Valencia is a north-south major arterial highway between El Toro Road and La Paz Road located just west of the I-5 Freeway. It has two southbound lanes and three north bound lanes along with a Class II bike lane in the southbound direction and a Class I bike lane in the northbound direction in the limits of El Toro Road to Laguna Hills Drive. The current five lane configuration does not meet the City's six lane requirement for major arterial highways that is set in the City's General Plan. The posted speed limit on this roadway is 45 mph in the vicinity of the project site.

Kennington Drive is a local street that connects the residential development located along Ashland Drive to Paseo De Valencia. Kennington Drive is 40 feet in width with double yellow striping.

Beckenham Street is a local street that connects the residential and commercial developments located to the east of the project site to Paseo De Valencia. Beckenham Street is 40 feet in width with no striping. The posted speed limit on this roadway is 30 mph.

Avenida Sevilla is a one way exit only private street west of Paseo De Valencia that connects the residents of Laguna Woods Village to Paseo De Valencia.

Laguna Hills Drive between Paseo De Valencia and Moulton Parkway is an east-west primary roadway with two lanes in each direction along with a raised median. There are existing Class II bike lanes along both sides of Laguna Hills Drive west of Paseo De Valencia. The posted speed limit on this roadway is 45 mph. Laguna Hills Drive west of

Moulton Parkway changes name to Aliso Viejo Parkway, and east of Paseo De Valencia it changes name to Stockport Avenue.

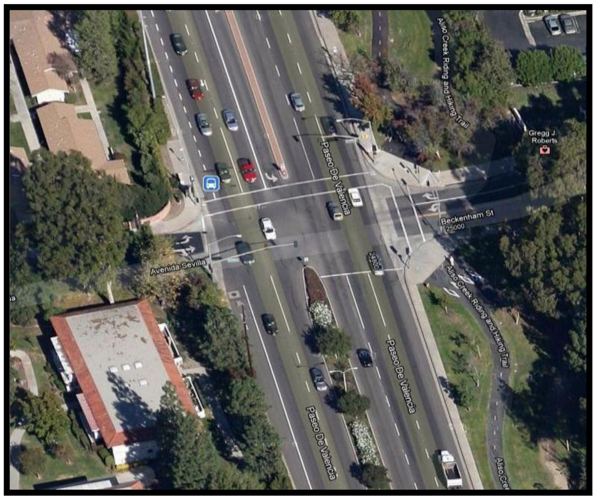
<u>Stockport Avenue</u> is a local street east of Paseo De Valencia and provides access to residential development in the area. Stockport Avenue is 40 feet in width with no striping.

The study analyzed the following intersections:

1. Paseo De Valencia (NS) at Kennington Drive (EW) -

Paseo De Valencia has two lanes in the southbound direction with an exclusive left turn only lane; northbound Paseo De Valencia has three lanes. Kennington Drive has two lanes in the westbound direction, one exclusive left turn only lane and one exclusive right turn only lane. This is a signalized T-intersection with a Class II bike lane along southbound Paseo De Valencia.

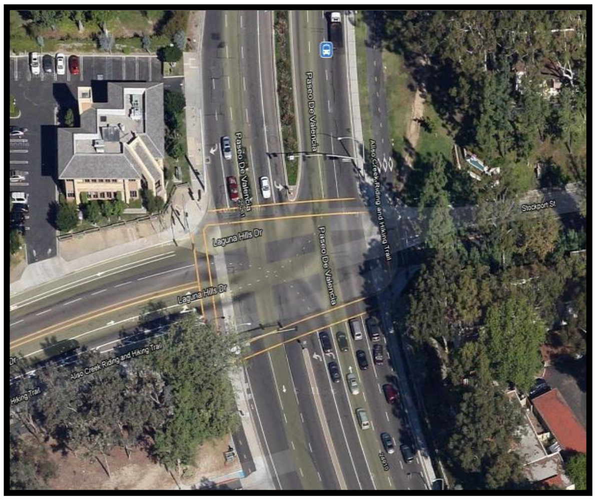
2. Paseo De Valencia (NS) at Beckenham Street/Avenida Sevilla (EW) -



Paseo De Valencia has two lanes in the southbound direction with an exclusive left turn lane and a Class II bike lane; Paseo De Valencia has three lanes in the northbound direction. The west leg of the intersection (Avenida Sevilla) is a one way eastbound only private street that provides egress for the residents of Laguna Woods Village. Avenida Sevilla has two lanes including an exclusive left turn only lane. Westbound Beckenham Street has two lanes, one exclusive left turn only lane and one exclusive right turn only lane. Eastbound Beckenham Street has one lane. This is a signalized intersection.

3. Paseo De Valencia (NS) at Laguna Hills Drive/Stockport Avenue (EW) –

Paseo De Valencia has five lanes in the southbound direction with an exclusive left turn only lane and an exclusive right turn only lane. The third southbound through lane on Paseo De Valencia originates about 250 feet north of the intersection. Northbound Paseo De Valencia has five lanes including two exclusive left turn only lanes. Eastbound Laguna Hills Drive has three lanes, one exclusive left turn only lane, a thru-left turn lane and an exclusive right turn only lane. Westbound Stockport Avenue has two lanes including an exclusive left turn only lane. There is an existing county trail which includes a Class I bike lane and an equestrian trail along northbound Paseo De Valencia starting at the intersection. This is a signalized intersection.



The existing number of through travel lanes and intersections controls is shown on Exhibit B.

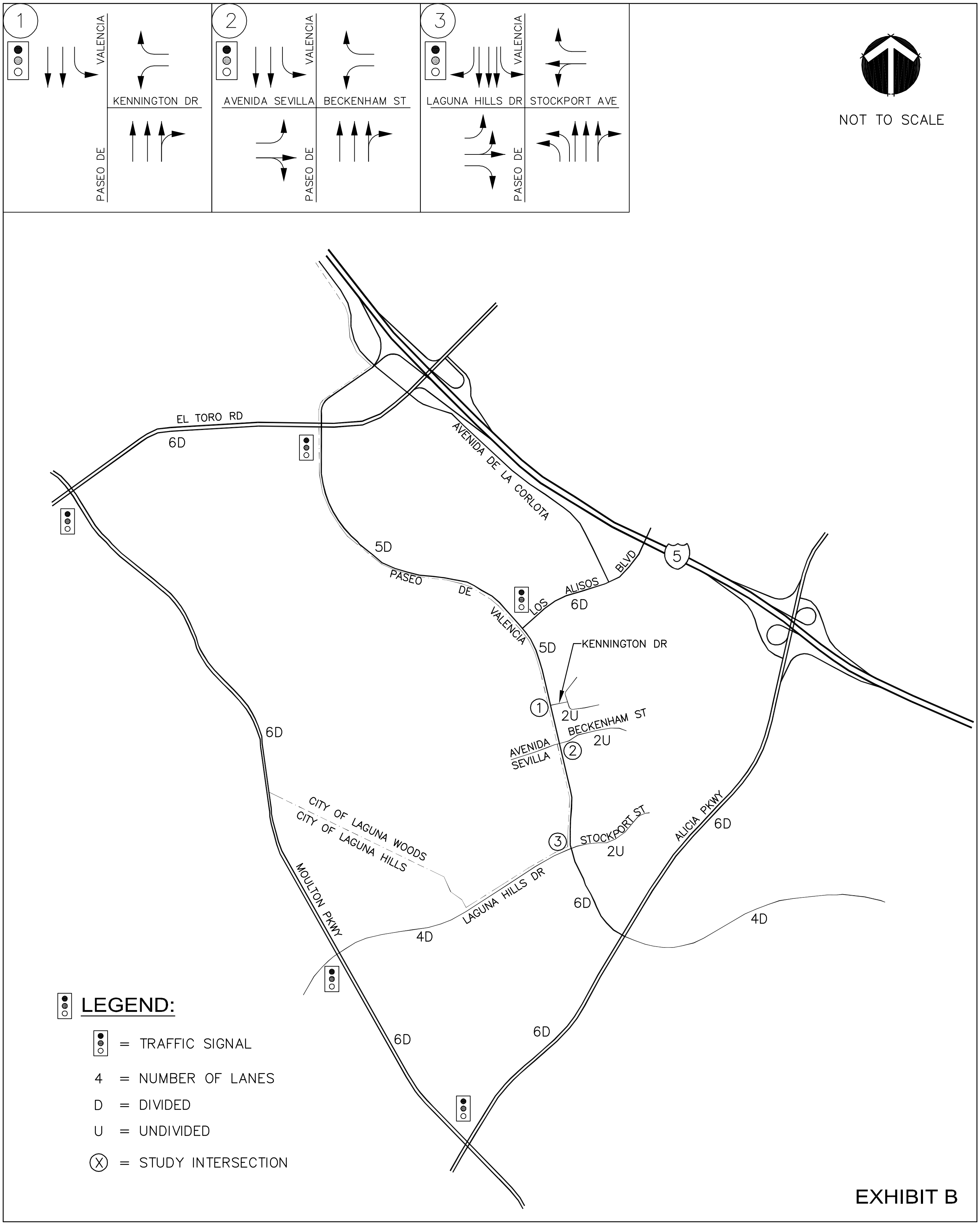


EXHIBIT B

LIN Consulting, Inc.

Traffic, Civil, and Electrical Consulting Engineers

Paseo De Valencia Widening
From Kennington Drive to
Laguna Hills Drive
City of Laguna Hills

EXISTING STUDY AREA

Existing Average Daily Traffic (ADT)

A 24-hour tube count was performed on Paseo De Valencia between Kennington Drive and Beckenham Street and Beckenham Street and Laguna Hills Drive on Tuesday, March 13, Wednesday, March 14 and on Thursday, March 15, 2012. Table 4 shows the summary of ADT counts for the two locations. Traffic count data in 15-minute increments for the 24-hour tube counts are provided in Appendix A.

Table 4. Summary of ADT Counts Along Paseo De Valencia

	Between Kennington Drive and Beckenham Street			**Between Beckenham Street and Laguna Hills Drive**		
	Tuesday 03/13/12	**Wednesday 03/14/12**	**Thursday 03/15/12**	**Tuesday 03/13/12**	**Wednesday 03/14/12**	**Thursday 03/15/12**
Northbound	15,202	14,593	15,583	14,494	14,092	14,983
Southbound	16,131	16,353	17,117	16,584	16,898	17,640
Total	31,333	30,946	32,700	31,078	30,990	32,623

Existing Roadway Segment Analysis

The technical evaluation of the roadway system in the City of Laguna Hills is performed using volume-to-capacity (V/C) ratios. V/C ratios are calculated based on current or future average daily traffic (ADT) volumes and daily capacity values for the various types of arterials. A level of service (LOS) scale is used to evaluate roadway performance based on V/C ratios. The LOS levels range from “A” to “F,” with LOS “A” representing free flow conditions and LOS “F” representing severe traffic congestion. Descriptions of traffic flow characteristics associated with each LOS are provided in Table 6. Paseo De Valencia is a major arterial highway between El Toro Road and La Paz Road and it is designated as major six lane divided highway in the Orange County Master Plan of Arterial Highways (MPAH). Per Orange County MPAH the capacity of a six lane divided highway is 45,000 Vehicles Per Day (VPD). Since Paseo De Valencia has two southbound lanes and three northbound lanes, the roadway capacity is assumed to be 22,500 and 15,000 VPD, in the northbound and southbound directions, respectively. Roadway Volume to Capacity (V/C) ratios and levels of service based on ADT counts conducted on Thursday, March 15, 2012 are presented in Table 5. As shown in Table 5, northbound Paseo De Valencia is currently operating at LOS "B" and southbound Paseo De Valencia at LOS "F".

Table 5. Existing Roadway Conditions – Paseo De Valencia

Roadway Segment	Direction	No. of Lanes	Capacity	Existing Volume	V/C	LOS
Between Kennington Dr. and Beckenham St.	Northbound	3	22,500	15,583	0.69	B
	Southbound	2	15,000	17,117	1.14	F
Between Beckenham St. and Laguna Hills Dr.	Northbound	3	22,500	14,983	0.67	B
	Southbound	2	15,000	17,640	1.18	F

V/C – Volume to Capacity Ratio, LOS – Level of Service

Existing Turning Movement Counts

Turning movement counts at the study intersections were conducted during the weekday AM peak hour (7:00 AM to 9:00 AM) and PM peak hour (4:00 PM to 6:00 PM) on Wednesday, March 14, 2012 (See Exhibits C and D). Intersection Turning Movement count data are provided in Appendix A.

Existing Intersection Analysis

The City accepts the ICU method for traffic impact evaluation purposes. To calculate an ICU, the volume of traffic using the intersection is compared with the capacity of the intersection, usually expressed by percent. The percent represents that portion of the hour required to provide sufficient capacity to accommodate all intersection traffic if all approaches operate at capacity. The ICU methodology makes adjustment for lost time by adding 0.1 to the sum of critical Volume to Capacity (V/C) ratios to calculate the ICU. The relationship between LOS and V/C is defined in Table 6.

Table 6. LOS By V/C

Level of Service (LOS)	Volume to Capacity Ratio (V/C)	Description
A	0.00 - 0.60	Excellent operation. All approaches to the intersection appear quite open, turning movements are easily made, and nearly all drivers find freedom of operation.
B	0.61 - 0.70	Very good operation. An occasional approach phase is fully utilized. Many drivers feel somewhat restricted within platoons of vehicles.
C	0.71 - 0.80	Good operation. Major approach phases fully utilized. Most drivers feel somewhat restricted.
D	0.81 - 0.90	Fair operation. Drivers may have to wait through more than one red signal indication. Queues may develop but dissipate rapidly, without excessive delays.
E	0.91 - 1.00	Poor operation. Volumes at or near capacity. Vehicle may wait through several signal cycles. Long queues form upstream from intersection.
F	>1.00	Forced flow. Represents jammed conditions. Intersection operates below capacity with low volumes. Queues may block upstream intersections.

Source –Laguna Hills General Plan, 2009.

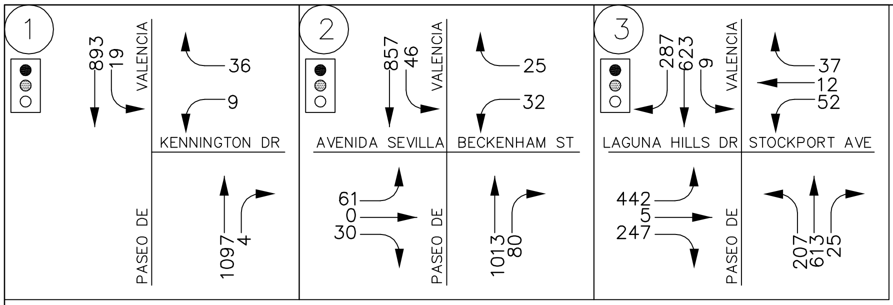
The acceptable minimum LOS for a signalized intersection in the City is LOS “D” which is an ICU value of 0.90 or less. Existing traffic conditions at the study area intersections are depicted in Table 7. All the study area intersections operate at LOS “B” or better, except the intersection of Paseo De Valencia at Laguna Hills Drive, which operates at

LOS “D” during the weekday PM peak hour. The LOS analysis worksheets for existing traffic conditions are included in Appendix B.

Table 7. Existing Traffic Condition

Intersection	**Weekday AM Peak Hour**		**Weekday PM Peak Hour**	
	LOS	**ICU**	**LOS**	**ICU**
Paseo De Valencia at Kennington Drive	A	0.384	B	0.632
Paseo De Valencia at Beckenham St/Avenida Sevilla	A	0.403	B	0.671
Paseo De Valencia at Laguna Hills Dr/Stockport Ave	A	0.539	D	0.831

ICU - Intersection Capacity Utilization, LOS - Level of Service



NOT TO SCALE

LEGEND:

Ⓧ = STUDY INTERSECTION

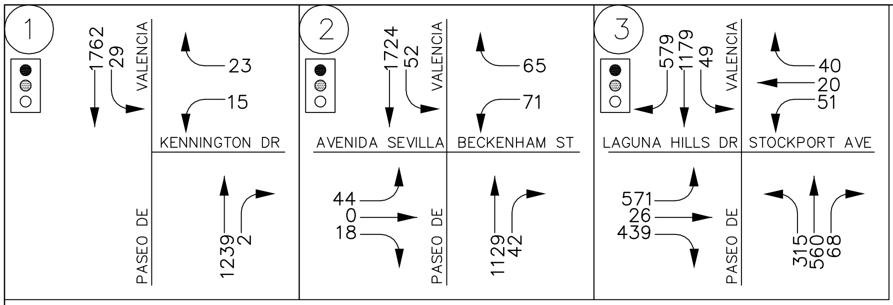
EXHIBIT C

LIN Consulting, Inc.

Traffic, Civil, and Electrical Consulting Engineers

Paseo De Valencia Widening
From Kennington Drive to
Laguna Hills Drive
City of Laguna Hills

EXISTING
TURNING MOVEMENT VOLUMES
WEEKDAY AM PEAK HOUR



NOT TO SCALE

LEGEND:

Ⓧ = STUDY INTERSECTION

EXHIBIT D

LIN Consulting, Inc.

Traffic, Civil, and Electrical Consulting Engineers

Paseo De Valencia Widening
From Kennington Drive to
Laguna Hills Drive
City of Laguna Hills

EXISTING
TURNING MOVEMENT VOLUMES
WEEKDAY PM PEAK HOUR

PROPOSED PROJECT

The City of Laguna Hills General Plan Mobility Element identifies Paseo De Valencia as a major arterial highway between El Toro Road and La Paz Road. Major arterial highways are defined in the City's General Plan as, "…6 lane divided roadways, with a typical right-of-way of 120 feet and raised landscaped median islands. The function of major arterials is to carry a large volume of regional traffic not handled by the freeway system." (City of Laguna Hills General Plan, page M-4.). Currently, Paseo De Valencia between El Toro Road and Laguna Hills Drive has two southbound lanes and three northbound lanes along with a Class II bike lane in the southbound direction and a Class I bike lane in the northbound direction. There is no sidewalk in the southbound direction. This segment of Paseo De Valencia does not meet the City's 6 lane requirement for major arterial highways. The proposed project will widen Paseo De Valencia by adding a third southbound lane between Kennington Drive and Laguna Hills Drive, which will correct the lane imbalance and bring this segment of the roadway into compliance with the City's General Plan. To accommodate the third southbound lane, the contiguous Class II bikes lanes in each direction and a new sidewalk along the southbound lane, the proposed project would shift the roadway to the east and reconstruct the landscaped median island, as necessary.

Exhibit E depicts the proposed lane geometry at the study area intersections in year 2014 after the proposed roadway improvements are constructed. Appendix C presents a layout concept plan of the proposed improvements and cross-sections of Paseo De Valencia between Kennington Drive and Laguna Hills Drive.

The changes to the number of approach lanes at the study area intersections after the construction of the proposed project are:

1. Paseo De Valencia (NS) at Kennington Drive (EW) -

The proposed project does not change the number of approach lanes at the intersection of Paseo De Valencia at Kennington Drive.

2. Paseo De Valencia (NS) at Beckenham Street/Avenida Sevilla (EW) -

The proposed project would add one lane to the southbound direction. After project completion, southbound Paseo De Valencia would have four lanes with one of them being an exclusive left turn only lane.

3. Paseo De Valencia (NS) at Laguna Hills Drive/Stockport Avenue (EW) -

The proposed project does not change the number of approach lanes at the intersection of Paseo De Valencia at Laguna Hills Drive but would make continuous the third southbound through lane.

4. Improvements along Paseo De Valencia between Kennington Drive and Laguna Hills Drive/Stockport Avenue -

The proposed project will add a third southbound through lane on Paseo De Valencia from Kennington Drive to just north of Laguna Hills Drive. The project proposes to add a Class II bike lane along northbound Paseo De Valencia and construct sidewalk along southbound Paseo De Valencia between Avenida Sevilla and Laguna Hills Drive.

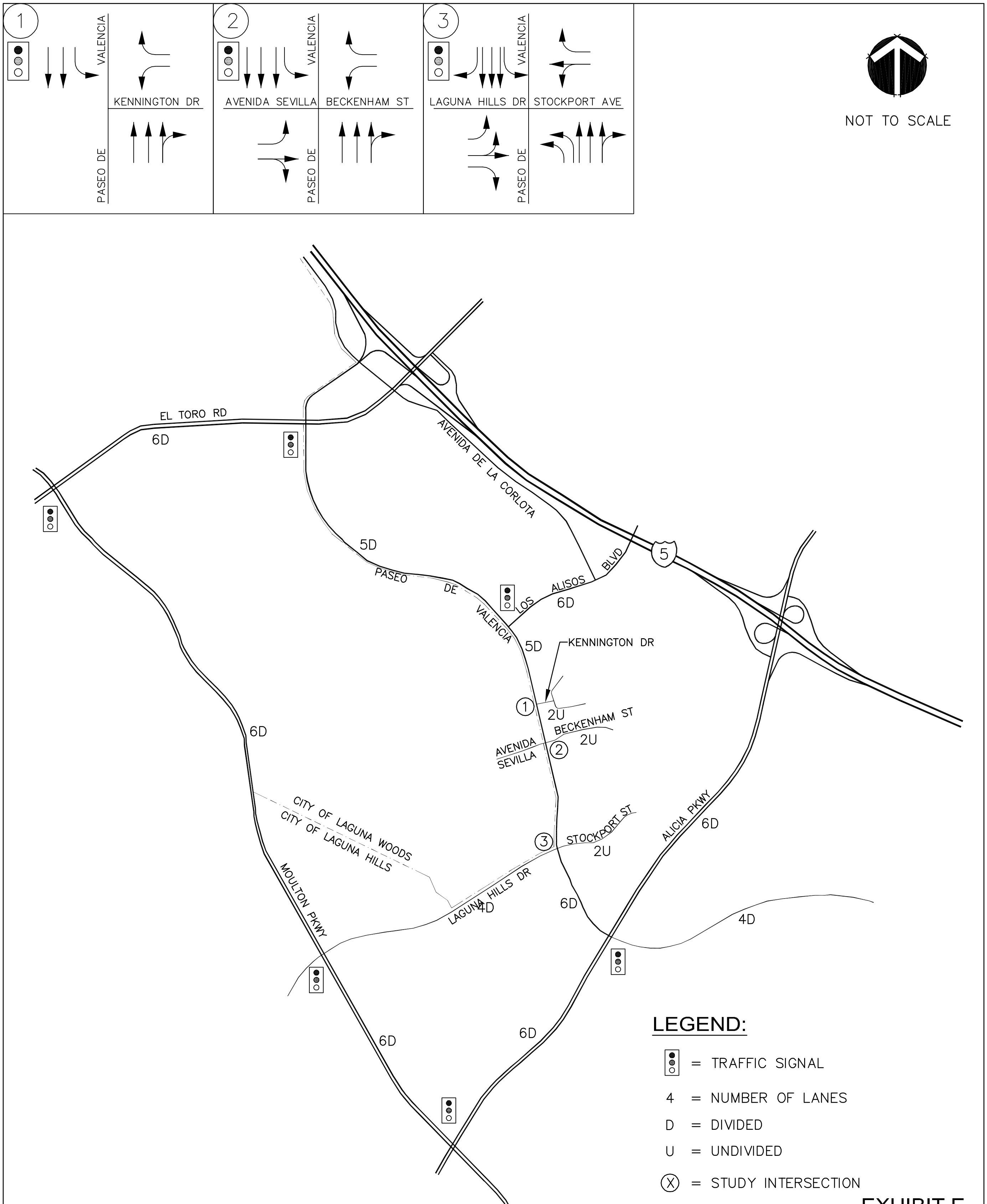


EXHIBIT E

LIN Consulting, Inc.
Traffic, Civil, and Electrical Consulting Engineers

Paseo De Valencia Widening
From Kennington Drive to
Laguna Hills Drive
City of Laguna Hills

PROPOSED LANE GEOMETRY

YEAR 2014 TRAFFIC CONDITIONS WITHOUT PROJECT

To assess future traffic conditions in Year 2014, existing traffic is combined with ambient growth. This traffic analysis presents estimated regional growth based upon an ambient growth rate of one (1) percent per year for 2 years, as recommended by the City. In addition to the ambient growth, the study analyzes the impact of cumulative projects which were approved by the City and are expected to be developed by Year 2014 (See Table 8). In addition to the projects in City of Laguna Hills, the study also verified projects within the City of Laguna Woods that may impact the study area. As per the information provided the City of Laguna Woods staff and City website, currently there are no known projects that will impact the study area. The traffic volumes generated by the cumulative projects are estimated based on the traffic impact studies conducted for those projects. Exhibit F shows the location of the cumulative projects with respect to the proposed project.

Table 8. Cumulative Projects

Cumulative Projects	**Location**	**Description**
Oakbrook Village Plaza – Phase 1[2]	Adjacent to Laguna Hills Mall and Avenida De La Carlota	Decrease in GLA for the retail land use to 134,000 Sq Ft and construction of 264 new residential apartments
Ashley Furniture[3]	Southwest corner of Paseo De Valencia and Avenida De La Carlota	Ashley Furniture – 30,000 Sq Ft Retail – 21,451 Sq Ft Fast Food w/Drive Through – 4,000 Sq Ft

Source – City of Laguna Hills

2 – Oakbrook Village Plaza, City of Laguna Hills, Traffic Impact Analysis by HDR Engineering

3 – Ashley Furniture Laguna Hills Traffic Study by Austin-Foust Associates, Inc.

GLA – Gross Leasable Area

The intersection turning movement volumes for Year 2014 plus Cumulative Project condition during weekday AM and PM peak hours are shown on Exhibits G and H, respectively.

Table 9 shows the intersection LOS for Year 2014 traffic conditions without the proposed project. All the study area intersections operate at LOS "B" or better, except the intersection of Paseo De Valencia and Laguna Hills Drive, which operates at LOS "D" during the weekday PM peak hour. The ICU calculation worksheets for intersection LOS for Year 2014 plus Cumulative Project traffic conditions are included in Appendix D.

Table 9. Year 2014 + Cumulative Project Traffic Condition

Intersection	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	ICU	LOS	ICU
Paseo De Valencia at Kennington Drive	A	0.392	B	0.643
Paseo De Valencia at Beckenham St/Avenida Sevilla	A	0.411	B	0.683
Paseo De Valencia at Laguna Hills Dr/Stockport Ave	A	0.547	D	0.845

ICU - Intersection Capacity Utilization, LOS - Level of Service

Year 2014 Roadway Segment Analysis Without Project

The roadway segment analysis for Year 2014 without the proposed project is based on the ADT counts conducted on Thursday, March 15, 2012. Year 2014 ADT counts are estimated based on the ambient growth rate of one (1) percent per year for 2 years, and the traffic generated by the cumulative projects. Roadway Volume to Capacity (V/C) ratios and levels of service for year 2014 without project are presented in Table 10. Paseo De Valencia between Kennington Drive and Beckenham Street operates at LOS "C" and "F" in the northbound and southbound directions, respectively. Paseo De Valencia between Beckenham Street and Laguna Hills Drive operates at LOS "B" and "F" in the northbound and southbound directions, respectively.

Table 10. Paseo De Valencia - Year 2014 + Cumulative Project Traffic Condition

Roadway Segment	Direction	No. of Lanes	Capacity	Year 2014 + Cum Project Volume	V/C	LOS
Between Kennington Dr. and Beckenham St.	Northbound	3	22,500	15,957	0.71	C
	Southbound	2	15,000	17,522	1.17	F
Between Beckenham St. and Laguna Hills Dr.	Northbound	3	22,500	15,345	0.68	B
	Southbound	2	15,000	18,056	1.20	F

V/C – Volume to Capacity Ratio, LOS - Level of Service

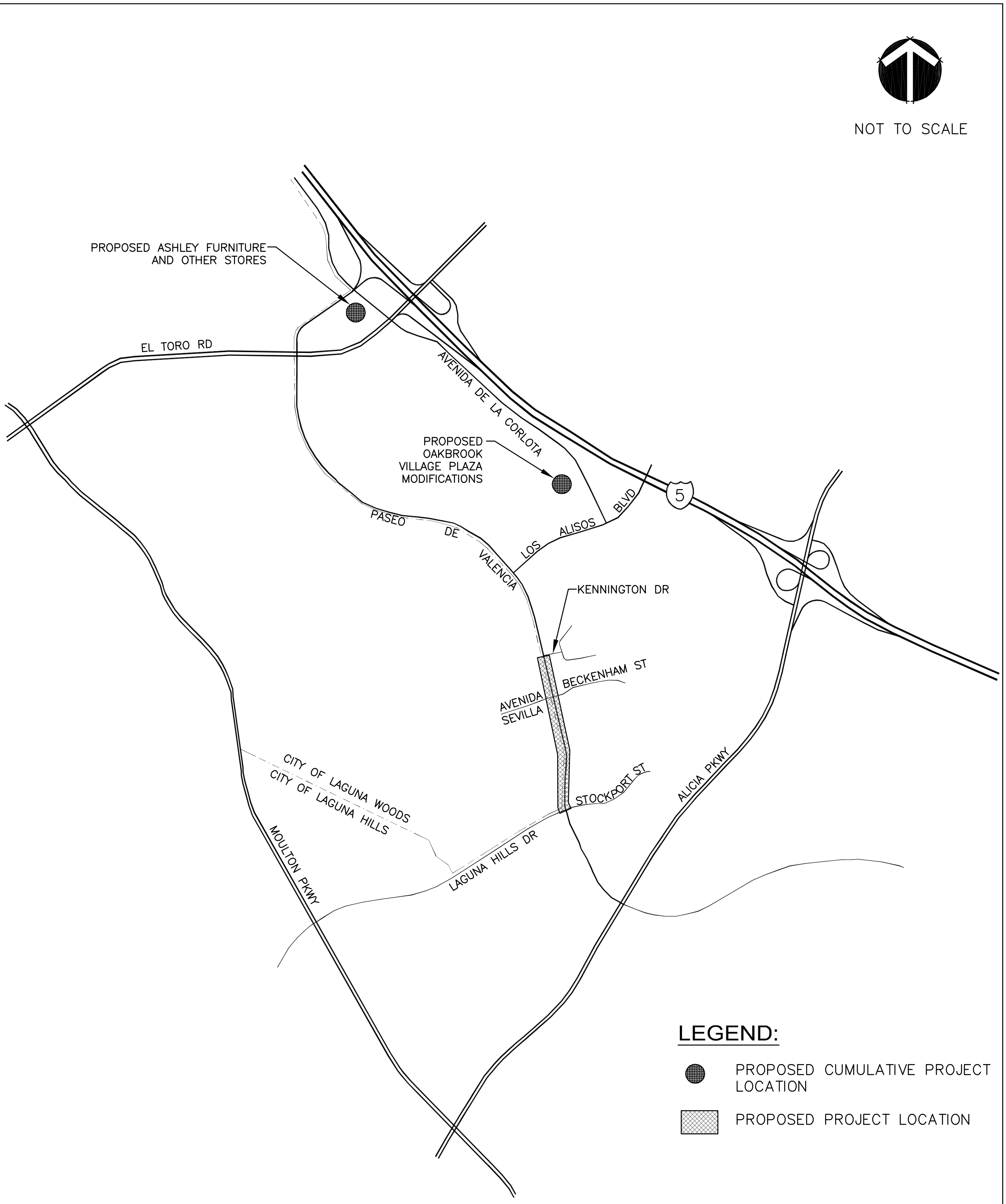


EXHIBIT F

LIN Consulting, Inc.

Traffic, Civil, and Electrical Consulting Engineers

Paseo De Valencia Widening
From Kennington Drive to
Laguna Hills Drive
City of Laguna Hills

CUMULATIVE PROJECT LOCATION MAP

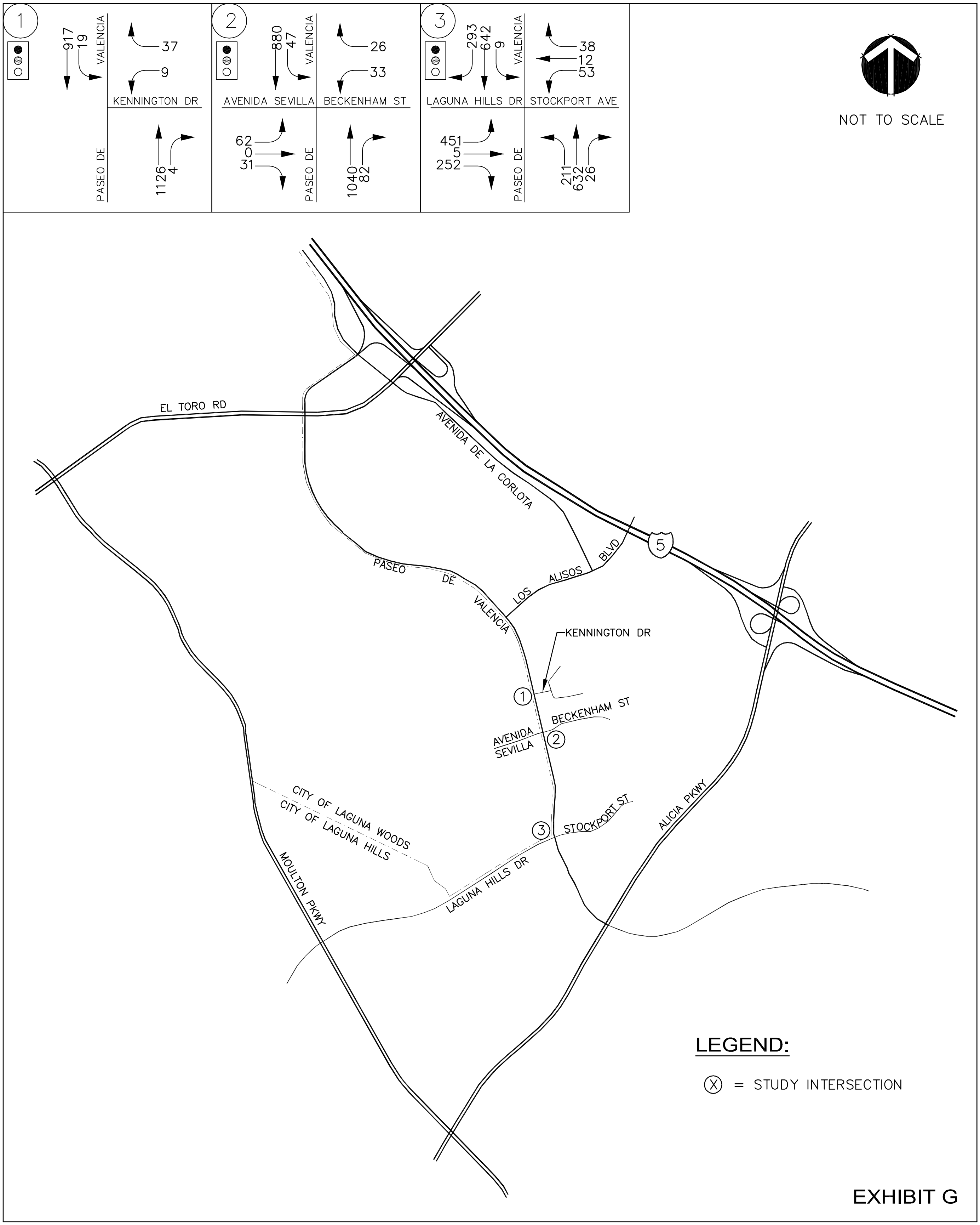


EXHIBIT G

LIN Consulting, Inc.

Traffic, Civil, and Electrical Consulting Engineers

Paseo De Valencia Widening
From Kennington Drive to
Laguna Hills Drive
City of Laguna Hills

YEAR 2014 + CUM PROJECT
TURNING MOVEMENT VOLUMES
WEEKDAY AM PEAK HOUR

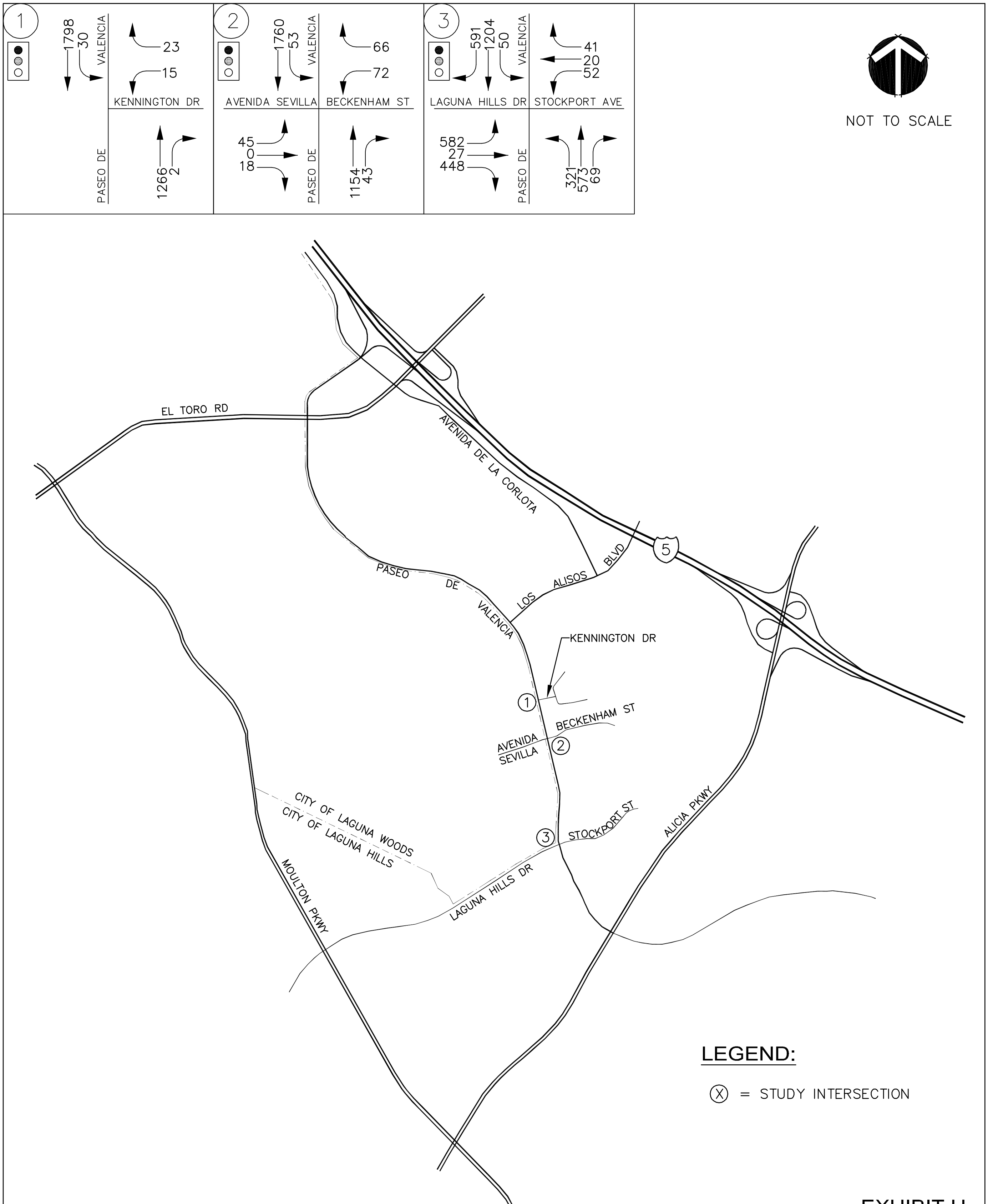


EXHIBIT H

LIN Consulting, Inc.

Traffic, Civil, and Electrical Consulting Engineers

Paseo De Valencia Widening
From Kennington Drive to
Laguna Hills Drive
City of Laguna Hills

YEAR 2014 + CUM PROJECT
TURNING MOVEMENT VOLUMES
WEEKDAY PM PEAK HOUR

YEAR 2014 TRAFFIC CONDITIONS PLUS PROJECT

Intersection LOS for the Year 2014 plus Project Traffic Condition have been calculated and shown in Table 11. All the study area intersections operate at LOS “B” or better, except the intersection of Paseo De Valencia and Laguna Hills Drive, which operates at LOS “D” during the weekday PM peak hour. Year 2014 plus Project Traffic LOS calculation worksheets are included in Appendix E.

Table 11. Year 2014 + Cumulative Project + Project Traffic Condition

Intersection	**Weekday AM Peak Hour**		**Weekday PM Peak Hour**	
	LOS	**ICU**	**LOS**	**ICU**
Paseo De Valencia at Kennington Drive	A	0.392	B	0.643
Paseo De Valencia at Beckenham St/Avenida Sevilla	A	0.400	A	0.510
Paseo De Valencia at Laguna Hills Dr/Stockport Ave	A	0.547	D	0.845

ICU - Intersection Capacity Utilization, LOS - Level of Service

Roadway Volume to Capacity (V/C) ratios and levels of service for Year 2014 plus Project Traffic Condition are presented in Table 12. The proposed project will add a third southbound through lane on Paseo De Valencia from Kennington Drive to just north of Laguna Hills Drive thus increasing the capacity of the southbound Paseo De Valencia from 15,000 VPD to 22,500 VPD. After the proposed improvements in year 2014, Paseo De Valencia between Kennington Drive and Beckenham Street operates at LOS “C” and Paseo De Valencia between Beckenham Street and Laguna Hills Drive operates at LOS “B” and “C” in the northbound and southbound directions, respectively.

Table 12. Paseo De Valencia - Year 2014 + Cum Project + Project Traffic Condition

Roadway Segment	**Direction**	**No. of Lanes**	**Capacity**	**Year 2014 + Cum Project + Project Volume**	**V/C**	**LOS**
Between Kennington Dr. and Beckenham St.	Northbound	3	22,500	15,957	0.71	C
	Southbound	3	22,500	17,522	0.78	C
Between Beckenham St. and Laguna Hills Dr.	Northbound	3	22,500	15,345	0.68	B
	Southbound	3	22,500	18,056	0.80	C

V/C – Volume to Capacity Ratio, LOS - Level of Service

IMPACT OF PROPOSED PROJECT ON STUDY AREA IN YEAR 2014

Table 13 shows the change in LOS and ICU ratio due to the proposed project improvements along Paseo De Valencia at the study area intersections in Year 2014. There is no change in the LOS at the study area intersections except for the intersection of Paseo De Valencia and Beckenham Street where the LOS during the PM peak hour improves from LOS "B" to LOS "A" and the ICU decreases by 2.68% and 25.33% during AM and PM peak hours, respectively.

Table 13. Change in LOS and ICU for Year 2014 due to Proposed Project

Intersection	Year 2014 Without Project LOS/(ICU)		Year 2014 With Project LOS/(ICU)	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Paseo De Valencia at Kennington Drive	A/(0.392)	B/(0.643)	A/(0.392)	B/(0.643)
Paseo De Valencia at Beckenham St/Avenida Sevilla	A/(0.411)	B/(0.683)	A/(0.400)	A/(0.510)
Paseo De Valencia at Laguna Hills Dr/Stockport Ave	A/(0.547)	D/(0.845)	A/(0.547)	D/(0.845)

LOS - Level of Service, ICU – Intersection Capacity Utilization

Table 14 shows the change in LOS and V/C ratio due to the proposed project improvements along Paseo De Valencia in Year 2014. The LOS on southbound Paseo De Valencia improves from LOS "F" to LOS "C" and the V/C ratio decreases by 33%.

Table 14. Change in LOS and V/C for Year 2014 due to Proposed Project

Roadway Segment	Direction	Year 2014 Without Project		Year 2014 With Project	
		V/C	LOS	V/C	LOS
Between Kennington Dr. and Beckenham St.	Northbound	0.71	C	0.71	C
	Southbound	1.17	F	0.78	C
Between Beckenham St. and Laguna Hills Dr.	Northbound	0.68	B	0.68	B
	Southbound	1.20	F	0.80	C

V/C – Volume to Capacity Ratio, LOS - Level of Service

YEAR 2035 TRAFFIC CONDITIONS WITHOUT PROJECT

In addition to the project build out year this traffic study analyzes the study area intersections for the horizon year (2035). The horizon year traffic volumes are estimated based upon the ambient growth rate of one (1) percent per year for 23 years, as recommended by the City.

The intersection turning movement volumes for the Year 2035 condition during weekday AM and PM peak hours are shown on Exhibits I and J, respectively.

Table 15 shows the intersection LOS for the Year 2035 traffic conditions without the proposed project. All of the study area intersections operate at LOS "D" or better, except the intersection of Paseo De Valencia at Laguna Hills Drive, which operates at LOS "F" during the weekday PM peak hour. The ICU calculation worksheets for intersection LOS for Year 2035 traffic conditions are included in Appendix F.

Table 15. Year 2035 Traffic Condition (Without Project)

Intersection	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	ICU	LOS	ICU
Paseo De Valencia at Kennington Drive	A	0.457	C	0.769
Paseo De Valencia at Beckenham St/Avenida Sevilla	A	0.480	D	0.818
Paseo De Valencia at Laguna Hills Dr/Stockport Ave	B	0.651	F	1.019

ICU - Intersection Capacity Utilization, LOS - Level of Service

Year 2035 weekday PM peak hour LOS at the intersection of Paseo De Valencia at Laguna Hills Drive is below the City's performance standard for intersections of LOS "D". The LOS can be brought back to acceptable LOS "D" by widening and restriping southbound Paseo De Valencia to provide dual right turn lanes along with an exclusive left turn only lane and three through lanes.

Year 2035 Roadway Segment Analysis Without Project

The roadway segment analysis for Year 2035 without the proposed project is based on the ADT counts conducted on Thursday, March 15, 2012. Year 2035 ADT counts are estimated based on the ambient growth rate of one (1) percent per year for 23 years. Roadway Volume to Capacity (V/C) ratios and levels of service for Year 2035 without project are presented in Table 16. Paseo De Valencia between Kennington Drive and Laguna Hills Drive operates at LOS "D" and "F" in the northbound and southbound directions, respectively.

Table 16. Paseo De Valencia - Year 2035 Traffic Condition (Without Project)

Roadway Segment	Direction	No. of Lanes	Capacity	Year 2035 Traffic Volume	V/C	LOS
Between Kennington Dr. and Beckenham St.	Northbound	3	22,500	19,590	0.87	D
	Southbound	2	15,000	21,519	1.43	F
Between Beckenham St. and Laguna Hills Dr.	Northbound	3	22,500	18,836	0.84	D
	Southbound	2	15,000	22,176	1.48	F

V/C – Volume to Capacity Ratio, LOS - Level of Service

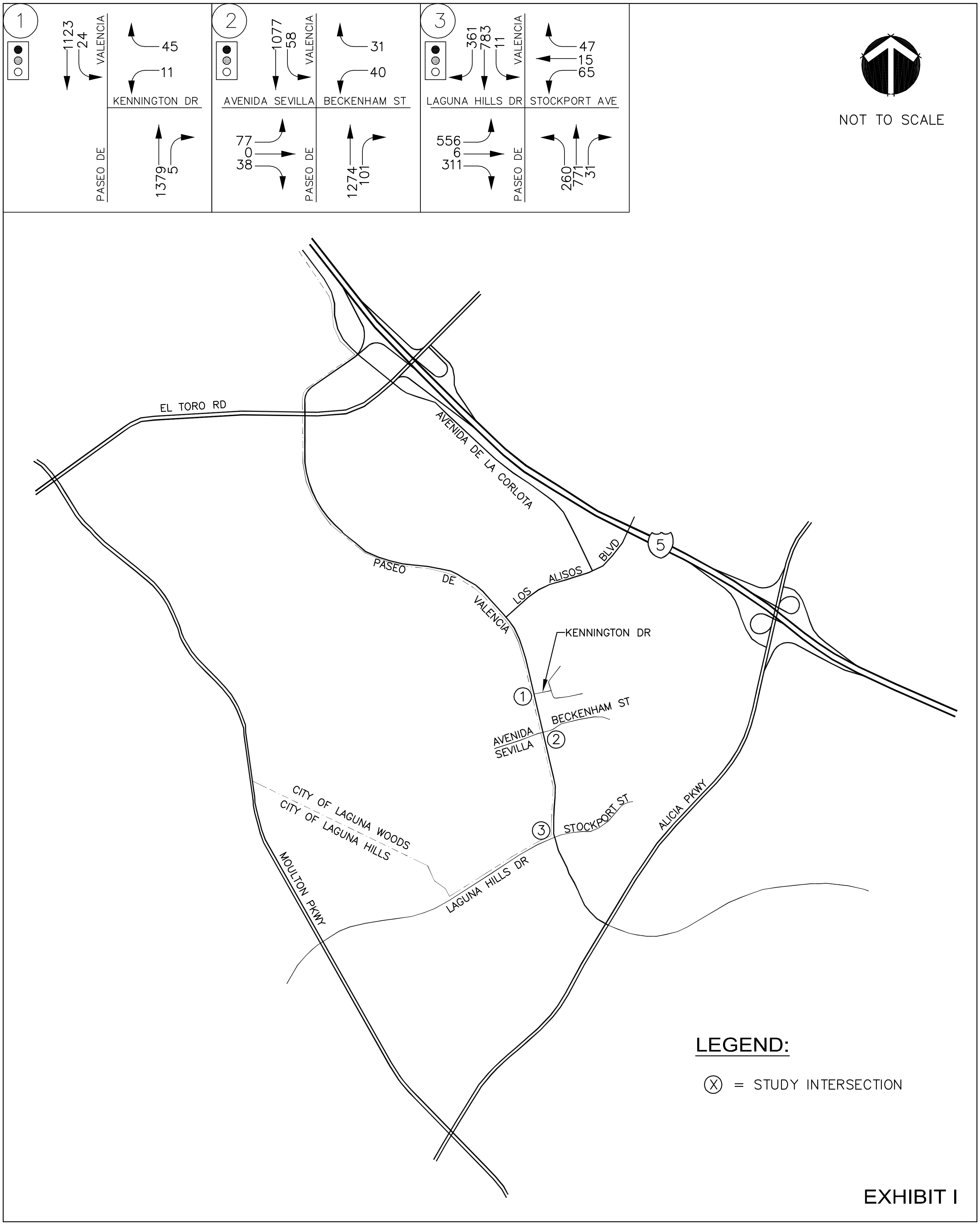


EXHIBIT I

LIN Consulting, Inc.

Traffic, Civil, and Electrical Consulting Engineers

Paseo De Valencia Widening
From Kennington Drive to
Laguna Hills Drive
City of Laguna Hills

YEAR 2035
TURNING MOVEMENT VOLUMES
WEEKDAY AM PEAK HOUR

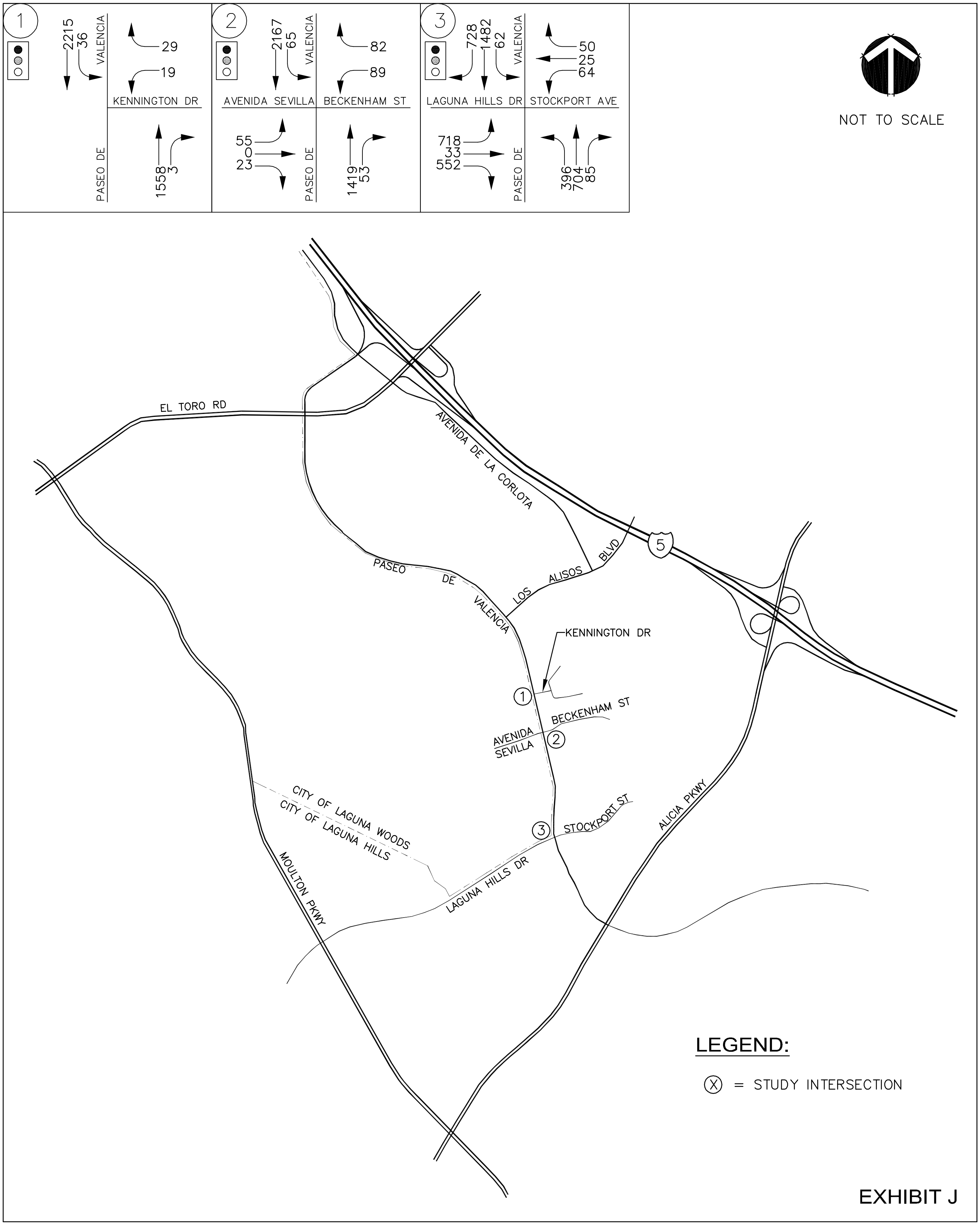


EXHIBIT J

LIN Consulting, Inc.
Traffic, Civil, and Electrical Consulting Engineers

Paseo De Valencia Widening
From Kennington Drive to
Laguna Hills Drive
City of Laguna Hills

YEAR 2035
TURNING MOVEMENT VOLUMES
WEEKDAY PM PEAK HOUR

YEAR 2035 TRAFFIC CONDITIONS PLUS PROJECT

Intersection LOS for Year 2035 plus Project Traffic Condition have been calculated and shown in Table 17. Year 2035 plus Project Traffic LOS calculation worksheets are included in Appendix G.

Table 17. Year 2035 + Project Traffic Condition

Intersection	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	ICU	LOS	ICU
Paseo De Valencia at Kennington Drive	A	0.457	C	0.769
Paseo De Valencia at Beckenham St/Avenida Sevilla	A	0.466	B	0.606
Paseo De Valencia at Laguna Hills Dr/Stockport Ave	B	0.651	F	1.019

ICU - Intersection Capacity Utilization

LOS - Level of Service

Roadway Volume to Capacity (V/C) ratios and levels of service for Year 2035 plus Project Traffic Condition are presented in Table 18. After the proposed improvements in Year 2035, Paseo De Valencia between Kennington Drive and Laguna Hills Drive operates at LOS “D” and “E” in the northbound and southbound directions, respectively.

Table 18. Paseo De Valencia - Year 2035 + Project Traffic Condition

Roadway Segment	Direction	No. of Lanes	Capacity	Year 2035 + Project Traffic Volume	V/C	LOS
Between Kennington Dr. and Beckenham St.	Northbound	3	22,500	19,590	0.87	D
	Southbound	3	22,500	21,519	0.96	E
Between Beckenham St. and Laguna Hills Dr.	Northbound	3	22,500	18,836	0.84	D
	Southbound	3	22,500	22,176	0.99	E

V/C – Volume to Capacity Ratio, LOS - Level of Service

IMPACT OF PROPOSED PROJECT ON STUDY AREA IN YEAR 2035

Table 19 shows the change in LOS and ICU due to the proposed project improvements along Paseo De Valencia at the study area intersections in Year 2035. There is no change in the LOS at the study area intersections except for the intersection of Paseo De Valencia and Beckenham Street where the LOS during PM peak hour improves from LOS “D” to LOS “B” and the ICU decreases by 2.92% and 25.92% during AM and PM peak hours, respectively.

Table 19. Change in LOS and ICU for Year 2035 due to Proposed Project

Intersection	Year 2035 Without Project LOS/(ICU)		Year 2035 With Project LOS/(ICU)	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Paseo De Valencia at Kennington Drive	A/(0.457)	C/(0.769)	A/(0.457)	C/(0.769)
Paseo De Valencia at Beckenham St/Avenida Sevilla	A/(0.480)	D/(0.818)	A/(0.466)	B/(0.606)
Paseo De Valencia at Laguna Hills Dr/Stockport Ave	B/(0.651)	F/(1.019)	B/(0.651)	F/(1.019)

LOS - Level of Service, ICU - Intersection Capacity Utilization

Table 20 shows the change in LOS and V/C ratio due to the proposed project improvements along Paseo De Valencia in Year 2035. The LOS on southbound Paseo De Valencia improves from LOS “F” to LOS “E” and the V/C ratio decreases by 33%.

Table 20. Change in LOS and V/C for Year 2035 due to Proposed Project

Roadway Segment	**Direction**	**Year 2035 Without Project**		**Year 2035 With Project***	
		V/C	**LOS**	**V/C**	**LOS**
Between Kennington Dr. and Beckenham St.	Northbound	0.87	D	0.87	D
	Southbound	1.43	F	0.96	E
Between Beckenham St. and Laguna Hills Dr.	Northbound	0.84	D	0.84	D
	Southbound	1.48	F	0.99	E

V/C – Volume to Capacity Ratio, LOS - Level of Service

** It is noted that the ambient traffic growth and the southbound Paseo De Valencia widening to three lanes will maintain a V/C of 0.90 or less (LOS D) until approximately year 2026.*

CONCLUSION

The analysis of Existing (2012), Opening Year (2014) and Horizon Year (2035) traffic conditions has shown that the proposed widening and reconstruction of Paseo De Valencia to its six lane configuration between Kennington Drive and Laguna Hills Drive, maintains all intersections at the City standard of LOS “D” or better, except for the intersection of Paseo De Valencia at Laguna Hills Drive, which is projected to operate at LOS “F” in 2035 during PM peak hour unless the southbound Paseo De Valencia is widened and restriped to provide dual right turn lanes along with an exclusive left turn only lane and three through lanes, which improves the LOS to “D”.

The addition of third southbound through lane on Paseo De Valencia from Kennington Drive to just north of Laguna Hills Drive increases the overall capacity of the roadway from 37,500 VPD to 45,000 VPD. The roadway segment analysis shows that the LOS along southbound Paseo De Valencia between Kennington Drive and Laguna Hills Drive improves from LOS “F” to LOS “C” and LOS “F” to LOS “E” in Year 2014 and 2035, respectively.

APPENDICES

APPENDIX A

TRAFFIC COUNT DATA

TUESDAY - MARCH 13, 2012 CITY: LAGUNA HILLS PROJECT: CA12-0316-0194

PASEO DE VALENCIA BTWN KENNINGTON & BECKENHAM

AM Period	NB		SB		EB	WB		PM Period	NB		SB		EB	WB	
00:00	15		32					12:00	252		225				
00:15	19		26					12:15	235		230				
00:30	13		22					12:30	230		243				
00:45	10	57	29	109			166	12:45	275	992	246	944			1936
01:00	6		19					13:00	231		259				
01:15	9		15					13:15	289		256				
01:30	14		14					13:30	215		252				
01:45	7	36	15	63			99	13:45	271	1006	229	996			2002
02:00	7		17					14:00	217		263				
02:15	8		7					14:15	279		236				
02:30	5		9					14:30	258		284				
02:45	4	24	5	38			62	14:45	267	1021	255	1038			2059
03:00	3		6					15:00	259		316				
03:15	5		4					15:15	295		294				
03:30	6		4					15:30	253		314				
03:45	10	24	6	20			44	15:45	280	1087	312	1236			2323
04:00	14		16					16:00	245		307				
04:15	8		13					16:15	282		363				
04:30	22		5					16:30	263		363				
04:45	21	65	17	51			116	16:45	272	1062	367	1400			2462
05:00	37		10					17:00	277		402				
05:15	43		17					17:15	308		411				
05:30	57		23					17:30	296		457				
05:45	63	200	37	87			287	17:45	293	1174	374	1644			2818
06:00	64		67					18:00	257		407				
06:15	83		52					18:15	239		407				
06:30	106		56					18:30	236		342				
06:45	158	411	75	250			661	18:45	198	930	333	1489			2419
07:00	262		167					19:00	222		277				
07:15	219		148					19:15	192		262				
07:30	267		163					19:30	165		247				
07:45	358	1106	203	681			1787	19:45	157	736	236	1022			1758
08:00	431		307					20:00	121		197				
08:15	351		201					20:15	123		204				
08:30	320		225					20:30	145		179				
08:45	268	1370	217	950			2320	20:45	121	510	153	733			1243
09:00	240		216					21:00	85		177				
09:15	239		189					21:15	74		163				
09:30	235		160					21:30	83		135				
09:45	239	953	142	707			1660	21:45	81	323	152	627			950
10:00	232		200					22:00	61		109				
10:15	220		169					22:15	63		105				
10:30	213		193					22:30	55		85				
10:45	218	883	162	724			1607	22:45	44	223	63	362			585
11:00	206		176					23:00	42		77				
11:15	200		182					23:15	34		58				
11:30	236		186					23:30	21		45				
11:45	244	886	184	728			1614	23:45	26	123	52	232			355
Total Vol.		6015		4408			**10423**			9187		11723			**20910**

Daily Totals

NB	SB	EB	WB	**Combined**
15202	16131			**31333**

	AM			**PM**		
Split %	57.7%	42.3%	**33.3%**	43.9%	56.1%	**66.7%**
Peak Hour	07:45	08:00	**07:45**	17:00	17:15	**17:00**
Volume	1460	950	**2396**	1174	1649	**2818**
P.H.F.	0.85	0.77	**0.81**	0.96	0.90	**0.94**

WEDNESDAY - MARCH 14, 2012 CITY: LAGUNA HILLS PROJECT: CA12-0316-0194

PASEO DE VALENCIA BTWN KENNINGTON & BECKENHAM

AM Period	NB		SB		EB	WB		PM Period	NB		SB		EB	WB	
00:00	21		29					12:00	227		212				
00:15	25		29					12:15	254		262				
00:30	11		17					12:30	249		221				
00:45	11	68	20	95			163	12:45	232	962	219	914			1876
01:00	12		18					13:00	243		232				
01:15	8		12					13:15	229		240				
01:30	5		9					13:30	291		257				
01:45	6	31	7	46			77	13:45	286	1049	251	980			2029
02:00	8		9					14:00	229		282				
02:15	5		4					14:15	237		284				
02:30	6		7					14:30	235		300				
02:45	5	24	10	30			54	14:45	265	966	295	1161			2127
03:00	1		5					15:00	252		297				
03:15	6		7					15:15	249		311				
03:30	9		6					15:30	249		261				
03:45	5	21	10	28			49	15:45	280	1030	299	1168			2198
04:00	10		9					16:00	281		377				
04:15	10		13					16:15	290		395				
04:30	13		7					16:30	257		399				
04:45	21	54	18	47			101	16:45	295	1123	436	1607			2730
05:00	37		14					17:00	311		455				
05:15	53		15					17:15	298		466				
05:30	45		21					17:30	324		402				
05:45	62	197	37	87			284	17:45	304	1237	448	1771			3008
06:00	69		55					18:00	248		368				
06:15	73		63					18:15	212		355				
06:30	119		96					18:30	216		321				
06:45	188	449	145	359			808	18:45	230	906	360	1404			2310
07:00	285		218					19:00	197		253				
07:15	269		255					19:15	157		238				
07:30	277		228					19:30	191		220				
07:45	266	1097	203	904			2001	19:45	128	673	202	913			1586
08:00	245		173					20:00	95		213				
08:15	239		151					20:15	99		204				
08:30	233		170					20:30	86		185				
08:45	243	960	190	684			1644	20:45	116	396	187	789			1185
09:00	236		178					21:00	85		148				
09:15	206		189					21:15	87		169				
09:30	227		160					21:30	69		123				
09:45	217	886	157	684			1570	21:45	79	320	120	560			880
10:00	244		172					22:00	59		110				
10:15	220		191					22:15	63		81				
10:30	204		178					22:30	64		97				
10:45	220	888	173	714			1602	22:45	40	226	82	370			596
11:00	220		195					23:00	44		52				
11:15	231		224					23:15	39		51				
11:30	209		191					23:30	26		58				
11:45	234	894	220	830			1724	23:45	27	136	47	208			344
Total Vol.		5569		4508			**10077**			9024		11845			**20869**

Daily Totals

NB	SB	EB	WB	**Combined**
14593	16353			**30946**

	AM			**PM**		
Split %	55.3%	44.7%	**32.6%**	43.2%	56.8%	**67.4%**
Peak Hour	07:00	11:45	**07:00**	17:00	17:00	**17:00**
Volume	1097	915	**2001**	1237	1771	**3008**
P.H.F.	0.96	0.87	**0.95**	0.97	0.95	**0.98**

THURSDAY - MARCH 15, 2012 CITY: LAGUNA HILLS PROJECT: CA12-0316-0194

PASEO DE VALENCIA BTWN KENNINGTON & BECKENHAM

AM Period	NB		SB		EB	WB		PM Period	NB		SB		EB	WB	
00:00	23		41					12:00	280		260				
00:15	21		26					12:15	257		270				
00:30	14		22					12:30	262		240				
00:45	13	71	24	113			184	12:45	291	1090	224	994			2084
01:00	12		18					13:00	227		296				
01:15	4		18					13:15	291		270				
01:30	9		16					13:30	277		261				
01:45	7	32	13	65			97	13:45	248	1043	278	1105			2148
02:00	5		23					14:00	243		277				
02:15	5		12					14:15	262		309				
02:30	6		9					14:30	266		325				
02:45	8	24	7	51			75	14:45	302	1073	285	1196			2269
03:00	4		8					15:00	261		339				
03:15	6		3					15:15	313		338				
03:30	5		7					15:30	292		373				
03:45	13	28	8	26			54	15:45	319	1185	342	1392			2577
04:00	14		14					16:00	296		382				
04:15	6		6					16:15	265		361				
04:30	17		6					16:30	268		367				
04:45	15	52	11	37			89	16:45	270	1099	410	1520			2619
05:00	35		13					17:00	287		399				
05:15	39		18					17:15	302		411				
05:30	51		23					17:30	310		428				
05:45	62	187	36	90			277	17:45	267	1166	421	1659			2825
06:00	59		61					18:00	271		428				
06:15	71		55					18:15	250		359				
06:30	99		57					18:30	213		343				
06:45	153	382	80	253			635	18:45	227	961	370	1500			2461
07:00	259		157					19:00	243		322				
07:15	196		136					19:15	165		273				
07:30	236		149					19:30	173		240				
07:45	386	1077	190	632			1709	19:45	146	727	257	1092			1819
08:00	440		303					20:00	132		230				
08:15	276		214					20:15	114		217				
08:30	346		238					20:30	113		180				
08:45	265	1327	193	948			2275	20:45	99	458	222	849			1307
09:00	300		186					21:00	103		185				
09:15	267		161					21:15	68		184				
09:30	215		147					21:30	79		167				
09:45	188	970	176	670			1640	21:45	71	321	126	662			983
10:00	228		181					22:00	70		141				
10:15	227		198					22:15	67		121				
10:30	227		169					22:30	62		113				
10:45	221	903	170	718			1621	22:45	52	251	87	462			713
11:00	224		225					23:00	49		61				
11:15	227		196					23:15	51		70				
11:30	238		197					23:30	47		68				
11:45	277	966	208	826			1792	23:45	43	190	58	257			447
Total Vol.		6019		4429			**10448**			9564		12688			**22252**

Daily Totals

NB	SB	EB	WB	**Combined**
15583	17117			**32700**

	AM			**PM**		
Split %	57.6%	42.4%	**32.0%**	43.0%	57.0%	**68.0%**
Peak Hour	07:45	11:45	**07:45**	15:15	17:15	**17:15**
Volume	1448	978	**2393**	1220	1688	**2838**
P.H.F.	0.82	0.91	**0.81**	0.97	0.99	**0.96**

TUESDAY - MARCH 13, 2012 CITY: LAGUNA HILLS PROJECT: CA12-0316-0194

PASEO DE VALENCIA BTWN BECKENHAM & LAGUNA HILLS

AM Period	NB		SB		EB	WB		PM Period	NB		SB		EB	WB	
00:00	25		33					12:00	215		227				
00:15	18		25					12:15	233		252				
00:30	13		21					12:30	188		250				
00:45	14	70	32	111			181	12:45	208	844	271	1000			1844
01:00	10		20					13:00	257		264				
01:15	6		16					13:15	240		275				
01:30	9		12					13:30	256		264				
01:45	13	38	18	66			104	13:45	205	958	235	1038			1996
02:00	10		12					14:00	261		256				
02:15	8		11					14:15	208		263				
02:30	7		10					14:30	259		287				
02:45	4	29	6	39			68	14:45	235	963	265	1071			2034
03:00	5		5					15:00	242		308				
03:15	2		4					15:15	235		306				
03:30	6		4					15:30	290		321				
03:45	6	19	4	17			36	15:45	237	1004	301	1236			2240
04:00	13		17					16:00	263		325				
04:15	10		10					16:15	230		382				
04:30	7		7					16:30	262		344				
04:45	19	49	16	50			99	16:45	249	1004	384	1435			2439
05:00	22		9					17:00	254		418				
05:15	35		17					17:15	256		407				
05:30	44		24					17:30	307		473				
05:45	52	153	31	81			234	17:45	263	1080	409	1707			2787
06:00	63		64					18:00	297		424				
06:15	63		53					18:15	235		409				
06:30	86		61					18:30	241		357				
06:45	111	323	74	252			575	18:45	210	983	334	1524			2507
07:00	174		161					19:00	211		310				
07:15	234		149					19:15	199		259				
07:30	222		168					19:30	209		243				
07:45	267	897	201	679			1576	19:45	163	782	242	1054			1836
08:00	380		326					20:00	159		203				
08:15	414		219					20:15	115		193				
08:30	331		230					20:30	128		190				
08:45	290	1415	211	986			2401	20:45	134	536	159	745			1281
09:00	280		230					21:00	117		168				
09:15	223		199					21:15	89		176				
09:30	220		189					21:30	85		140				
09:45	227	950	135	753			1703	21:45	78	369	155	639			1008
10:00	236		199					22:00	73		110				
10:15	224		174					22:15	62		101				
10:30	186		185					22:30	70		95				
10:45	193	839	171	729			1568	22:45	54	259	62	368			627
11:00	190		191					23:00	42		79				
11:15	206		196					23:15	44		55				
11:30	193		189					23:30	30		48				
11:45	205	794	198	774			1568	23:45	20	136	48	230			366
Total Vol.		5576		4537			**10113**			8918		12047			**20965**

Daily Totals

NB	SB	EB	WB	**Combined**
14494	16584			**31078**

	AM			PM		
Split %	55.1%	44.9%	**32.5%**	42.5%	57.5%	**67.5%**
Peak Hour	08:00	08:00	**08:00**	17:15	17:30	**17:15**
Volume	1415	986	**2401**	1123	1715	**2836**
P.H.F.	0.85	0.76	**0.85**	0.89	0.91	**0.91**

WEDNESDAY - MARCH 14, 2012 CITY: LAGUNA HILLS PROJECT: CA12-0316-0194

PASEO DE VALENCIA BTWN BECKENHAM & LAGUNA HILLS

AM Period	NB		SB		EB	WB		PM Period	NB		SB		EB	WB	
00:00	24		32					12:00	215		230				
00:15	23		27					12:15	208		261				
00:30	24		20					12:30	245		250				
00:45	12	83	22	101			184	12:45	230	898	229	970			1868
01:00	11		17					13:00	224		253				
01:15	14		14					13:15	206		246				
01:30	5		10					13:30	214		252				
01:45	10	40	5	46			86	13:45	300	944	263	1014			1958
02:00	5		11					14:00	254		284				
02:15	7		4					14:15	217		293				
02:30	5		8					14:30	225		304				
02:45	6	23	9	32			55	14:45	215	911	289	1170			2081
03:00	4		5					15:00	252		315				
03:15	1		6					15:15	232		314				
03:30	7		7					15:30	268		300				
03:45	8	20	8	26			46	15:45	248	1000	331	1260			2260
04:00	7		9					16:00	257		384				
04:15	9		12					16:15	274		397				
04:30	9		9					16:30	241		416				
04:45	11	36	18	48			84	16:45	255	1027	447	1644			2671
05:00	24		13					17:00	287		457				
05:15	40		16					17:15	282		492				
05:30	48		20					17:30	301		418				
05:45	35	147	35	84			231	17:45	286	1156	450	1817			2973
06:00	68		54					18:00	281		405				
06:15	66		63					18:15	207		366				
06:30	93		87					18:30	239		345				
06:45	164	391	134	338			729	18:45	200	927	352	1468			2395
07:00	289		226					19:00	227		277				
07:15	264		253					19:15	190		246				
07:30	270		228					19:30	173		232				
07:45	265	1088	206	913			2001	19:45	168	758	186	941			1699
08:00	242		187					20:00	122		227				
08:15	232		155					20:15	88		198				
08:30	227		177					20:30	97		184				
08:45	256	957	198	717			1674	20:45	84	391	184	793			1184
09:00	260		188					21:00	121		164				
09:15	225		209					21:15	97		161				
09:30	186		169					21:30	73		125				
09:45	218	889	181	747			1636	21:45	69	360	113	563			923
10:00	215		157					22:00	78		110				
10:15	214		205					22:15	60		81				
10:30	198		189					22:30	64		92				
10:45	204	831	190	741			1572	22:45	61	263	91	374			637
11:00	197		197					23:00	41		53				
11:15	204		249					23:15	49		52				
11:30	209		194					23:30	35		57				
11:45	192	802	244	884			1686	23:45	25	150	45	207			357
Total Vol.		5307		4677			**9984**			8785		12221			**21006**

Daily Totals

NB	SB	EB	WB	**Combined**
14092	16898			**30990**

	AM			**PM**		
Split %	53.2%	46.8%	**32.2%**	41.8%	58.2%	**67.8%**
Peak Hour	07:00	11:45	**07:00**	17:00	17:00	**17:00**
Volume	1088	985	**2001**	1156	1817	**2973**
P.H.F.	0.94	0.94	**0.97**	0.97	0.92	**0.96**

THURSDAY - MARCH 15, 2012 CITY: LAGUNA HILLS PROJECT: CA12-0316-0194

PASEO DE VALENCIA BTWN BECKENHAM & LAGUNA HILLS

AM Period	NB		SB		EB	WB		PM Period	NB		SB		EB	WB	
00:00	27		46					12:00	249		263				
00:15	22		26					12:15	255		291				
00:30	18		21					12:30	236		264				
00:45	18	85	20	113			198	12:45	243	983	227	1045			2028
01:00	9		17					13:00	276		286				
01:15	11		21					13:15	220		303				
01:30	7		17					13:30	281		277				
01:45	6	33	13	68			101	13:45	274	1051	274	1140			2191
02:00	9		21					14:00	222		273				
02:15	4		12					14:15	218		324				
02:30	6		9					14:30	268		338				
02:45	5	24	8	50			74	14:45	229	937	323	1258			2195
03:00	8		6					15:00	287		332				
03:15	5		2					15:15	259		334				
03:30	5		8					15:30	296		380				
03:45	6	24	9	25			49	15:45	283	1125	373	1419			2544
04:00	14		10					16:00	308		385				
04:15	9		8					16:15	269		372				
04:30	8		6					16:30	245		388				
04:45	12	43	11	35			78	16:45	250	1072	412	1557			2629
05:00	20		12					17:00	273		420				
05:15	35		17					17:15	272		434				
05:30	38		21					17:30	302		451				
05:45	51	144	35	85			229	17:45	290	1137	431	1736			2873
06:00	59		65					18:00	256		460				
06:15	57		55					18:15	270		383				
06:30	77		59					18:30	235		343				
06:45	102	295	69	248			543	18:45	226	987	379	1565			2552
07:00	164		149					19:00	230		339				
07:15	252		155					19:15	221		288				
07:30	189		154					19:30	158		255				
07:45	234	839	190	648			1487	19:45	162	771	256	1138			1909
08:00	416		296					20:00	160		225				
08:15	426		259					20:15	123		212				
08:30	296		227					20:30	113		190				
08:45	296	1434	214	996			2430	20:45	115	511	225	852			1363
09:00	264		184					21:00	88		172				
09:15	291		170					21:15	109		181				
09:30	229		144					21:30	73		182				
09:45	210	994	182	680			1674	21:45	81	351	123	658			1009
10:00	181		186					22:00	84		138				
10:15	222		193					22:15	59		126				
10:30	199		176					22:30	64		111				
10:45	208	810	180	735			1545	22:45	65	272	98	473			745
11:00	214		215					23:00	48		62				
11:15	194		215					23:15	57		68				
11:30	210		214					23:30	45		62				
11:45	244	862	216	860			1722	23:45	49	199	64	256			455
Total Vol.		5587		4543			**10130**			9396		13097			**22493**

Daily Totals

NB	SB	EB	WB	**Combined**
14983	17640			**32623**

	AM			**PM**		
Split %	55.2%	44.8%	**31.1%**	41.8%	58.2%	**68.9%**
Peak Hour	08:00	11:45	**08:00**	15:30	17:15	**17:15**
Volume	1434	1034	**2430**	1156	1776	**2896**
P.H.F.	0.84	0.89	**0.85**	0.97	0.97	**0.96**

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

DATE: 3/14/12 WEDNESDAY	LOCATION:	EL SEGUNDO		PROJECT #:	CA12-0316-0194
	NORTH & SOUTH:	PASEO DE VALENCIA		LOCATION #:	1
	EAST & WEST:	KENNINGTON		CONTROL:	SIGNAL

NOTES:

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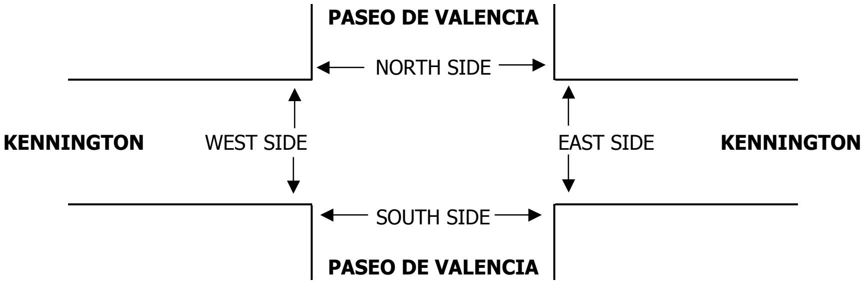
		NORTHBOUND PASEO DE VALENCIA			SOUTHBOUND PASEO DE VALENCIA			EASTBOUND KENNINGTON			WESTBOUND KENNINGTON			
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	LANES:	X	3	0	1	2	X	X	X	X	1	X	1	
AM	7:00 AM		290	1	6	222					2		9	530
	7:15 AM		266	0	2	251					2		6	527
	7:30 AM		273	1	8	220					4		8	514
	7:45 AM		268	2	3	200					1		13	487
	8:00 AM		239	2	4	175					4		10	434
	8:15 AM		241	1	7	148					3		7	407
	8:30 AM		226	2	5	171					3		0	407
	8:45 AM		250	1	7	187					2		12	459
	VOLUMES	0	2,053	10	42	1,574	0	0	0	0	21	0	65	3,765
	APPROACH %	0%	100%	0%	3%	97%	0%	0%	0%	0%	24%	0%	76%	
	APP/DEPART	2,063	/	2,118	1,616	/	1,595	0	/	52	86	/	0	0
	BEGIN PEAK HR		7:00 AM											
	VOLUMES	0	1,097	4	19	893	0	0	0	0	9	0	36	2,058
	APPROACH %	0%	100%	0%	2%	98%	0%	0%	0%	0%	20%	0%	80%	
	PEAK HR FACTOR		0.946			0.901			0.000			0.804		0.971
	APP/DEPART	1,101	/	1,133	912	/	902	0	/	23	45	/	0	0
PM	4:00 PM		287	0	9	375					7		8	686
	4:15 PM		283	0	8	393					5		4	693
	4:30 PM		261	0	10	395					3		3	672
	4:45 PM		285	0	4	435					6		6	736
	5:00 PM		314	0	10	456					3		8	791
	5:15 PM		300	1	6	458					5		7	777
	5:30 PM		326	0	8	398					3		3	738
	5:45 PM		299	1	5	450					4		5	764
	VOLUMES	0	2,355	2	60	3,360	0	0	0	0	36	0	44	5,857
	APPROACH %	0%	100%	0%	2%	98%	0%	0%	0%	0%	45%	0%	55%	
	APP/DEPART	2,357	/	2,399	3,420	/	3,396	0	/	62	80	/	0	0
	BEGIN PEAK HR		5:00 PM											
	VOLUMES	0	1,239	2	29	1,762	0	0	0	0	15	0	23	3,070
	APPROACH %	0%	100%	0%	2%	98%	0%	0%	0%	0%	39%	0%	61%	
	PEAK HR FACTOR		0.952			0.961			0.000			0.792		0.970
	APP/DEPART	1,241	/	1,262	1,791	/	1,777	0	/	31	38	/	0	0

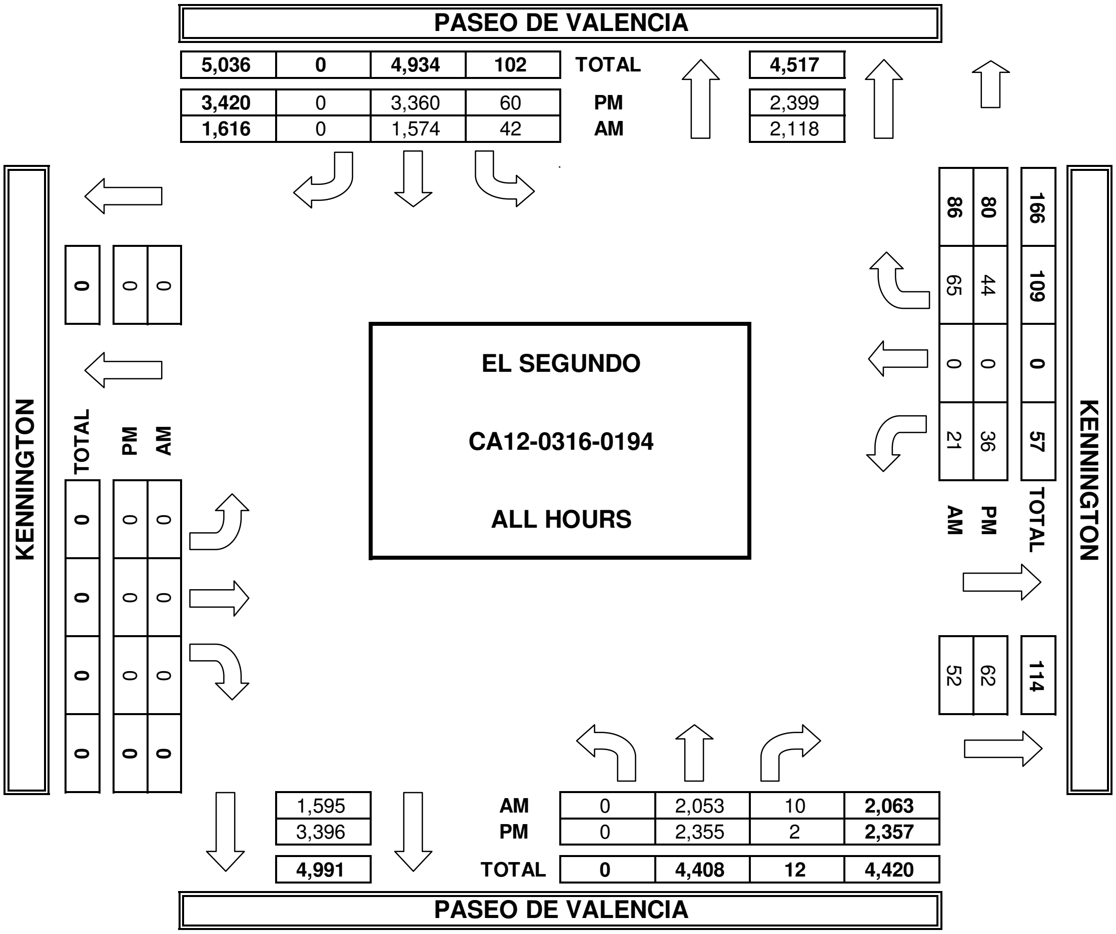
U-TURNS				
NB	SB	EB	WB	TTL
X	X	X	X	
				0
				0
				0
				0
				0
				0
				0
				0
0	0	0	0	0
				0
				0
				0
				0
				0
				0
				0
				0
0	0	0	0	0

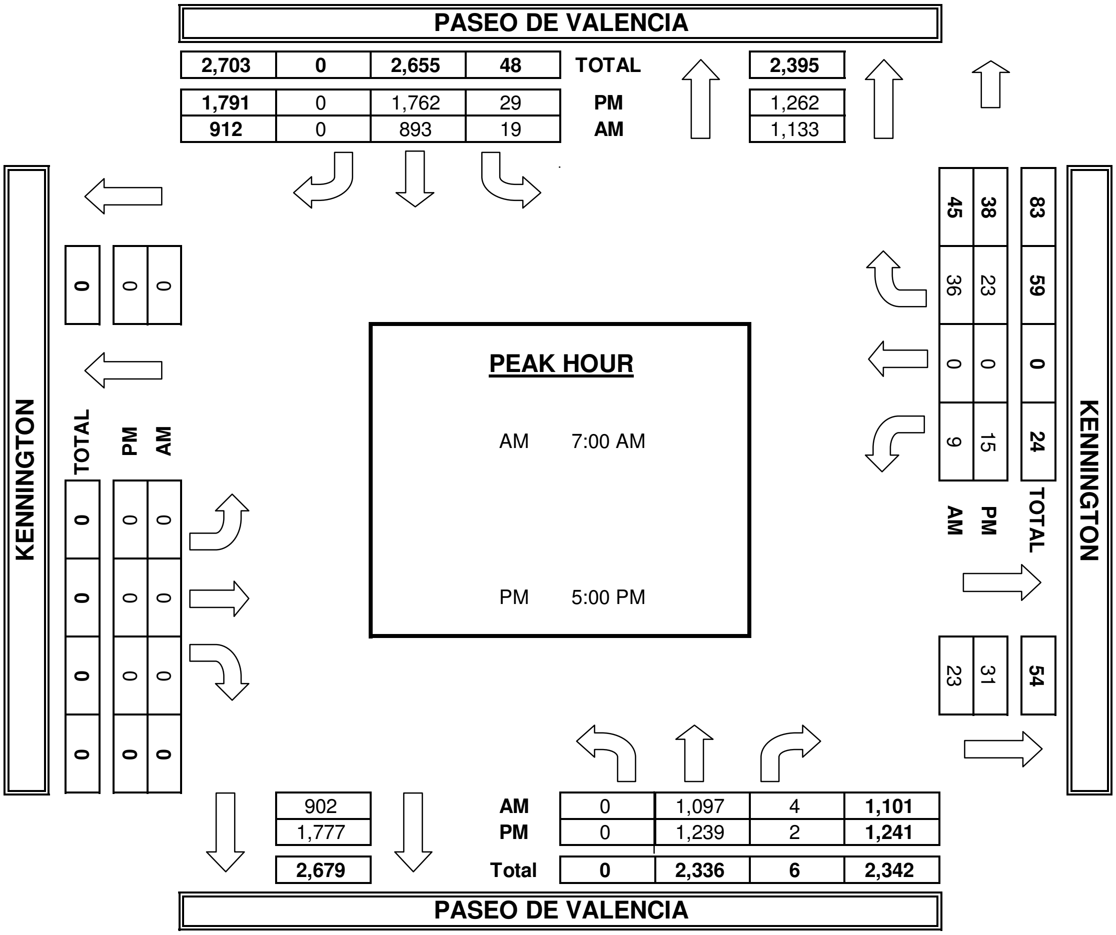


		PEDESTRIAN CROSSINGS					PEDESTRIAN ACTIVATIONS					BICYCLE CROSSINGS				
		N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	NS	SS	ES	WS	TOTAL
AM	7:00 AM					0					0					0
	7:15 AM					0					0					0
	7:30 AM					0					0					0
	7:45 AM					0					0					0
	8:00 AM					0					0					0
	8:15 AM					0					0					0
	8:30 AM					0					0					0
	8:45 AM					0					0					0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PM	4:00 PM					0					0					0
	4:15 PM					0					0					0
	4:30 PM					0					0					0
	4:45 PM					0					0					0
	5:00 PM					0					0					0
	5:15 PM					0					0					0
	5:30 PM					0					0					0
	5:45 PM					0					0					0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PACIFIC TRAFFIC DATA SERVICES

TURNING MOVEMENT COUNTS





INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

DATE:				
3/14/12	LOCATION: EL SEGUNDO		PROJECT #:	CA12-0316-0194
WEDNESDAY	NORTH & SOUTH: PASEO DE VALENCIA		LOCATION #:	2
	EAST & WEST: BECKENHAM		CONTROL:	SIGNAL

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		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
			PASEO DE VALENCIA			PASEO DE VALENCIA			BECKENHAM			BECKENHAM		
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	LANES:	0	3	0	1	2	0	1	0.5	0.5	1	X	1	
AM	7:00 AM		273	19	13	214	0	11	0	2	14	0	8	554
	7:15 AM		241	19	10	239	0	16	0	8	2	0	7	542
	7:30 AM		256	16	14	210	0	16	0	15	5	0	4	536
	7:45 AM		243	26	9	194	0	18	0	5	11	0	6	512
	8:00 AM		222	18	10	168	0	21	0	9	9	0	0	457
	8:15 AM		215	15	9	142	0	21	3	3	7	0	6	421
	8:30 AM		218	15	13	160	0	10	3	12	8	0	2	441
	8:45 AM		236	18	18	174	0	13	1	7	15	0	1	483
	VOLUMES	0	1,904	146	96	1,501	0	126	7	61	71	0	34	3,946
	APPROACH %	0%	93%	7%	6%	94%	0%	65%	4%	31%	68%	0%	32%	
	APP/DEPART	2,050	/	2,064	1,597	/	1,633	194	/	249	105	/	0	0
	BEGIN PEAK HR		7:00 AM											
	VOLUMES	0	1,013	80	46	857	0	61	0	30	32	0	25	2,144
	APPROACH %	0%	93%	7%	5%	95%	0%	67%	0%	33%	56%	0%	44%	
	PEAK HR FACTOR		0.936			0.907			0.734			0.648		0.968
	APP/DEPART	1,093	/	1,099	903	/	919	91	/	126	57	/	0	0
PM	4:00 PM		256	12	16	368	0	15	0	6	15	0	19	707
	4:15 PM		254	13	14	383	0	13	0	7	11	0	18	713
	4:30 PM		223	12	8	389	0	15	0	9	11	0	18	685
	4:45 PM		250	8	13	430	0	17	0	2	17	0	21	758
	5:00 PM		281	10	20	437	0	13	0	5	24	0	21	811
	5:15 PM		278	8	11	453	0	11	0	6	26	0	10	803
	5:30 PM		295	12	10	389	0	11	0	5	14	0	21	757
	5:45 PM		275	12	11	445	0	9	0	2	7	0	13	774
	VOLUMES	0	2,112	87	103	3,294	0	104	0	42	125	0	141	6,008
	APPROACH %	0%	96%	4%	3%	97%	0%	71%	0%	29%	47%	0%	53%	
	APP/DEPART	2,199	/	2,357	3,397	/	3,461	146	/	190	266	/	0	0
	BEGIN PEAK HR		5:00 PM											
	VOLUMES	0	1,129	42	52	1,724	0	44	0	18	71	0	65	3,145
	APPROACH %	0%	96%	4%	3%	97%	0%	71%	0%	29%	52%	0%	48%	
	PEAK HR FACTOR		0.954			0.957			0.861			0.756		0.969
	APP/DEPART	1,171	/	1,238	1,776	/	1,813	62	/	94	136	/	0	0

U-TURNS				
NB	SB	EB	WB	TTL
X	X	X	X	
				0
				0
				0
				0
				0
				0
				0
				0
0	0	0	0	0
				0
				0
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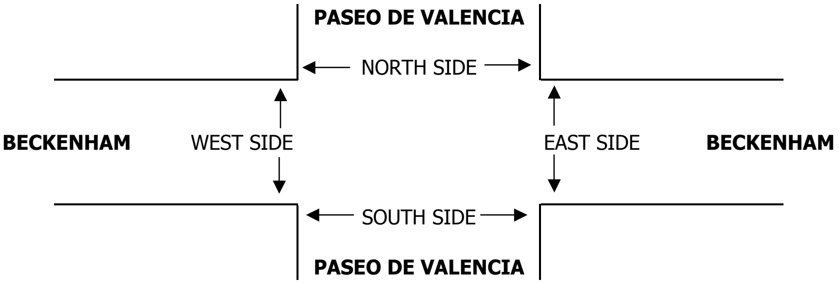
				0
				0
				0
0	0	0	0	0



		PEDESTRIAN CROSSINGS					PEDESTRIAN ACTIVATIONS					BICYCLE CROSSINGS				
		N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	NS	SS	ES	WS	TOTAL
AM	7:00 AM					0					0					0
	7:15 AM					0					0					0
	7:30 AM					0					0					0
	7:45 AM					0					0					0
	8:00 AM					0					0					0
	8:15 AM					0					0					0
	8:30 AM					0					0					0
	8:45 AM					0					0					0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PM	4:00 PM					0					0					0
	4:15 PM					0					0					0
	4:30 PM					0					0					0
	4:45 PM					0					0					0
	5:00 PM					0					0					0
	5:15 PM					0					0					0
	5:30 PM					0					0					0
	5:45 PM					0					0					0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PACIFIC TRAFFIC DATA SERVICES

TURNING MOVEMENT COUNTS

PASEO DE VALENCIA

4,994	**0**	**4,795**	**199**	**TOTAL**
3,397	0	3,294	103	**PM**
1,597	0	1,501	96	**AM**

4,421
2,357
2,064

BECKENHAM

TOTAL	**PM**	**AM**
0	0	0
230	104	126
7	0	7
103	42	61
340	**146**	**194**

EL SEGUNDO

CA12-0316-0194

ALL HOURS

BECKENHAM

AM	**PM**	**TOTAL**
105	**266**	**371**
34	141	**175**
0	0	**0**
71	125	**196**
249	190	**439**

1,633	**AM**	0	1,904	146	**2,050**
3,461	**PM**	0	2,112	87	**2,199**
5,094	**TOTAL**	**0**	**4,016**	**233**	**4,249**

PASEO DE VALENCIA

PASEO DE VALENCIA

2,679	**0**	**2,581**	**98**	**TOTAL**
1,776	0	1,724	52	**PM**
903	0	857	46	**AM**

2,337
1,238
1,099

BECKENHAM

TOTAL	**PM**	**AM**
0	0	0
105	44	61
0	0	0
48	18	30
153	**62**	**91**

PEAK HOUR

AM 7:00 AM

PM 5:00 PM

BECKENHAM

AM	**PM**	**TOTAL**
57	**136**	**193**
25	65	**90**
0	0	**0**
32	71	**103**
126	94	**220**

919	**AM**	0	1,013	80	**1,093**
1,813	**PM**	0	1,129	42	**1,171**
2,732	**Total**	**0**	**2,142**	**122**	**2,264**

PASEO DE VALENCIA

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

DATE: 3/14/12 WEDNESDAY	LOCATION:	LAGUNA HILLS	PROJECT #:	CA12-0316-0194
	NORTH & SOUTH:	PASEO DE VALENCIA	LOCATION #:	3
	EAST & WEST:	LAGUNA HILLS	CONTROL:	SIGNAL

NOTES:

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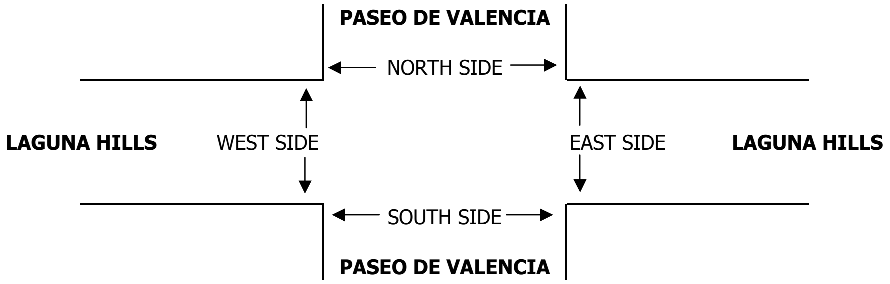
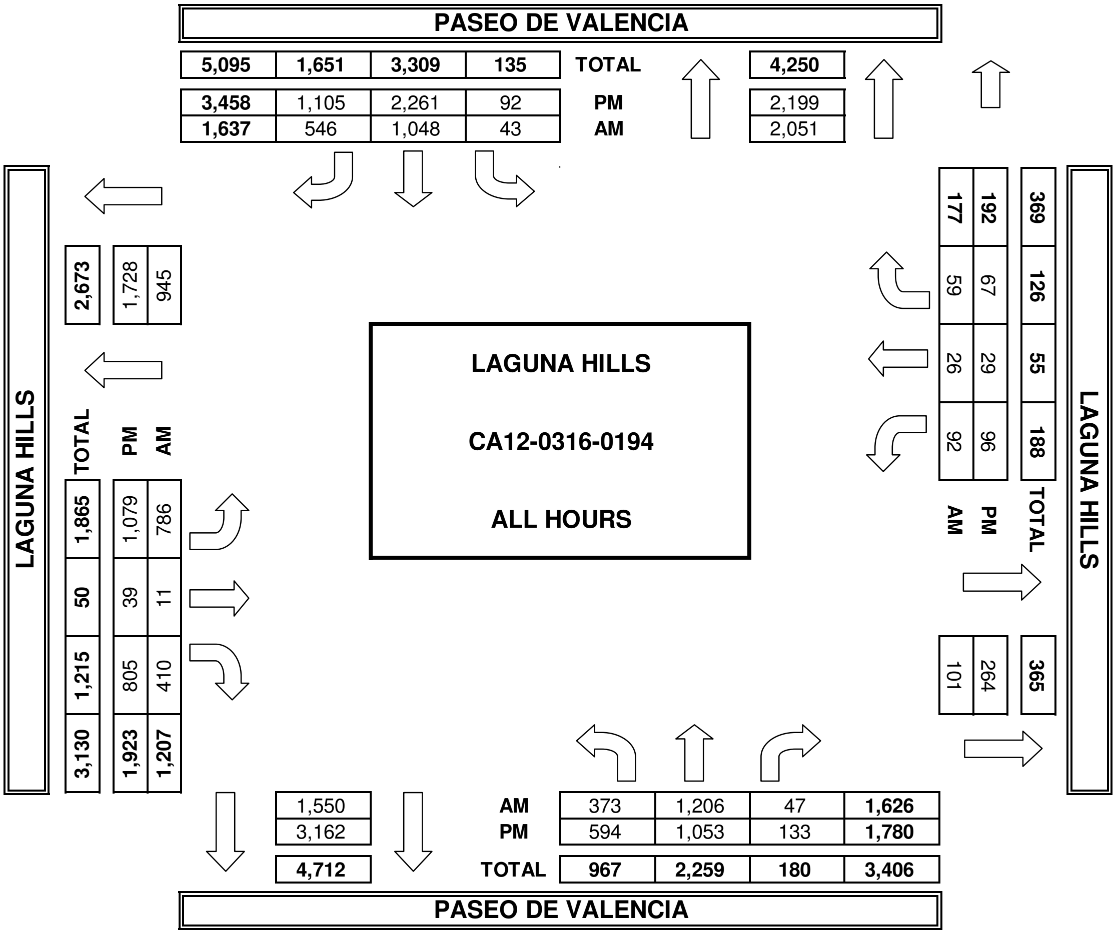
		NORTHBOUND PASEO DE VALENCIA			SOUTHBOUND PASEO DE VALENCIA			EASTBOUND LAGUNA HILLS			WESTBOUND LAGUNA HILLS				U-TURNS				
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL	NB	SB	EB	WB	TTL
	LANES:	2	3	0	1	3	1	1.5	0.5	1	1	1	0		X	X	X	X	
AM	7:00 AM	63	150	10	3	145	85	134	1	62	10	3	9	675					0
	7:15 AM	58	145	6	2	169	73	109	3	58	14	6	9	652					0
	7:30 AM	37	168	5	1	171	61	90	0	63	21	3	10	630					0
	7:45 AM	49	150	4	3	138	68	109	1	64	7	0	9	602					0
	8:00 AM	45	155	5	6	110	77	81	1	44	6	4	8	542					0
	8:15 AM	39	147	6	11	82	56	76	1	48	11	5	6	488					0
	8:30 AM	40	139	9	11	107	60	91	3	37	15	0	4	516					0
	8:45 AM	42	152	2	6	126	66	96	1	34	8	5	4	542					0
	VOLUMES	373	1,206	47	43	1,048	546	786	11	410	92	26	59	4,647	0	0	0	0	0
	APPROACH %	23%	74%	3%	3%	64%	33%	65%	1%	34%	52%	15%	33%						
	APP/DEPART	1,626	/	2,051	1,637	/	1,550	1,207	/	101	177	/	945	0					
	BEGIN PEAK HR		7:00 AM																
	VOLUMES	207	613	25	9	623	287	442	5	247	52	12	37	2,559					
	APPROACH %	24%	73%	3%	1%	68%	31%	64%	1%	36%	51%	12%	37%						
	PEAK HR FACTOR		0.947			0.942			0.881			0.743		0.948					
	APP/DEPART	845	/	1,092	919	/	922	694	/	39	101	/	506	0					
PM	4:00 PM	77	145	17	14	243	131	115	0	95	17	2	9	865					0
	4:15 PM	58	120	17	7	277	115	134	8	86	10	1	7	840					0
	4:30 PM	74	113	20	11	274	128	122	1	97	13	3	5	861					0
	4:45 PM	70	115	11	11	288	152	137	4	88	5	3	6	890					0
	5:00 PM	81	112	21	9	322	127	167	9	129	15	2	13	1,007					0
	5:15 PM	75	137	14	15	299	176	138	5	102	13	10	8	992					0
	5:30 PM	71	151	15	11	255	141	146	2	110	9	5	11	927					0
	5:45 PM	88	160	18	14	303	135	120	10	98	14	3	8	971					0
	VOLUMES	594	1,053	133	92	2,261	1,105	1,079	39	805	96	29	67	7,353	0	0	0	0	0
	APPROACH %	33%	59%	7%	3%	65%	32%	56%	2%	42%	50%	15%	35%						
	APP/DEPART	1,780	/	2,199	3,458	/	3,162	1,923	/	264	192	/	1,728	0					
	BEGIN PEAK HR		5:00 PM																
	VOLUMES	315	560	68	49	1,179	579	571	26	439	51	20	40	3,897					
	APPROACH %	33%	59%	7%	3%	65%	32%	55%	3%	42%	46%	18%	36%						
	PEAK HR FACTOR		0.886			0.922			0.849			0.895		0.967					
	APP/DEPART	943	/	1,171	1,807	/	1,669	1,036	/	143	111	/	914	0					

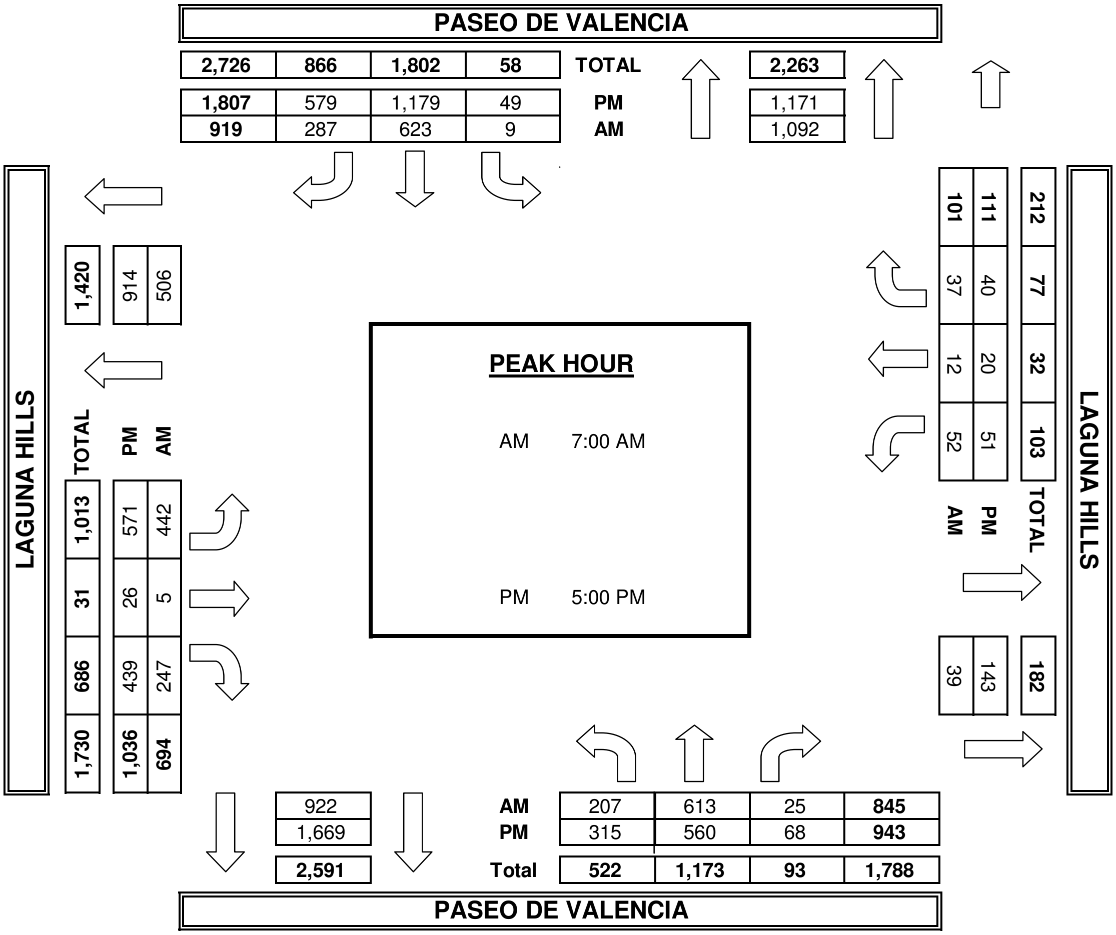


		PEDESTRIAN CROSSINGS					PEDESTRIAN ACTIVATIONS					BICYCLE CROSSINGS				
		N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	NS	SS	ES	WS	TOTAL
AM	7:00 AM					0					0					0
	7:15 AM					0					0					0
	7:30 AM					0					0					0
	7:45 AM					0					0					0
	8:00 AM					0					0					0
	8:15 AM					0					0					0
	8:30 AM					0					0					0
	8:45 AM					0					0					0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PM	4:00 PM					0					0					0
	4:15 PM					0					0					0
	4:30 PM					0					0					0
	4:45 PM					0					0					0
	5:00 PM					0					0					0
	5:15 PM					0					0					0
	5:30 PM					0					0					0
	5:45 PM					0					0					0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PACIFIC TRAFFIC DATA SERVICES

TURNING MOVEMENT COUNTS





APPENDIX B

EXISTING

CALCULATION WORKSHEETS

Intersection Capacity Utilization Analysis (ICU)

Traffic Scenario: **Existing**
Intersection # **1**
Project: Paseo De Valencia Widening
North/South St: Paseo De Valencia
East/West St: Kennington Drive
Date: 4/5/12
By: Ray

Movement		No, of Lanes	Critical Lane Capacity	**Weekday A.M. Peak Hour** Volumes Total	Critical Lane	V/C Ratio	Critical V/C	**Weekday P.M. Peak Hour** Volumes Total	Critical Lane	V/C Ratio	Critical V/C
Northbound	:Left		1700								
	:Thru	3.0	1700	1097	367	0.216		1239	414	0.243	
	Right:		1700	4				2			
Southbound	:Left	1.0	1700	19	19	0.011		29	29	0.017	
	:Thru	2.0	1700	893	447	0.263	0.263	1762	881	0.518	0.518
	Right:		1700								
Eastbound	:Left		1700								
	:Thru		1700								
	Right:		1700								
Westbound	:Left	1.0	1700	9	9	0.005		15	15	0.009	
	:Thru		1700								
	Right:	1.0	1700	36	36	0.021	0.021	23	23	0.014	0.014
Sum of Critical V/C Ratios							0.284				0.532
Adjustments for Lost Time							0.100				0.100
Intersection Capacity Utilization (ICU)							**0.384**				**0.632**
Level of Service (LOS)							**A**				**B**

NOTES:

Level of Service (LOS)	
A	*0.00 ~ 0.60*
B	*0.61 ~ 0.70*
C	*0.71 ~ 0.80*
D	*0.81 ~ 0.90*
E	*0.91 ~ 1.00*
F	*1.00+*

Critical Lane Flow Factors		
0.5	*Lanes:*	*2.00*
1	*Lane:*	*1.00*
1.5	*Lanes:*	*0.67*
2	*Lanes:*	*0.50*
2.5	*Lanes:*	*0.40*
3	*Lanes:*	*0.33*

LIN Consulting, Inc.

Intersection Capacity Utilization Analysis (ICU)

Traffic Scenario: **Existing**
Intersection # **2**
Project: Paseo De Valencia Widening
North/South St: Paseo De Valencia
East/West St: Avenida Sevilla/Beckenham St

Date: 4/5/12
By: Ray

Movement		No, of Lanes	Critical Lane Capacity	**Weekday A.M. Peak Hour**				**Weekday P.M. Peak Hour**			
				Volumes				Volumes			
				Total	Critical Lane	V/C Ratio	Critical V/C	Total	Critical Lane	V/C Ratio	Critical V/C
	:Left		1700								
Northbound	:Thru	3.0	1700	1013	364	0.214		1129	390	0.230	
	Right:		1700	80				42			
	:Left	1.0	1700	46	46	0.027		52	52	0.031	
Southbound	:Thru	2.0	1700	857	429	0.252	0.252	1724	862	0.507	0.507
	Right:		1700								
	:Left	1.0	1700	61	61	0.036	0.036	44	44	0.026	0.026
Eastbound	:Thru	1.0	1700		30	0.018			18	0.011	
	Right:		1700	30				18			
	:Left	1.0	1700	32	32	0.019		71	71	0.042	
Westbound	:Thru		1700								
	Right:	1.0	1700	25	25	0.015	0.015	65	65	0.038	0.038

Sum of Critical V/C Ratios	0.303	0.571
Adjustments for Lost Time	0.100	0.100
Intersection Capacity Utilization (ICU)	**0.403**	**0.671**
Level of Service (LOS)	**A**	**B**

NOTES:

Level of Service (LOS)	
A	*0.00 ~ 0.60*
B	*0.61 ~ 0.70*
C	*0.71 ~ 0.80*
D	*0.81 ~ 0.90*
E	*0.91 ~ 1.00*
F	*1.00+*

Critical Lane Flow Factors		
0.5	*Lanes:*	*2.00*
1	*Lane:*	*1.00*
1.5	*Lanes:*	*0.67*
2	*Lanes:*	*0.50*
2.5	*Lanes:*	*0.40*
3	*Lanes:*	*0.33*

Intersection Capacity Utilization Analysis (ICU)

Traffic Scenario: **Existing**
Intersection # **3**
Project: Paseo De Valencia Widening
North/South St: Paseo De Valencia
East/West St: Laguna Hills Drive
Date: 4/5/12
By: Ray

Movement		No, of Lanes	Critical Lane Capacity	Weekday A.M. Peak Hour				Weekday P.M. Peak Hour			
				Volumes				Volumes			
				Total	Critical Lane	V/C Ratio	Critical V/C	Total	Critical Lane	V/C Ratio	Critical V/C
	:Left	2.0	1700	207	114	0.067	0.067	315	173	0.102	0.102
Northbound	:Thru	3.0	1700	613	213	0.125		560	209	0.123	
	Right:		1700	25				68			
	:Left	1.0	1700	9	9	0.005		49	49	0.029	
Southbound	:Thru	3.0	1700	623	208	0.122		1179	393	0.231	
	Right:	1.0	1700	287	287	0.169	0.169	579	579	0.341	0.341
	:Left	1.5	1700	442	296	0.174	0.174	571	383	0.225	
Eastbound	:Thru	0.5	1700	5	10	0.006		26	52	0.031	
	Right:	1.0	1700	247	247	0.145		439	439	0.258	0.258
	:Left	1.0	1700	52	52	0.031		51	51	0.030	0.030
Westbound	:Thru	1.0	1700	12	49	0.029	0.029	20	60	0.035	
	Right:		1700	37				40			
Sum of Critical V/C Ratios							0.439				0.731
Adjustments for Lost Time							0.100				0.100
Intersection Capacity Utilization (ICU)							**0.539**				**0.831**
Level of Service (LOS)							**A**				**D**

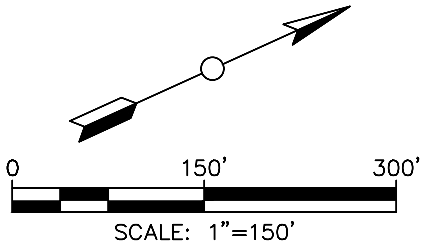
NOTES:

Level of Service (LOS)	
A	*0.00 ~ 0.60*
B	*0.61 ~ 0.70*
C	*0.71 ~ 0.80*
D	*0.81 ~ 0.90*
E	*0.91 ~ 1.00*
F	*1.00+*

Critical Lane Flow Factors		
0.5	*Lanes:*	*2.00*
1	*Lane:*	*1.00*
1.5	*Lanes:*	*0.67*
2	*Lanes:*	*0.50*
2.5	*Lanes:*	*0.40*
3	*Lanes:*	*0.33*

APPENDIX C

PROPOSED STREET IMPROVEMENTS



STV

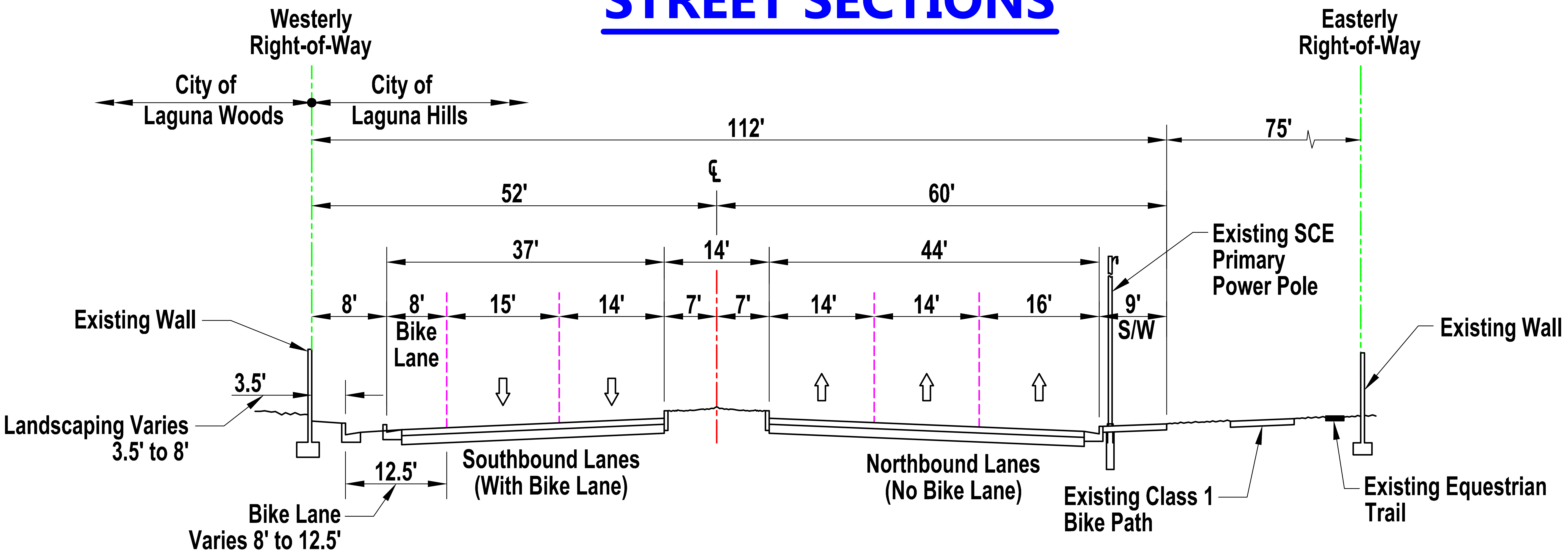
PASEO DE VALENCIA
STREET IMPROVEMENTS BETWEEN
LAGUNA HILLS DRIVE AND
KENNINGTON DRIVE

DATE: NOVEMBER 15, 2011
NOT FOR CONSTRUCTION

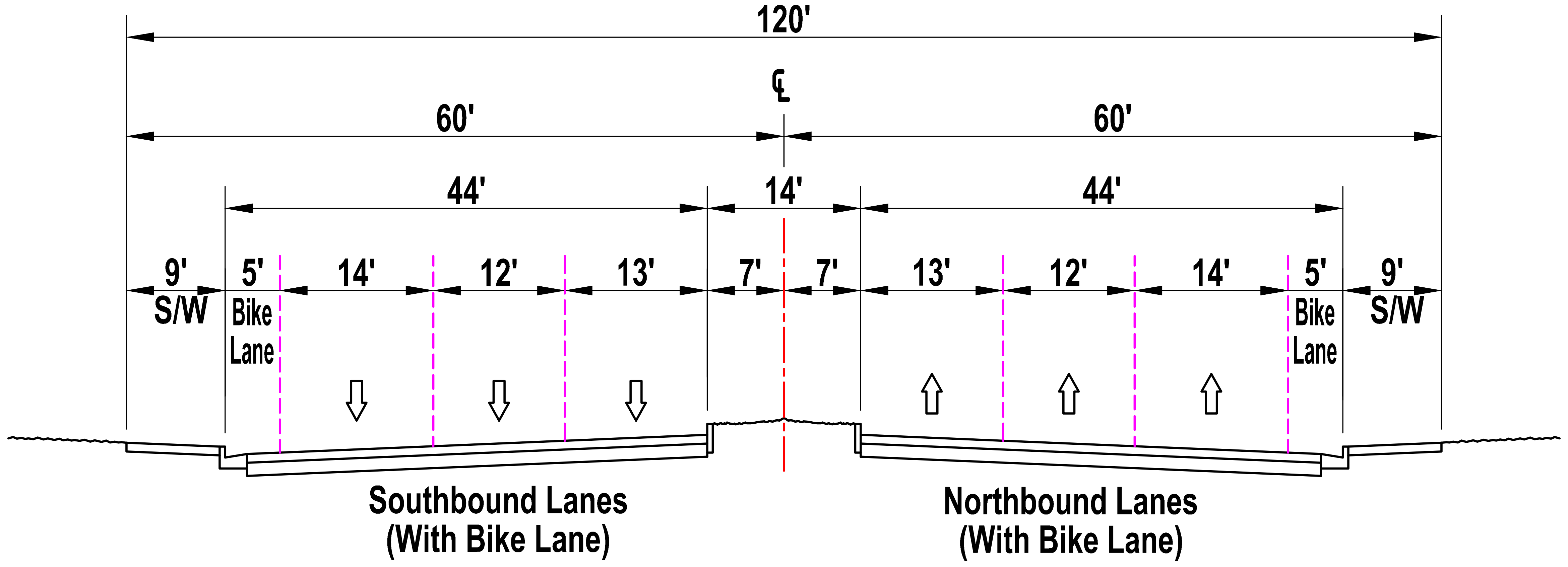
11.9.2011 4:12 PM PASEO-DE-VALENCIA (CIVIL3D 2011).DWG

CITY OF LAGUNA HILLS - PASEO DE VALENCIA STREET IMPROVEMENT PROJECT

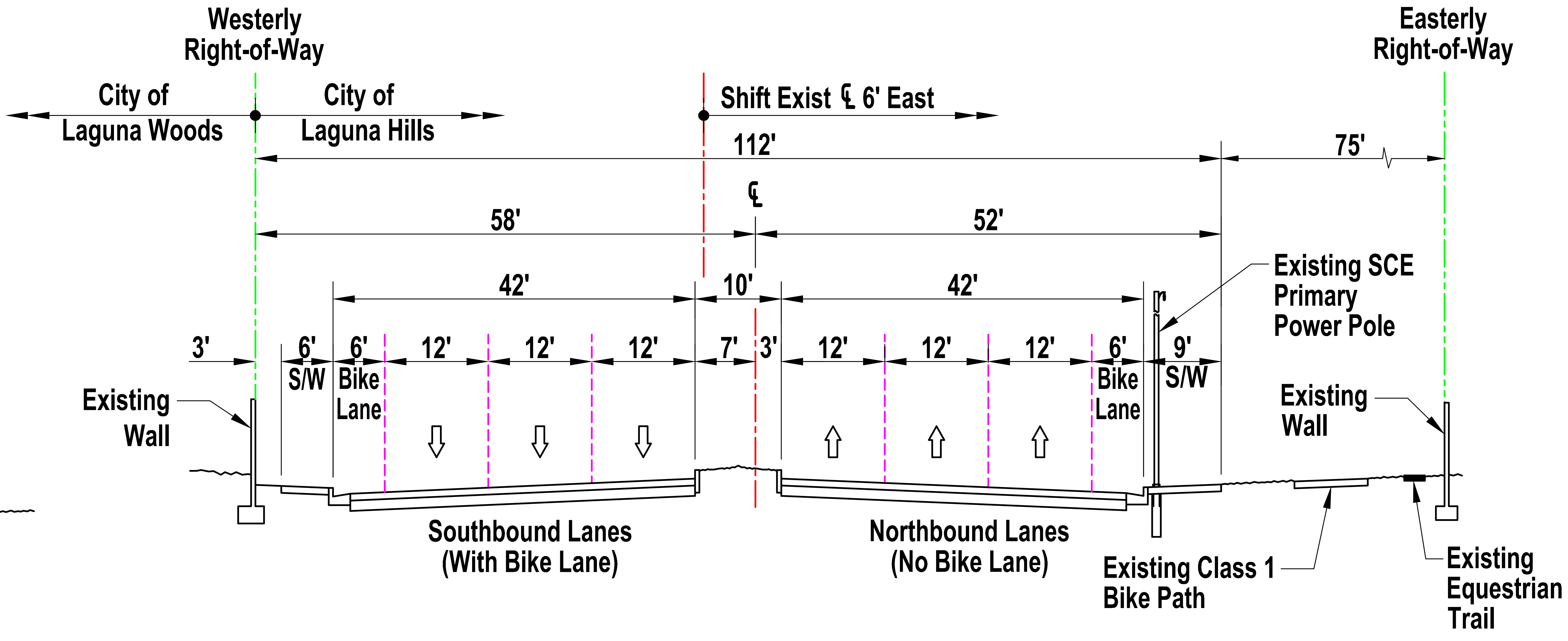
STREET SECTIONS



Existing Typical Section @ Edison Pole
Southeast Corner of Kennington Drive



Typical Major Arterial
6 Lane Divided Roadway



Proposed Typical Section @ Edison Pole
Southeast Corner of Kennington Drive

STV 100 Years

PASEO DE VALENCIA
STREET IMPROVEMENTS BETWEEN
LAGUNA HILLS DRIVE AND
KENNINGTON DRIVE

DATE: APRIL 16, 2012
NOT FOR CONSTRUCTION

APPENDIX D

YEAR 2014

CALCULATION WORKSHEETS

Intersection Capacity Utilization Analysis (ICU)

Traffic Scenario: **Existing + Growth + Other**
Intersection # **1**
Project: Paseo De Valencia Widening
North/South St: Paseo De Valencia
East/West St: Kennington Drive
Date: 1/15/14
By: Ray

Movement		No, of Lanes	Critical Lane Capacity	Weekday A.M. Peak Hour Volumes Total	Critical Lane	V/C Ratio	Critical V/C	Weekday P.M. Peak Hour Volumes Total	Critical Lane	V/C Ratio	Critical V/C
	:Left		1700								
Northbound	:Thru	3.0	1700	1126	377	0.222		1266	423	0.249	
	Right:		1700	4				2			
	:Left	1.0	1700	19	19	0.011		30	30	0.017	
Southbound	:Thru	2.0	1700	917	458	0.270	0.270	1798	899	0.529	0.529
	Right:		1700								
	:Left		1700								
Eastbound	:Thru		1700								
	Right:		1700								
	:Left	1.0	1700	9	9	0.005		15	15	0.009	
Westbound	:Thru		1700								
	Right:	1.0	1700	37	37	0.022	0.022	23	23	0.014	0.014
Sum of Critical V/C Ratios							0.292				0.543
Adjustments for Lost Time							0.100				0.100
Intersection Capacity Utilization (ICU)							**0.392**				**0.643**
Level of Service (LOS)							**A**				**B**

NOTES:

Level of Service (LOS)	
A	*0.00 ~ 0.60*
B	*0.61 ~ 0.70*
C	*0.71 ~ 0.80*
D	*0.81 ~ 0.90*
E	*0.91 ~ 1.00*
F	*1.00+*

Critical Lane Flow Factors		
0.5	*Lanes:*	*2.00*
1	*Lane:*	*1.00*
1.5	*Lanes:*	*0.67*
2	*Lanes:*	*0.50*
2.5	*Lanes:*	*0.40*
3	*Lanes:*	*0.33*

LIN Consulting, Inc.

Intersection Capacity Utilization Analysis (ICU)

Traffic Scenario: **Existing + Growth + Other**
Intersection # **2**
Project: Paseo De Valencia Widening
North/South St: Paseo De Valencia
East/West St: Avenida Sevilla/Beckenham St
Date: 1/15/14
By: Ray

Movement		No, of Lanes	Critical Lane Capacity	Weekday A.M. Peak Hour				Weekday P.M. Peak Hour			
				Volumes Total	Volumes Critical Lane	V/C Ratio	Critical V/C	Volumes Total	Volumes Critical Lane	V/C Ratio	Critical V/C
Northbound	:Left		1700								
	:Thru	3.0	1700	1040	374	0.220		1154	399	0.235	
	Right:		1700	82				43			
Southbound	:Left	1.0	1700	47	47	0.028		53	53	0.031	
	:Thru	2.0	1700	880	440	0.259	0.259	1760	880	0.518	0.518
	Right:		1700								
Eastbound	:Left	1.0	1700	62	62	0.037	0.037	45	45	0.026	0.026
	:Thru	1.0	1700		31	0.018			18	0.011	
	Right:		1700	31				18			
Westbound	:Left	1.0	1700	33	33	0.019		72	72	0.043	
	:Thru		1700								
	Right:	1.0	1700	26	26	0.015	0.015	66	66	0.039	0.039

Sum of Critical V/C Ratios	0.311	0.583
Adjustments for Lost Time	0.100	0.100
Intersection Capacity Utilization (ICU)	**0.411**	**0.683**
Level of Service (LOS)	**A**	**B**

NOTES:

Level of Service (LOS)	
A	*0.00 ~ 0.60*
B	*0.61 ~ 0.70*
C	*0.71 ~ 0.80*
D	*0.81 ~ 0.90*
E	*0.91 ~ 1.00*
F	*1.00+*

Critical Lane Flow Factors		
0.5	*Lanes:*	*2.00*
1	*Lane:*	*1.00*
1.5	*Lanes:*	*0.67*
2	*Lanes:*	*0.50*
2.5	*Lanes:*	*0.40*
3	*Lanes:*	*0.33*

Intersection Capacity Utilization Analysis (ICU)

Traffic Scenario: **Existing + Growth + Other**
Intersection # **3**
Project: Paseo De Valencia Widening
North/South St: Paseo De Valencia
East/West St: Laguna Hills Drive
Date: 1/15/14
By: Ray

						Weekday A.M. Peak Hour				Weekday P.M. Peak Hour			
						Volumes				Volumes			
Movement		No, of Lanes	Critical Lane Capacity			Total	Critical Lane	V/C Ratio	Critical V/C	Total	Critical Lane	V/C Ratio	Critical V/C
	:Left	2.0	1700			211	116	0.068	0.068	321	177	0.104	0.104
Northbound	:Thru	3.0	1700			632	219	0.129		573	214	0.126	
	Right:		1700			26				69			
	:Left	1.0	1700			9	9	0.005		50	50	0.029	
Southbound	:Thru	3.0	1700			642	214	0.126		1204	401	0.236	
	Right:	1.0	1700			293	293	0.172	0.172	591	591	0.347	0.347
	:Left	1.5	1700			451	302	0.178	0.178	582	390	0.230	
Eastbound	:Thru	0.5	1700			5	10	0.006		27	53	0.031	
	Right:	1.0	1700			252	252	0.148		448	448	0.263	0.263
	:Left	1.0	1700			53	53	0.031		52	52	0.031	0.031
Westbound	:Thru	1.0	1700			12	50	0.029	0.029	20	61	0.036	
	Right:		1700			38				41			

Sum of Critical V/C Ratios	0.447	0.745
Adjustments for Lost Time	0.100	0.100
Intersection Capacity Utilization (ICU)	**0.547**	**0.845**
Level of Service (LOS)	**A**	**D**

NOTES:

Level of Service (LOS)

A	*0.00 ~ 0.60*
B	*0.61 ~ 0.70*
C	*0.71 ~ 0.80*
D	*0.81 ~ 0.90*
E	*0.91 ~ 1.00*
F	*1.00+*

Critical Lane Flow Factors

0.5	*Lanes:*	*2.00*
1	*Lane:*	*1.00*
1.5	*Lanes:*	*0.67*
2	*Lanes:*	*0.50*
2.5	*Lanes:*	*0.40*
3	*Lanes:*	*0.33*

APPENDIX E

YEAR 2014 PLUS PROJECT

CALCULATION WORKSHEETS

Intersection Capacity Utilization Analysis (ICU)

Traffic Scenario: **Existing + Growth + Other + Project**
Intersection # **1**
Project: Paseo De Valencia Widening
North/South St: Paseo De Valencia
East/West St: Kennington Drive
Date: 4/5/12
By: Ray

Movement		No, of Lanes	Critical Lane Capacity	**Weekday A.M. Peak Hour** Volumes Total	Critical Lane	V/C Ratio	Critical V/C	**Weekday P.M. Peak Hour** Volumes Total	Critical Lane	V/C Ratio	Critical V/C
	:Left		1700								
Northbound	:Thru	3.0	1700	1126	377	0.222		1266	423	0.249	
	Right:		1700	4				2			
	:Left	1.0	1700	19	19	0.011		30	30	0.017	
Southbound	:Thru	2.0	1700	917	458	0.270	0.270	1798	899	0.529	0.529
	Right:		1700								
	:Left		1700								
Eastbound	:Thru		1700								
	Right:		1700								
	:Left	1.0	1700	9	9	0.005		15	15	0.009	
Westbound	:Thru		1700								
	Right:	1.0	1700	37	37	0.022	0.022	23	23	0.014	0.014

	A.M.	P.M.
Sum of Critical V/C Ratios	0.292	0.543
Adjustments for Lost Time	0.100	0.100
Intersection Capacity Utilization (ICU)	**0.392**	**0.643**
Level of Service (LOS)	**A**	**B**

NOTES:

Level of Service (LOS)	
A	*0.00 ~ 0.60*
B	*0.61 ~ 0.70*
C	*0.71 ~ 0.80*
D	*0.81 ~ 0.90*
E	*0.91 ~ 1.00*
F	*1.00+*

Critical Lane Flow Factors		
0.5	*Lanes:*	*2.00*
1	*Lane:*	*1.00*
1.5	*Lanes:*	*0.67*
2	*Lanes:*	*0.50*
2.5	*Lanes:*	*0.40*
3	*Lanes:*	*0.33*

Intersection Capacity Utilization Analysis (ICU)

Traffic Scenario: **Existing + Growth + Other + Project**
Intersection # **2**
Project: Paseo De Valencia Widening
North/South St: Paseo De Valencia
East/West St: Avenida Sevilla/Beckenham St
Date: 4/5/12
By: Ray

Movement		No, of Lanes	Critical Lane Capacity	**Weekday A.M. Peak Hour** Volumes Total	Critical Lane	V/C Ratio	Critical V/C	**Weekday P.M. Peak Hour** Volumes Total	Critical Lane	V/C Ratio	Critical V/C
	:Left		1700								
Northbound	:Thru	3.0	1700	1040	374	0.220	0.220	1154	399	0.235	
	Right:		1700	82				43			
	:Left	1.0	1700	47	47	0.028	0.028	53	53	0.031	
Southbound	:Thru	3.0	1700	880	293	0.173		1760	587	0.345	0.345
	Right:		1700								
	:Left	1.0	1700	62	62	0.037	0.037	45	45	0.026	0.026
Eastbound	:Thru	1.0	1700		31	0.018			18	0.011	
	Right:		1700	31				18			
	:Left	1.0	1700	33	33	0.019		72	72	0.043	
Westbound	:Thru		1700								
	Right:	1.0	1700	26	26	0.015	0.015	66	66	0.039	0.039

	A.M.	P.M.
Sum of Critical V/C Ratios	0.300	0.410
Adjustments for Lost Time	0.100	0.100
Intersection Capacity Utilization (ICU)	**0.400**	**0.510**
Level of Service (LOS)	**A**	**A**

NOTES:

Level of Service (LOS)	
A	*0.00 ~ 0.60*
B	*0.61 ~ 0.70*
C	*0.71 ~ 0.80*
D	*0.81 ~ 0.90*
E	*0.91 ~ 1.00*
F	*1.00+*

Critical Lane Flow Factors		
0.5	*Lanes:*	*2.00*
1	*Lane:*	*1.00*
1.5	*Lanes:*	*0.67*
2	*Lanes:*	*0.50*
2.5	*Lanes:*	*0.40*
3	*Lanes:*	*0.33*

Intersection Capacity Utilization Analysis (ICU)

Traffic Scenario: **Existing + Growth + Other + Project**
Intersection # **3**
Project: Paseo De Valencia Widening
North/South St: Paseo De Valencia
East/West St: Laguna Hills Drive
Date: 4/5/12
By: Ray

				Weekday A.M. Peak Hour				Weekday P.M. Peak Hour			
		No,	Critical	Volumes				Volumes			
Movement		of Lanes	Lane Capacity	Total	Critical Lane	V/C Ratio	Critical V/C	Total	Critical Lane	V/C Ratio	Critical V/C
	:Left	2.0	1700	211	116	0.068	0.068	321	177	0.104	0.104
Northbound	:Thru	3.0	1700	632	219	0.129		573	214	0.126	
	Right:		1700	26				69			
	:Left	1.0	1700	9	9	0.005		50	50	0.029	
Southbound	:Thru	3.0	1700	642	214	0.126		1204	401	0.236	
	Right:	1.0	1700	293	293	0.172	0.172	591	591	0.347	0.347
	:Left	1.5	1700	451	302	0.178	0.178	582	390	0.230	
Eastbound	:Thru	0.5	1700	5	10	0.006		27	53	0.031	
	Right:	1.0	1700	252	252	0.148		448	448	0.263	0.263
	:Left	1.0	1700	53	53	0.031		52	52	0.031	0.031
Westbound	:Thru	1.0	1700	12	50	0.029	0.029	20	61	0.036	
	Right:		1700	38				41			

	A.M.	P.M.
Sum of Critical V/C Ratios	0.447	0.745
Adjustments for Lost Time	0.100	0.100
Intersection Capacity Utilization (ICU)	**0.547**	**0.845**
Level of Service (LOS)	**A**	**D**

NOTES:

Level of Service (LOS)

A	*0.00 ~ 0.60*
B	*0.61 ~ 0.70*
C	*0.71 ~ 0.80*
D	*0.81 ~ 0.90*
E	*0.91 ~ 1.00*
F	*1.00+*

Critical Lane Flow Factors

0.5	*Lanes:*	*2.00*
1	*Lane:*	*1.00*
1.5	*Lanes:*	*0.67*
2	*Lanes:*	*0.50*
2.5	*Lanes:*	*0.40*
3	*Lanes:*	*0.33*

APPENDIX F

YEAR 2035

CALCULATION WORKSHEETS

Intersection Capacity Utilization Analysis (ICU)

Traffic Scenario: **Year 2035**
Intersection # **1**
Project: Paseo De Valencia Widening
North/South St: Paseo De Valencia
East/West St: Kennington Drive
Date: 4/5/12
By: Ray

Movement		No, of Lanes	Critical Lane Capacity	**Weekday A.M. Peak Hour** Volumes Total	Critical Lane	V/C Ratio	Critical V/C	**Weekday P.M. Peak Hour** Volumes Total	Critical Lane	V/C Ratio	Critical V/C
	:Left		1700								
Northbound	:Thru	3.0	1700	1379	461	0.271		1558	520	0.306	
	Right:		1700	5				3			
	:Left	1.0	1700	24	24	0.014		36	36	0.021	
Southbound	:Thru	2.0	1700	1123	561	0.330	0.330	2215	1108	0.652	0.652
	Right:		1700								
	:Left		1700								
Eastbound	:Thru		1700								
	Right:		1700								
	:Left	1.0	1700	11	11	0.007		19	19	0.011	
Westbound	:Thru		1700								
	Right:	1.0	1700	45	45	0.027	0.027	29	29	0.017	0.017

	A.M.	P.M.
Sum of Critical V/C Ratios	0.357	0.669
Adjustments for Lost Time	0.100	0.100
Intersection Capacity Utilization (ICU)	**0.457**	**0.769**
Level of Service (LOS)	**A**	**C**

NOTES:

Level of Service (LOS)	
A	*0.00 ~ 0.60*
B	*0.61 ~ 0.70*
C	*0.71 ~ 0.80*
D	*0.81 ~ 0.90*
E	*0.91 ~ 1.00*
F	*1.00+*

Critical Lane Flow Factors		
0.5	*Lanes:*	*2.00*
1	*Lane:*	*1.00*
1.5	*Lanes:*	*0.67*
2	*Lanes:*	*0.50*
2.5	*Lanes:*	*0.40*
3	*Lanes:*	*0.33*

Intersection Capacity Utilization Analysis (ICU)

Traffic Scenario: **Year 2035**
Intersection # **2**
Project: Paseo De Valencia Widening
North/South St: Paseo De Valencia
East/West St: Avenida Sevilla/Beckenham St
Date: 4/5/12
By: Ray

				Weekday A.M. Peak Hour				**Weekday P.M. Peak Hour**			
		No,	Critical	Volumes				Volumes			
Movement		of Lanes	Lane Capacity	Total	Critical Lane	V/C Ratio	Critical V/C	Total	Critical Lane	V/C Ratio	Critical V/C
	:Left		1700								
Northbound	:Thru	3.0	1700	1274	458	0.269		1419	491	0.289	
	Right:		1700	101				53			
	:Left	1.0	1700	58	58	0.034		65	65	0.038	
Southbound	:Thru	2.0	1700	1077	539	0.317	0.317	2167	1084	0.637	0.637
	Right:		1700								
	:Left	1.0	1700	77	77	0.045	0.045	55	55	0.033	0.033
Eastbound	:Thru	1.0	1700		38	0.022			23	0.013	
	Right:		1700	38				23			
	:Left	1.0	1700	40	40	0.024		89	89	0.053	
Westbound	:Thru		1700								
	Right:	1.0	1700	31	31	0.018	0.018	82	82	0.048	0.048

Sum of Critical V/C Ratios	0.380	0.718
Adjustments for Lost Time	0.100	0.100
Intersection Capacity Utilization (ICU)	**0.480**	**0.818**
Level of Service (LOS)	**A**	**D**

NOTES:

Level of Service (LOS)	
A	*0.00 ~ 0.60*
B	*0.61 ~ 0.70*
C	*0.71 ~ 0.80*
D	*0.81 ~ 0.90*
E	*0.91 ~ 1.00*
F	*1.00+*

Critical Lane Flow Factors		
0.5	*Lanes:*	*2.00*
1	*Lane:*	*1.00*
1.5	*Lanes:*	*0.67*
2	*Lanes:*	*0.50*
2.5	*Lanes:*	*0.40*
3	*Lanes:*	*0.33*

Intersection Capacity Utilization Analysis (ICU)

Traffic Scenario: **Year 2035**
Intersection # **3**
Project: Paseo De Valencia Widening
North/South St: Paseo De Valencia
East/West St: Laguna Hills Drive
Date: 4/5/12
By: Ray

Movement		No, of Lanes	Critical Lane Capacity	**Weekday A.M. Peak Hour**				**Weekday P.M. Peak Hour**			
				Volumes				Volumes			
				Total	Critical Lane	V/C Ratio	Critical V/C	Total	Critical Lane	V/C Ratio	Critical V/C
	:Left	2.0	1700	260	143	0.084	0.084	396	218	0.128	0.128
Northbound	:Thru	3.0	1700	771	267	0.157		704	263	0.155	
	Right:		1700	31				85			
	:Left	1.0	1700	11	11	0.007		62	62	0.036	
Southbound	:Thru	3.0	1700	783	261	0.154		1482	494	0.291	
	Right:	1.0	1700	361	361	0.212	0.212	728	728	0.428	0.428
	:Left	1.5	1700	556	372	0.219	0.219	718	481	0.283	
Eastbound	:Thru	0.5	1700	6	13	0.007		33	65	0.038	
	Right:	1.0	1700	311	311	0.183		552	552	0.325	0.325
	:Left	1.0	1700	65	65	0.038		64	64	0.038	0.038
Westbound	:Thru	1.0	1700	15	62	0.036	0.036	25	75	0.044	
	Right:		1700	47				50			
Sum of Critical V/C Ratios							0.551				0.919
Adjustments for Lost Time							0.100				0.100
Intersection Capacity Utilization (ICU)							**0.651**				**1.019**
Level of Service (LOS)							**B**				**F**

NOTES:

Level of Service (LOS)	
A	*0.00 ~ 0.60*
B	*0.61 ~ 0.70*
C	*0.71 ~ 0.80*
D	*0.81 ~ 0.90*
E	*0.91 ~ 1.00*
F	*1.00+*

Critical Lane Flow Factors		
0.5	*Lanes:*	*2.00*
1	*Lane:*	*1.00*
1.5	*Lanes:*	*0.67*
2	*Lanes:*	*0.50*
2.5	*Lanes:*	*0.40*
3	*Lanes:*	*0.33*

APPENDIX G

YEAR 2035 PLUS PROJECT

CALCULATION WORKSHEETS

Intersection Capacity Utilization Analysis (ICU)

Traffic Scenario: **Year 2035 + Project**

Intersection # **1**

Project: Paseo De Valencia Widening

North/South St: Paseo De Valencia

East/West St: Kennington Drive

Date: 4/5/12

By: Ray

Movement		No, of Lanes	Critical Lane Capacity	**Weekday A.M. Peak Hour**				**Weekday P.M. Peak Hour**			
				Volumes				Volumes			
				Total	Critical Lane	V/C Ratio	Critical V/C	Total	Critical Lane	V/C Ratio	Critical V/C
	:Left		1700								
Northbound	:Thru	3.0	1700	1379	461	0.271		1558	520	0.306	
	Right:		1700	5				3			
	:Left	1.0	1700	24	24	0.014		36	36	0.021	
Southbound	:Thru	2.0	1700	1123	561	0.330	0.330	2215	1108	0.652	0.652
	Right:		1700								
	:Left		1700								
Eastbound	:Thru		1700								
	Right:		1700								
	:Left	1.0	1700	11	11	0.007		19	19	0.011	
Westbound	:Thru		1700								
	Right:	1.0	1700	45	45	0.027	0.027	29	29	0.017	0.017

Sum of Critical V/C Ratios	0.357	0.669
Adjustments for Lost Time	0.100	0.100
Intersection Capacity Utilization (ICU)	**0.457**	**0.769**
Level of Service (LOS)	**A**	**C**

NOTES:

Level of Service (LOS)	
A	*0.00 ~ 0.60*
B	*0.61 ~ 0.70*
C	*0.71 ~ 0.80*
D	*0.81 ~ 0.90*
E	*0.91 ~ 1.00*
F	*1.00+*

Critical Lane Flow Factors		
0.5	*Lanes:*	*2.00*
1	*Lane:*	*1.00*
1.5	*Lanes:*	*0.67*
2	*Lanes:*	*0.50*
2.5	*Lanes:*	*0.40*
3	*Lanes:*	*0.33*

Intersection Capacity Utilization Analysis (ICU)

Traffic Scenario: **Year 2035 + Project**
Intersection # **2**
Project: Paseo De Valencia Widening
North/South St: Paseo De Valencia
East/West St: Avenida Sevilla/Beckenham St
Date: 4/5/12
By: Ray

Movement		No, of Lanes	Critical Lane Capacity	**Weekday A.M. Peak Hour** Volumes Total	Critical Lane	V/C Ratio	Critical V/C	**Weekday P.M. Peak Hour** Volumes Total	Critical Lane	V/C Ratio	Critical V/C
	:Left		1700								
Northbound	:Thru	3.0	1700	1274	458	0.269	0.269	1419	491	0.289	
	Right:		1700	101				53			
	:Left	1.0	1700	58	58	0.034	0.034	65	65	0.038	
Southbound	:Thru	3.0	1700	1077	359	0.211		2167	722	0.425	0.425
	Right:		1700								
	:Left	1.0	1700	77	77	0.045	0.045	55	55	0.033	0.033
Eastbound	:Thru	1.0	1700		38	0.022			23	0.013	
	Right:		1700	38				23			
	:Left	1.0	1700	40	40	0.024		89	89	0.053	
Westbound	:Thru		1700								
	Right:	1.0	1700	31	31	0.018	0.018	82	82	0.048	0.048

	A.M.	P.M.
Sum of Critical V/C Ratios	0.366	0.506
Adjustments for Lost Time	0.100	0.100
Intersection Capacity Utilization (ICU)	**0.466**	**0.606**
Level of Service (LOS)	**A**	**B**

NOTES:

Level of Service (LOS)	
A	*0.00 ~ 0.60*
B	*0.61 ~ 0.70*
C	*0.71 ~ 0.80*
D	*0.81 ~ 0.90*
E	*0.91 ~ 1.00*
F	*1.00+*

Critical Lane Flow Factors		
0.5	*Lanes:*	*2.00*
1	*Lane:*	*1.00*
1.5	*Lanes:*	*0.67*
2	*Lanes:*	*0.50*
2.5	*Lanes:*	*0.40*
3	*Lanes:*	*0.33*

Intersection Capacity Utilization Analysis (ICU)

Traffic Scenario: **Year 2035 + Project**
Intersection # **3**
Project: Paseo De Valencia Widening
North/South St: Paseo De Valencia
East/West St: Laguna Hills Drive
Date: 4/5/12
By: Ray

Movement		No, of Lanes	Critical Lane Capacity	Weekday A.M. Peak Hour				Weekday P.M. Peak Hour			
				Volumes				Volumes			
				Total	Critical Lane	V/C Ratio	Critical V/C	Total	Critical Lane	V/C Ratio	Critical V/C
Northbound	:Left	2.0	1700	260	143	0.084	0.084	396	218	0.128	0.128
	:Thru	3.0	1700	771	267	0.157		704	263	0.155	
	Right:		1700	31				85			
Southbound	:Left	1.0	1700	11	11	0.007		62	62	0.036	
	:Thru	3.0	1700	783	261	0.154		1482	494	0.291	
	Right:	1.0	1700	361	361	0.212	0.212	728	728	0.428	0.428
Eastbound	:Left	1.5	1700	556	372	0.219	0.219	718	481	0.283	
	:Thru	0.5	1700	6	13	0.007		33	65	0.038	
	Right:	1.0	1700	311	311	0.183		552	552	0.325	0.325
Westbound	:Left	1.0	1700	65	65	0.038		64	64	0.038	0.038
	:Thru	1.0	1700	15	62	0.036	0.036	25	75	0.044	
	Right:		1700	47				50			

	A.M.	P.M.
Sum of Critical V/C Ratios	0.551	0.919
Adjustments for Lost Time	0.100	0.100
Intersection Capacity Utilization (ICU)	**0.651**	**1.019**
Level of Service (LOS)	**B**	**F**

NOTES:

Level of Service (LOS)	
A	*0.00 ~ 0.60*
B	*0.61 ~ 0.70*
C	*0.71 ~ 0.80*
D	*0.81 ~ 0.90*
E	*0.91 ~ 1.00*
F	*1.00+*

Critical Lane Flow Factors		
0.5	*Lanes:*	*2.00*
1	*Lane:*	*1.00*
1.5	*Lanes:*	*0.67*
2	*Lanes:*	*0.50*
2.5	*Lanes:*	*0.40*
3	*Lanes:*	*0.33*

Appendix E

Cultural Resources Record Search

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INITIAL STUDY AND CULTURAL RESOURCES RECORDS SEARCH FOR THE PASEO DE VALENCIA WIDENING PROJECT LAGUNA HILLS, CALIFORNIA

Prepared for:

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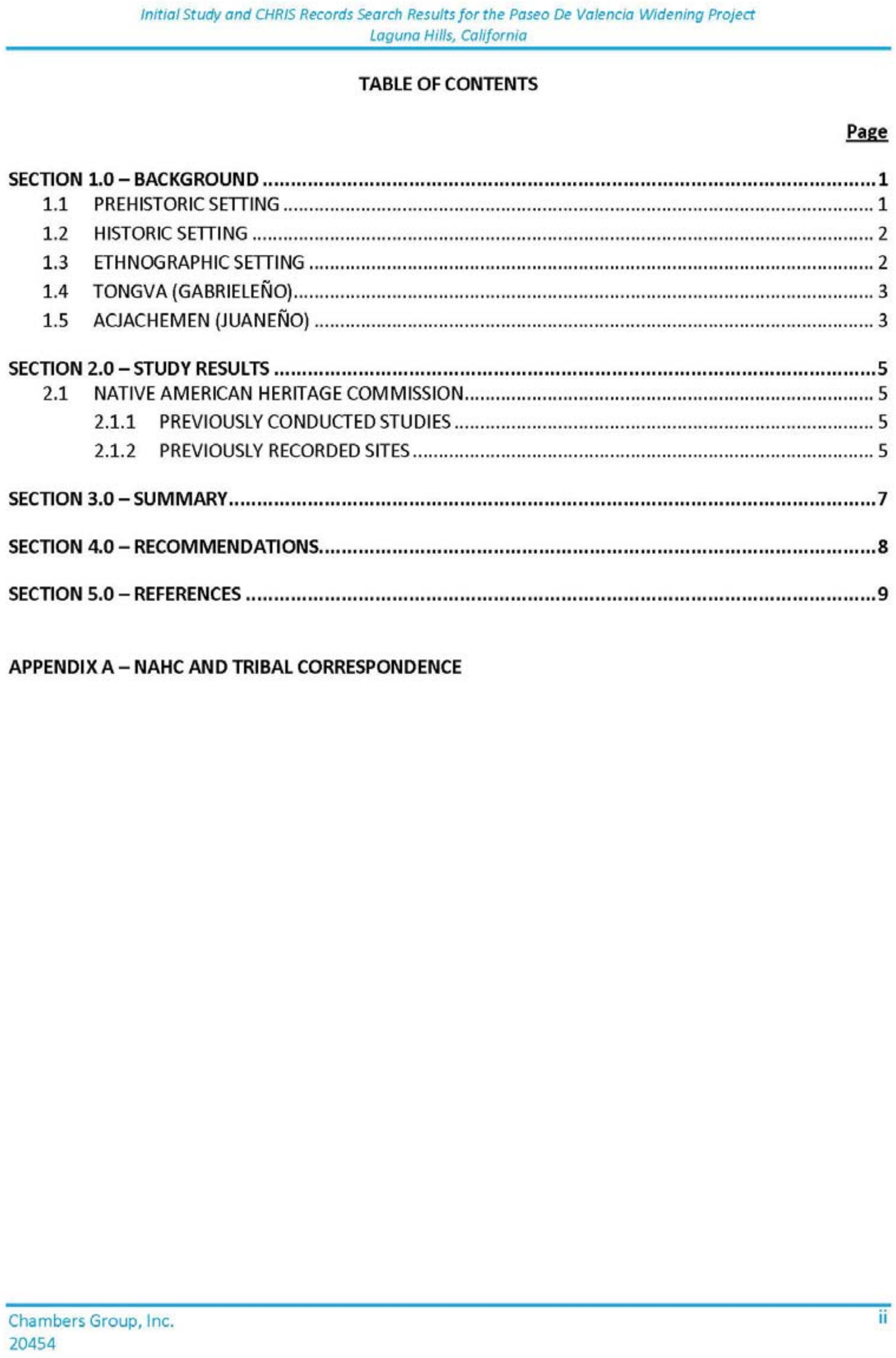
September 2012



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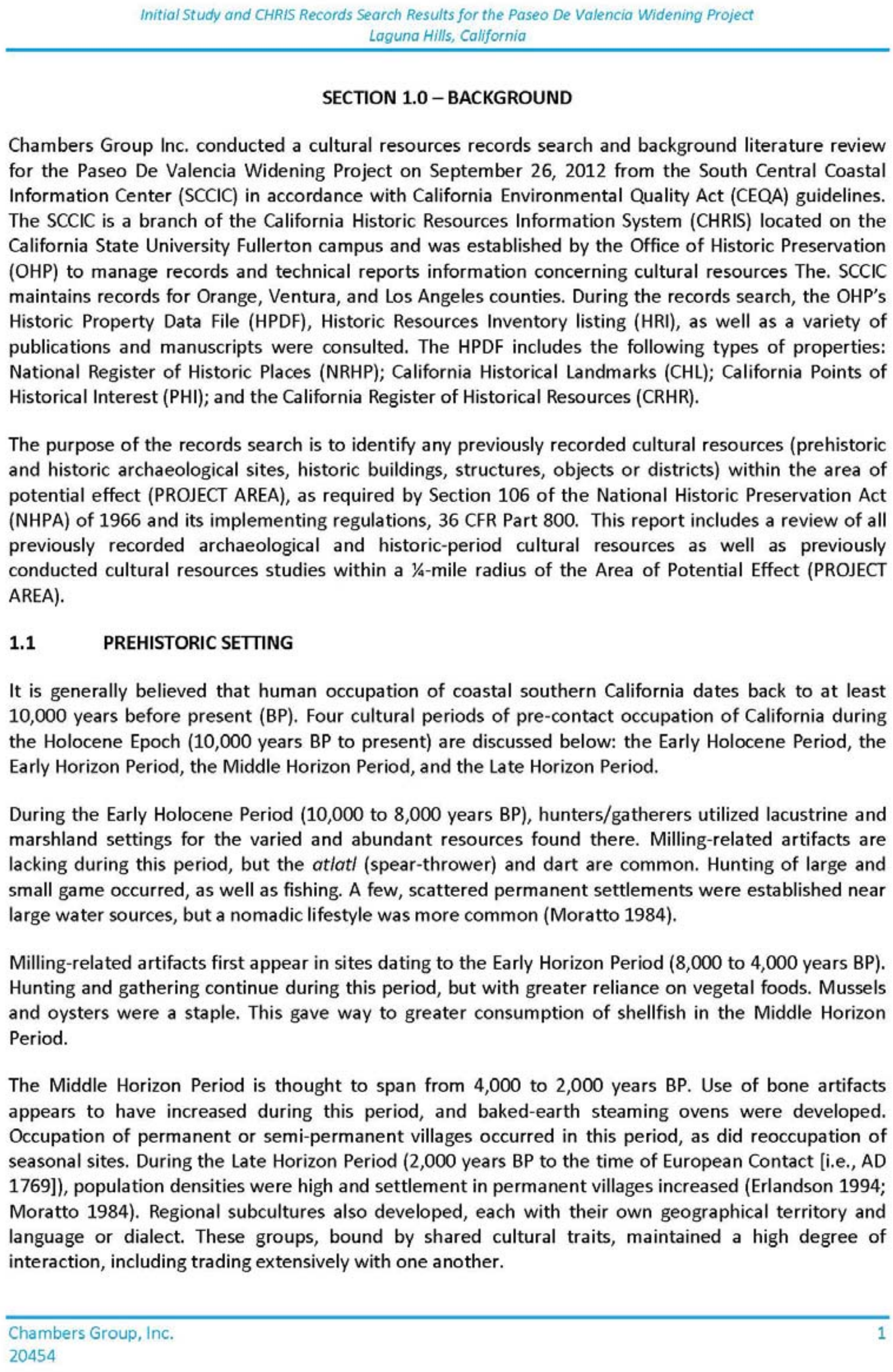


SECTION 1.0 – BACKGROUND

Chambers Group Inc. conducted a cultural resources records search and background literature review for the Paseo De Valencia Widening Project on September 26, 2012 from the South Central Coastal Information Center (SCCIC) in accordance with California Environmental Quality Act (CEQA) guidelines. The SCCIC is a branch of the California Historic Resources Information System (CHRIS) located on the California State University Fullerton campus and was established by the Office of Historic Preservation (OHP) to manage records and technical reports information concerning cultural resources The. SCCIC maintains records for Orange, Ventura, and Los Angeles counties. During the records search, the OHP's Historic Property Data File (HPDF), Historic Resources Inventory listing (HRI), as well as a variety of publications and manuscripts were consulted. The HPDF includes the following types of properties: National Register of Historic Places (NRHP); California Historical Landmarks (CHL); California Points of Historical Interest (PHI); and the California Register of Historical Resources (CRHR).

The purpose of the records search is to identify any previously recorded cultural resources (prehistoric and historic archaeological sites, historic buildings, structures, objects or districts) within the area of potential effect (PROJECT AREA), as required by Section 106 of the National Historic Preservation Act (NHPA) of 1966 and its implementing regulations, 36 CFR Part 800. This report includes a review of all previously recorded archaeological and historic-period cultural resources as well as previously conducted cultural resources studies within a ¼-mile radius of the Area of Potential Effect (PROJECT AREA).

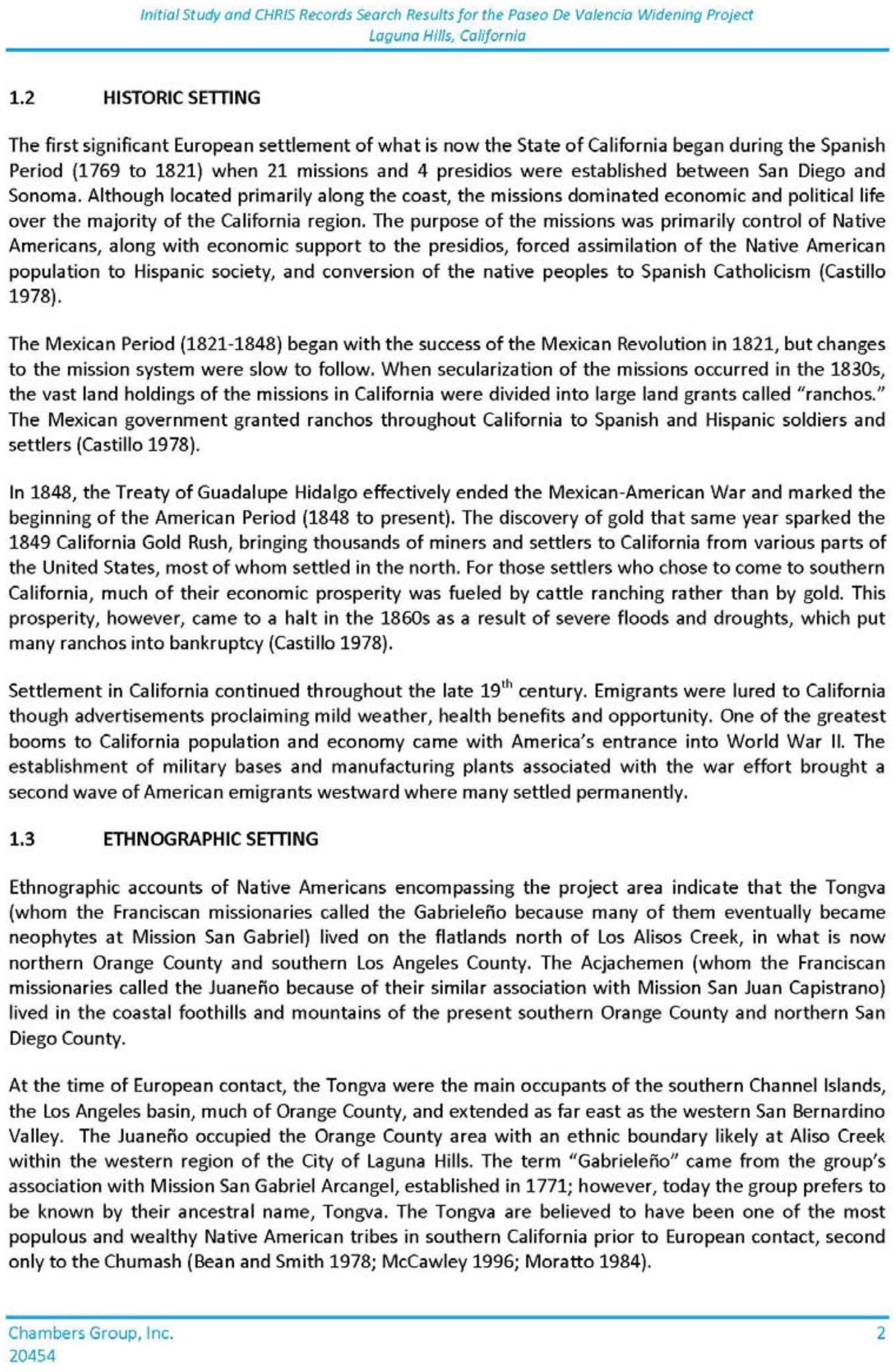
1.1 PREHISTORIC SETTING

It is generally believed that human occupation of coastal southern California dates back to at least 10,000 years before present (BP). Four cultural periods of pre-contact occupation of California during the Holocene Epoch (10,000 years BP to present) are discussed below: the Early Holocene Period, the Early Horizon Period, the Middle Horizon Period, and the Late Horizon Period.

During the Early Holocene Period (10,000 to 8,000 years BP), hunters/gatherers utilized lacustrine and marshland settings for the varied and abundant resources found there. Milling-related artifacts are lacking during this period, but the *atlatl* (spear-thrower) and dart are common. Hunting of large and small game occurred, as well as fishing. A few, scattered permanent settlements were established near large water sources, but a nomadic lifestyle was more common (Moratto 1984).

Milling-related artifacts first appear in sites dating to the Early Horizon Period (8,000 to 4,000 years BP). Hunting and gathering continue during this period, but with greater reliance on vegetal foods. Mussels and oysters were a staple. This gave way to greater consumption of shellfish in the Middle Horizon Period.

The Middle Horizon Period is thought to span from 4,000 to 2,000 years BP. Use of bone artifacts appears to have increased during this period, and baked-earth steaming ovens were developed. Occupation of permanent or semi-permanent villages occurred in this period, as did reoccupation of seasonal sites. During the Late Horizon Period (2,000 years BP to the time of European Contact [i.e., AD 1769]), population densities were high and settlement in permanent villages increased (Erlandson 1994; Moratto 1984). Regional subcultures also developed, each with their own geographical territory and language or dialect. These groups, bound by shared cultural traits, maintained a high degree of interaction, including trading extensively with one another.



1.2 HISTORIC SETTING

The first significant European settlement of what is now the State of California began during the Spanish Period (1769 to 1821) when 21 missions and 4 presidios were established between San Diego and Sonoma. Although located primarily along the coast, the missions dominated economic and political life over the majority of the California region. The purpose of the missions was primarily control of Native Americans, along with economic support to the presidios, forced assimilation of the Native American population to Hispanic society, and conversion of the native peoples to Spanish Catholicism (Castillo 1978).

The Mexican Period (1821-1848) began with the success of the Mexican Revolution in 1821, but changes to the mission system were slow to follow. When secularization of the missions occurred in the 1830s, the vast land holdings of the missions in California were divided into large land grants called "ranchos." The Mexican government granted ranchos throughout California to Spanish and Hispanic soldiers and settlers (Castillo 1978).

In 1848, the Treaty of Guadalupe Hidalgo effectively ended the Mexican-American War and marked the beginning of the American Period (1848 to present). The discovery of gold that same year sparked the 1849 California Gold Rush, bringing thousands of miners and settlers to California from various parts of the United States, most of whom settled in the north. For those settlers who chose to come to southern California, much of their economic prosperity was fueled by cattle ranching rather than by gold. This prosperity, however, came to a halt in the 1860s as a result of severe floods and droughts, which put many ranchos into bankruptcy (Castillo 1978).

Settlement in California continued throughout the late 19th century. Emigrants were lured to California though advertisements proclaiming mild weather, health benefits and opportunity. One of the greatest booms to California population and economy came with America's entrance into World War II. The establishment of military bases and manufacturing plants associated with the war effort brought a second wave of American emigrants westward where many settled permanently.

1.3 ETHNOGRAPHIC SETTING

Ethnographic accounts of Native Americans encompassing the project area indicate that the Tongva (whom the Franciscan missionaries called the Gabrieleño because many of them eventually became neophytes at Mission San Gabriel) lived on the flatlands north of Los Alisos Creek, in what is now northern Orange County and southern Los Angeles County. The Acjachemen (whom the Franciscan missionaries called the Juaneño because of their similar association with Mission San Juan Capistrano) lived in the coastal foothills and mountains of the present southern Orange County and northern San Diego County.

At the time of European contact, the Tongva were the main occupants of the southern Channel Islands, the Los Angeles basin, much of Orange County, and extended as far east as the western San Bernardino Valley. The Juaneño occupied the Orange County area with an ethnic boundary likely at Aliso Creek within the western region of the City of Laguna Hills. The term "Gabrieleño" came from the group's association with Mission San Gabriel Arcangel, established in 1771; however, today the group prefers to be known by their ancestral name, Tongva. The Tongva are believed to have been one of the most populous and wealthy Native American tribes in southern California prior to European contact, second only to the Chumash (Bean and Smith 1978; McCawley 1996; Moratto 1984).

1.4 TONGVA (GABRIELEÑO)

The Tongva occupied numerous villages with populations ranging from 50 to 200 inhabitants. Residential structures within the villages were domed, circular, and made from thatched tule or other available wood. Tongva society was organized by kinship groups, with each group composed of several related families who together owned hunting and gathering territories. Settlement patterns varied according to the availability of floral and faunal resources (Bean and Smith 1978; McCawley 1996; Miller 1991).

Vegetal staples consisted of acorns, chia, seeds, piñon nuts, sage, cacti, roots, and bulbs. Animals hunted included deer, antelope, coyote, rabbits, squirrels, rodents, birds, and snakes. The Tongva also fished (Bean and Smith 1978; McCawley 1996; Miller 1991).

By the late 18th century, Tongva population had significantly dwindled due to introduced diseases and dietary deficiencies. Tongva communities near the missions disintegrated as individuals succumbed to Spanish control, fled the region, or died. Later, many of the Tongva fell into indentured servitude to Anglo-Americans. By the early 1900s, few Tongva people had survived and much of their culture had been lost (Bean and Smith 1978; McCawley 1996; Miller 1991). However, in the 1970s, a revival of the Tongva culture began which continues today with growing interest and support.

1.5 ACJACHEMEN (JUANEÑO)

Fr. Geronimo Boscana wrote a description of Juaneño culture and history while stationed at San Juan Capistrano Mission from 1814 to 1826. There are two versions of Boscana's account (Bright 1978; Koerper and Mason 2001:3-3). One was written in 1822 and published by the Smithsonian Institute in 1934 (Harrington 1934). The other was written in 1825, published by Fine Arts Press in 1933, and reprinted by the Malki Museum Press in 1978 (Boscana 1933, 1978). Ethnohistorian Stephen O'Neil (1982) investigated mission records that perpetuate a close relationship between two Juaneño villages recognized as Putuidem and Acaptivit within close proximity to Mission San Juan Capistrano.

According to Boscana, Putuidem[1] was founded by colonists from a place called *Seját* on the Los Nietos Rancho located 7 or 8 leagues from Mission San Juan Capistrano. The chief at *Seját* was Oyáison and his wife was Sirorum. They had three daughters, Coronne (the eldest), Vuiragram, and Uiniojum. When his wife died, chief Oyáison and Coronne departed their rancheria with a number of families that formed a colonizing expedition and headed in a southerly direction.

The identification of the Juaneño village of Putuidem was originally made by O'Neil (1982) who pointed out that mission records show that Putuidem would have had to have been located near the village of *Acaptivit* (*Acagchemem*[2]). Mission records list a "Capitan" or chief at Putuidem, but not at *Acagchemem*, suggesting the chief at Putuidem was in charge of both villages. No marriages are recorded between

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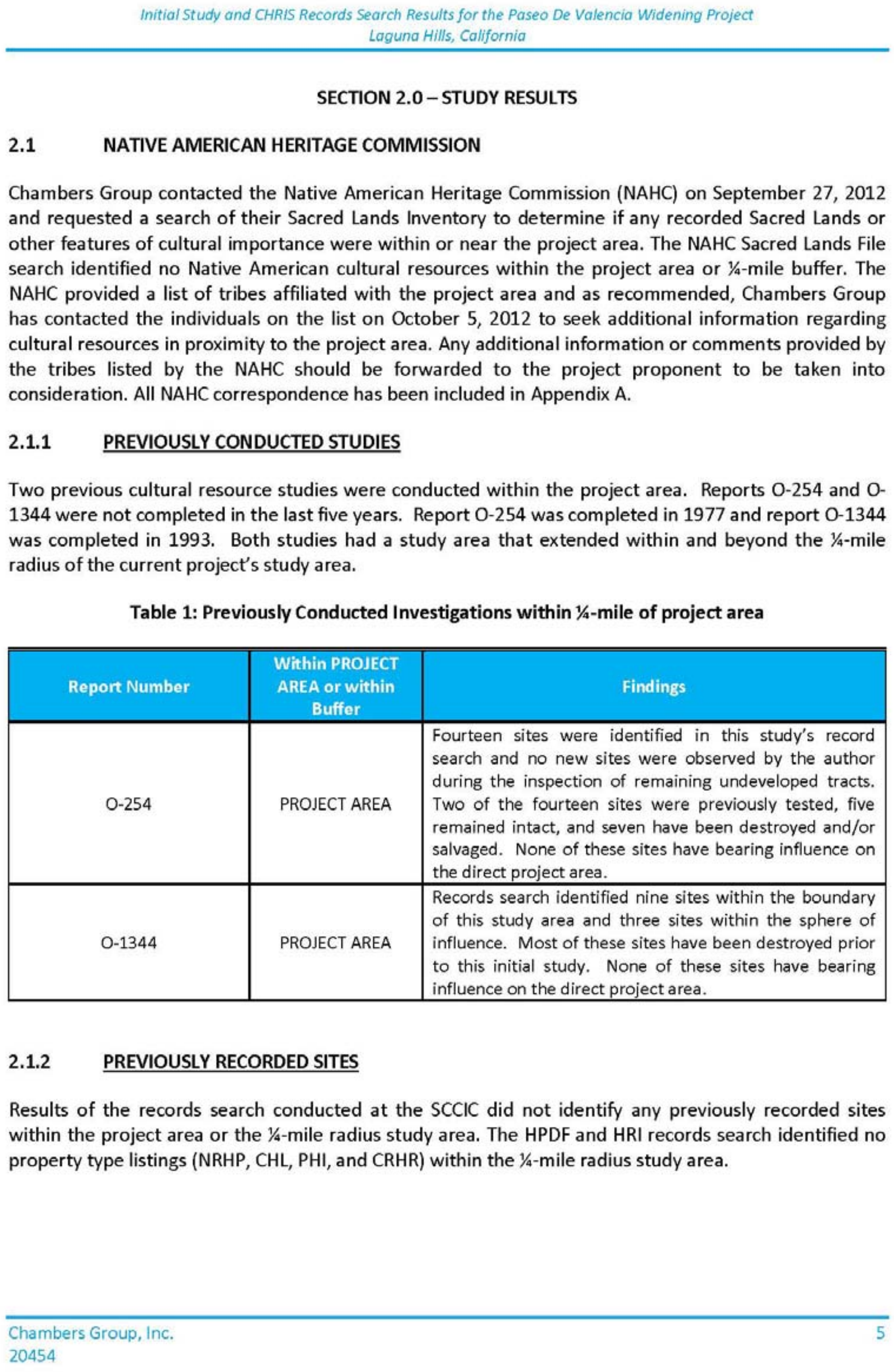
[1] Although Boscana used the spelling "Putuidem" for the village, other spellings occur in the mission records, including *Puituide, Pituide*, and *Putuide* (Harrington 1934). Harrington spelled the name of the village *Putii⍰um* (Harrington 1934:217).

[2] Boscana used the spelling "Acagchemem" for the name of people from the village of Acaptivit. Today, the Juaneño Band of Mission Indians, Acjachemen Nation recognizes the spelling as "Acjachemen."

people from Putuidem and *Acagchemem*, indicating that people from the two villages were probably from the same clan and, therefore, too closely related to marry.

In addition, two baptismal records list the person's village of origin as "*Pituide, o Captivit*." Baptismal records list a boy from Putuidem who had a sister and brother from *Acaptivit* and a boy from *Acaptivit* who had a sister from Putuidem. Both the recorded children of Raunet, the *Capitan* of Putuidem are recorded as coming from *Acaptivit* (O'Neil 1982). Both *Acaptivit* and Putuidem were among the villages with large numbers of people baptized in the years immediately following the founding of the mission, indicating they were close to the mission (O'Neil, personal communication 2004). The mission record data indicate close political and kinship links between Putuidem and *Acaptivit* (*Acagchemem*) that likely would not have been possible without geographic proximity.



SECTION 2.0 – STUDY RESULTS

2.1 NATIVE AMERICAN HERITAGE COMMISSION

Chambers Group contacted the Native American Heritage Commission (NAHC) on September 27, 2012 and requested a search of their Sacred Lands Inventory to determine if any recorded Sacred Lands or other features of cultural importance were within or near the project area. The NAHC Sacred Lands File search identified no Native American cultural resources within the project area or ¼-mile buffer. The NAHC provided a list of tribes affiliated with the project area and as recommended, Chambers Group has contacted the individuals on the list on October 5, 2012 to seek additional information regarding cultural resources in proximity to the project area. Any additional information or comments provided by the tribes listed by the NAHC should be forwarded to the project proponent to be taken into consideration. All NAHC correspondence has been included in Appendix A.

2.1.1 PREVIOUSLY CONDUCTED STUDIES

Two previous cultural resource studies were conducted within the project area. Reports O-254 and O-1344 were not completed in the last five years. Report O-254 was completed in 1977 and report O-1344 was completed in 1993. Both studies had a study area that extended within and beyond the ¼-mile radius of the current project's study area.

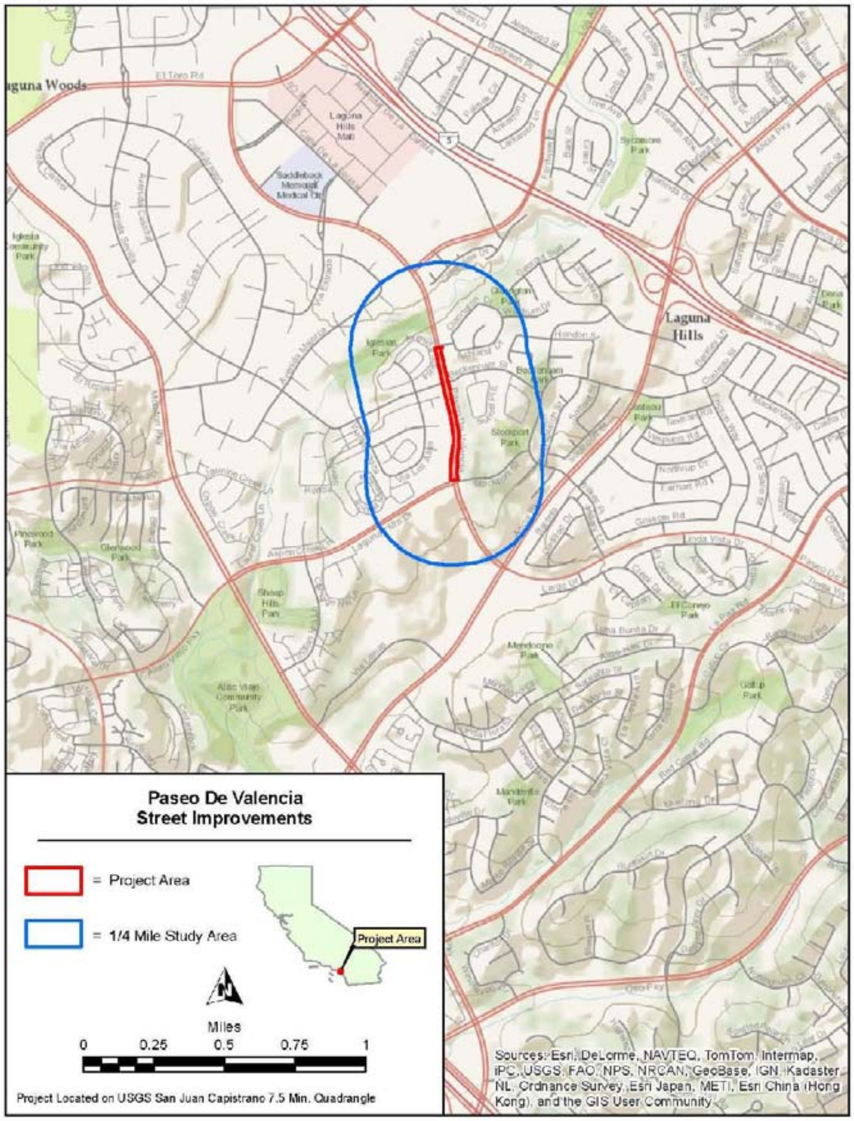
Table 1: Previously Conducted Investigations within ¼-mile of project area

Report Number	Within PROJECT AREA or within Buffer	Findings
O-254	PROJECT AREA	Fourteen sites were identified in this study's record search and no new sites were observed by the author during the inspection of remaining undeveloped tracts. Two of the fourteen sites were previously tested, five remained intact, and seven have been destroyed and/or salvaged. None of these sites have bearing influence on the direct project area.
O-1344	PROJECT AREA	Records search identified nine sites within the boundary of this study area and three sites within the sphere of influence. Most of these sites have been destroyed prior to this initial study. None of these sites have bearing influence on the direct project area.

2.1.2 PREVIOUSLY RECORDED SITES

Results of the records search conducted at the SCCIC did not identify any previously recorded sites within the project area or the ¼-mile radius study area. The HPDF and HRI records search identified no property type listings (NRHP, CHL, PHI, and CRHR) within the ¼-mile radius study area.

Figure 1: Location Map of Study Area



Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, iPC, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), and the GIS User Community

SECTION 3.0 – SUMMARY

Based upon the results of the records search conducted at the SCCIC, the project area has not been previously surveyed for cultural resources in the last five years and its potential for containing surface and/or subsurface cultural resources at this time is unknown. Subsurface deposits of cultural resources are possible, but not likely. Studies identified within the records search's ¼-mile radius suggest a low likelihood of surface and/or subsurface cultural resources within the Project area. The project area has undergone previous development activity, likely covering or destroying any potential surface level cultural resources. Record search results from the SCCIC data base indicates that no sites have been identified and recorded within the project's PROJECT AREA or ¼-mile study area. The NAHC Sacred Lands inventory search identified no Native American cultural resources within the project area.

SECTION 4.0 – RECOMMENDATIONS

After conducting a cultural resources records search and initial Native American consultation, Chambers Group determined that cultural resources have not been identified and recorded within the ¼ mile project area.

The proposed project is contained within a previously disturbed environment of which no cultural resources have been identified in the past. There is a low likelihood of encountering cultural resources or undisturbed soils containing historic or Native American cultural resources for this Project. Chambers Group, therefore, recommends that no further cultural resources work is necessary for this Project.

Chambers Group, however, recommends, in the unlikely event of the Project encountering native, undisturbed soils, that a cultural monitor be present. Further, in the event that cultural resources are encountered during any ground disturbing activities, all work must halt at that specific location until the resources can be properly evaluated by an archaeologist that meets the Secretary of the Interior standards, the appropriate managing agencies, and possibly after contacting the appropriate affiliated Tribal Group, in the case of Native American cultural resources.

Additionally, if human remains are encountered during excavation, all construction in the immediate area must discontinue and the Project Manager should be notified. The state health and safety code 7050.5 dictate that "...no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and distribution pursuant to public resources code section 5097.98." If such remains prove to be prehistoric, then the appropriate managing agencies and Tribal Groups will likewise be contacted. A Most Likely Descendant (MLD) designated by the Native American Heritage Commission will be notified and a plan to address the remains will be formulated.

SECTION 5.0 – REFERENCES

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1933 Chinigchinich: A Revised and Annotated Version of Alfred Robinson's Translation of Father Geronimo Boscana's Historical Account of the Belief, Usages, Customs and Extravagancies of the Indians of San Juan Capistrano Called the Acagchemem Tribe. Originally published in 1846. Fine Arts Press, Santa Ana.

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Bright, W.

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1933 Annotations. In Chinigchinich A Revised and Annotated Version of Alfred Robinson's Translation...etc., edited by P. T. Manna. Fine Arts Press: Santa Ana. Reprinted by Malki Museum Press, 1978.

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1929 Aboriginal Society in Southern California. University of California Publications in American Archaeology and Ethnology 26(1):1-358.

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Appendix F

Native American Heritage Commission Letters

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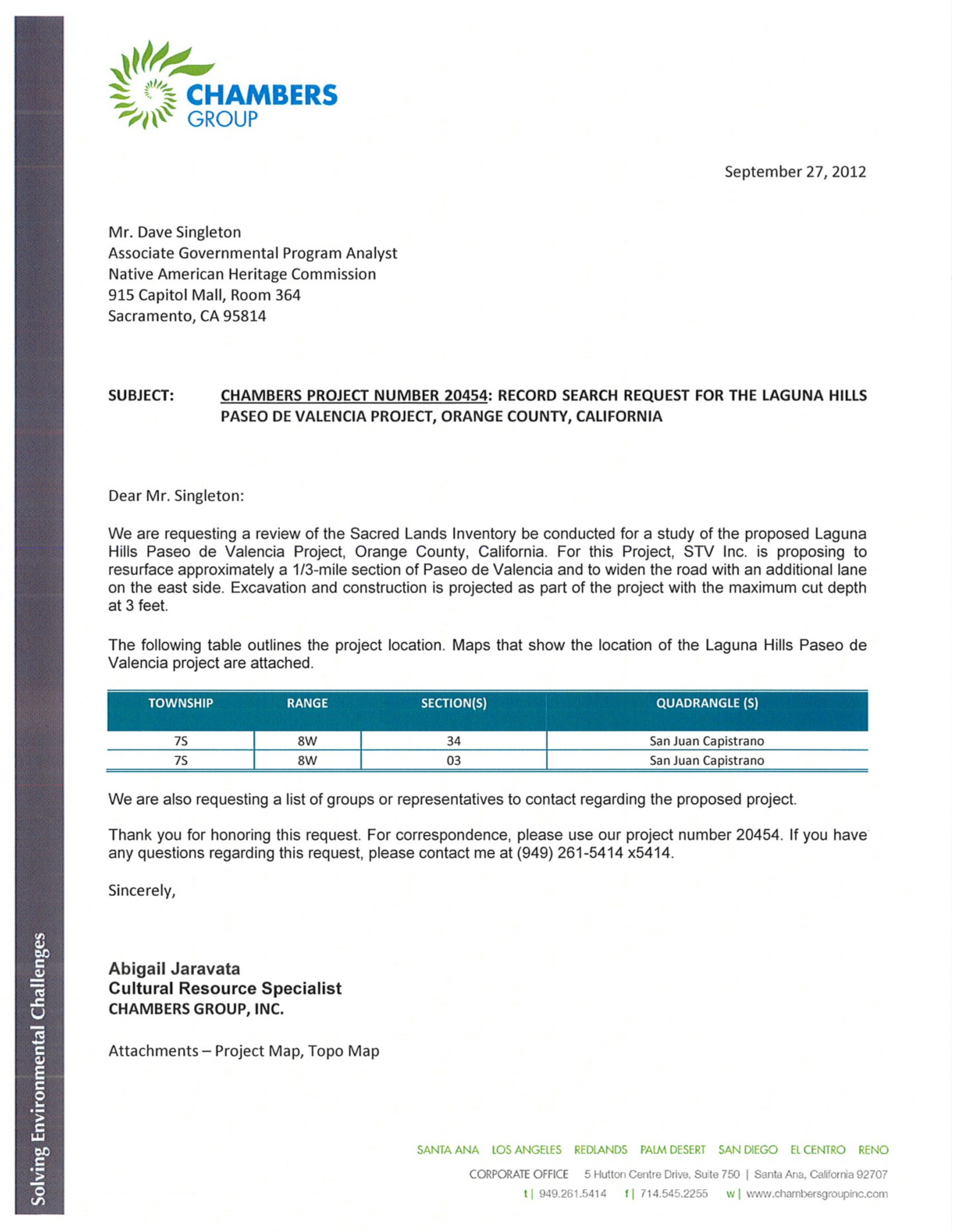


CHAMBERS
GROUP

September 27, 2012

Mr. Dave Singleton
Associate Governmental Program Analyst
Native American Heritage Commission
915 Capitol Mall, Room 364
Sacramento, CA 95814

SUBJECT: **CHAMBERS PROJECT NUMBER 20454: RECORD SEARCH REQUEST FOR THE LAGUNA HILLS PASEO DE VALENCIA PROJECT, ORANGE COUNTY, CALIFORNIA**

Dear Mr. Singleton:

We are requesting a review of the Sacred Lands Inventory be conducted for a study of the proposed Laguna Hills Paseo de Valencia Project, Orange County, California. For this Project, STV Inc. is proposing to resurface approximately a 1/3-mile section of Paseo de Valencia and to widen the road with an additional lane on the east side. Excavation and construction is projected as part of the project with the maximum cut depth at 3 feet.

The following table outlines the project location. Maps that show the location of the Laguna Hills Paseo de Valencia project are attached.

TOWNSHIP	RANGE	SECTION(S)	QUADRANGLE (S)
7S	8W	34	San Juan Capistrano
7S	8W	03	San Juan Capistrano

We are also requesting a list of groups or representatives to contact regarding the proposed project.

Thank you for honoring this request. For correspondence, please use our project number 20454. If you have any questions regarding this request, please contact me at (949) 261-5414 x5414.

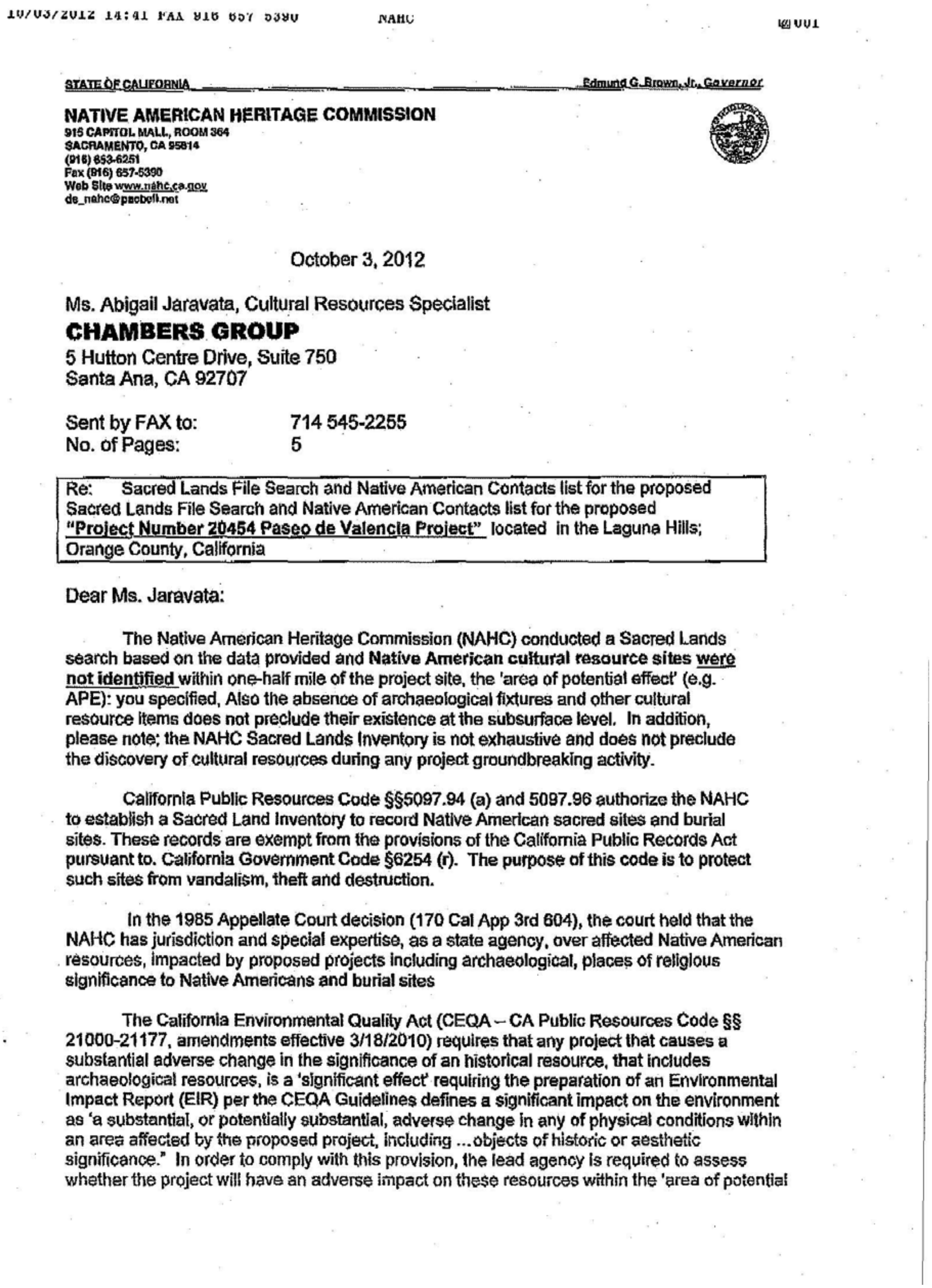
Sincerely,

Abigail Jaravata
Cultural Resource Specialist
CHAMBERS GROUP, INC.

Attachments – Project Map, Topo Map

Solving Environmental Challenges

SANTA ANA LOS ANGELES REDLANDS PALM DESERT SAN DIEGO EL CENTRO RENO
CORPORATE OFFICE 5 Hutton Centre Drive, Suite 750 | Santa Ana, California 92707
t | 949.261.5414 f | 714.545.2255 w | www.chambersgroupinc.com



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STATE OF CALIFORNIA Edmund G. Brown, Jr., Governor

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-6251
Fax (916) 657-5390
Web Site www.nahc.ca.gov
ds_nahc@pacbell.net

October 3, 2012

Ms. Abigail Jaravata, Cultural Resources Specialist
CHAMBERS GROUP
5 Hutton Centre Drive, Suite 750
Santa Ana, CA 92707

Sent by FAX to:	714 545-2255
No. of Pages:	5

Re: Sacred Lands File Search and Native American Contacts list for the proposed Sacred Lands File Search and Native American Contacts list for the proposed **"Project Number 20454 Paseo de Valencia Project"** located in the Laguna Hills; Orange County, California

Dear Ms. Jaravata:

The Native American Heritage Commission (NAHC) conducted a Sacred Lands search based on the data provided and **Native American cultural resource sites** **were not identified** within one-half mile of the project site, the 'area of potential effect' (e.g. APE): you specified, Also the absence of archaeological fixtures and other cultural resource items does not preclude their existence at the subsurface level. In addition, please note; the NAHC Sacred Lands Inventory is not exhaustive and does not preclude the discovery of cultural resources during any project groundbreaking activity.

California Public Resources Code §§5097.94 (a) and 5097.96 authorize the NAHC to establish a Sacred Land Inventory to record Native American sacred sites and burial sites. These records are exempt from the provisions of the California Public Records Act pursuant to. California Government Code §6254 (r). The purpose of this code is to protect such sites from vandalism, theft and destruction.

In the 1985 Appellate Court decision (170 Cal App 3rd 604), the court held that the NAHC has jurisdiction and special expertise, as a state agency, over affected Native American resources, impacted by proposed projects including archaeological, places of religious significance to Native Americans and burial sites

The California Environmental Quality Act (CEQA – CA Public Resources Code §§ 21000-21177, amendments effective 3/18/2010) requires that any project that causes a substantial adverse change in the significance of an historical resource, that includes archaeological resources, is a 'significant effect' requiring the preparation of an Environmental Impact Report (EIR) per the CEQA Guidelines defines a significant impact on the environment as 'a substantial, or potentially substantial, adverse change in any of physical conditions within an area affected by the proposed project, including …objects of historic or aesthetic significance." In order to comply with this provision, the lead agency is required to assess whether the project will have an adverse impact on these resources within the 'area of potential effect (APE), and if so, to mitigate that effect. CA Government Code §65040.12(e) defines "environmental justice" provisions and is applicable to the environmental review processes. The NAHC recommends *avoidance* as defined by CEQA Guidelines §15370(a) to pursuing a project that would damage or destroy Native American cultural resources and California Public Resources Code Section 21083.2 (Archaeological Resources) that requires documentation, data recovery of cultural resources, construction to avoid sites and the possible use of covenant easements to protect sites.

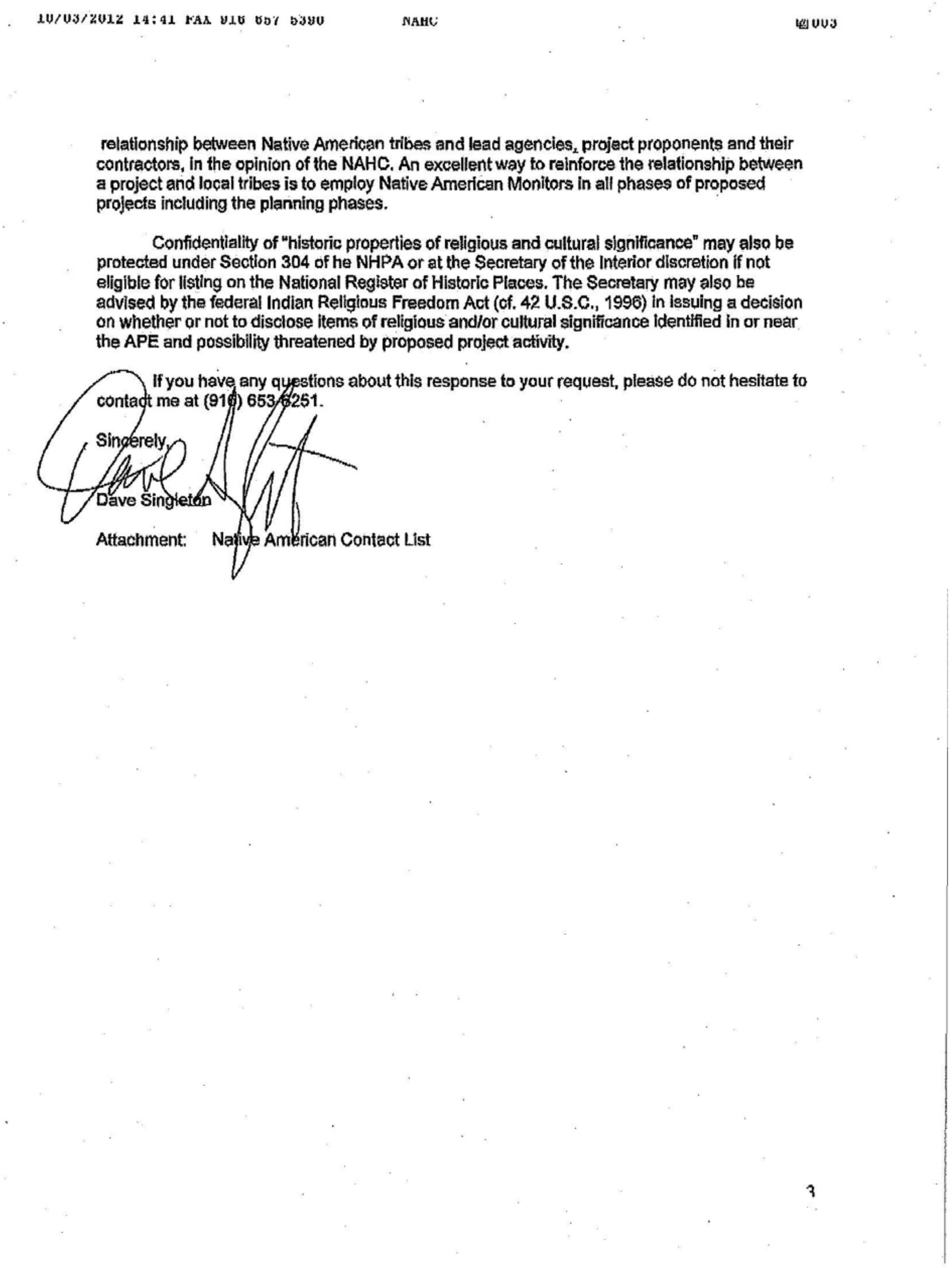
Early consultation with Native American tribes in your area is the best way to avoid unanticipated discoveries once a project is underway. Local Native Americans may have knowledge of the religious and cultural significance of the historic properties of the proposed project for the area (e.g. APE). Consultation with Native American communities is also a matter of environmental justice as defined by California Government Code §65040.12(e). We urge consultation with those tribes and interested Native Americans on the list that the NAHC has provided in order to see if your proposed project might impact Native American cultural resources. Lead agencies should consider avoidance as defined in §15370 of the CEQA Guidelines when significant cultural resources as defined by the CEQA Guidelines §15064.5 (b)(c)(f) may be affected by a proposed project. If so, Section 15382 of the CEQA Guidelines defines a significant impact on the environment as "substantial," and Section 2183.2 which requires documentation, data recovery of cultural resources.

The 1992 *Secretary of the Interiors Standards for the Treatment of Historic Properties* were revised so that they could be applied to all historic resource types included in the National Register of Historic Places and including cultural landscapes. Also, federal Executive Orders Nos. 11593 (preservation of cultural environment), 13175 (coordination & consultation) and 13007 (Sacred Sites) are helpful, supportive guides for Section 106 consultation. The aforementioned Secretary of the Interior's *Standards* include recommendations for all 'lead agencies' to consider the historic context of proposed projects and to "research" the cultural landscape that might include the 'area of potential effect.'

Partnering with local tribes and interested Native American consulting parties, on the NAHC list, should be conducted in compliance with the requirements of federal NEPA (42 U.S.C 4321-43351) and Section 106 4(f), Section 110 and (k) of the federal NHPA (16 U.S.C. 470 *et seq*), Section 4(f) of the Department of Transportation Act of 1966 (23 CFR 774); 36 CFR Part 800.3 (f) (2) & .5, the President's Council on Environmental Quality (CSQ, 42 U.S.C 4371 *et seq.* and NAGPRA (25 U.S.C. 3001-3013) as appropriate. The 1992 *Secretary of the Interiors Standards for the Treatment of Historic Properties* were revised so that they could be applied to all historic resource types included in the National Register of Historic Places and including cultural landscapes. Also, federal Executive Orders Nos. 11593 (preservation of cultural environment), 13175 (coordination & consultation) and 13007 (Sacred Sites) are helpful, supportive guides for Section 106 consultation. The NAHC remains concerned about the limitations and methods employed for NHPA Section 106 Consultation.

Also, California Public Resources Code Section 5097.98, California Government Code §27491 and Health & Safety Code Section 7050.5 provide for provisions for accidentally discovered archeological resources during construction and mandate the processes to be followed in the event of an accidental discovery of any human remains in a project location other than a 'dedicated cemetery', another important reason to have Native American Monitors on board with the project.

To be effective, consultation on specific projects must be the result of an ongoing



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relationship between Native American tribes and lead agencies, project proponents and their contractors, in the opinion of the NAHC. An excellent way to reinforce the relationship between a project and local tribes is to employ Native American Monitors in all phases of proposed projects including the planning phases.

Confidentiality of "historic properties of religious and cultural significance" may also be protected under Section 304 of he NHPA or at the Secretary of the Interior discretion if not eligible for listing on the National Register of Historic Places. The Secretary may also be advised by the federal Indian Religious Freedom Act (cf. 42 U.S.C., 1996) in issuing a decision on whether or not to disclose items of religious and/or cultural significance identified in or near the APE and possibility threatened by proposed project activity.

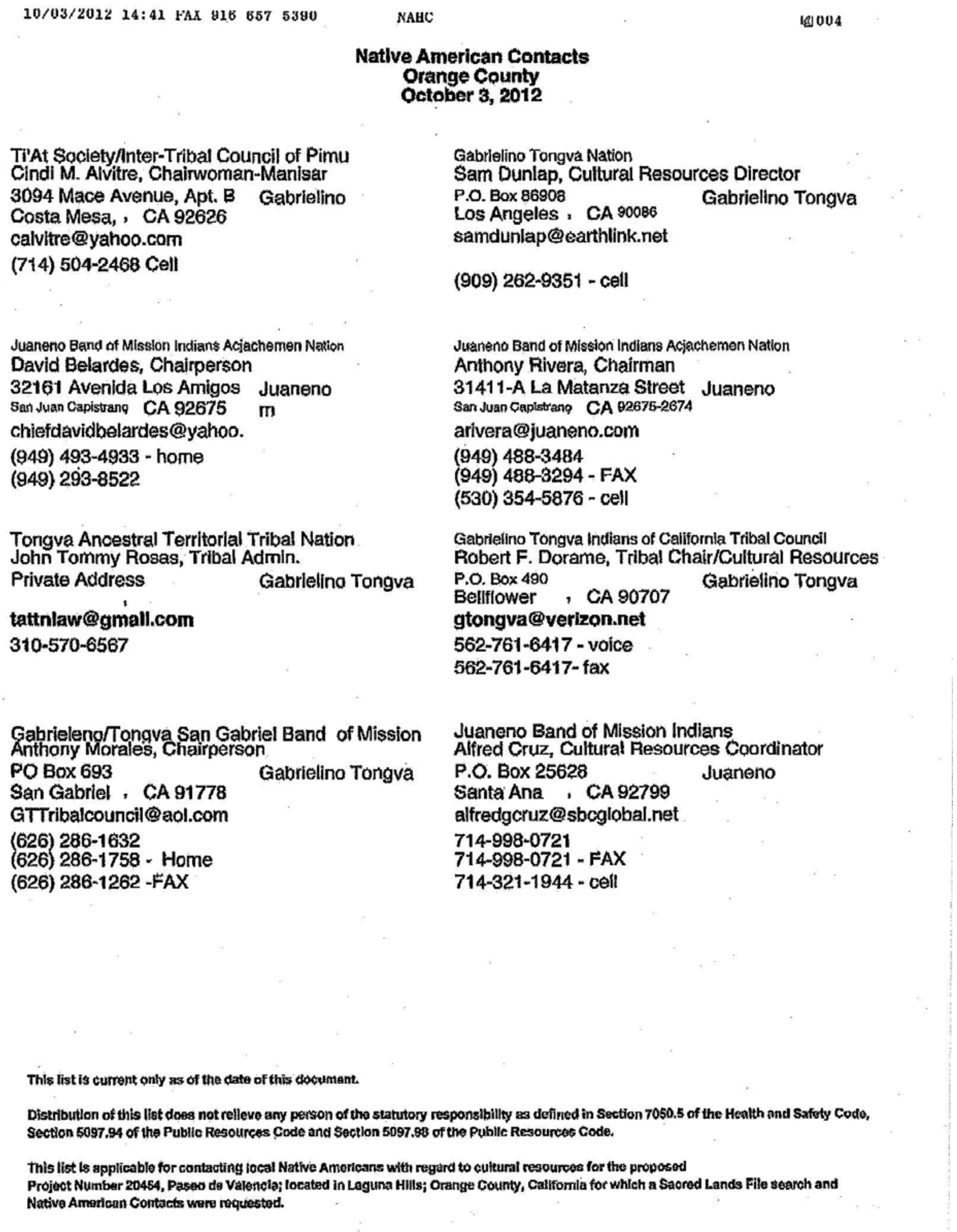
If you have any questions about this response to your request, please do not hesitate to contact me at (916) 653-6251.

Sincerely,

Dave Singleton

Attachment: Native American Contact List

3



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Native American Contacts
Orange County
October 3, 2012

Ti'At Society/Inter-Tribal Council of Pimu
Cindi M. Alvitre, Chairwoman-Manisar
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Costa Mesa, , CA 92626
calvitre@yahoo.com
(714) 504-2468 Cell

Gabrielino Tongva Nation
Sam Dunlap, Cultural Resources Director
P.O. Box 86908 Gabrielino Tongva
Los Angeles , CA 90086
samdunlap@earthlink.net

(909) 262-9351 - cell

Juaneno Band of Mission Indians Acjachemen Nation
David Belardes, Chairperson
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San Juan Capistrano CA 92675 m
chiefdavidbelardes@yahoo.
(949) 493-4933 - home
(949) 293-8522

Juaneno Band of Mission Indians Acjachemen Nation
Anthony Rivera, Chairman
31411-A La Matanza Street Juaneno
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arivera@juaneno.com
(949) 488-3484
(949) 488-3294 - FAX
(530) 354-5876 - cell

Tongva Ancestral Territorial Tribal Nation
John Tommy Rosas, Tribal Admin.
Private Address Gabrielino Tongva
,
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310-570-6567

Gabrielino Tongva Indians of California Tribal Council
Robert F. Dorame, Tribal Chair/Cultural Resources
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gtongva@verizon.net
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562-761-6417- fax

Gabrieleno/Tongva San Gabriel Band of Mission
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(626) 286-1758 - Home
(626) 286-1262 -FAX

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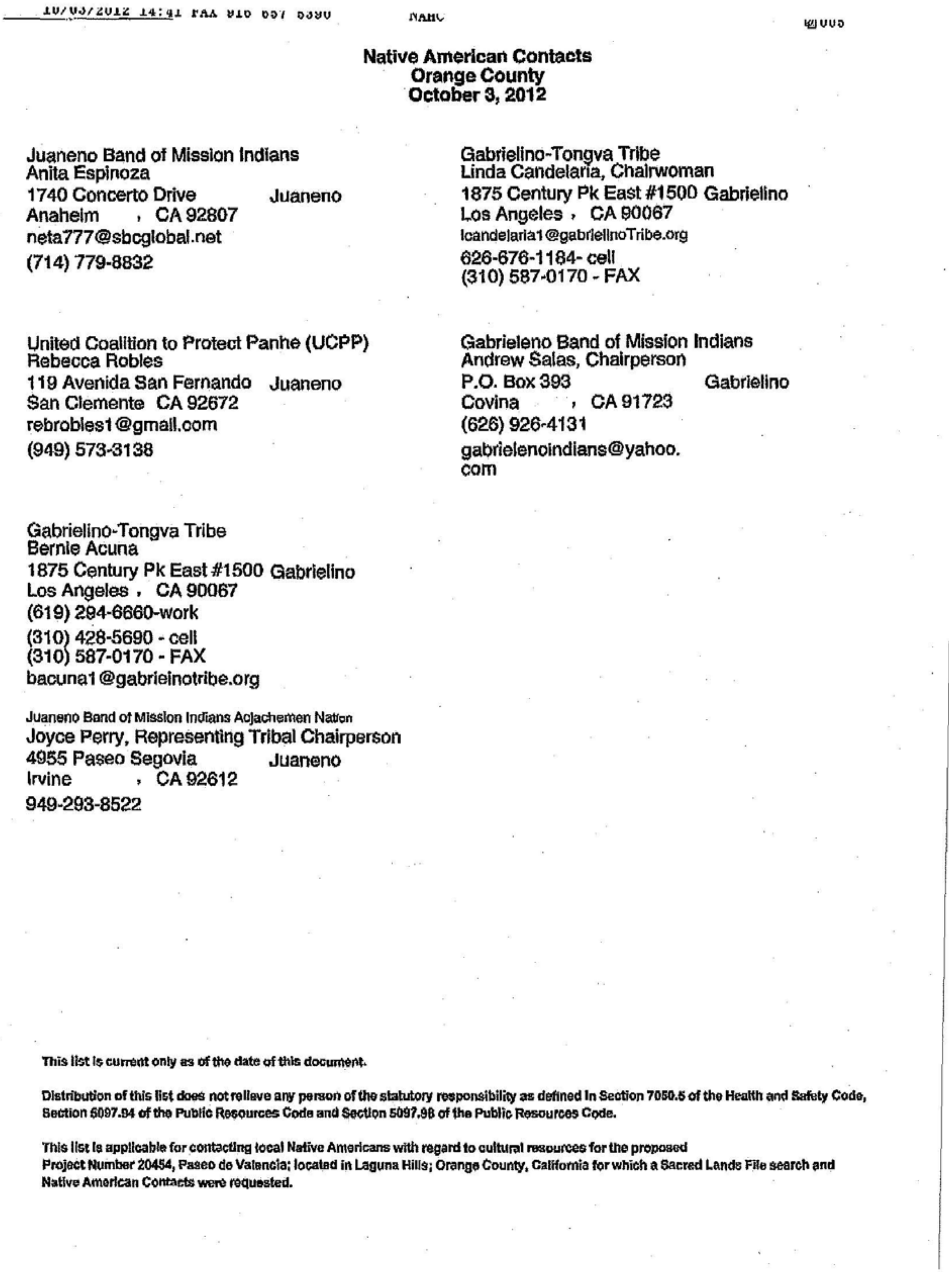
714-998-0721
714-998-0721 - FAX
714-321-1944 - cell

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable for contacting local Native Americans with regard to cultural resources for the proposed Project Number 20454, Paseo de Valencia; located in Laguna Hills; Orange County, California for which a Sacred Lands File search and Native American Contacts were requested.



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Native American Contacts
Orange County
October 3, 2012

Juaneno Band of Mission Indians
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Gabrielino-Tongva Tribe
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(310) 587-0170 - FAX

United Coalition to Protect Panhe (UCPP)
Rebecca Robles
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San Clemente CA 92672
rebrobles1@gmail.com
(949) 573-3138

Gabrieleno Band of Mission Indians
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Gabrielino-Tongva Tribe
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(310) 587-0170 - FAX
bacuna1@gabrieinotribe.org

Juaneno Band of Mission Indians Acjachemen Nation
Joyce Perry, Representing Tribal Chairperson
4955 Paseo Segovia Juaneno
Irvine , CA 92612
949-293-8522

This list is current only as of the date of this document.

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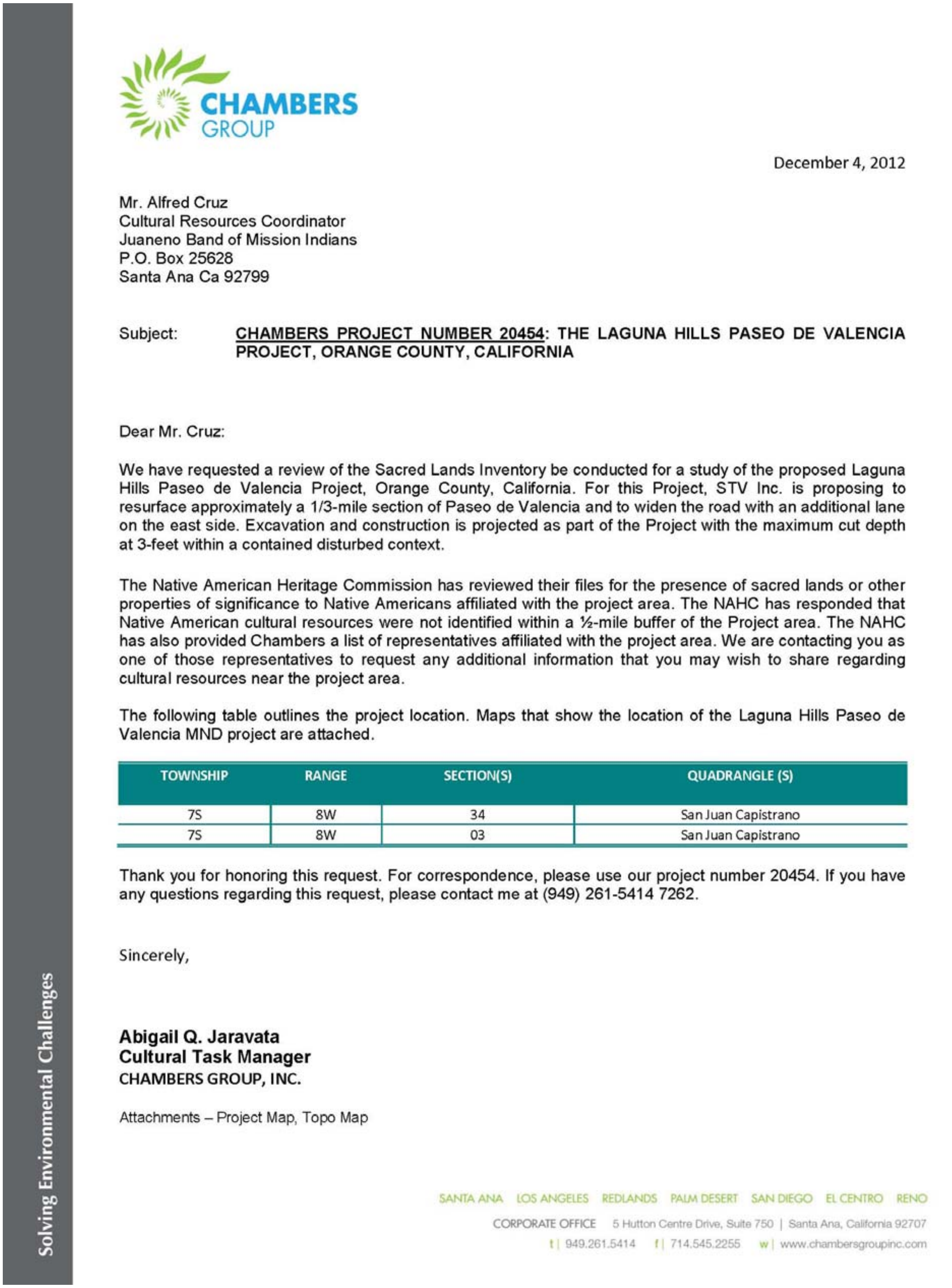


CHAMBERS
GROUP

December 4, 2012

Mr. Alfred Cruz
Cultural Resources Coordinator
Juaneno Band of Mission Indians
P.O. Box 25628
Santa Ana Ca 92799

Subject: **CHAMBERS PROJECT NUMBER 20454: THE LAGUNA HILLS PASEO DE VALENCIA PROJECT, ORANGE COUNTY, CALIFORNIA**

Dear Mr. Cruz:

We have requested a review of the Sacred Lands Inventory be conducted for a study of the proposed Laguna Hills Paseo de Valencia Project, Orange County, California. For this Project, STV Inc. is proposing to resurface approximately a 1/3-mile section of Paseo de Valencia and to widen the road with an additional lane on the east side. Excavation and construction is projected as part of the Project with the maximum cut depth at 3-feet within a contained disturbed context.

The Native American Heritage Commission has reviewed their files for the presence of sacred lands or other properties of significance to Native Americans affiliated with the project area. The NAHC has responded that Native American cultural resources were not identified within a ½-mile buffer of the Project area. The NAHC has also provided Chambers a list of representatives affiliated with the project area. We are contacting you as one of those representatives to request any additional information that you may wish to share regarding cultural resources near the project area.

The following table outlines the project location. Maps that show the location of the Laguna Hills Paseo de Valencia MND project are attached.

TOWNSHIP	RANGE	SECTION(S)	QUADRANGLE (S)
7S	8W	34	San Juan Capistrano
7S	8W	03	San Juan Capistrano

Thank you for honoring this request. For correspondence, please use our project number 20454. If you have any questions regarding this request, please contact me at (949) 261-5414 7262.

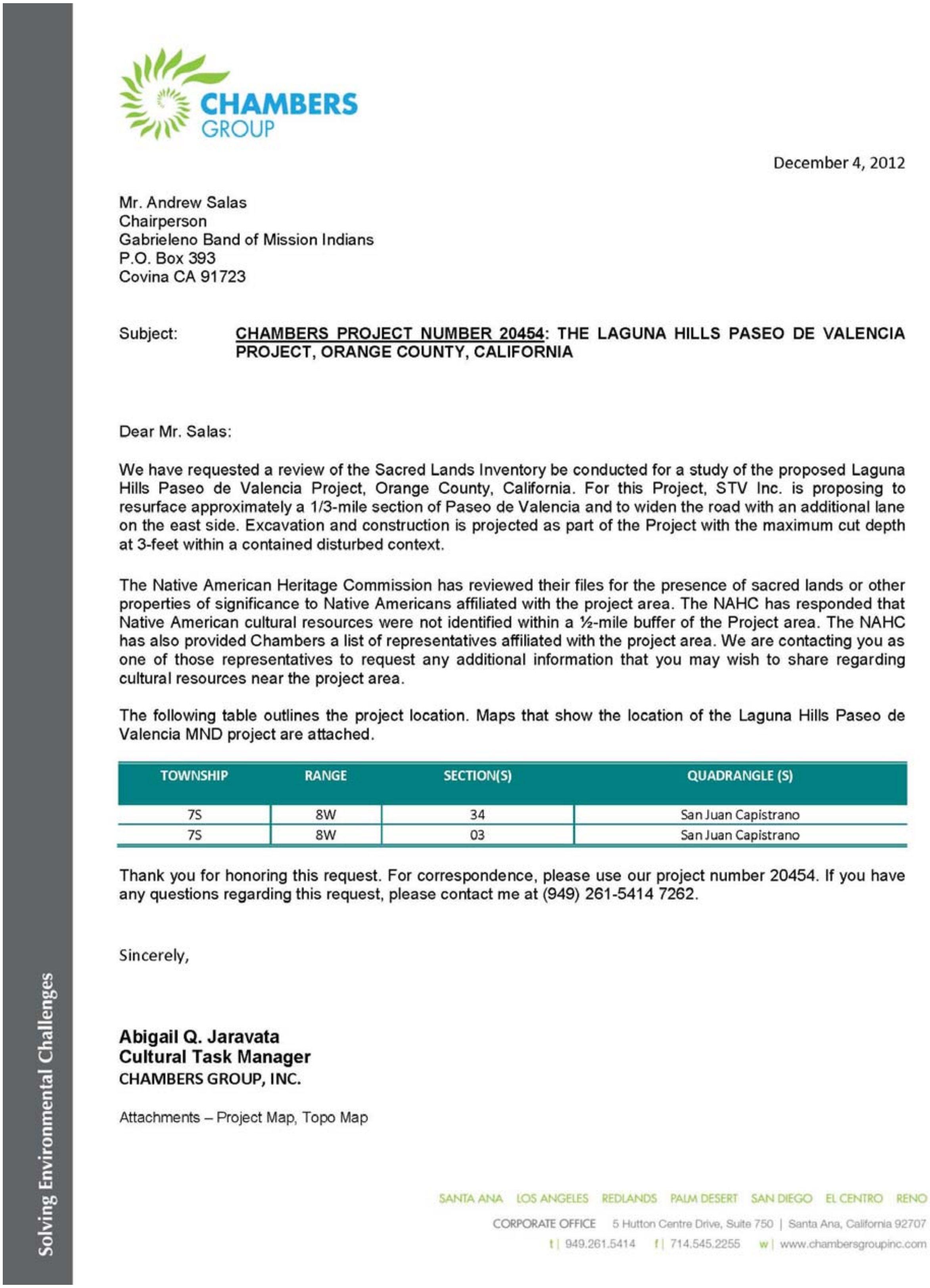
Sincerely,

Abigail Q. Jaravata
Cultural Task Manager
CHAMBERS GROUP, INC.

Attachments – Project Map, Topo Map

Solving Environmental Challenges

SANTA ANA LOS ANGELES REDLANDS PALM DESERT SAN DIEGO EL CENTRO RENO
CORPORATE OFFICE 5 Hutton Centre Drive, Suite 750 | Santa Ana, California 92707
t | 949.261.5414 f | 714.545.2255 w | www.chambersgroupinc.com



CHAMBERS
GROUP

December 4, 2012

Mr. Andrew Salas
Chairperson
Gabrieleno Band of Mission Indians
P.O. Box 393
Covina CA 91723

Subject: **CHAMBERS PROJECT NUMBER 20454: THE LAGUNA HILLS PASEO DE VALENCIA PROJECT, ORANGE COUNTY, CALIFORNIA**

Dear Mr. Salas:

We have requested a review of the Sacred Lands Inventory be conducted for a study of the proposed Laguna Hills Paseo de Valencia Project, Orange County, California. For this Project, STV Inc. is proposing to resurface approximately a 1/3-mile section of Paseo de Valencia and to widen the road with an additional lane on the east side. Excavation and construction is projected as part of the Project with the maximum cut depth at 3-feet within a contained disturbed context.

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7S	8W	03	San Juan Capistrano

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Sincerely,

Abigail Q. Jaravata
Cultural Task Manager
CHAMBERS GROUP, INC.

Attachments – Project Map, Topo Map

Solving Environmental Challenges

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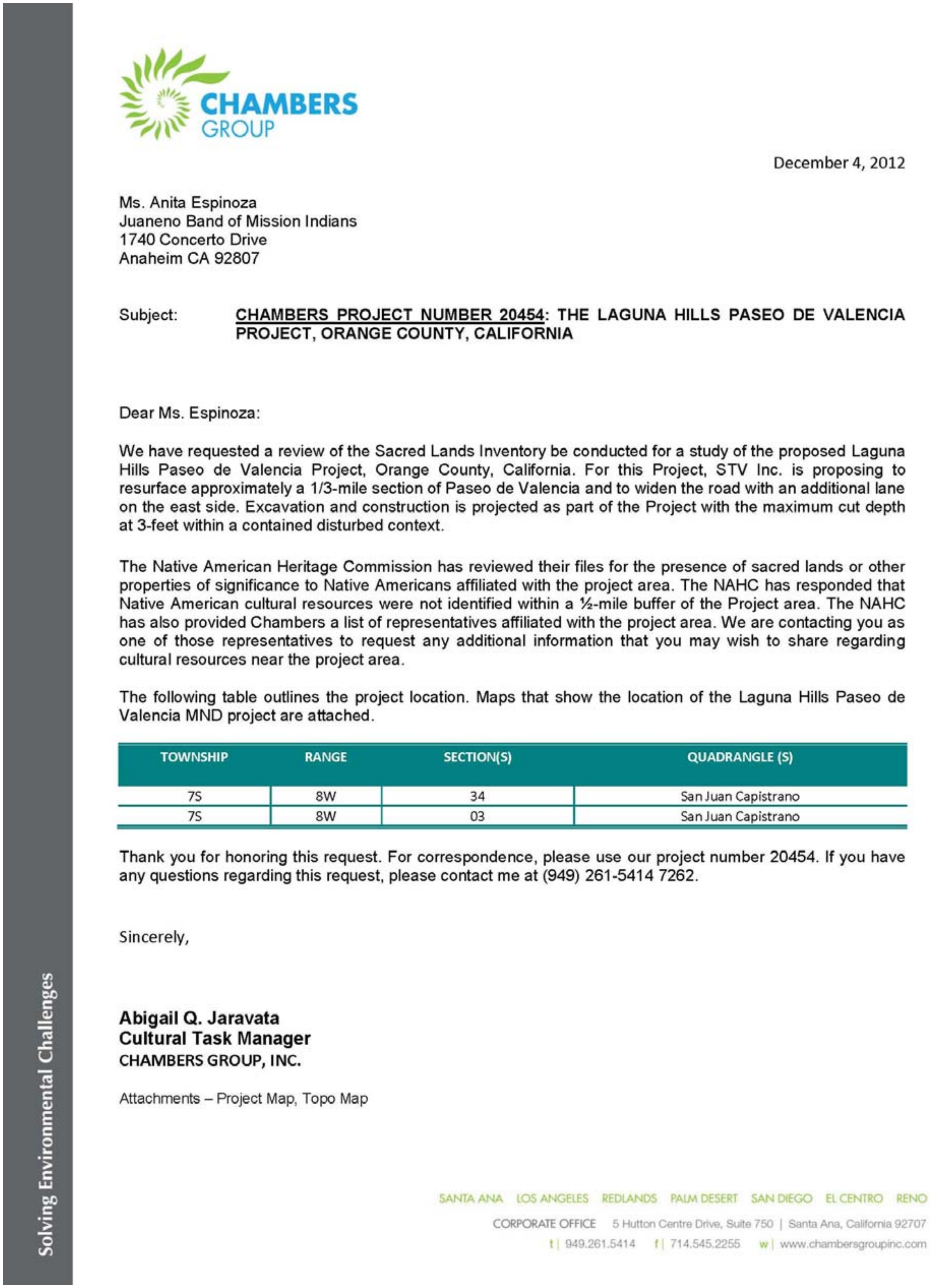

CHAMBERS
GROUP

December 4, 2012

Ms. Anita Espinoza
Juaneno Band of Mission Indians
1740 Concerto Drive
Anaheim CA 92807

Subject: **CHAMBERS PROJECT NUMBER 20454: THE LAGUNA HILLS PASEO DE VALENCIA PROJECT, ORANGE COUNTY, CALIFORNIA**

Dear Ms. Espinoza:

We have requested a review of the Sacred Lands Inventory be conducted for a study of the proposed Laguna Hills Paseo de Valencia Project, Orange County, California. For this Project, STV Inc. is proposing to resurface approximately a 1/3-mile section of Paseo de Valencia and to widen the road with an additional lane on the east side. Excavation and construction is projected as part of the Project with the maximum cut depth at 3-feet within a contained disturbed context.

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TOWNSHIP	RANGE	SECTION(S)	QUADRANGLE (S)
7S	8W	34	San Juan Capistrano
7S	8W	03	San Juan Capistrano

Thank you for honoring this request. For correspondence, please use our project number 20454. If you have any questions regarding this request, please contact me at (949) 261-5414 7262.

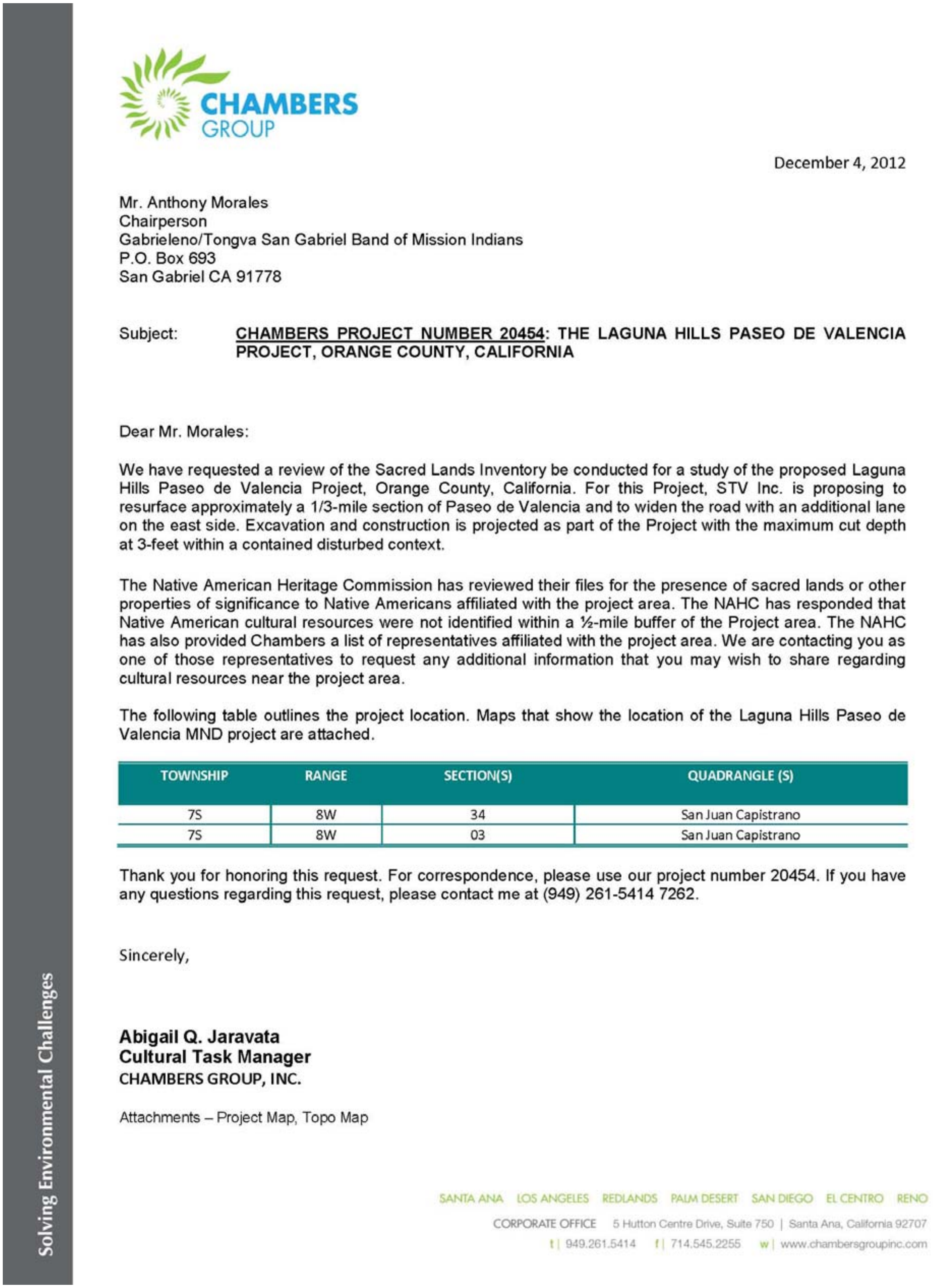
Sincerely,

Abigail Q. Jaravata
Cultural Task Manager
CHAMBERS GROUP, INC.

Attachments – Project Map, Topo Map

Solving Environmental Challenges

SANTA ANA LOS ANGELES REDLANDS PALM DESERT SAN DIEGO EL CENTRO RENO
CORPORATE OFFICE 5 Hutton Centre Drive, Suite 750 | Santa Ana, California 92707
t | 949.261.5414 f | 714.545.2255 w | www.chambersgroupinc.com



CHAMBERS
GROUP

December 4, 2012

Mr. Anthony Morales
Chairperson
Gabrieleno/Tongva San Gabriel Band of Mission Indians
P.O. Box 693
San Gabriel CA 91778

Subject: **CHAMBERS PROJECT NUMBER 20454: THE LAGUNA HILLS PASEO DE VALENCIA PROJECT, ORANGE COUNTY, CALIFORNIA**

Dear Mr. Morales:

We have requested a review of the Sacred Lands Inventory be conducted for a study of the proposed Laguna Hills Paseo de Valencia Project, Orange County, California. For this Project, STV Inc. is proposing to resurface approximately a 1/3-mile section of Paseo de Valencia and to widen the road with an additional lane on the east side. Excavation and construction is projected as part of the Project with the maximum cut depth at 3-feet within a contained disturbed context.

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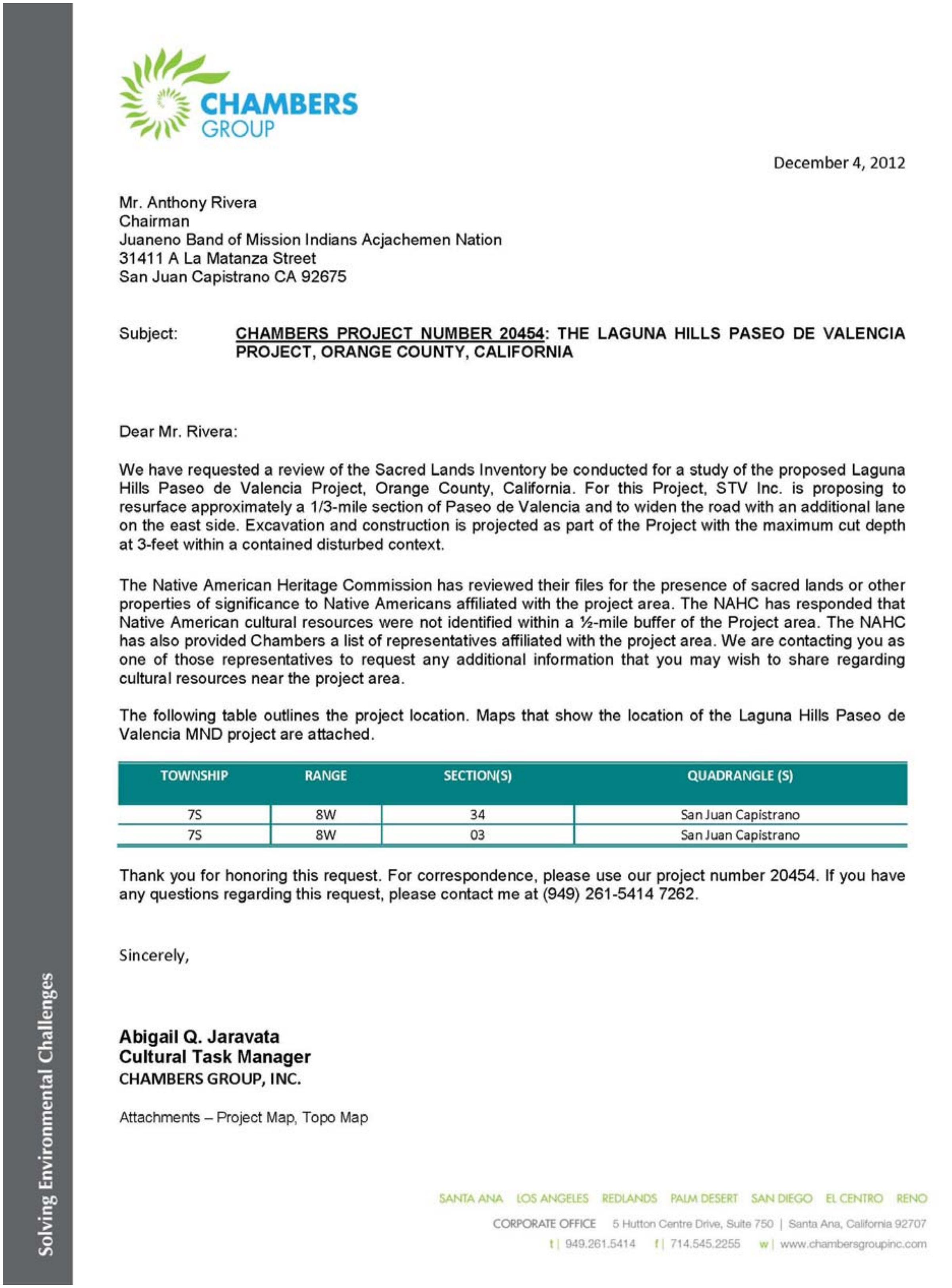

CHAMBERS
GROUP

December 4, 2012

Mr. Anthony Rivera
Chairman
Juaneno Band of Mission Indians Acjachemen Nation
31411 A La Matanza Street
San Juan Capistrano CA 92675

Subject: **CHAMBERS PROJECT NUMBER 20454: THE LAGUNA HILLS PASEO DE VALENCIA PROJECT, ORANGE COUNTY, CALIFORNIA**

Dear Mr. Rivera:

We have requested a review of the Sacred Lands Inventory be conducted for a study of the proposed Laguna Hills Paseo de Valencia Project, Orange County, California. For this Project, STV Inc. is proposing to resurface approximately a 1/3-mile section of Paseo de Valencia and to widen the road with an additional lane on the east side. Excavation and construction is projected as part of the Project with the maximum cut depth at 3-feet within a contained disturbed context.

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Cultural Task Manager
CHAMBERS GROUP, INC.

Attachments – Project Map, Topo Map

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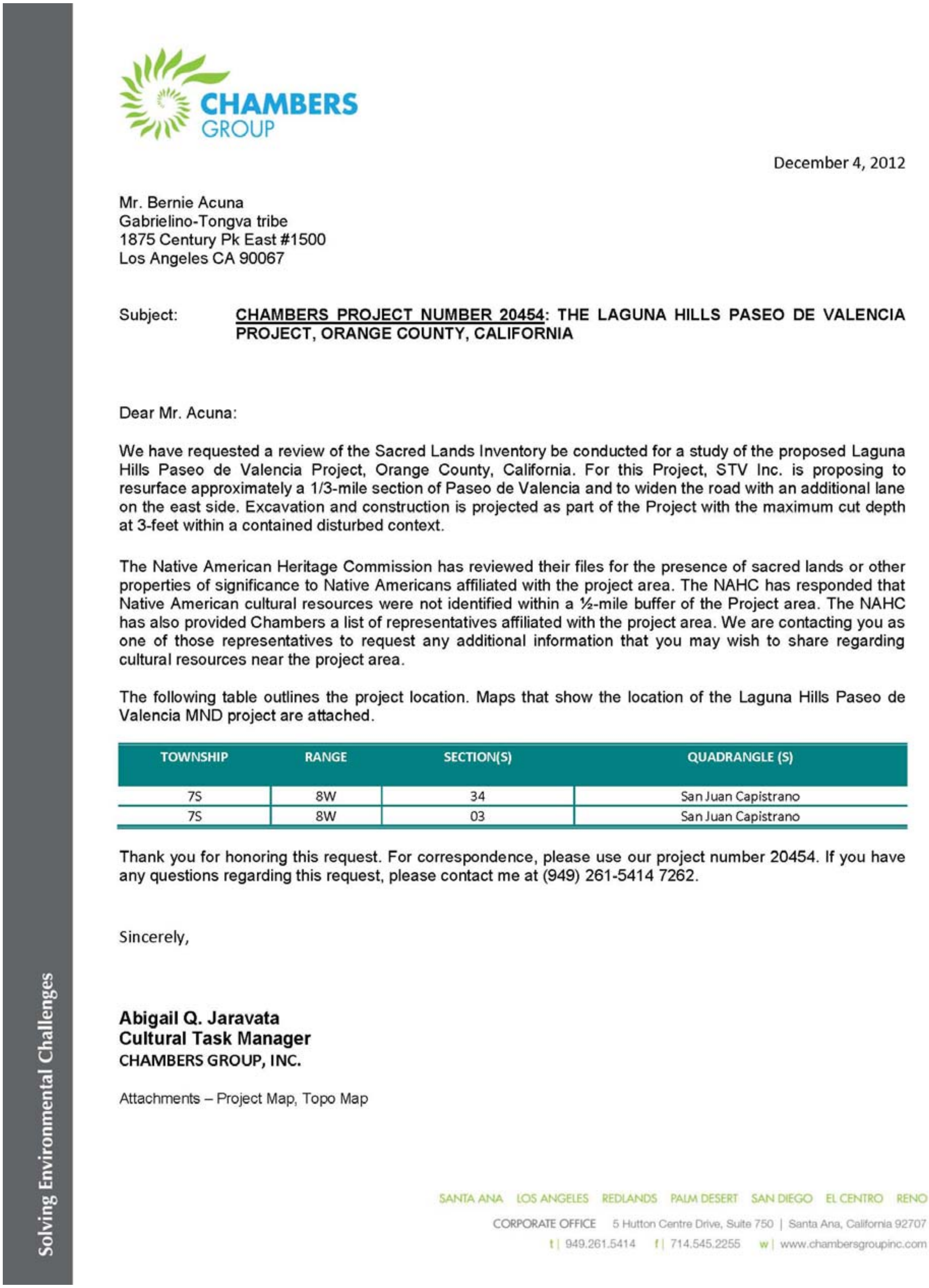

CHAMBERS
GROUP

December 4, 2012

Mr. Bernie Acuna
Gabrielino-Tongva tribe
1875 Century Pk East #1500
Los Angeles CA 90067

Subject: **CHAMBERS PROJECT NUMBER 20454: THE LAGUNA HILLS PASEO DE VALENCIA PROJECT, ORANGE COUNTY, CALIFORNIA**

Dear Mr. Acuna:

We have requested a review of the Sacred Lands Inventory be conducted for a study of the proposed Laguna Hills Paseo de Valencia Project, Orange County, California. For this Project, STV Inc. is proposing to resurface approximately a 1/3-mile section of Paseo de Valencia and to widen the road with an additional lane on the east side. Excavation and construction is projected as part of the Project with the maximum cut depth at 3-feet within a contained disturbed context.

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Sincerely,

Abigail Q. Jaravata
Cultural Task Manager
CHAMBERS GROUP, INC.

Attachments – Project Map, Topo Map

Solving Environmental Challenges

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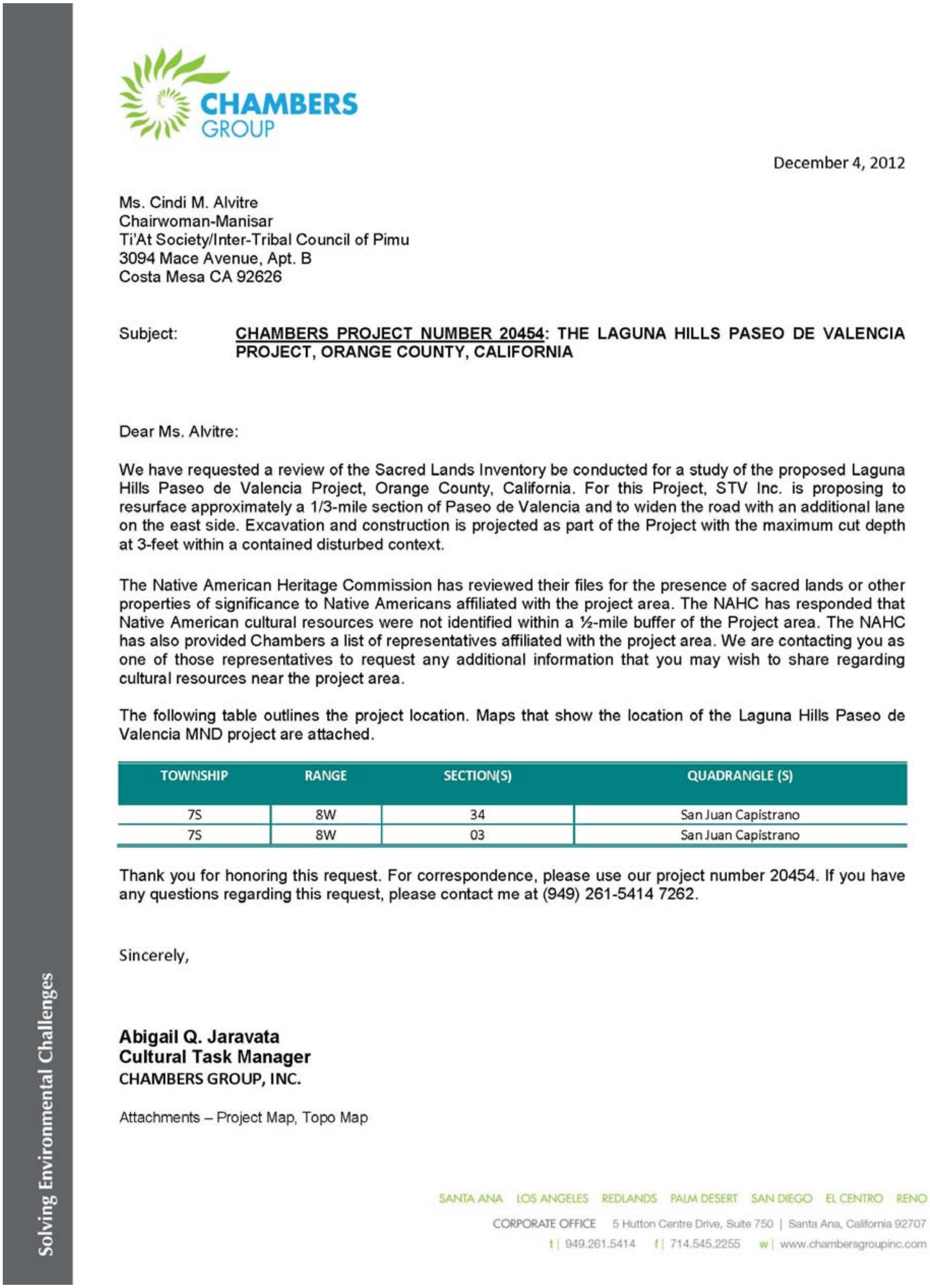

CHAMBERS
GROUP

December 4, 2012

Ms. Cindi M. Alvitre
Chairwoman-Manisar
Ti'At Society/Inter-Tribal Council of Pimu
3094 Mace Avenue, Apt. B
Costa Mesa CA 92626

Subject: **CHAMBERS PROJECT NUMBER 20454: THE LAGUNA HILLS PASEO DE VALENCIA PROJECT, ORANGE COUNTY, CALIFORNIA**

Dear Ms. Alvitre:

We have requested a review of the Sacred Lands Inventory be conducted for a study of the proposed Laguna Hills Paseo de Valencia Project, Orange County, California. For this Project, STV Inc. is proposing to resurface approximately a 1/3-mile section of Paseo de Valencia and to widen the road with an additional lane on the east side. Excavation and construction is projected as part of the Project with the maximum cut depth at 3-feet within a contained disturbed context.

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Cultural Task Manager
CHAMBERS GROUP, INC.

Attachments – Project Map, Topo Map

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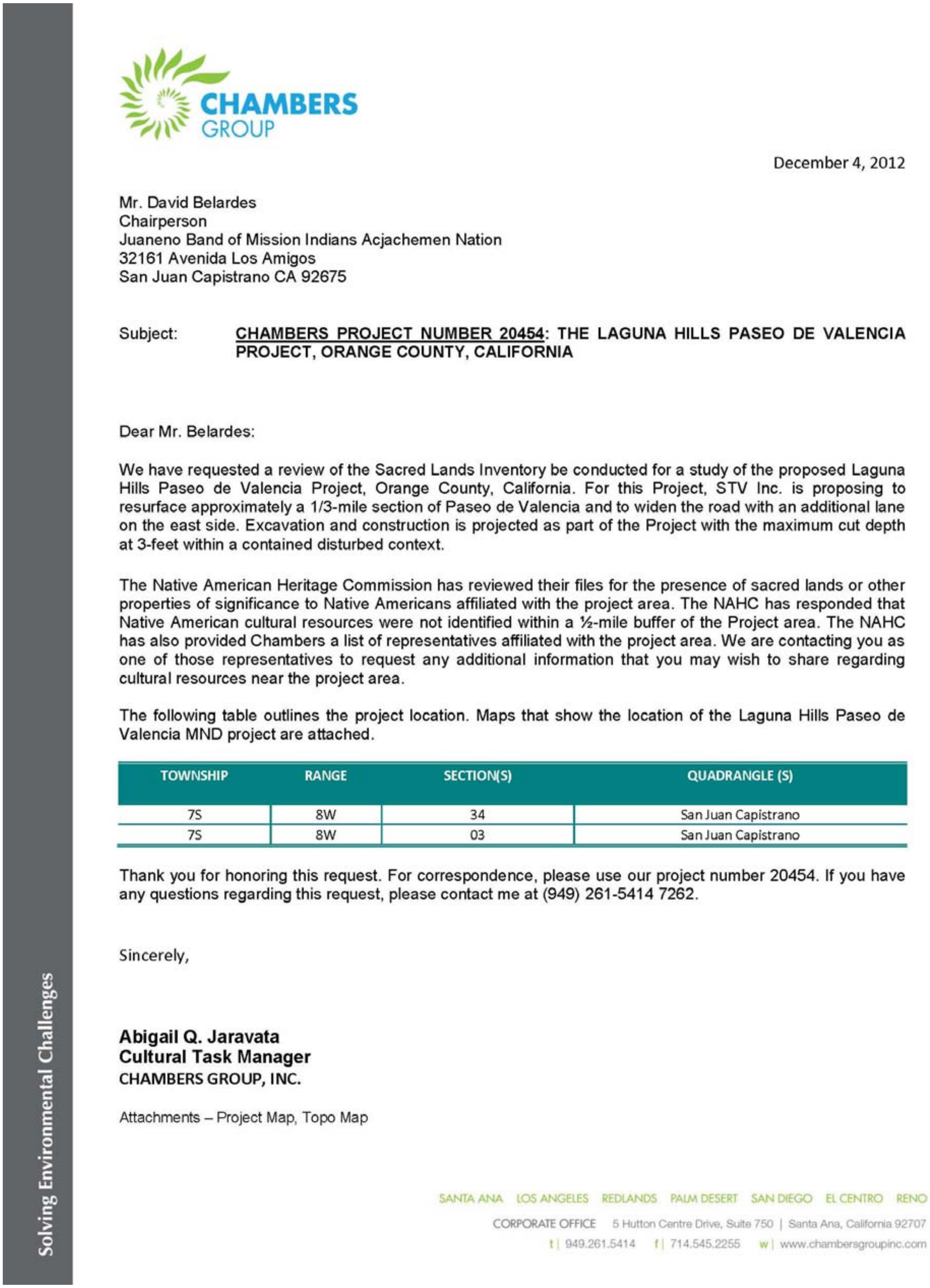

CHAMBERS
GROUP

December 4, 2012

Mr. David Belardes
Chairperson
Juaneno Band of Mission Indians Acjachemen Nation
32161 Avenida Los Amigos
San Juan Capistrano CA 92675

Subject: **CHAMBERS PROJECT NUMBER 20454: THE LAGUNA HILLS PASEO DE VALENCIA PROJECT, ORANGE COUNTY, CALIFORNIA**

Dear Mr. Belardes:

We have requested a review of the Sacred Lands Inventory be conducted for a study of the proposed Laguna Hills Paseo de Valencia Project, Orange County, California. For this Project, STV Inc. is proposing to resurface approximately a 1/3-mile section of Paseo de Valencia and to widen the road with an additional lane on the east side. Excavation and construction is projected as part of the Project with the maximum cut depth at 3-feet within a contained disturbed context.

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Cultural Task Manager
CHAMBERS GROUP, INC.

Attachments – Project Map, Topo Map

Solving Environmental Challenges

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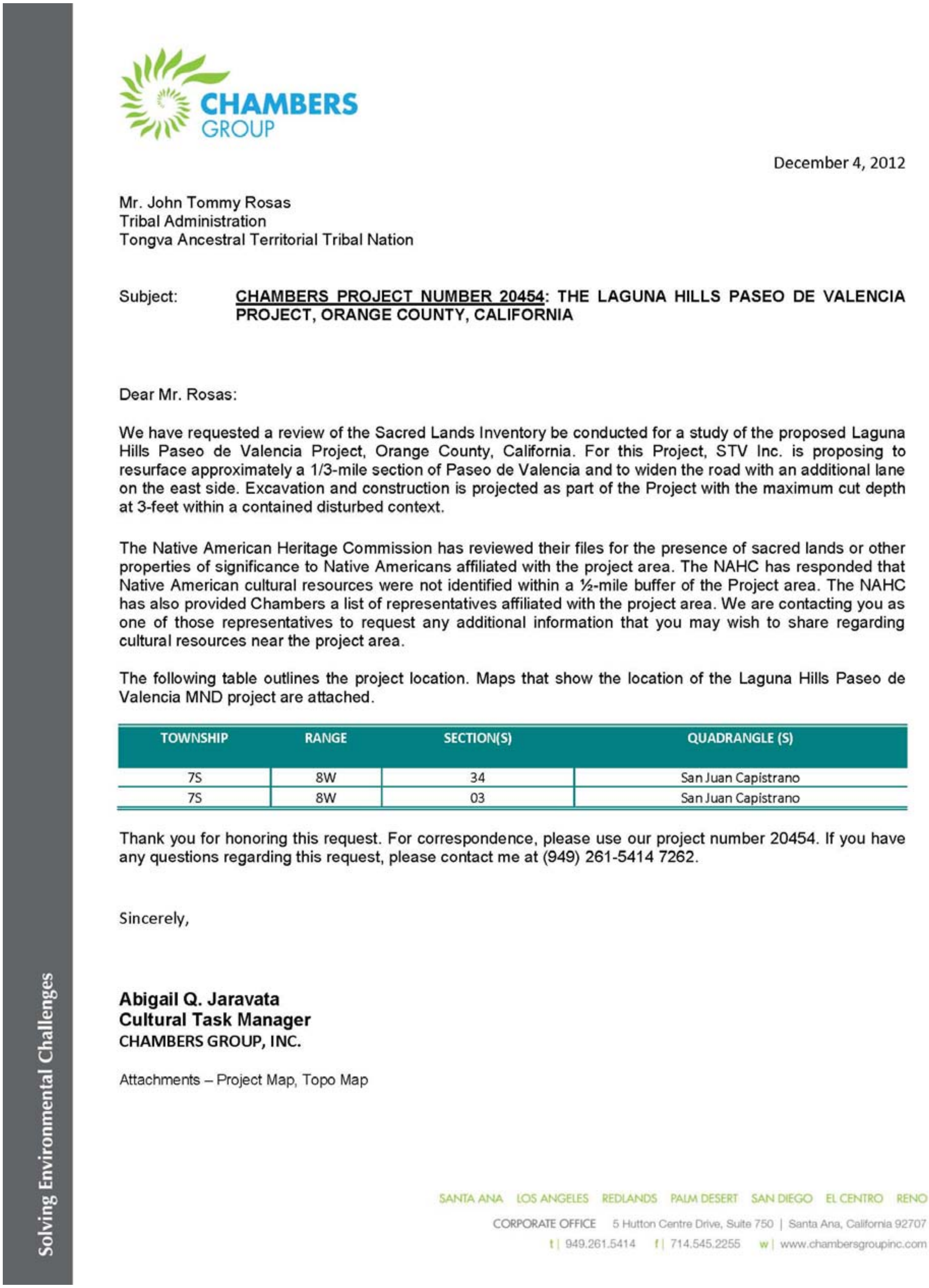

CHAMBERS
GROUP

December 4, 2012

Mr. John Tommy Rosas
Tribal Administration
Tongva Ancestral Territorial Tribal Nation

Subject: **CHAMBERS PROJECT NUMBER 20454: THE LAGUNA HILLS PASEO DE VALENCIA PROJECT, ORANGE COUNTY, CALIFORNIA**

Dear Mr. Rosas:

We have requested a review of the Sacred Lands Inventory be conducted for a study of the proposed Laguna Hills Paseo de Valencia Project, Orange County, California. For this Project, STV Inc. is proposing to resurface approximately a 1/3-mile section of Paseo de Valencia and to widen the road with an additional lane on the east side. Excavation and construction is projected as part of the Project with the maximum cut depth at 3-feet within a contained disturbed context.

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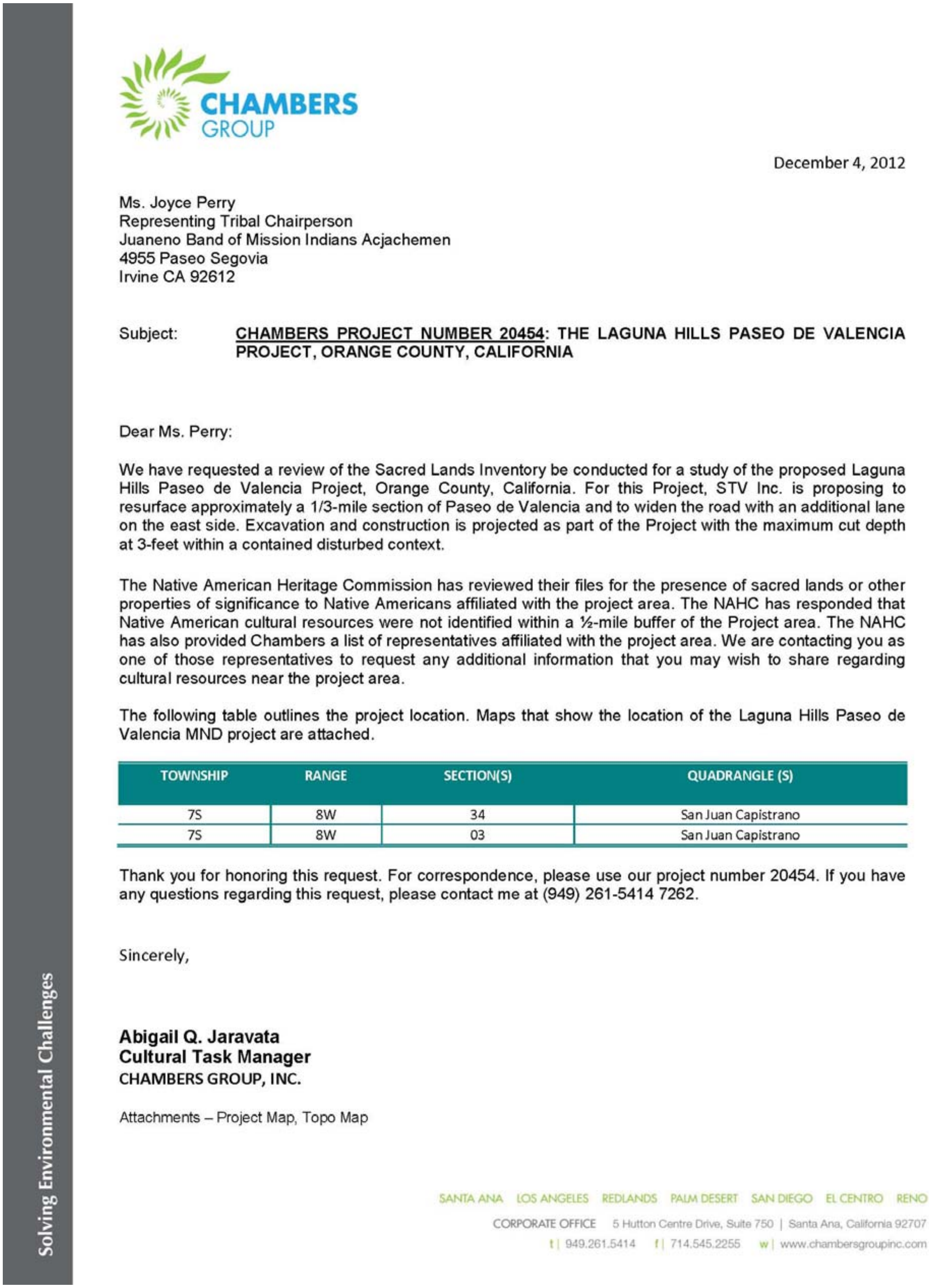

December 4, 2012

Ms. Joyce Perry
Representing Tribal Chairperson
Juaneno Band of Mission Indians Acjachemen
4955 Paseo Segovia
Irvine CA 92612

Subject: **CHAMBERS PROJECT NUMBER 20454: THE LAGUNA HILLS PASEO DE VALENCIA PROJECT, ORANGE COUNTY, CALIFORNIA**

Dear Ms. Perry:

We have requested a review of the Sacred Lands Inventory be conducted for a study of the proposed Laguna Hills Paseo de Valencia Project, Orange County, California. For this Project, STV Inc. is proposing to resurface approximately a 1/3-mile section of Paseo de Valencia and to widen the road with an additional lane on the east side. Excavation and construction is projected as part of the Project with the maximum cut depth at 3-feet within a contained disturbed context.

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CHAMBERS GROUP, INC.

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Solving Environmental Challenges

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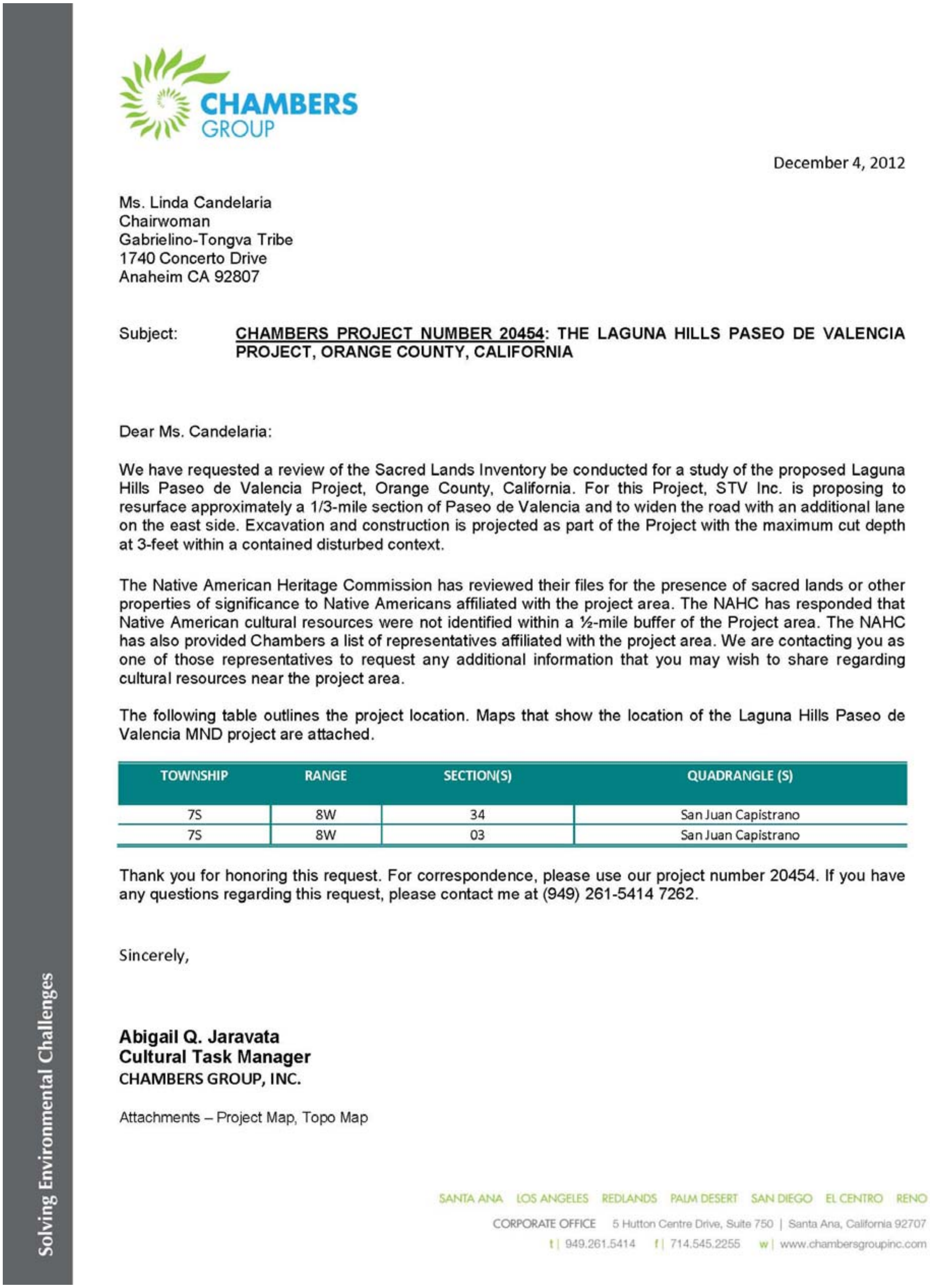

CHAMBERS
GROUP

December 4, 2012

Ms. Linda Candelaria
Chairwoman
Gabrielino-Tongva Tribe
1740 Concerto Drive
Anaheim CA 92807

Subject: **CHAMBERS PROJECT NUMBER 20454: THE LAGUNA HILLS PASEO DE VALENCIA PROJECT, ORANGE COUNTY, CALIFORNIA**

Dear Ms. Candelaria:

We have requested a review of the Sacred Lands Inventory be conducted for a study of the proposed Laguna Hills Paseo de Valencia Project, Orange County, California. For this Project, STV Inc. is proposing to resurface approximately a 1/3-mile section of Paseo de Valencia and to widen the road with an additional lane on the east side. Excavation and construction is projected as part of the Project with the maximum cut depth at 3-feet within a contained disturbed context.

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CHAMBERS GROUP, INC.

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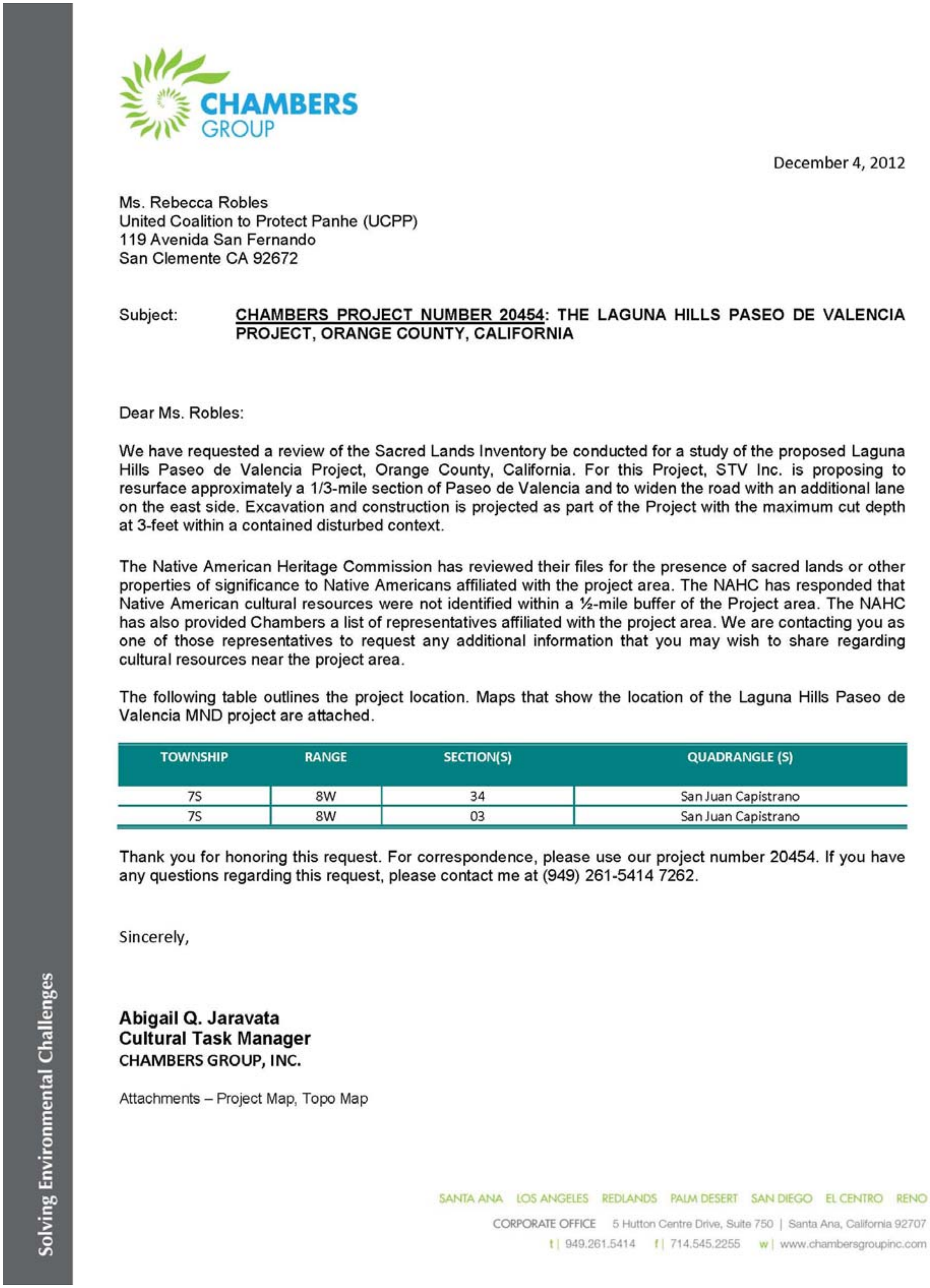

CHAMBERS
GROUP

December 4, 2012

Ms. Rebecca Robles
United Coalition to Protect Panhe (UCPP)
119 Avenida San Fernando
San Clemente CA 92672

Subject: **CHAMBERS PROJECT NUMBER 20454: THE LAGUNA HILLS PASEO DE VALENCIA PROJECT, ORANGE COUNTY, CALIFORNIA**

Dear Ms. Robles:

We have requested a review of the Sacred Lands Inventory be conducted for a study of the proposed Laguna Hills Paseo de Valencia Project, Orange County, California. For this Project, STV Inc. is proposing to resurface approximately a 1/3-mile section of Paseo de Valencia and to widen the road with an additional lane on the east side. Excavation and construction is projected as part of the Project with the maximum cut depth at 3-feet within a contained disturbed context.

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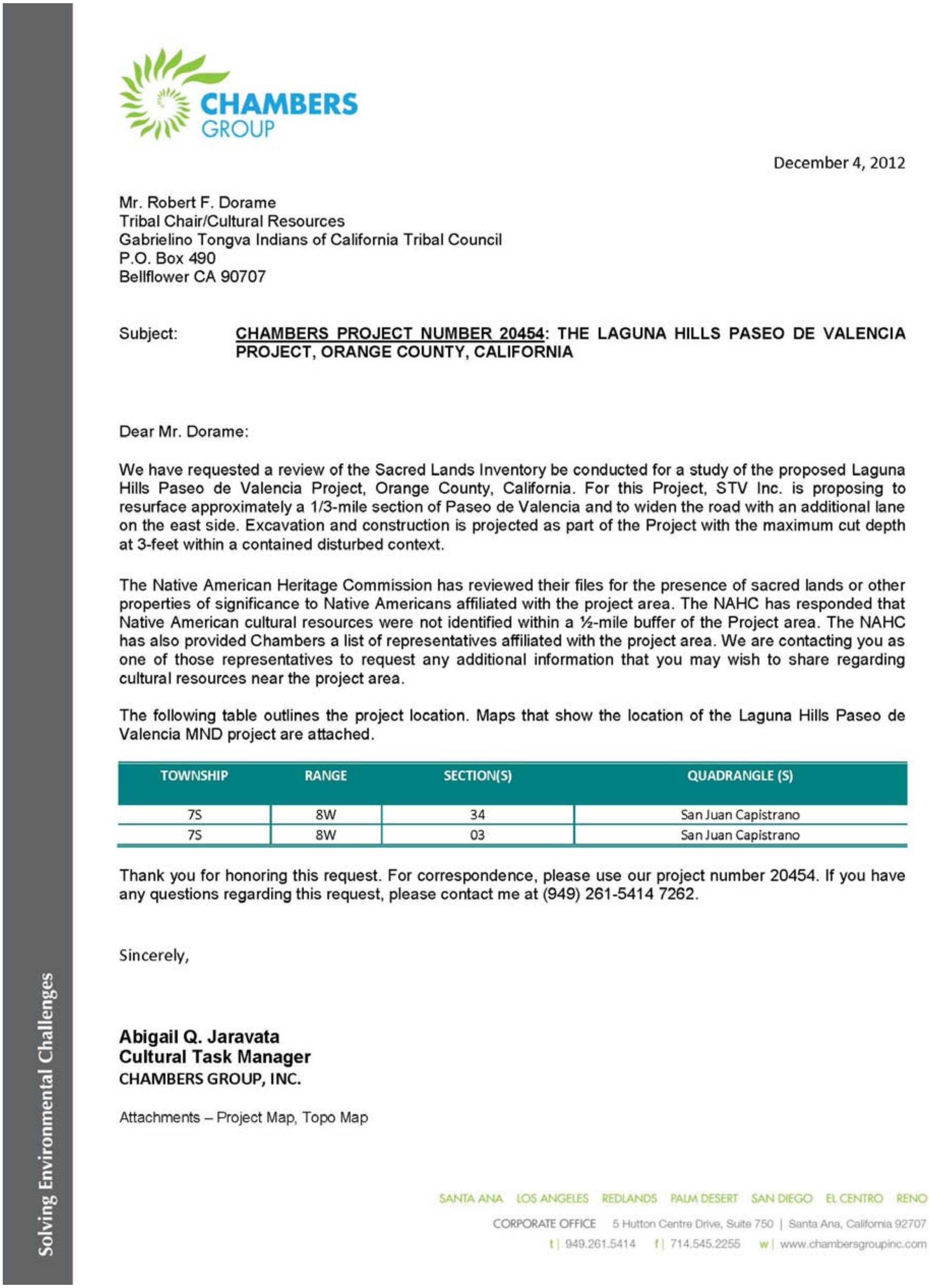

CHAMBERS
GROUP

December 4, 2012

Mr. Robert F. Dorame
Tribal Chair/Cultural Resources
Gabrielino Tongva Indians of California Tribal Council
P.O. Box 490
Bellflower CA 90707

Subject: **CHAMBERS PROJECT NUMBER 20454: THE LAGUNA HILLS PASEO DE VALENCIA PROJECT, ORANGE COUNTY, CALIFORNIA**

Dear Mr. Dorame:

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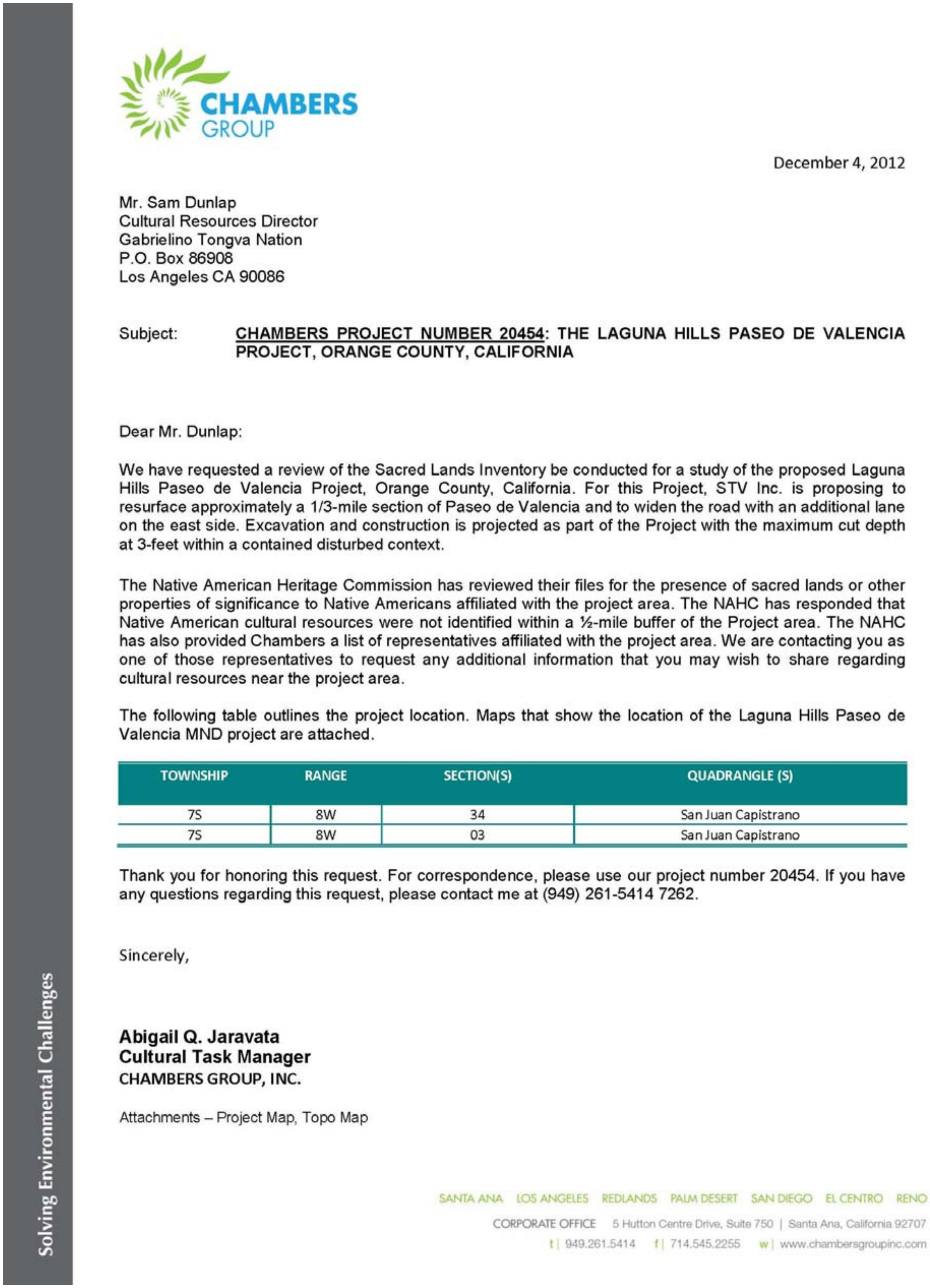

CHAMBERS
GROUP

December 4, 2012

Mr. Sam Dunlap
Cultural Resources Director
Gabrielino Tongva Nation
P.O. Box 86908
Los Angeles CA 90086

Subject: **CHAMBERS PROJECT NUMBER 20454: THE LAGUNA HILLS PASEO DE VALENCIA PROJECT, ORANGE COUNTY, CALIFORNIA**

Dear Mr. Dunlap:

We have requested a review of the Sacred Lands Inventory be conducted for a study of the proposed Laguna Hills Paseo de Valencia Project, Orange County, California. For this Project, STV Inc. is proposing to resurface approximately a 1/3-mile section of Paseo de Valencia and to widen the road with an additional lane on the east side. Excavation and construction is projected as part of the Project with the maximum cut depth at 3-feet within a contained disturbed context.

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Appendix G

Geotechnical Investigation – Paseo de Valencia Widening Prepared by Group Delta Consultants, Inc., May 21, 2012

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GEOTECHNICAL INVESTIGATION FOR THE PROPOSED WIDENING OF PASEO DE VALENCIA BETWEEN KENNINGTON DRIVE AND LAGUNA HILLS DRIVE LAGUNA HILLS, CALIFORNIA

Prepared for

STV INCORPORATED
100 Pacifica, Suite 140
Irvine, CA 92618

Prepared by

GROUP DELTA CONSULTANTS, INC.
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GDC Project No. IR-556
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Geotechnical Engineering

Geology

Hydrogeology

Earthquake Engineering

Materials Testing & Inspection

Forensic Services

May 21, 2012

STV Incorporated
100 Pacifica, Suite 140
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Attention: Tapas Dutta, P.E.

Subject: Geotechnical Investigation for the
Proposed Widening of Paseo de Valencia
Between Kennington Drive and Laguna Hills Drive
Laguna Hills, California
GDC Project No. IR-556

Dear Tapas:

Group Delta Consultants, Inc. (GDC) is pleased to provide this report of our geotechnical investigation for the proposed widening of Paseo de Valencia between Kennington Drive and Laguna Hills Drive in Laguna Hills, California.

We appreciate the opportunity to provide geotechnical services for this project. If you have any questions pertaining to this report, or if we can be of further service, please do not hesitate to contact us.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

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GEOTECHNICAL INVESTIGATION FOR THE WIDENING OF PASEO DE VALENCIA BETWEEN KENNINGTON DRIVE AND LAGUNA HILLS DRIVE LAGUNA HILLS, CALIFORNIA

1.0 INTRODUCTION

This Geotechnical Report presents our recommendations for the proposed widening of Paseo de Valencia between Kennington Drive and Laguna Hills drive in Laguna Hills, California. The site location is presented on the Vicinity Map in Figure 1A and Topographic Map in Figure 1B. Group Delta Consultants, Inc. performed a geotechnical investigation at the site.

1.1 Scope of Work

The purpose of our investigation is to provide geotechnical recommendations for the design and construction of the proposed improvements. Our scope of work included the following:

- Obtaining an encroachment permit from the City of Laguna Hills;
- Reviewing available published geologic, seismic, and geotechnical information and maps pertaining to the site and surrounding area;
- Marking and clearing utilities through DigAlert;
- Coordinating traffic control for two borings located in the roadway;
- Performing six (6) hollow stem auger borings to investigate the subsurface conditions at the site;
- Performing laboratory testing on samples recovered from the borings;
- Performing engineering analyses and developing geotechnical recommendations for project design; and
- Presenting the data, conclusions, and recommendations of our geotechnical investigation in this report.

1.2 Project Description

STV is providing engineering services to the City of Laguna Hills (City) for the widening of an approximately 0.4 mile section of Paseo de Valencia located between Kennington Drive and Laguna Hills Drive in Laguna Hills, California. The widening is one of several segments being widened by the City under separate contracts. The proposed roadway profile will be raised slightly, therefore the existing structural pavement sections will need to be demolished, removed, and replaced by new structural pavement sections. The existing roadway has a raised center median, two travel lanes and a bike lane with no sidewalk in the southbound direction, and three travel lanes with a sidewalk and no bike lane and in the northbound direction (Figure 2C). The existing Aliso Creek Riding and Hiking trail easement is a grassy area located just east of the northbound sidewalk, and contains a paved bike path and an unpaved equestrian trail. The road widening may encroach into a portion of this existing easement.

The improvements will provide three travel lanes in each direction, raised landscaped median, southbound bike lane, and sidewalks in both directions. Additionally, pending results of noise studies, sound walls may be constructed on the east and west sides of the roadway between the widened road and adjacent residential properties. Buried utilities, light poles, and other associated improvements are anticipated. A Vicinity Map for the site is presented as Figure 1A and the conceptual site improvements are shown in Figures 2B and 2C. Site photographs are provided in Appendix C.

2.0 FIELD AND LABORATORY INVESTIGATION

2.1 Field Investigation

The subsurface conditions in the area of the proposed improvements were investigated by advancing six (6) hollow-stem auger borings at the locations shown in Figures 2A, 3A, and 3B. Four of these borings were performed in the adjacent Aliso Creek Riding and Hiking Trail area to the east of Paseo de Valencia and two were performed within the existing southbound roadway. Borings were advanced to a depth of 5 to 21.5 feet below the existing grade. The boring logs are presented in Appendix A.

2.2 Laboratory Testing

Laboratory testing was performed on selected samples of the subsurface materials recovered from the borings. Tests were conducted to develop index, classification, strength, compressibility, and corrosivity properties of the subsurface materials for use in foundation design. The tests included:

- Moisture Content (ASTM D 2216);
- Dry Density (ASTM D 2937);
- USCS Lab Soil Classification (ASTM D 2487);
- Visual / Manual Soil Classification (ASTM D 2488);
- Grain Size Distribution (Sieve/Hydrometer)(ASTM D 422);
- Percent Passing #200 Sieve (ASTM D 1140);
- Atterberg Limits (ASTM D 4318);
- Expansion Index (ASTM D 4829);
- Direct Shear (ASTM D 3080);
- Pocket Penetrometer (N/A); and
- Soil Corrosivity (pH, sulfate, and chloride) (CT 422, 443, 417 and 643, ASTM D 516).

Moisture content, dry density, percentage of Gravel / Sand / Fines, Atterberg Limits, and results of Pocket Penetrometer testing are shown on the boring records in Appendix A. Detailed descriptions of the tests performed and their results are presented in Appendix B.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Conditions

The site consists of a 0.4 mile section of Paseo de Valencia between Kennington Drive and Laguna Hills Drive and is currently occupied by an existing asphalt concrete roadway, a vegetated median, and overhead power lines on the west side of the road trending in the north to south direction. The northbound roadway consists of three travel lanes and a sidewalk and the southbound roadway consists of two travel lanes and a bike lane. An aerial photograph, site improvement plans, and topographic plan is shown in Figures 2A, 2B & 2C, and 3A & 3B, respectively. Selected site photographs are presented in Appendix C.

The existing pavement on the road consists of asphalt concrete. The Aliso Creek Riding and Hiking Trail is located east of the existing roadway and is vegetated with grass and small trees. The trail area contains a paved walking path and an unpaved equestrian trail. The unpaved path meanders near the east extent of the trail area furthest from the road. The site topography is gently rolling with elevations generally ranging from El. +350 at the south end of the site to El. +337 at the north end of the project site and a high point of El. +374 near the middle of the site. Residential properties are located east of the Aliso Creek Riding and Hiking Trail and west of the southbound lanes.

Due to the localized high point (El. +374), located approximately 1,000 feet north of the intersection of Laguna Hills Drive and Paseo de Valencia, drainage north of this area will generally flow to the north and drainage south of this area will generally flow to the south. Drainage is generally sheet flow that is collected in existing gutter and stormwater collection systems. Aliso Creek is located approximately 350 feet beyond the north extent of the project and flows to the southwest.

Fire hydrants, manholes, and small utility boxes indicate the presence of buried water and sewer lines, cable lines, and other utilities. Wood bollards are located within the paved path areas on the east corners of Kennington Drive, Beckham Drive, and Laguna Hills Drive to prevent vehicles from accessing the trail area.

3.2 Geology

The site is located in the Peninsular Ranges Geomorphic Province of southern California. A regional geologic map of the site from the USGS Santa Ana 30' x 60' Quadrangle is presented in Figure 4 (USGS, 2008). The map shows the site is underlain by Tertiary aged Capistrano Formation siltstone facies (Tcs) and at depth by Monterey Formation (Tm). These soils generally consist of early Pliocene and Miocene siliceous and diatomaceous marine sandstone, siltstone, and mudstone.

The Monterey Formation has thin interbedded white to pale brown, thinly laminated siltstone and tan, fine to medium grained feldspathic sandstone. Young alluvium is present in the adjacent and active Aliso Creek stream channel. Man-made fills associated with roadways and other developments may have been placed over the alluvial soils in surrounding areas to the site.

3.3 Subsurface Conditions

Based on the data, and consistent with the geologic map in Figure 4, the site is underlain by Capistrano Formation Siltstone (Tcs). When classified as a soil, the Tcs is very stiff to hard Lean Clay (CL) and Lean Clay with Sand (CL). Minor fills consisting of Silty Sand (SM) were encountered under the pavement sections in both roadway borings. Trench backfill was encountered in hand-auger boring A-12-003 and consisted of Poorly-Graded Sand (SP).

Lab testing performed on the formational soils indicates fines content ranging from 76 to 89% (average 84%), an average moisture content of about 22%, an average in-situ unit weight of about 122 pcf, and an expansion index (EI) of 68. Atterberg Limits testing indicates an average liquid limit of 46 and a plasticity index of 26. Soils generally had undrained shear strength greater than 4.5 ksf estimated by pocket penetrometer. However, soil in the upper 15 feet of Boring A-12-001 had pocket penetrometer readings ranging from 2.5 to 4.0 ksf. Standard Penetration Test blowcount in the native soils adjusted to 60% hammer energy (N_{60}) ranged from 9 to 77 blows per foot.

3.4 Groundwater

Groundwater was not encountered in our investigation to the maximum depth explored of 21.5 ft below existing grade. Localized perched water or seepage could be encountered locally.

3.5 Drilling Notes

Boring A-12-003 was performed to 5 ft depth using a hand auger due to numerous buried utilities in the exploration location. All other borings were advanced to target depths. Upon auger withdrawal, boreholes remained open to the maximum depth with no caving. Boreholes were allowed to remain open for several minutes prior to backfilling to allow for groundwater to flow into the borehole, but no ground water was encountered in any of the borings.

4.0 ANALYSES AND RECOMMENDATIONS

4.1 Geologic and Seismic Hazards

Potential geologic and seismic hazards for any site include ground rupture, seismic shaking, liquefaction, seismic compaction and settlement, expansive soils, collapsible soils, slope instability, lateral spreading, subsidence, and tsunamis / flooding.

The site is located in a seismically active area. Ground shaking due to nearby and distant earthquakes should be anticipated during the life of the project. The seismic hazards are discussed in the following paragraphs.

4.1.1 Ground Surface Rupture

The site is not located in an Alquist-Priolo Special Studies Zone, and no known active faults are mapped as crossing or projecting toward the site. Caltrans ARS Online Regional Fault Map is shown in Figure 5. The closest known active faults in the Caltrans database are the San Joaquin Hills Blind Thrust and the Newport-Inglewood Rose Canyon Fault Zone (Los Angeles Basin – Northern Section) which is located about 11.6 km (7.2 mi) southwest of the site. Though the site is above the San Joaquin Hills Blind Thrust, this fault is a blind thrust fault which dips to the southwest direction. The nearest surface projection is located 1.4 km (0.9 mi) from the site and the top of the rupture plane is located more than 2 km (1.2 mi) below the earth's surface. Therefore, the potential for fault rupture is considered remote.

4.1.2 2010 CBC Seismic Design Parameters

The site is located at the following approximate coordinates:

Latitude:	33.5992 degrees North
Longitude:	-117.7018 degrees West

We developed design ground motion parameters and response spectrum in accordance with the 2010 California Building Code (CBC) and ASCE 7-05. The USGS computer program "Earthquake Ground Motion Parameters, Version 5.0.9a – 10/21/2009," was used to determine the mapped Maximum Considered Earthquake (MCE) bedrock spectral acceleration parameters and the site modified MCE and Design site response spectra. The soil profile is borderline Site Class C / Site Class D. For design purposes, Site Class D was conservatively assumed. The ground motion parameters are tabulated and the MCE and Design spectra for the site are plotted in Table 1. The resulting MCE and Design Peak Ground Acceleration (PGA) are 0.58g and 0.39g, respectively.

4.1.3 Liquefaction Potential

Liquefaction involves the sudden loss in strength of a saturated, cohesionless soil (sand and non-plastic silts) caused by the build-up of pore water pressure during cyclic loading, such as produced by an earthquake. This increase in pore water pressure can temporarily transform the soil into a fluid mass, resulting in vertical settlement and can also cause lateral ground deformations. Typically, liquefaction occurs in areas where there are loose to medium dense sands and silts, and where the depth to groundwater is less than 50 feet from the surface. In summary, three simultaneous conditions are required for liquefaction:

- Liquefaction susceptible soils (saturated loose to medium dense cohesionless soils);
- Groundwater within 50 feet of the surface;
- Strong Shaking, such as caused by an earthquake.

The site is not located in a State of California Seismic Hazard Zone for Liquefaction. No groundwater was encountered in our exploration to a depth of 21.5 feet explored and Capistrano Formation was encountered directly below the subsurface, which is not considered to be susceptible to liquefaction. Therefore, the liquefaction potential at the site is negligible.

4.1.4 Expansive Soils

The near surface materials encountered at the site generally consist of weathered Tertiary formation which is generally a clayey soil with medium plasticity. Based on laboratory testing, these materials have a medium expansion potential (Expansion Index EI=68). Expansive soils tend to swell when wetted which can result in heave and cracking of surface hardscape and other improvements. The local standard of practice for the design and construction of foundations, slabs, and hardscape supported on soils with a medium expansion potential is provided below. A medium expansion potential corresponds to an Expansion Index (EI) of 51 to 90. Structural design requirements may require greater thickness and/or more reinforcing than indicated, and should evaluated by the structural engineer.

- Footings should be founded at least 18 inches below lowest adjacent grade.

- Footings should be reinforced with one #4 bar top and bottom.

- Prior to placing concrete or pavement, the subgrade should be thoroughly wetted and kept moist.

- The concrete slabs and panels should be at least 4 inches thick and should be reinforced with a 6" x 6" – 10/10 mesh, or #3 bars at 24 inches center to center, both ways.

- Concrete slabs and hardscape should have a maximum joint spacing of 10 feet; #3 bars dowels at construction joints; and, the outside edge should be deepened to a thickness of 12 inches. One #3 bar should be used to reinforce the flared edge.

- The adjacent area should be sloped at 2 percent, or greater, to drain away from slabs and pavements.

- For additional protection, consideration should also be given to removing the upper 6 inches of expansive soils below slabs and paving and replacing them with non-expansive sandy soil having an EI of not more than 20.

- Bushes, trees and irrigation pipes and valves should be kept sufficiently away from the edges of foundations and hardscape to prevent root damage, and/or moisture changes in the supporting subgrade.

4.1.5 Other Geologic and Seismic Hazards

4.1.5.1 Seismic Settlement

Seismic shaking can also cause soil compaction and ground settlement without liquefaction occurring, including settlement of granular soils above the water table. Subsurface materials at this site consist of very stiff to hard cohesive (non-granular) soil. Therefore, seismic compaction settlement potential is negligible.

4.1.5.2 Tsunami and Seiches

All low-lying areas along California's coast are subject to potentially dangerous tsunamis. Tsunamis are long-period waves generated primarily from distant and local submarine earthquakes, landslides or volcanic eruptions. The elevation of the site is above more than 350 feet mean sea level, and the site is located about 6.5 miles from the Pacific Ocean. Therefore, the potential for a Tsunami is not a hazard for this site.

Seiche is wave action generated during an earthquake in a steep sided, deep water body. No bodies of water fitting this description are located in the general vicinity of the site. Therefore, the potential for seiches is not a consideration for this site.

4.1.5.3 Slope Stability and Lateral Spreading

The site is not located in a State of California Seismic Hazard Zone for Seismic Slope instability. No significant post-construction slopes are to be constructed and slope stability is not considered a significant hazard for the proposed site. As discussed in Section 4.1.3, liquefaction potential at this site is negligible and therefore lateral spreading is not an issue at this site.

4.1.5.4 Flood Hazard

The flood hazard potential for the site was evaluated using Federal Emergency Management Agency (FEMA) Flood Plain Maps on their web site to determine potential flooding potential (FEMA, 2011). The FEMA site classifies the site as being in Zone X, which means the area has a projected average flood water depth of less than 1 foot or that the drainage area is less than 1 square mile or is protected by levees from 100 year floods. The site has positive drainage gradients away from the existing roadway and area of proposed road widening. Therefore, the potential for flood hazards should be low for any 100 year or less rain storm.

It may be noted that the Aliso Creek, located north of Kennington Drive (the northern project extent) by approximately 350 feet, is mapped in an AE Zone, which means this area is subject to inundation by the 1-percent-annual-chance flood event. However, the creek is at an elevation several feet lower than our site and it is highly unlikely potential inundation will affect the project site.

4.2 Pavement Recommendations

4.2.1 Existing Pavement Sections and Conditions

Existing pavement sections in the project area are generally in fair to good condition with only localized cracking or damage. The existing pavement section was measured in the two roadway borings, A-12-003 and A-12-005. Existing sections consist of Hot Mix Asphalt (HMA) underlain by Aggregate Base (AB). The base layer thickness at the boring locations ranges between 10 and 14 inches. The HMA layer is 7-inches thick in boring A-12-005 and 9-inches thick in boring A-12-003. It appears the HMA was applied in two 4.5-inch lifts at A-12-003 (possibly overlay).

4.2.2 Quiet Pavement

Based on conversations with STV, we understand that the City is considering the use of Quiet Pavement technology to reduce the tire/pavement noise from the widened roadway. As the project site is located near a school, hospital, and residential community, it is considered in an area of frequent human use and may benefit from noise-reducing technologies. Caltrans Office of Concrete Pavement and Pavement Foundations has a myriad research to identify Quiet Pavement surface treatments, materials, design specifications, and construction methods that result in a safe, durable and cost effective product.

A literature review of the available research indicates that pavements intended to reduce noise may be designed and maintained in accordance with guidelines issued by the Quieter Pavement Bulletin, effective October 15, 2009 (Caltrans, 2009) and the Caltrans Highway Design Manual (Caltrans, 2006). Either rubberized Hot Mix Asphalt (HMA) or Open Graded Friction Course (OGFC) surface treatment may be used as noise-reducing construction materials. In addition to noise reduction, these materials may also reduce glare, improve fast drainage of water, and eliminate tire spray and hydroplaning (NAPA, 1998). Rubberized HMA may be used as a structural wearing course layer as part of the surface layer at a minimum thickness of 0.20 foot. OGFC may be used as a non-structural wearing course above the surface layer at a minimum thickness of 0.1 ft.

4.2.3 R-Value

Two bulk samples were tested to evaluate the R-value for near surface soils. Based on laboratory testing, the subgrade soil has a minimum R-value of 12.

4.2.4 Traffic Index

Based on our conversation with STV, we understand the City has provided a Traffic Index (TI) of 9.2 for design of the widened Paseo de Valencia.

4.2.5 Structural Pavement Section

The pavement section should be designed based on the design R-value and Traffic Index (TI). The Caltrans Highway Design Manual was used for design of the recommended HMA over Aggregate Base (AB) pavement sections.

Design R-Value: 12

	Section Thickness
Traffic Index	**HMA Over AB (feet)**
9.2	0.45 AC/1.60 AB

The upper 8-inches of subgrade supporting pavements should be moisture conditioned to near optimum and compacted to at least 95 percent relative compaction (ASTM D1557). AB should be Class 2 in accordance with Caltrans or Greenbook and be compacted to not less than 95% relative compaction.

The existing roadway pavements may be crushed and reused onsite as base or fill, provided it meets these requirements.

4.3 Foundation Recommendations

4.3.1 Minor Structure Foundations

Lightly loaded structures may be supported on shallow spread footings provided that subgrade is prepared as recommended in the following sections and in accordance with expansive soil requirements described in Section 4.1.4. The minimum recommended footing depth is 18 inches below undisturbed ground/finished grade and minimum recommended footing width is 12" for strip and isolated footings. The allowable bearing capacity for the minimum 12" wide by 12" deep strip and isolated footings is 1.5 ksf; this may be increased by 0.5 ksf for each additional foot of width and for each additional foot of depth below the minimum, not to exceed 2.5 ksf.

The allowable bearing pressures assume that the footings are founded in undisturbed native soil or properly compacted fill. These values have a minimum factor of safety of 3 with respect to a bearing failure. The allowable bearing pressure can be increased by one-third for temporary loads associated with wind and seismic loading.

All foundation excavations should be supported in competent undisturbed native soils or compacted fill and should be checked by the project geotechnical engineer before the placement of reinforcing steel. Any loose or soft soils found should be excavated and replaced with structural fill or lean concrete slurry. The limits and depth for the excavation and replacement should be determined by the geotechnical engineer.

4.3.2 Lateral Resistance

Concrete bearing on existing clayey soils may be designed for an ultimate soil-to-concrete sliding friction coefficient of 0.35. For footings with a key so that sliding occurs along a soil-soil interface, an ultimate sliding friction coefficient may be taken as soil-to-soil friction of 0.65. Passive resistance may be taken as an equivalent fluid pressure of 300 pcf. For sustained lateral loads, a factor of safety of 1.5 should be applied to the above values. A factor of safety of 1.1 may be used for wind or seismic loads. Friction and passive may be combined without reduction.

4.3.3 Soundwall Foundations

We understand that soundwalls may be constructed between the widened roadway and nearby residential properties. The sound walls may be Masonry Block on Pile Cap or Masonry Block on Type 736/SV Barrier in accordance with the 2010 Caltrans Standard Plans. The most economical foundation type will be Cast-In-Drilled-Hole (CIDH) piles. The site is well-suited due to cohesive soil and lack of groundwater. For use with the Caltrans Standard Plans, a soil friction angle of 35 degrees may be used for sound wall foundation installed in native formational soil or engineered fill compacted to 95% relative compaction in accordance with ASTM D 1557. We recommend a friction angle of 30 degrees be used where the soundwall foundations will be installed in engineered fill compacted to 90% relative compaction. Case 1 should be used where there is level ground ($^+$/- 10%) on both side of the wall and Case 2 should be used where there is level ground ($^+$/- 10%) on the traffic side of the wall and sloping ground no steeper than 2:1 on the opposite side.

4.3.4 Settlement

Total settlement of minor foundations under static loads is expected to be ½ inch or less, and will occur quickly after placement of the structural loads. Differential settlement may be taken as ¼" over 20 feet.

4.3.5 Lateral Earth Pressures

On-site clayey materials are not suitable for use as wall backfill due to expansive potential and poor drainage. Therefore, offsite borrow soil should be used for wall backfill. Wall backfill soil should consist of low expansive granular soils having a sand equivalent (SE) of at least 20 and Expansion Index (EI) less than 50. The following lateral earth pressures may be used for the specified backfill material compacted to not less than 90% relative compaction:

- Active earth pressure (walls that can yield ¼" for each 10 ft height):
    - Soil unit weight: γ = 120 pcf
    - Active coefficient: Ka=0.28
    - Equivalent fluid pressure (EFP): 34 pcf

- At-rest earth pressure (restrained walls, braced walls):
    - Soil unit weight γ = 120 pcf
    - At-rest coefficient: Ko=0.45
    - Equivalent fluid pressure (EFP): 54 pcf

Soil passive resistance may be taken as 300 pcf.

4.3.6 Retaining Wall Backfill

All retaining walls should be backfilled with low expansive granular soils having a sand equivalent (SE) of at least 20 and Expansion Index (EI) less than 50. On-site soils do not meet this criterion. Backfill should be compacted to not less than 90% relative compaction (ASTM D 1557). In addition, all walls should have a properly designed drainage system to prevent buildup of hydrostatic pressures behind the wall. This may consist of geocomposite strip drains and weepholes.

4.3.7 General Imported Fill

In general, imported general fill soil should have a maximum particle size of 3 inches in any dimension, less than 50% passing the Number 200 sieve, and a Plasticity Index (PI) less than 15.

4.4 Site Preparation and Grading

4.4.1 Clearing and Grubbing

The site is currently covered by grass and small trees and contains existing improvements such as roadway, sidewalk, curb and gutter, and paved / unpaved, bike, equestrian, and walking paths. Following demolition and prior to general site grading, clearing and grubbing should be performed in accordance with the current edition of Standard Specifications for Public Works Construction (SSPWC, a.k.a. "Greenbook"), Section 300-1. Any debris, pavements, rubble, existing undocumented fill, vegetation, or other deleterious items should be removed and disposed of outside the construction limits. The vegetation should be removed from the site. The topsoil may be stockpiled and reused in planned landscape areas. Any soils loosened during clearing should also be removed.

All active or inactive utilities within the construction limits should be identified for relocation, abandonment, or protection prior to grading. Any pipes greater than 2 inches in diameter to be abandoned in-place should be filled with sand/cement slurry. The adequacy of existing backfill around utilities to remain in place under new structures should be evaluated; loose or dumped trench backfill should be removed and replaced with properly compacted backfill.

4.4.2 Excavation

Only shallow excavations are anticipated for this project. Based on the boring logs, excavation of near surface soils within the upper 10 feet should be readily accomplished using conventional heavy duty grading equipment. If cemented materials are encountered within excavations, difficult excavation or heavy ripping could be encountered.

4.4.3 Subgrade Preparation

To provide uniform support below areas to receive new fills or the proposed roadway and pavement, we recommend that after clearing and grubbing, the subgrade be proof rolled with loaded heavy equipment. Any loose or pumping soil should be removed and recompacted or stabilized with geogrid (Tensar BX 1200 or equal) and aggregate as directed by the geotechnical engineer in the field.

After successful proof rolling or stabilization, the upper 8" below the grading plane should be scarified and compacted to 90% relative compaction in areas to receive general fill and 95% in areas to receive pavements, hardscape, or structures, as per ASTM D 1557-91 at or near its optimum moisture content.

Deeper removals will be required if loose fill, loose native soils, highly porous soils, wet soils, organic materials, or other unsuitable materials are encountered at the bottom of the excavation. The actual limits for removals should be determined by the project geotechnical engineer during grading, based on the actual conditions encountered.

4.5 Temporary Excavation and Shoring

Near surface soils generally classify as OSHA Type A. Temporary excavations up to 5 feet deep should stand temporarily with vertical sides. In general, temporary construction excavations may be made at a maximum of 3/4:1 (horizontal: vertical) slope without shoring above the water table. Stability of construction excavations is the responsibility of the contractor, and should follow all applicable OSHA regulations. The designated competent person on site should observe all excavations to verify they are stable or recommend laying back or shoring the excavation.

No surcharge loads should be permitted within a horizontal distance equal to the height of cut or 5 ft from the top of the slopes, whichever is greater, unless the cut is shored. Excavations that extend below an imaginary plane inclined at 2h:1v below the edge of any adjacent existing site foundations or roadways should be properly shored to maintain support of the adjacent structures. The contractor will be responsible for the design of the shoring and dewatering. All excavation and shoring systems should meet the minimum requirements of the Occupational Safety and Health (OSHA) Standards.

If space is not available for excavation, shoring may be used. For restrained shoring such as trench shields a uniform rectangular earth pressure lateral pressure of 30H psf plus 50 percent of any surcharge or traffic loads should be included as a uniform rectangular loading on the shoring.

4.6 Site Drainage

The site should be graded to maintain positive drainage, so all runoff is properly collected and conveyed away from foundations to proper disposal in approved storm drains or drainage devices.

4.7 Utility Trenches

4.7.1 Bedding

Bedding zone shall be defined as the area containing the material specified that is supporting, surrounding, and extending to 1 foot above the top of pipe. The bedding shall satisfy the requirements of Standard Specifications for Public Works Construction (SSPWC) Section 306-1.2.1. There shall be 4-inch minimum of bedding below the pipe and 1 inch minimum clearance below a projecting bell. There shall be a minimum side clearance of 6 inches on each side of the pipe. Bedding material shall be sand, gravel, crushed aggregate, or native free-draining material having a Sand Equivalent of not less than 30, or other material approved by the engineer. We recommend that the materials used for the bedding zone be placed, and compacted with mechanical means. Jetting shall not be allowed.

4.7.2 Backfill

Backfill shall be considered as starting 12-inches above the pipe. Any boulders or cobbles larger than 3 inches in any dimensions should be removed before backfilling. We recommend that all backfill should be placed in lifts not exceeding six to eight inches in thickness and be compacted to at least 90 percent of maximum dry density as determined by the ASTM D-1557. The upper 12 inches below pavement should be compacted to at least 95 percent of maximum dry density. Mechanical compaction will be required to accomplish compaction above the bedding zone; jetting shall not be allowed.

In backfill areas, where mechanical compaction of soil backfill is impractical due to space constraints, sand-cement slurry may be substituted for compacted backfill. The slurry should contain one sack of cement per cubic yard and have a maximum slump of 5-inches. When set, such a mix typically has the consistency of hard compacted soil, and allows for future excavation.

4.8 Soil Corrosivity

A representative sample of the near surface soils was tested to evaluate its corrosion characteristics. The results indicate the test sample had a pH of 8.1, chloride content of 106 ppm, and water-soluble sulfate content of 20 ppm. The sulfate results indicate that sulfate exposure is negligible (ACI 318, Table 4.3.1). Based on the 2010 CBC, the corrosion potential for sulfate attack on concrete in contact with native soils is negligible. The corrosion potential for chloride on concrete is also negligible (ACI 318).

The tested soil had minimum measured electrical resistivity of 581 Ohm-cm. To evaluate the corrosion potential of near-surface soils on buried metals, we used the following correlation between electrical resistivity and corrosion potential:

Elect. Resistivity, Ohm-cm	Corrosion Potential
Less than 1,000	Severe
1,000-2,000	Corrosive
2,000-10,000	Moderate
Greater than 10,000	Mild

Based on these data, it is our opinion that general onsite near-surface soils have a severely corrosive potential for buried metal. This should be considered in design of any buried metal elements, and a corrosion expert should be consulted for mitigation measures if required. Laboratory corrosion test results from the site are presented in Appendix B.

4.9 Construction Considerations

The following issues should be considered during construction phase activities:

- Work within the existing roadway may require traffic control and/or lane closures or night work with limited construction staging areas;
- Buried utilities, surface improvements, and other obstructions are present and may cause construction conflicts;
- We anticipate that the proposed excavations will not encounter the permanent groundwater table; however, perched water could be encountered, and if excessive seepage occurs it may be necessary to take additional measures;
- Site grading and structural improvements may require various temporary excavations. The contractor should submit temporary excavation and drawings for the engineer's approval prior to excavation;

- Nearby residential properties may limit the hours in the day for construction; it is important to consider the noise impacts to the nearby residential properties; and
- Our subsurface characterization is based on explorations performed at the locations shown in Figures 2A, 3A, and 3B. Subsurface conditions between these locations are based on extrapolation. Therefore, if conditions different than those assumed in the design are encountered during construction or CIDH pile excavations, GDC should be notified immediately so that we can assess the impact to our current recommendations and make appropriate modifications, if necessary.

4.10 Community Concerns

We understand that local residents have expressed concern at recent community meetings regarding existing soil movement problems at their residences, and the potential for additional movements resulting from construction activities associated with the proposed project. Since the roadway project site appears to be underlain at the surface entirely by stable Tertiary formational material, it is unlikely that construction equipment operation or excavations would adversely affect the adjacent off-site residential structures. Existing distress reported at these residences could be a result of the structures being supported on expansive fills, which are prone to soil movements over time.

To guard against potential damage claims during construction, and to document pre-existing conditions, the City may consider the following measures:

- Have Group Delta perform a data review of off-site soil conditions at affected residences including areas potentially underlain by fill soils;
- Have Group Delta perform pre-construction rear yard inspections to document existing conditions at each affected residence. This could include:
  - Visual observations of cracking, soil movements, or other distress
  - Photographic documentation
  - Site inspection report
- Monitoring during construction:
  - Settlement monitoring along the property line or within rear yards
  - Vibration monitoring
- Post-construction inspections, if necessary.

5.0 LIMITATIONS

This investigation was performed in accordance with generally accepted geotechnical engineering principles and practice. The professional engineering work and judgments presented in this report meet the standard of care of our profession at this time. No other warranty, expressed or implied, is made.

The recommendations for this project are, to a high degree dependent upon proper quality control of grading and foundation construction. Consequently, the recommendations are made contingent on the opportunity of Group Delta to observe grading operations, mat foundation installation, and subgrade/base preparation. If parties other than Group Delta are engaged to provide such services, they must be notified that they will be required to assume complete responsibility for the geotechnical phase of the project by concurring with the recommendations in this report or provide alternate recommendations as deemed appropriate.

6.0 REFERENCES

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TABLES

TABLE 1
CBC 2010 / ASCE 7-05 ACCELERATION RESPONSE SPECTRA

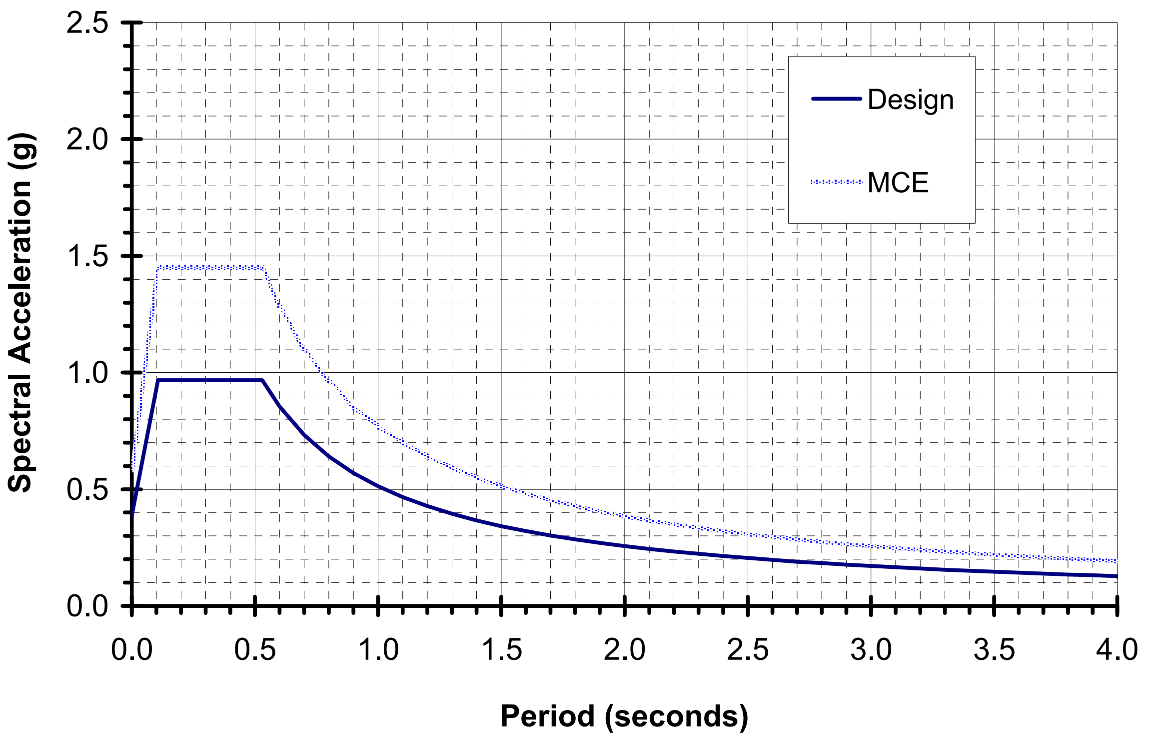
GDC PROJECT NO. IR-556 Paseo de Valencia Widening Project

Site Latitude: 33.5992 **Site Longitude: -117.7018**

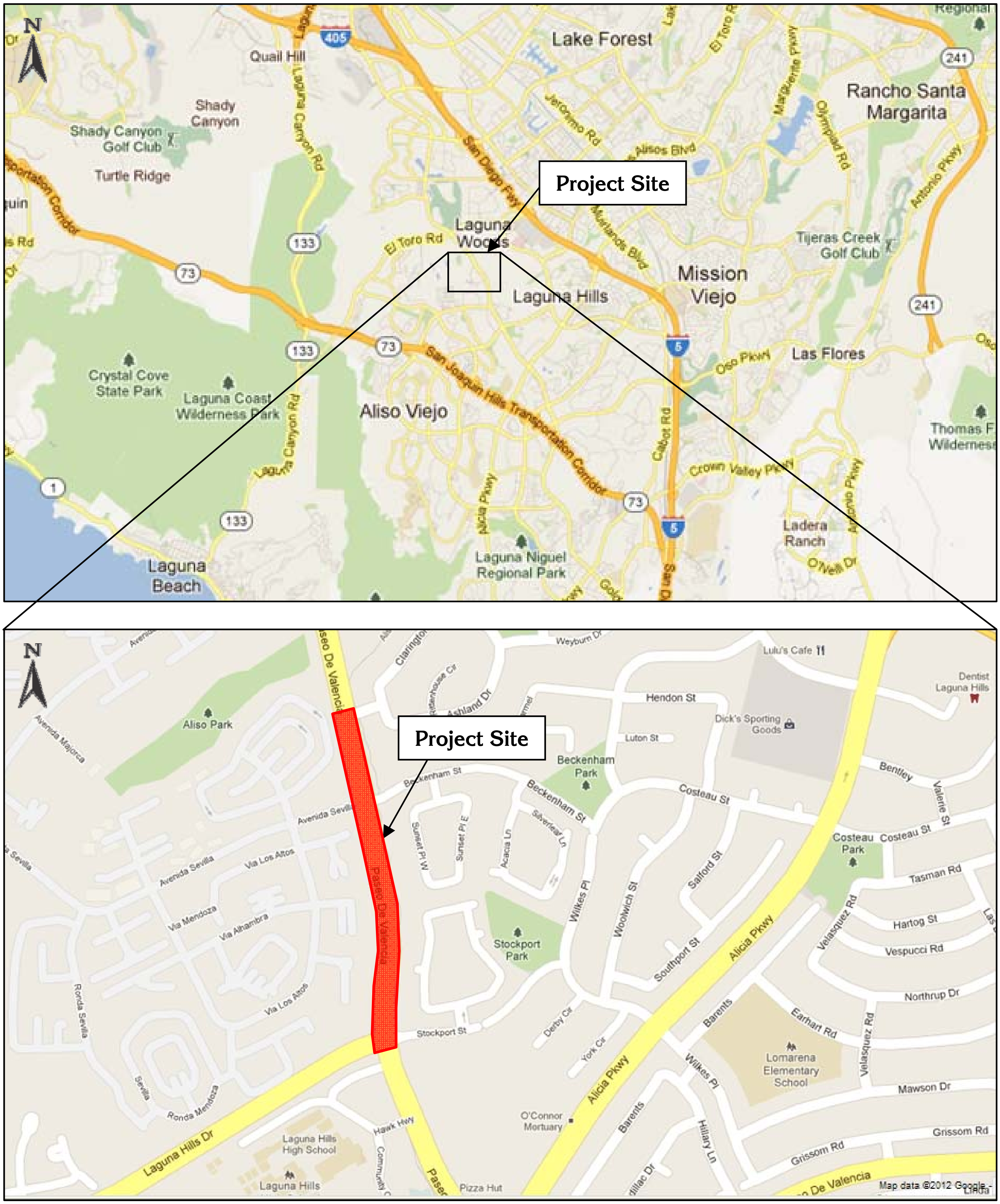
INPUT	S_S=	1.451	g = short period (0.2 sec) mapped spectral response acceleration MCE Site Class B (**CBC 2010 Fig. 1613.5(3) or USGS Ground Motion Calculator**)
	S_1=	0.513	g = 1.0 sec period mapped spectral response acceleration MCE Site Class B (**CBC 2010 Fig. 1613.5(4) or USGS Ground Motion Calculator)**
	Site Class=	D	= Site Class definition based on **CBC 2010 Table 1613.5.2**
	F_a=	1.00	= Site Coefficient applied to S_s to account for soil type (**CBC 2010 Table 1613.5.3(1)**)
	F_v=	1.500	= Site Coefficient applied to S_1 to account for soil type (**CBC 2010 Table 1613.5.3(2)**)
	T_L=	8.00	sec = Long Period Transition Period (**ASCE 7-05 Figure 22-16**)
OUTPUT	S_{MS}=	1.451	= site class modified short period (0.2 sec) MCE spectral response acceleration = F_a x S_s (**CBC 2010 Eqn. 16-37**)
	S_{M1}=	0.770	= site class modified 1.0 sec period MCE spectral response acceleration = F_v x S_1 (**CBC 2010 Eqn. 16-38**)
	S_{DS}=	0.967	= site class modified short period (0.2 sec) Design spectral response acceleration = 2/3 x S_{MS} (**CBC 2010 Eqn. 16-39**)
	S_{D1}=	0.513	= site class modified 1.0 sec period Design spectral response acceleration = 2/3 x S_{M1} (**CBC 2010 Eqn. 16-40**)
	T_0=	0.106	sec = 0.2 S_{D1}/S_{DS} = Control Period (left end of peak) for ARS Curve (Section 11.4.5 ASCE 7-05)
	T_S=	0.530	sec = S_{D1}/S_{DS} = Control Period (right end of peak) for ARS Curve (Section 11.4.5 ASCE 7-05)

SPECTRUM CALCULATION

T (seconds)	Design Sa (g)	MCE Sa (g)
0.000	0.387	0.580
0.106	0.967	1.451
0.530	0.967	1.451
0.600	0.855	1.283
0.700	0.733	1.099
0.800	0.641	0.962
0.900	0.570	0.855
1.000	0.513	0.770
1.100	0.466	0.700
1.200	0.428	0.641
1.300	0.395	0.592
1.400	0.366	0.550
1.500	0.342	0.513
1.600	0.321	0.481
1.700	0.302	0.453
1.800	0.285	0.428
1.900	0.270	0.405
2.000	0.257	0.385
2.100	0.244	0.366
2.200	0.233	0.350
2.300	0.223	0.335
2.400	0.214	0.321
2.500	0.205	0.308
2.600	0.197	0.296
2.700	0.190	0.285
2.800	0.183	0.275
2.900	0.177	0.265
3.000	0.171	0.257
3.100	0.165	0.248
3.200	0.160	0.240
3.300	0.155	0.233
3.400	0.151	0.226
3.500	0.147	0.220
3.600	0.143	0.214
3.700	0.139	0.208
3.800	0.135	0.203
3.900	0.132	0.197
4.000	0.128	0.192
4.000	0.128	0.192



FIGURES



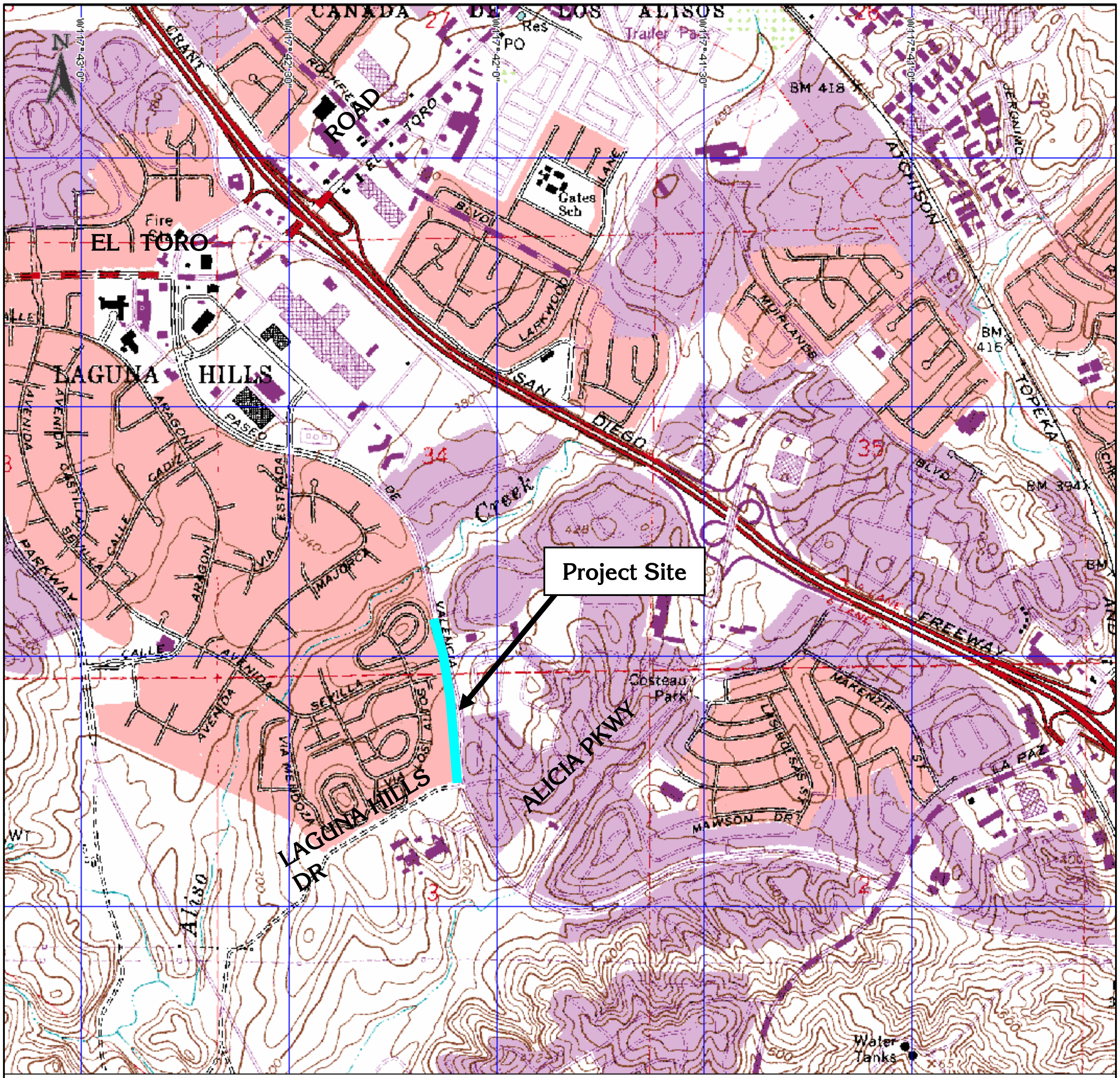
Reference: Google Maps

GDC Project No. IR-556

Paseo de Valencia Widening Project
Laguna Hills, California

Vicinity Map

Figure 1A



1999 DeLorme Yarmouth, ME 04096 Source Data: USGS 600 ft Scale: 1 : 20,800 Detail: 13-3 Datum: WGS84

Reference: USGS, DeLorme Yarmouth, ME 04096

GROUP DELTA CONSULTANTS

GDC Project No. IR-556

Paseo de Valencia Widening Project
Laguna Hills, California

USGS 7.5' Quadrangle Map

Figure 1B

Reference: Google Earth

⊕ = **Location of GDC Hollow Stem Auger Boring**

🟨 = **Existing roadway to be widened**

🟦 = **Proposed area of expansion (Existing Aliso Creek Riding and Hiking Trail)**

GROUP DELTA CONSULTANTS

GDC Project No. IR-556

Paseo De Valencia Widening Project
Laguna Hills, California

Exploration Location Plan

Figure 2A

9.23.2011 11:46 AM PASEO-DE-VALENCIA (CIVIL3D 2011).DWG

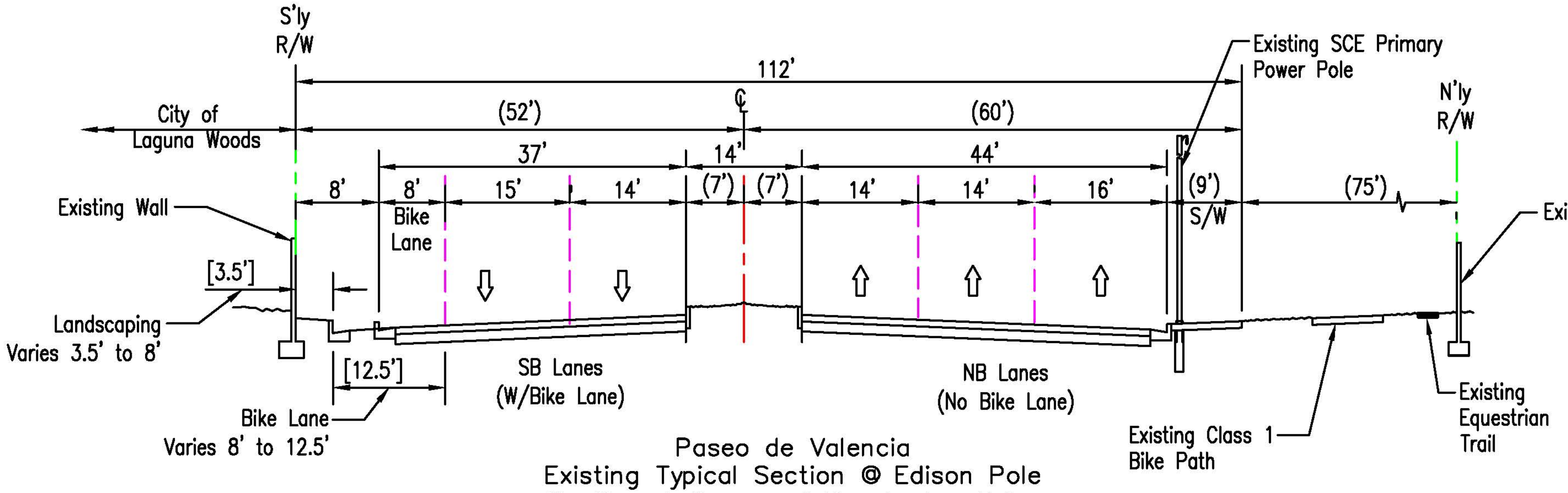
STV

PASEO DE VALENCIA
STREET IMPROVEMENTS BETWEEN
LAGUNA HILLS DRIVE AND
KENNINGTON DRIVE

DATE: SEPTEMBER 21, 2011
NOT FOR CONSTRUCTION

Figure 2B - Site Improvement Plan

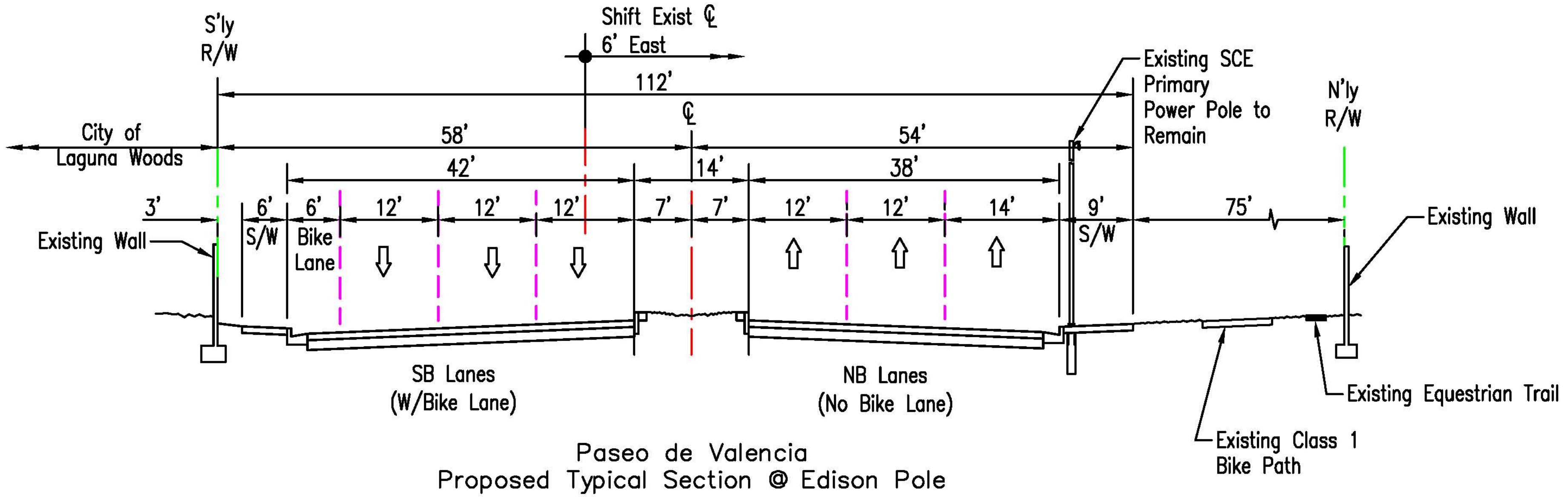
11.9.2011 2:42 PM PASEO-DE-VALENCIA (CIVIL3D 2011)_SECTIONS.DWG



Paseo de Valencia
Existing Typical Section @ Edison Pole
Southeast Corner of Kennington Drive

( ) Per As-Built Drawings
Tract 8103 and 8091

[ ] Per Field Measurements



Paseo de Valencia
Proposed Typical Section @ Edison Pole
Southeast Corner of Kennington Drive

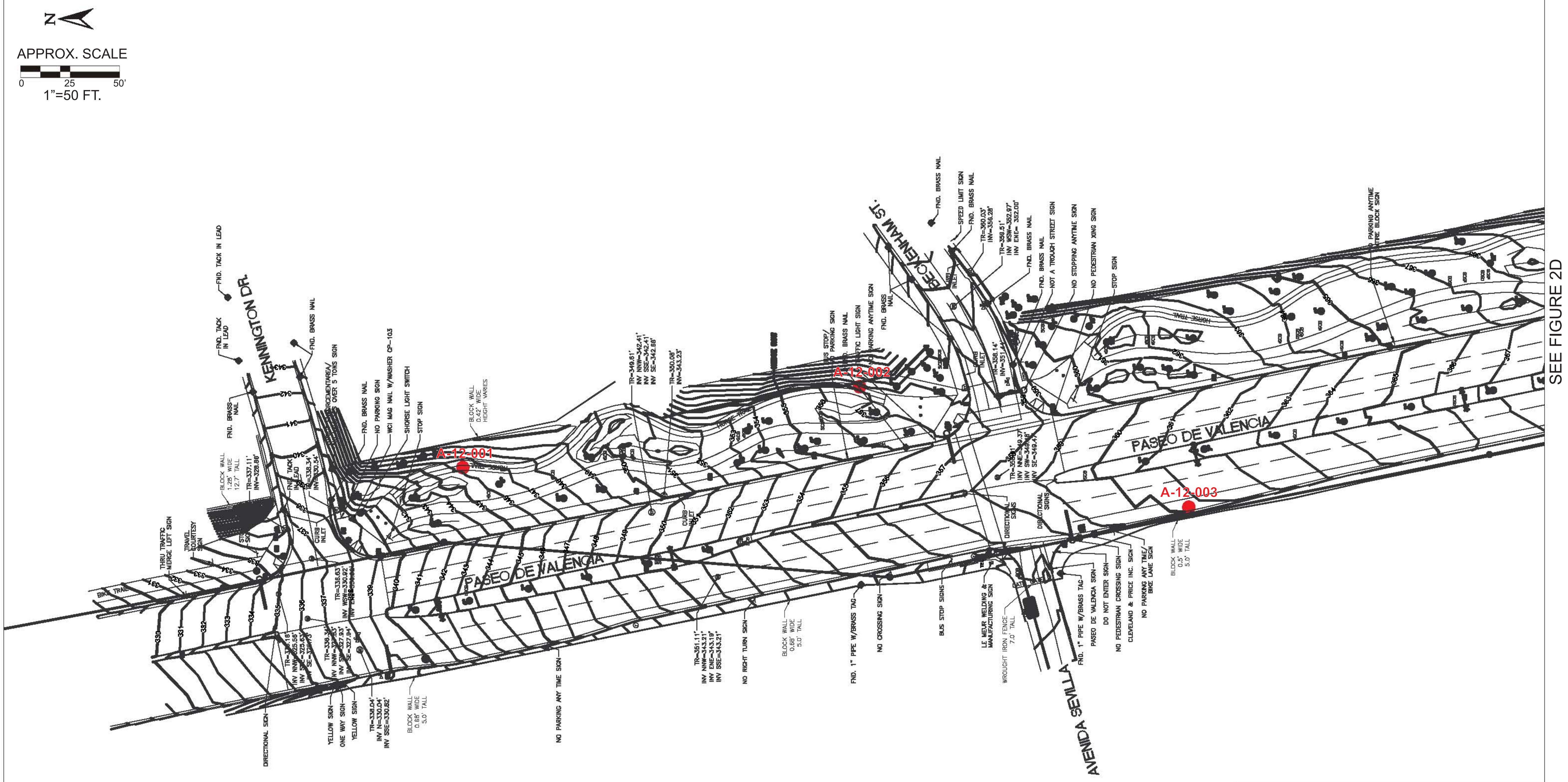
0 20' 40'
SCALE: 1"=20'

STV

PASEO DE VALENCIA
STREET IMPROVEMENTS BETWEEN
LAGUNA HILLS DRIVE AND
KENNINGTON DRIVE

DATE: NOVEMBER 15, 2011
NOT FOR CONSTRUCTION

Figure 2C - Site Improvement Plan



LEGEND

● LOCATION OF BORING BY GDC

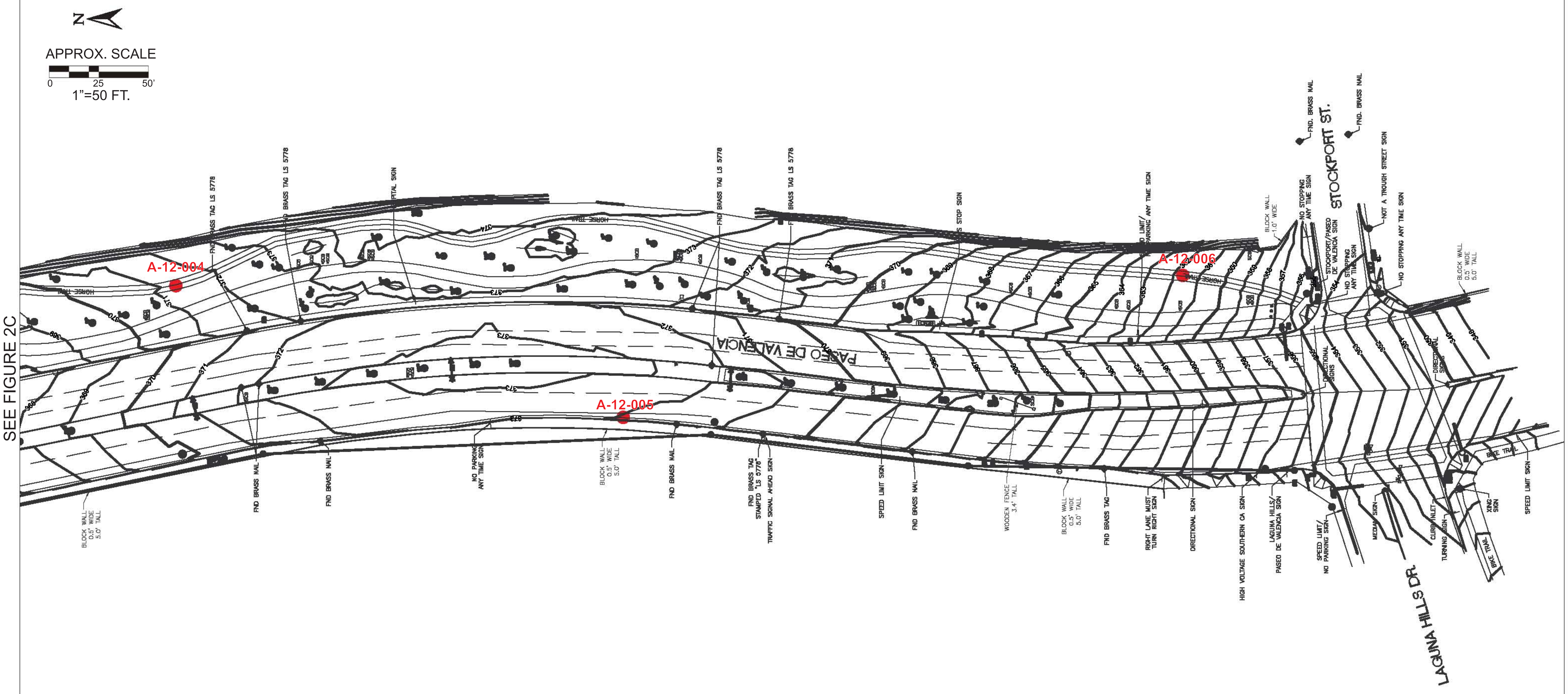
GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618 (949) 450-2100

FIGURE NUMBER
3A

PROJECT NAME
PASEO DE VALENCIA WIDENING
LAGUNA HILLS, CALIFORNIA

PROJECT NUMBER
IR-556

SITE TOPOGRAPHIC MAP



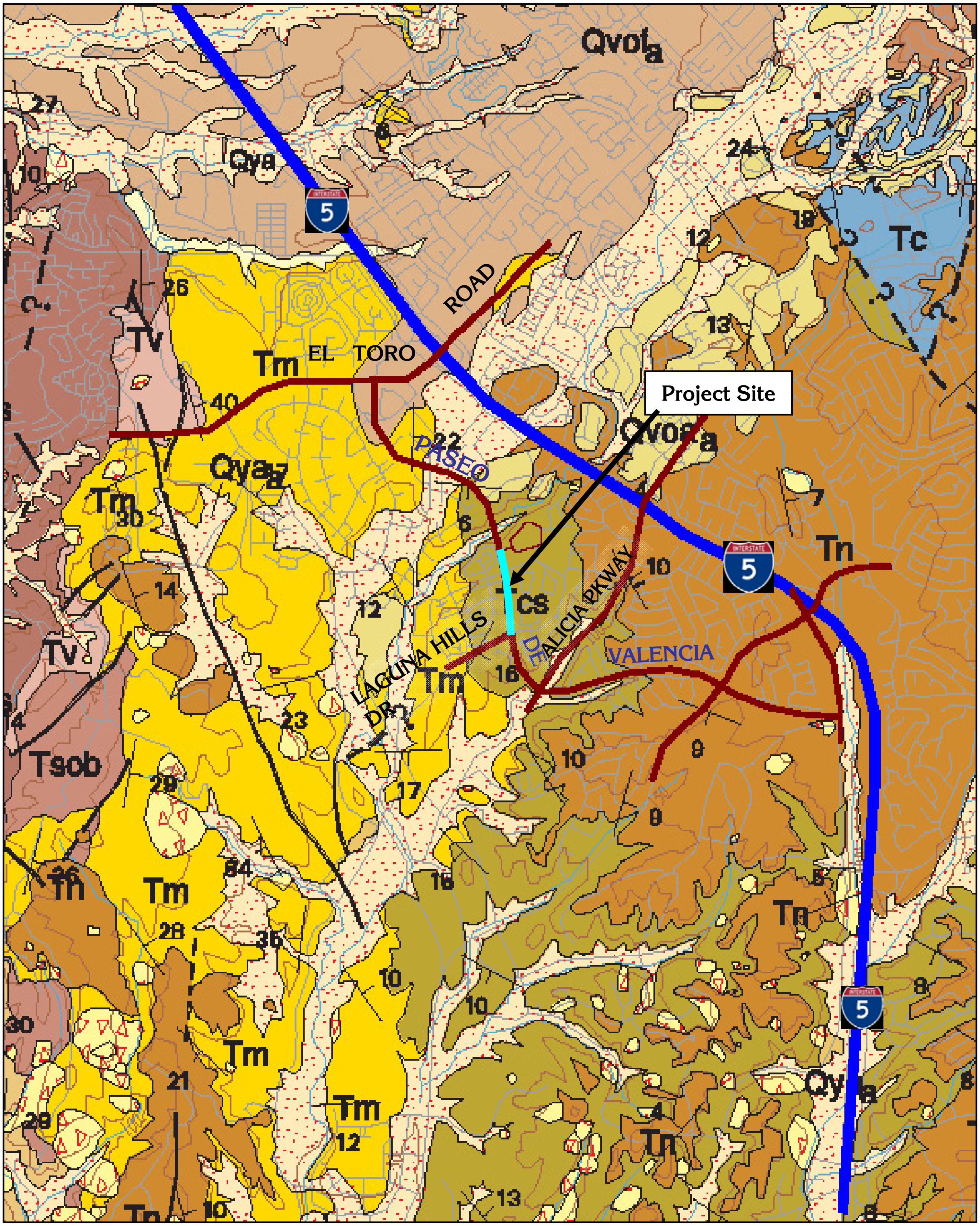
LEGEND

● LOCATION OF BORING BY GDC

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618 (949) 450-2100

FIGURE NUMBER	3B
PROJECT NAME PASEO DE VALENCIA WIDENING LAGUNA HILLS, CALIFORNIA	PROJECT NUMBER IR-556

SITE TOPOGRAPHIC MAP



Reference: *USGS, Preliminary Geologic Map of the Santa Ana 30' x 60' Quadrangle.*

LEGEND

Qal = Alluvium
Tcs = Capistrano Formation (Siltstone)
Tm = Monterey Formation
Tn = Niguel Formation

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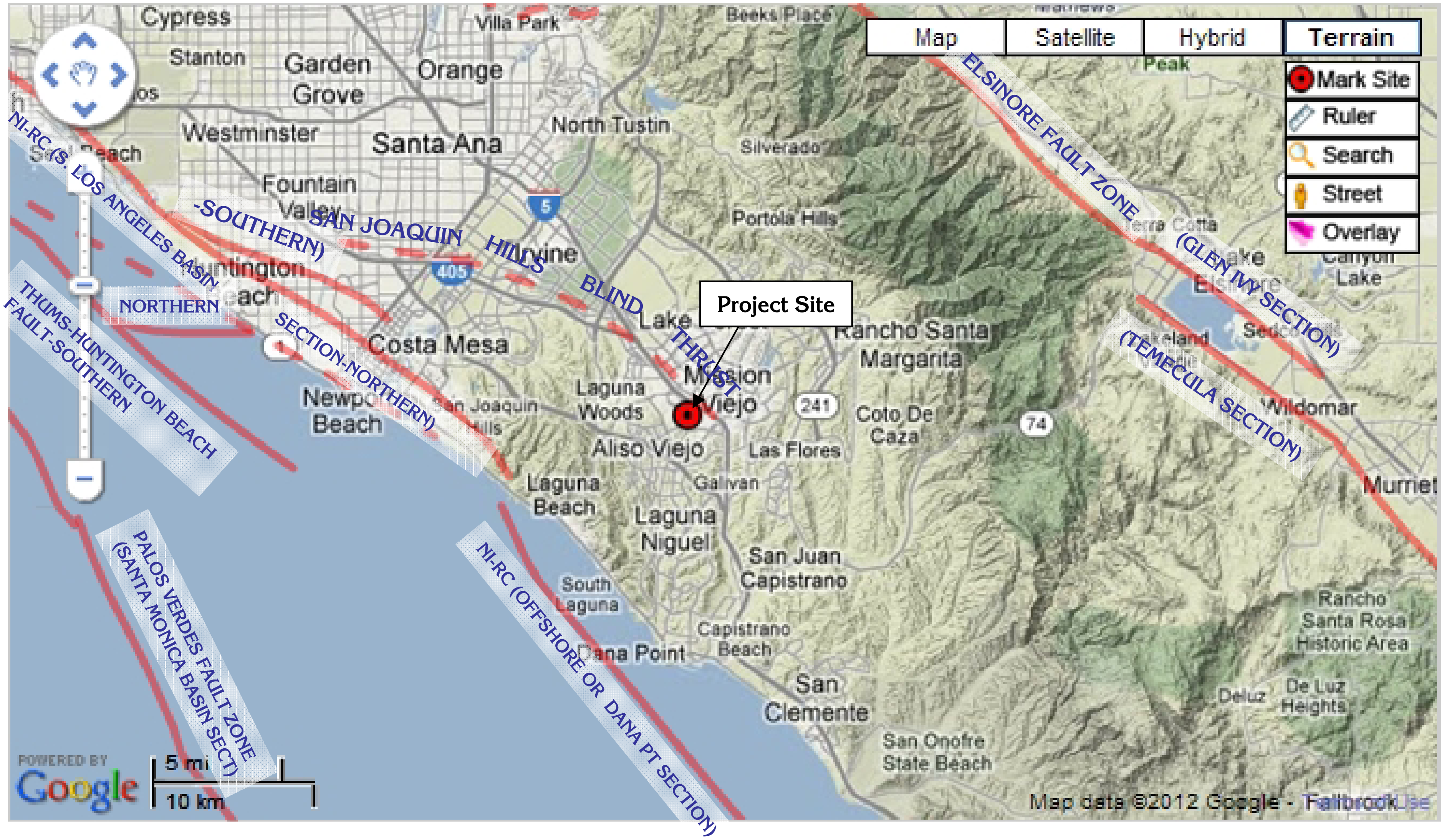
GDC Project No. IR-556

Paseo de Valencia Widening Project
Laguna Hills, California

Regional Geologic Map

Figure 4



Reference: Caltrans ARS Online v1.0.4

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GDC Project No. IR-556

Paseo De Valencia Widening Project
Laguna Hills, California

Regional Fault Map

Figure 5

APPENDIX A
FIELD INVESTIGATION

APPENDIX A
FIELD INVESTIGATION

A.1 Introduction

The subsurface conditions at the Paseo de Valencia site were investigated by performing six hollow-stem auger borings on March 30, 2012. The locations of the explorations are presented in Figure 2A, 3A, and 3B of the main report. A summary of field explorations is presented in Table A-1.

Prior to beginning the exploration program, access permission and drilling permits were obtained as necessary from the City of Laguna Hills. Subsurface utility maps were reviewed prior to selecting locations for subsurface investigations. Underground Service Alert (USA) was notified and each exploration location was cleared for underground utilities. Approved traffic control plans were implemented where necessary during field activities. The exploration methods are described in the following sections.

A.2 Soil Drilling and Sampling

Drilling, Logging, and Soil Classification

Borings were performed by GDC's drilling subcontractors Scott's Drilling Service under the continuous technical supervision of a GDC field engineer, who visually inspected the soil samples, measured groundwater levels, maintained detailed records of the borings, and visually / manually classified the soils in accordance with the ASTM D 2488 and the Unified Soil Classification System (USCS). Logging and classification was performed in general accordance with Caltrans "Soil and Rock Logging, Classification, and Presentation Manual (2010 Edition)". A Boring Record Legend and Key for Soil Classification are presented in Figures A-1A through A-1E. The boring records are presented in Figures A-2 through Figure A-7.

Sampling

Bulk samples of soil cuttings were collected at selected depths and drive samples were collected at a typical interval of 2.5 feet from the borings. The sampling was performed using Standard Penetration Test (SPT) samplers in accordance with ASTM D 1586 and Ring-Lined "California" Split Barrel samplers in accordance with ASTM D 3550.

Bulk samples were collected from auger cuttings and placed in plastic bags.

SPT drive samples were obtained using a 2-inch outside diameter and 1.375-inch inside diameter split-spoon sampler without lining. The soil recovered from the SPT sampling was sealed in plastic bags to preserve the natural moisture content.

California drive samples were collected with a 3-inch outside diameter 2.5-inch inside diameter split barrel sampler with a 2.42-inch inside diameter cutting shoe. The sampler barrel is lined with 18-inches of metal rings for sample collection and has an additional length of waste barrel. Stainless steel or brass liner rings for sample collection are 1-inch high, 2.42-inch inside diameter, and 2.5-inch outside diameter. California samples were removed from the sampler, retained in the metal rings and placed in sealed plastic canisters to prevent loss of moisture.

At each sampling interval, the drive samplers were fitted onto sampling rod, lowered to the bottom of the boring, and driven 18 inches or to refusal (50 blows per 6 inches) with a 140-lb hammer free-falling a height of 30-inches using a rope and cathead hammer.

Compared to the SPT, the California sampler provides less disturbed samples.

Penetration Resistance

SPT blow counts adjusted to 60% hammer efficiency (N_{60}) are routinely used as an index of the relative density of coarse grained soils, and are sometimes used (but less reliable) to estimate consistency of cohesive soils. For samples collected using non-SPT samplers, different hammer weight and drop height, and/or efficiency different than 60%, correction factors can be applied to estimate the equivalent SPT N_{60} value following the approach of Burmister (1948) as follows:

$$N^*_{60} = \quad N_R * C_E * C_H * C_S$$

where

N^*_{60} = equivalent SPT N_{60}

N_R = Raw Field Blowcount (blows per foot)

C_E = Hammer Efficiency Correction = Er_i / 60%

C_H = Hammer Energy Correction = (W * H) / (140 lb * 30 in)

C_S = Sampler Size Correction = $[(2.0 \text{ in})^2-(1.375 \text{ in})^2]/[D_o^2-D_i^2]$

Er_i = hammer efficiency, %

W= actual drive hammer weight, lbs

H = actual drive hammer drop, inch

D_o, D_i = actual sampler outside and inside diameter, respectively, inches

Burmister's correction assumes that penetration resistance (blowcount) is inversely proportional to the hammer energy. For a hammer other than a 140# hammer with 30" drop the hammer energy correction is equal to the ratio of the theoretical hammer energy (weight times drop) to the theoretical SPT hammer energy, or C_H = (W * H) / (140 lb * 30 in).

Burmister's correction assumes that penetration resistance (blowcount) is proportional to the annular end area of the drive sampler. For California drive samplers with D_o=3 inch and D_i=2.42 inch the sampler size correction factor is the ratio of the annular area of an SPT split spoon to that of the California Sampler, or $C_S = [2.0^2-1.375^2]/[3^2-2.42^2] = 0.67$.

To normalize the field SPT and California blowcounts to a hammer with 60% efficiency, an energy correction factor equal to Hammer Efficiency (%) / 60% was applied to the field blowcounts. Hammer efficiency was determined by published correlations with the CME Automatic Hammer blow count rate (USBR, 1999).

The correction factors applied to obtain N^*_{60} are summarized in the following table:

Borings	**Hammer Type**	**Hammer Weight and Drop**	**C_H**	**Hammer Efficiency (%)**	**C_E**	**Cal Sampler Dimensions**	**C_S**	**Combined Correction Factor SPT Samples**	**Combined Correction Factor CAL Samples**
A-12-001 A-12-002 A-12-003 A-12-004 A-12-005 A-12-006	Rope and Cathead	140# 30" or other	1.0	60	ERi/60	D_o=3.0" D_i=2.42"	0.67	1.0	0.67

Corrected N^*_{60} are generally used, with due engineering judgment, only for qualitative assessment of in place density or consistency, and are not used for other more critical analyses such as liquefaction.

Relative Density and Consistency

Equivalent SPT N_{60} values were used as the basis for classifying relative density of granular/cohesionless soils. Wherever possible consistency classification of cohesive soils was based on undrained shear strength estimated in the field with a pocket penetrometer or by testing in the laboratory. Where pocket penetrometer or other tests could not be performed, consistency of cohesive soils was estimated by correlations to Equivalent SPT N_{60}. The correlations for consistency and relative density are shown in the Boring Record Legend, Figures A-1A through A-1C. Drive sample field blow counts, SPT N^*_{60} values, pocket penetrometer readings, and corresponding density/consistency classifications are presented on the boring records.

Borehole Abandonment

At the completion of the drilling groundwater was measured and the borings were abandoned by backfilling the borehole with drill cuttings, as indicated on the records. The surface was patched with cold mix asphalt concrete or quickset concrete, as necessary. Notes describing the borehole abandonment are presented at the bottom of each boring record.

Sample Handling and Transport

Geotechnical samples were sealed to prevent moisture loss, packed in appropriate protective containers, and transported to the geotechnical laboratory for further examination and geotechnical testing.

Laboratory Testing

The soils were further examined and tested in the laboratory and classified in accordance with the Unified Soil Classification System following ASTM D 2487 and D 2488 (see Figures A-1D and A-1E). Field classifications presented on the records were modified where necessary on the basis of the laboratory test results. Descriptions of the laboratory tests performed and a summary of the results are presented in Appendix B.

A.3 List of Attached Tables and Figures

The following tables and figures are attached and complete this appendix:

List of Tables

List of Figures

TABLE A-1
SUMMARY OF FIELD EXPLORATIONS

Exploration No.	Approximate Exploration Location		Date	Exploration			Figure No.
	Latitude	Longitude		Type	Surface Elevation (ft)	Total Depth (ft)	
A-12-001	33°36'4.12"N	117°42'6.88"W	3/30/12	HSA	346	16.5	A-2
A-12-002	33°36'0.73"N	117°42'5.91"W	3/30/12	HSA	357	16.5	A-3
A-12-003	33°35'58.20"N	117°42'7.10"W	3/30/12	HSA	360.5	5	A-4
A-12-004	33°35'54.24"N	117°42'4.36"W	3/30/12	HSA	371.5	21.5	A-5
A-12-005	33°35'50.32"N	117°42'5.60"W	3/30/12	HSA	372	16.5	A-6
A-12-006	33°35'45.89"N	117°42'4.09"W	3/30/12	HSA	362	16.5	A-7

Notes:

1) Boring locations are illustrated in Figures 2A, 3A, and 3B of the main report.

2) Elevations estimated to nearest 0.5 ft using measuring wheel and topographic map.

3) Ground water was not encountered in the borings in this field investigation.

HSA = Hollow-Stem Auger

SOIL IDENTIFICATION AND DESCRIPTION SEQUENCE

Sequence	Identification Components	Refer to Section		Required	Optional
		Field	Lab		
1	Group Name	2.5.2	3.2.2	●	
2	Group Symbol	2.5.2	3.2.2	●	
	Description Components				
3	Consistency of Cohesive Soil	2.5.3	3.2.3	●	
4	Apparent Density of Cohesionless Soil	2.5.4		●	
5	Color	2.5.5		●	
6	Moisture	2.5.6		●	
7	Percent or Proportion of Soil	2.5.7	3.2.4	●	⬬
	Particle Size	2.5.8	2.5.8	●	⬬
	Particle Angularity	2.5.9			○
	Particle Shape	2.5.10			○
8	Plasticity (for fine-grained soil)	2.5.11	3.2.5		○
9	Dry Strength (for fine-grained soil)	2.5.12			○
10	Dilatency (for fine-grained soil)	2.5.13			○
11	Toughness (for fine-grained soil)	2.5.14			○
12	Structure	2.5.15			○
13	Cementation	2.5.16		●	
14	Percent of Cobbles and Boulders	2.5.17		●	
	Description of Cobbles and Boulders	2.5.18		●	
15	Consistency Field Test Result	2.5.3		●	
16	Additional Comments	2.5.19			○

Describe the soil using descriptive terms in the order shown

Minimum Required Sequence:

USCS Group Name (Group Symbol); Consistency or Density; Color; Moisture; Percent or Proportion of Soil; Particle Size; Plasticity (optional).

⬬ = optional for non-Caltrans projects

Where applicable:

Cementation; % cobbles & boulders; Description of cobbles & boulders; Consistency field test result

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

HOLE IDENTIFICATION

Holes are identified using the following convention:

H – YY – NNN

Where:

H: Hole Type Code

YY: 2-digit year

NNN: 3-digit number (001-999)

Hole Type Code and Description

Hole Type Code	Description
A	Auger boring (hollow or solid stem, bucket)
R	Rotary drilled boring (conventional)
RC	Rotary core (self-cased wire-line, continuously-sampled)
RW	Rotary core (self-cased wire-line, not continuously sampled)
P	Rotary percussion boring (Air)
HD	Hand driven (1-inch soil tube)
HA	Hand auger
D	Driven (dynamic cone penetrometer)
CPT	Cone Penetration Test
O	Other (note on LOTB)

Description Sequence Examples:

SANDY lean CLAY (CL); very stiff; yellowish brown; moist; mostly fines; some SAND, from fine to medium; few gravels; medium plasticity; PP=2.75.

Well-graded SAND with SILT and GRAVEL and COBBLES (SW-SM); dense; brown; moist; mostly SAND, from fine to coarse; some fine GRAVEL; few fines; weak cementation; 10% GRANITE COBBLES; 3 to 6 inches; hard; subrounded.

Clayey SAND (SC); medium dense, light brown; wet; mostly fine sand,; little fines; low plasticity.

GROUP DELTA CONSULTANTS

GDC Project No. IR-556

Paseo de Valencia Widening Project
Laguna Hills, CA

BORING RECORD LEGEND #1

Figure A-1A

GROUP SYMBOLS AND NAMES

Graphic / Symbol	Group Names	Graphic / Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND	CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND		
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND	CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND	ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GM	SILTY GRAVEL SILTY GRAVEL with SAND	OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND		
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND	OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL		
SP	Poorly graded SAND Poorly graded SAND with GRAVEL	CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL		
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
SM	SILTY SAND SILTY SAND with GRAVEL		
SC	CLAYEY SAND CLAYEY SAND with GRAVEL	OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL		
PT	PEAT	OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	COBBLES COBBLES and BOULDERS BOULDERS		

FIELD AND LABORATORY TESTING

C	Consolidation (ASTM D 2435)
CL	Collapse Potential (ASTM D 5333)
CP	Compaction Curve (CTM 216)
CR	Corrosion, Sulfates, Chlorides (CTM 643; CTM 417; CTM 422)
CU	Consolidated Undrained Triaxial (ASTM D 4767)
DS	Direct Shear (ASTM D 3080)
EI	Expansion Index (ASTM D 4829)
M	Moisture Content (ASTM D 2216)
OC	Organic Content (ASTM D 2974)
P	Permeability (CTM 220)
PA	Particle Size Analysis (ASTM D 422)
PI	Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89, AASHTO T 90)
PL	Point Load Index (ASTM D 5731)
PM	Pressure Meter
R	R-Value (CTM 301)
SE	Sand Equivalent (CTM 217)
SG	Specific Gravity (AASHTO T 100)
SL	Shrinkage Limit (ASTM D 427)
SW	Swell Potential (ASTM D 4546)
UC	Unconfined Compression - Soil (ASTM D 2166) Unconfined Compression - Rock (ASTM D 2938)
UU	Unconsolidated Undrained Triaxial (ASTM D 2850)
UW	Unit Weight (ASTM D 4767)

SAMPLER GRAPHIC SYMBOLS

- ☒ Standard Penetration Test (SPT)
- ⧗ Standard California Sampler
- ⧗ Modified California Sampler (2.4” ID, 3” OD)
- ▯ Shelby Tube
- ▯ Piston Sampler
- ▯ NX Rock Core
- ▮ HQ Rock Core
- ▩ Bulk Sample
- ◪ Other (see remarks)

DRILLING METHOD SYMBOLS

- Auger Drilling
- Rotary Drilling
- Dynamic Cone or Hand Driven
- Diamond Core

WATER LEVEL SYMBOLS

- ▽ First Water Level Reading (during drilling)
- ▼ Static Water Level Reading (after drilling, date)

Definitions for Change in Material

Term	Definition	Symbol
Material Change	Change in material is observed in the sample or core and the location of change can be accurately located.	―――――
Estimated Material Change	Change in material cannot be accurately located either because the change is gradational or because of limitations of the drilling and sampling methods.	– – – – –
Soil / Rock Boundary	Material changes from soil characteristics to rock characteristics.	∼∼∼ ∼ ∼ ∼

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

GROUP DELTA CONSULTANTS

GDC Project No. IR-556

Paseo de Valencia Widening Project
Laguna Hills, CA

BORING RECORD LEGEND #2

Figure A-1B

CONSISTENCY OF COHESIVE SOILS

Description	Shear Strength (tsf)	Pocket Penetrometer, PP, Measurement (tsf)	Torvane, TV, Measurement (tsf)	Vane Shear, VS, Measurement (tsf)
Very Soft	Less than 0.12	Less than 0.25	Less than 0.12	Less than 0.12
Soft	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
Stiff	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
Very Stiff	1 - 2	2 - 4	1 - 2	1 - 2
Hard	Greater than 2	Greater than 4	Greater than 2	Greater than 2

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (blows / 12 inches)
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Greater than 50

MOISTURE

Description	Criteria
Dry	No discernable moisture
Moist	Moisture present, but no free water
Wet	Visible free water

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 - 10%
Little	15 - 25%
Some	30 - 45%
Mostly	50 - 100%

PARTICLE SIZE

Description		Size (in)
Boulder		Greater than 12
Cobble		3 - 12
Gravel	Coarse	3/4 - 3
	Fine	1/5 - 3/4
Sand	Coarse	1/16 - 1/5
	Medium	1/64 - 1/16
	Fine	1/300 - 1/64
Silt and Clay		Less than 1/300

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010), with the exception of consistency of cohesive soils vs. N_{60}.

Plasticity

Description	Criteria
Nonplastic	A 1/8-in. thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

CONSISTENCY OF COHESIVE SOILS

Description	SPT N_{60} (blows/12 inches)
Very Soft	0 - 2
Soft	2 - 4
Medium Stiff	4 - 8
Stiff	8 - 15
Very Stiff	15 - 30
Hard	Greater than 30

Ref: Peck, Hansen, and Thornburn, 1974,
"Foundation Engineering," Second Edition.

Note: Only to be used (with caution) when pocket penetrometer or other data on undrained shear strength are unavailable. Not allowed by Caltrans Soil and Rock Logging and Classification Manual, 2010.

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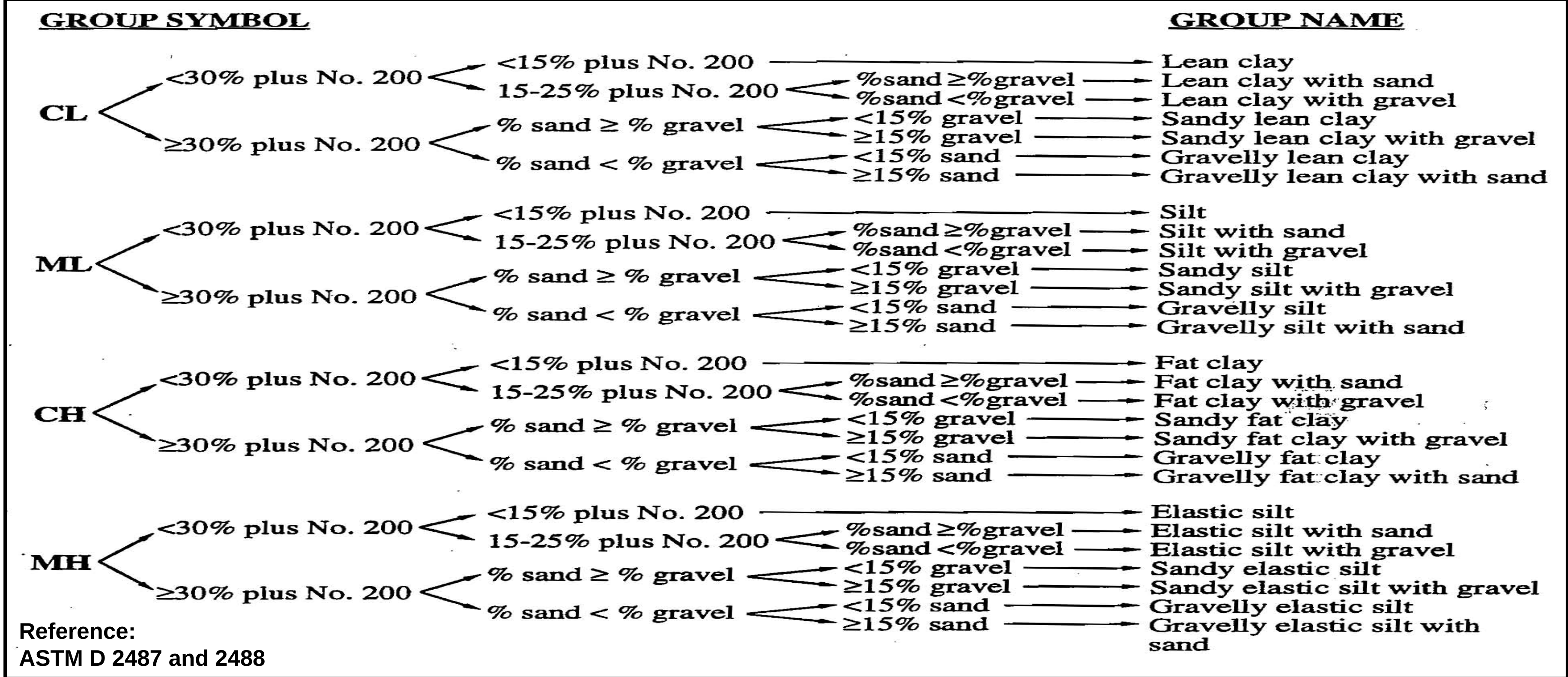
GDC Project No. IR-556

Paseo de Valencia Widening Project
Laguna Hills, CA

BORING RECORD LEGEND #3

Figure A-1C

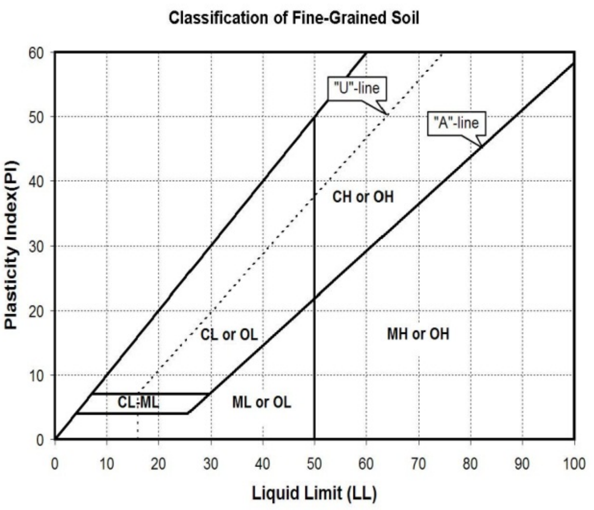
CLASSIFICATION OF INORGANIC FINE GRAINED SOILS (Soils with ≥50% finer than No. 200 Sieve)



Reference:
ASTM D 2487 and 2488

Laboratory Classification of Clay and Silt

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).



CL: LL<50; above A-Line.

CH: LL≥50; above A-Line.

ML: LL<50; below A-Line, or PI<4,
or Non-Plastic

MH: LL≥50; below A-Line.

CL-ML: above A-Line and PI=4 to 7

CL/CH, ML/MH: at or near LL=50

ML/CL, MH/CH: at or near the A-Line

Field Identification of Clays and Silts

Group Symbol	Dry Strength	Dilatancy	Toughness	Plasticity
ML	None to low	Slow to rapid	Low or thread cannot be formed	Low to nonplastic
CL	Medium to high	None to slow	Medium	Medium
MH	Low to medium	None to slow	Low to medium	Low to medium
CH	High to very high	None	High	High

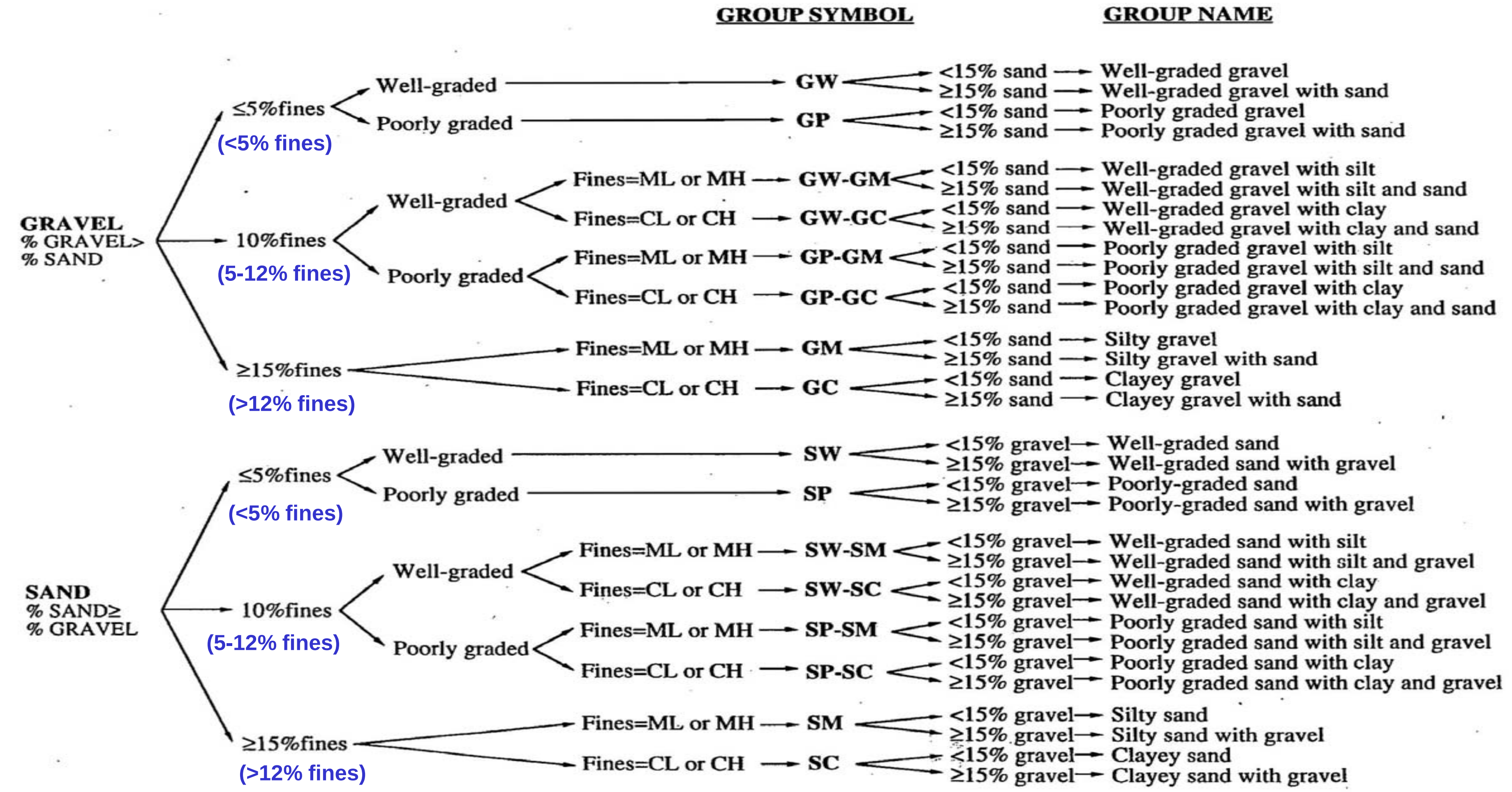
GDC Project No. IR-556

Paseo de Valencia Widening Project
Laguna Hills, CA

KEY FOR SOIL CLASSIFICATION #1

Figure A-1D

CLASSIFICATION OF COARSE-GRAINED SOILS (Soils with <50% "fines" passing No. 200 Sieve)



Reference:

ASTM D 2487 and 2488

Note: Values estimated to nearest 5% to be used for visual identification, values in parentheses to be used for classification when based on laboratory grain size data.

Granular Soil Gradation Parameters

Coefficient of Uniformity: $C_u = D_{60}/D_{10}$

Coefficient of Curvature: $Cc= D_{30}^2 / (D_{60} \times D_{10})$

D_{10} = 10% of soil is finer than this diameter

D_{30} = 10% of soil is finer than this diameter

D_{60} = 10% of soil is finer than this diameter

Group Symbol	Gradation or Plasticity Requirement
SW	$C_u > 6$ and $1 \leq C_c \leq 3$
GW	$C_u > 4$ and $1 \leq C_c \leq 3$
GP or SP	Clean gravel or sand not meeting requirement for SW or GW
SM or GM	Non-plastic fines or below A-Line or PI<4
SC or GC	Plastic fines or above A-Line and PI>7

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GDC Project No. IR-556

Paseo de Valencia Widening Project
Laguna Hills, CA

KEY FOR SOIL CLASSIFICATION #2

Figure A-1E

BORING RECORD

PROJECT NAME Paseo de Valencia Widening Project
PROJECT NUMBER IR-556
HOLE ID **A-12-001**
SITE LOCATION Laguna Hills, California
START 3/30/2012
FINISH 3/30/2012
SHEET NO. 1 of 1
DRILLING COMPANY Scott's Drilling Service
DRILL RIG Ingersoll-Rand 6015
DRILLING METHOD Hollow Stem Auger
LOGGED BY MSL
CHECKED BY CS
HAMMER TYPE (WEIGHT/DROP) 140 lb, 30"
HAMMER EFFICIENCY (ERi) 60
BORING DIA. (in) 8
TOTAL DEPTH (ft) 16.5
GROUND ELEV (ft) 346
DEPTH/*ELEV.* GW (ft) ▽ NE / *na* **DURING DRILLING**
DRIVE SAMPLER TYPE(S) & SIZE (ID) SPT (1.4"), CAL (2.4")
NOTES N*60=Nspt=0.67Ncal
▼ NE / *na* **AFTER DRILLING**

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
															Lean CLAY (CL); olive brown; moist; fine SAND; medium plasticity; (CAPISTRANO FORMATION).
	345														
			B-1												
			R-2	5 9 21	30	20			23.3	98	45:26	PA R			86% fines; 14% SAND Very stiff; tan brown; oxidation; PP=2.5.
5															PP=3.0; increased oxidation staining.
	340		S-3	7 8 13	21	21									
			R-4	10 13 15	28	19			29	93					PP=3.25.
10															PP=3.75; dark brown spots in addition to oxidation.
	335		S-5	6 8 8	16	16									
15															PP=4.0; hard; increase in fines.
	330		R-6	14 22 30	52	35			28	93					
															Boring terminated at 16.5 ft bgs. Ground water not encountered. No caving. Borehole backfilled with soil cuttings and tamped to surface.
20															
	325														

BORING RECORD

PROJECT NAME Paseo de Valencia Widening Project
PROJECT NUMBER IR-556
HOLE ID A-12-002
SITE LOCATION Laguna Hills, California
START 3/30/2012
FINISH 3/30/2012
SHEET NO. 1 of 1
DRILLING COMPANY Scott's Drilling Service
DRILL RIG Ingersoll-Rand 6015
DRILLING METHOD Hollow Stem Auger
LOGGED BY MSL
CHECKED BY CS
HAMMER TYPE (WEIGHT/DROP) 140 lb, 30"
HAMMER EFFICIENCY (ERi) 60
BORING DIA. (in) 8
TOTAL DEPTH (ft) 16.5
GROUND ELEV (ft) 357
DEPTH/*ELEV.* GW (ft) ∇ NE / *na* DURING DRILLING; ▼ NE / *na* AFTER DRILLING
DRIVE SAMPLER TYPE(S) & SIZE (ID) SPT (1.4"), CAL (2.4")
NOTES N*60=Nspt=0.67Ncal

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
															Lean CLAY with SAND (CL); moist; brown; fine SAND; medium plasticity; (CAPISTRANO FORMATION).
	355														
			B-1												PP=3.75; very stiff.
			S-2	4 4 5	9	9			16.5			PA			78% fines; 22% SAND
5															Sandy Lean CLAY (CL); light brown/tan; moist; fine SAND; PP>4.5.
			R-3	21 46 50/6"	96	64						DS			
	350														Lean CLAY with SAND (CL); hard; olive-green/brown; moist; fine SAND; medium plasticity; abundant oxidation; PP>4.5; (CAPISTRANO FORMATION).
			S-4	8 12 17	29	29									
10															Tan; mottled with orange oxidation; PP>4.5.
			R-5	20 33 37	70	47			25.5	97					
	345														
15															PP>4.5.
			S-6	9 11 12	23	23									
	340														Boring terminated at 16.5 ft bgs. Ground water not encountered. No caving. Borehole backfilled with soil cuttings and tamped to surface.
20															
	335														

GROUP DELTA CONSULTANTS, INC.

FIGURE

A-3

BORING RECORD

PROJECT NAME Paseo de Valencia Widening Project	**PROJECT NUMBER** IR-556	**HOLE ID** **A-12-003**	
SITE LOCATION Laguna Hills, California	**START** 3/30/2012	**FINISH** 3/30/2012	**SHEET NO.** 1 of 1
DRILLING COMPANY Scott's Drilling Service	**DRILL RIG** Ingersoll-Rand 6015	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** MSL
CHECKED BY CS			
HAMMER TYPE (WEIGHT/DROP) 140 lb, 30"	**HAMMER EFFICIENCY (ERi)** 60	**BORING DIA. (in)** 8	**TOTAL DEPTH (ft)** 5
GROUND ELEV (ft) 360.5	**DEPTH/*ELEV.* GW (ft)** ▽ NE / *na* **DURING DRILLING**	▼ NE / *na* **AFTER DRILLING**	
DRIVE SAMPLER TYPE(S) & SIZE (ID) SPT (1.4"), CAL (2.4")	**NOTES** N*60=Nspt=0.67Ncal		

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	360	▨	B-1						21.7			PA			Hand Auger to 5 ft due to numerous buried utilities. ASPHALT OVERLAY (4.5") over ASPHALT (4.5") over BASE (10"). Lean CLAY with SAND (CL); brown; moist; fine to medium SAND; trace GRAVEL. 76% fines; 21% SAND; 3% GRAVEL Olive gray-brown; fine SAND; medium plasticity. SAND (SP); orangish-brown; moist; medium SAND; nonplastic to low plasticity (TRENCH BACKFILL). Lean CLAY with SAND (CL); olive gray-brown; moist; fine SAND; medium plasticity; (CAPISTRANO FORMATION).
5	355														Boring terminated at 5 ft bgs. Ground water not encountered. No caving. Borehole backfilled with soil cuttings and tamped to within 4" of surface. Surface patched with concrete with added black dye.
10	350														
15	345														
20	340														

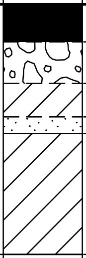

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FIGURE

A-4

BORING RECORD

PROJECT NAME Paseo de Valencia Widening Project
PROJECT NUMBER IR-556
HOLE ID A-12-004
SITE LOCATION Laguna Hills, California
START 3/30/2012
FINISH 3/30/2012
SHEET NO. 1 of 1
DRILLING COMPANY Scott's Drilling Service
DRILL RIG Ingersoll-Rand 6015
DRILLING METHOD Hollow Stem Auger
LOGGED BY MSL
CHECKED BY CS
HAMMER TYPE (WEIGHT/DROP) 140 lb, 30"
HAMMER EFFICIENCY (ERi) 60
BORING DIA. (in) 8
TOTAL DEPTH (ft) 21.5
GROUND ELEV (ft) 371.5
DEPTH/*ELEV.* GW (ft) ⊻ NE / *na* **DURING DRILLING**
AFTER DRILLING ▼ NE / *na*
DRIVE SAMPLER TYPE(S) & SIZE (ID) SPT (1.4"), CAL (2.4")
NOTES N*60=Nspt=0.67Ncal

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	370														Lean CLAY with SAND (CL); brown; moist; fine SAND; medium plasticity; (CAPISTRANO FORMATION).
			B-1 R-2	23 46 50/4"	96 /10"	64 /10"			13.1	115		CR EI PA			PP>4.5; hard; brown with white veins. 85% fines; 15% SAND
5	365		S-3	15 20 27	47	47									PP>4.5; tan with white spots; fine SAND; highly cemented.
			R-4	25 34 39	73	49			23.4	101					PP>4.5; light brown.
10	360		S-5	10 15 24	39	39									PP>4.5; olive green-brown; moist; fine SAND; medium plasticity; oxidation present; sample fractures on 45 degree planes that contain white fine SAND beds.
15	355		R-6	10 22 36	58	39			29.2	96		PA			Lean CLAY (CL); hard; olive green-brown with white veins; moist; fine SAND; abundant oxidation; PP>4.5. 88% fines; 12% SAND
20	350		S-7	6 9 12	21	21									PP>4.5.
															Boring terminated at 21.5 ft bgs. Ground water not encountered. No caving. Borehole backfilled with soil cuttings and tamped to surface.

GROUP DELTA CONSULTANTS, INC.

FIGURE

A-5

BORING RECORD

PROJECT NAME Paseo de Valencia Widening Project
PROJECT NUMBER IR-556
HOLE ID A-12-005
SITE LOCATION Laguna Hills, California
START 3/30/2012
FINISH 3/30/2012
SHEET NO. 1 of 1
DRILLING COMPANY Scott's Drilling Service
DRILL RIG Ingersoll-Rand 6015
DRILLING METHOD Hollow Stem Auger
LOGGED BY MSL
CHECKED BY CS
HAMMER TYPE (WEIGHT/DROP) 140 lb, 30"
HAMMER EFFICIENCY (ERi) 60
BORING DIA. (in) 8
TOTAL DEPTH (ft) 16.5
GROUND ELEV (ft) 372
DEPTH/*ELEV.* GW (ft) ⊻ NE / *na* **DURING DRILLING**
▼ NE / *na* **AFTER DRILLING**
DRIVE SAMPLER TYPE(S) & SIZE (ID) SPT (1.4"), CAL (2.4")
NOTES N*60=Nspt=0.67Ncal

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
															Hand auger to 5 ft due to numerous utilities. ASPHALT (7") over BASE (14")
	370														Silty, Clayey SAND (SC-SM); brown; moist; fine-medium SAND.
			B-1						25.6		46:27	R			Lean CLAY with SAND (CL); olive green-brown; moist; fine SAND; medium plasticity; (CAPISTRANO FORMATION).
5			S-2	6 11 14	25	25			14.5			PA			PP>4.5; hard; dark brown. 85% fines; 15% SAND
	365														
			R-3	13 23 34	57	38									PP>4.5; white veins.
10			S-4	9 12 16	28	28									PP>4.5; occcasional oxidation horizons.
	360														
15			R-5	19 32 41	73	49			25.7	96					PP>4.5; slight increase in SAND; some SILT.
	355														Boring terminated at 16.5 ft bgs. Ground water not encountered. No caving. Borehole backfilled with soil cuttings and tamped to within 4" of surface. Surface patched with concrete with added black dye.
20															
	350														

GROUP DELTA CONSULTANTS, INC.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE

A-6

BORING RECORD

PROJECT NAME Paseo de Valencia Widening Project
PROJECT NUMBER IR-556
HOLE ID A-12-006
SITE LOCATION Laguna Hills, California
START 3/30/2012
FINISH 3/30/2012
SHEET NO. 1 of 1
DRILLING COMPANY Scott's Drilling Service
DRILL RIG Ingersoll-Rand 6015
DRILLING METHOD Hollow Stem Auger
LOGGED BY MSL
CHECKED BY CS
HAMMER TYPE (WEIGHT/DROP) 140 lb, 30"
HAMMER EFFICIENCY (ERi) 60
BORING DIA. (in) 8
TOTAL DEPTH (ft) 16.5
GROUND ELEV (ft) 362
DEPTH/*ELEV.* GW (ft) ▽ NE / *na* **DURING DRILLING**; ▼ NE / *na* **AFTER DRILLING**
DRIVE SAMPLER TYPE(S) & SIZE (ID) SPT (1.4"), CAL (2.4")
NOTES N*60=Nspt=0.67Ncal

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
															Silty SAND (SM); tan; moist; fine to medium SAND; gravel up to 1/4" in diameter; vegetation; (TOPSOIL).
															Lean CLAY (CL); moist; tan with oxidation; fine SAND ; SILT; cemented layers; (CAPISTRANO FORMATION).
	360														
			B-1						16.1		46:26				PP>4.5; hard.
			S-2	10 16 20	36	36			19			PA			89% fines; 11% SAND
5															PP>4.5; multicolored tan, brown; abundant oxidation horizons.
			R-3	22 38 50/6"	88	59			15.6	101					
	355														
															PP>4.5; olive green-brown; oxidation; medium plasticity.
			S-4	8 11 13	24	24									
10															PP>4.5; increase in cementation.
			R-5	15 24 31	55	37									
	350														
15															PP>4.5; mica present through out sample.
			S-6	10 14 19	33	33									
															Boring terminated at 16.5 ft bgs. Ground water not encountered. No caving. Borehole backfilled with soil cuttings and tamped to surface.
	345														
20															
	340														

GROUP DELTA CONSULTANTS, INC.

FIGURE

A-7

APPENDIX B
LABORATORY TESTING

APPENDIX B
LABORATORY TESTING

B.1 General

The laboratory testing was performed using appropriate American Society for Testing and Materials (ASTM) and Caltrans Test Methods (CTM).

Modified California drive samples, Standard Penetration Test (SPT) drive samples, and bulk samples collected during the field investigation were carefully sealed in the field to prevent moisture loss. The samples of earth materials were then transported to the laboratory for further examination and testing. Tests were performed on selected samples as an aid in classifying the earth materials and to evaluate their physical properties and engineering characteristics. Laboratory testing for this investigation included:

- Soil Classification: USCS (ASTM D 2487) and Visual Manual (ASTM D 2488);
- Moisture content (ASTM D 2216) and Dry Unit Weight (ASTM D 2937);
- Atterberg Limits (ASTM D 4318);
- Grain Size Distribution (ASTM D 422) & % Passing #200 Sieve (ASTM D 1140);
- Expansion Index (ASTM D 4829);
- Direct Shear (ASTM D 3080);
- R-Value (CTM 301);
- Soil Corrosivity:
    - pH (CTM 643);
    - Water-Soluble Sulfate (ASTM D 516, CTM 417);
    - Water-Soluble Chloride(Ion-Specific Probe, CTM 422);
    - Minimum Electrical Resistivity (CTM 643).

Brief descriptions of the laboratory testing program and test results are presented below.

B.2 Soil Classification

Earth materials recovered from subsurface explorations were classified in general accordance with Caltrans' "Soil and Rock Logging Classification Manual, 2010". The subsurface soils were classified visually / manually in the field in accordance with the Unified Soil Classification System (USCS) following ASTM D 2488; soil classifications were modified as necessary based on testing in the laboratory in accordance with ASTM D 2487. The details of the soil classification system and boring records presenting the classifications are presented in Appendix A.

B.3 Moisture Content and Dry Unit Weight

The in-situ moisture content of selected bulk, SPT, and Ring samples was determined by oven drying in general accordance with ASTM D 2216. Selected California Ring samples were trimmed flush in the metal rings and wet weight was measured. After drying, the dry weight of each sample was measured, volume and weight of the metal containers was measured, and moisture content and dry density were calculated in general accordance with ASTM D 2216 and D 2937. Results of these tests are presented on the boring records in Appendix A.

B.4 Atterberg Limits

Characterization of the fine-grained fractions of soils was evaluated using the Atterberg Limits. This test includes Liquid Limit and Plastic Limit tests to determine the Plasticity Index in accordance with ASTM D 4318. Results of these tests are presented on the boring records in Appendix A and are plotted on a Plasticity Chart in Figure B-1 of this Appendix.

B.5 Grain Size Distribution and Percent Passing No. 200 Sieve:

Representative samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. The percentage of fines (soil passing No. 200 sieve) was determined for selected samples in accordance with ASTM D 1140. For selected samples the washed fraction retained on the No. 200 sieve was then screened on a No. 4 sieve, and the percentage retained on No. 4 was weighed to determine the percentage of gravel. For selected samples, the washed material retained on No. 200 sieve was shaken through a standard stack of sieves in accordance with ASTM D 422 to determine the grain size distribution. For selected samples, the grain size distribution of the fraction finer than No. 200 sieve was determined by Hydrometer Analysis in accordance with ASTM D 422. The results of grain size distribution tests are plotted in Figure B-2 of this appendix. The relative proportion (or percentage) by dry weight of gravel (retained on No. 4 sieve), sand (passing No. 4 and retained on No. 200 sieve), and fines (passing No. 200 sieve) are listed on the boring records in Appendix A.

B.6 Direct Shear Test

To determine the drained shear strength parameters of the on-site soils, direct shear tests were performed on a select in situ sample in accordance with ASTM D 3080. After the initial weight and volume measurements were made, the sample was placed in the shear machine, and a selected normal load was applied. The sample was saturated or kept at field moisture (to model worst case field conditions), allowed to consolidate under the selected normal load, and then sheared to failure. Shear rate was selected to maintain drained conditions. Shear stress and vertical/horizontal sample deformations were monitored throughout the test. The process was repeated on additional samples of the same soil material at two additional normal loads. The test results are presented in Figure B-3 of this appendix.

B.7 R-Value

A Resistance or R-Value test was performed on selected bulk samples of the subgrade soils encountered under proposed pavement locations. The test was conducted in general accordance with CTM 301. The test results are summarized in Table B-3 of this appendix.

B.8 Soil Corrosivity

Tests were performed in order to determine corrosion potential of site soils on concrete and ferrous metals. Corrosivity testing included minimum electrical resistivity and soil pH (Caltrans method 643), water-soluble chlorides (Orion 170A+ Ion Probe), and water-soluble sulfates (ASTM D 516). The test results are presented in Table B-2 of this appendix.

B.9 List of Attached Figures

The following tables and figures are attached and complete this appendix:

List of Tables

List of Figures

Table B-1

Expansion Index Test Results

BORING NO	SAMPLE NO	DEPTH (feet)	SOIL TYPE	EXPANSION INDEX	EXPANSION POTENTIAL
A-12-004	B-1	0-5	CL	68	"Medium"

Table B-2

Corrosion Test Results

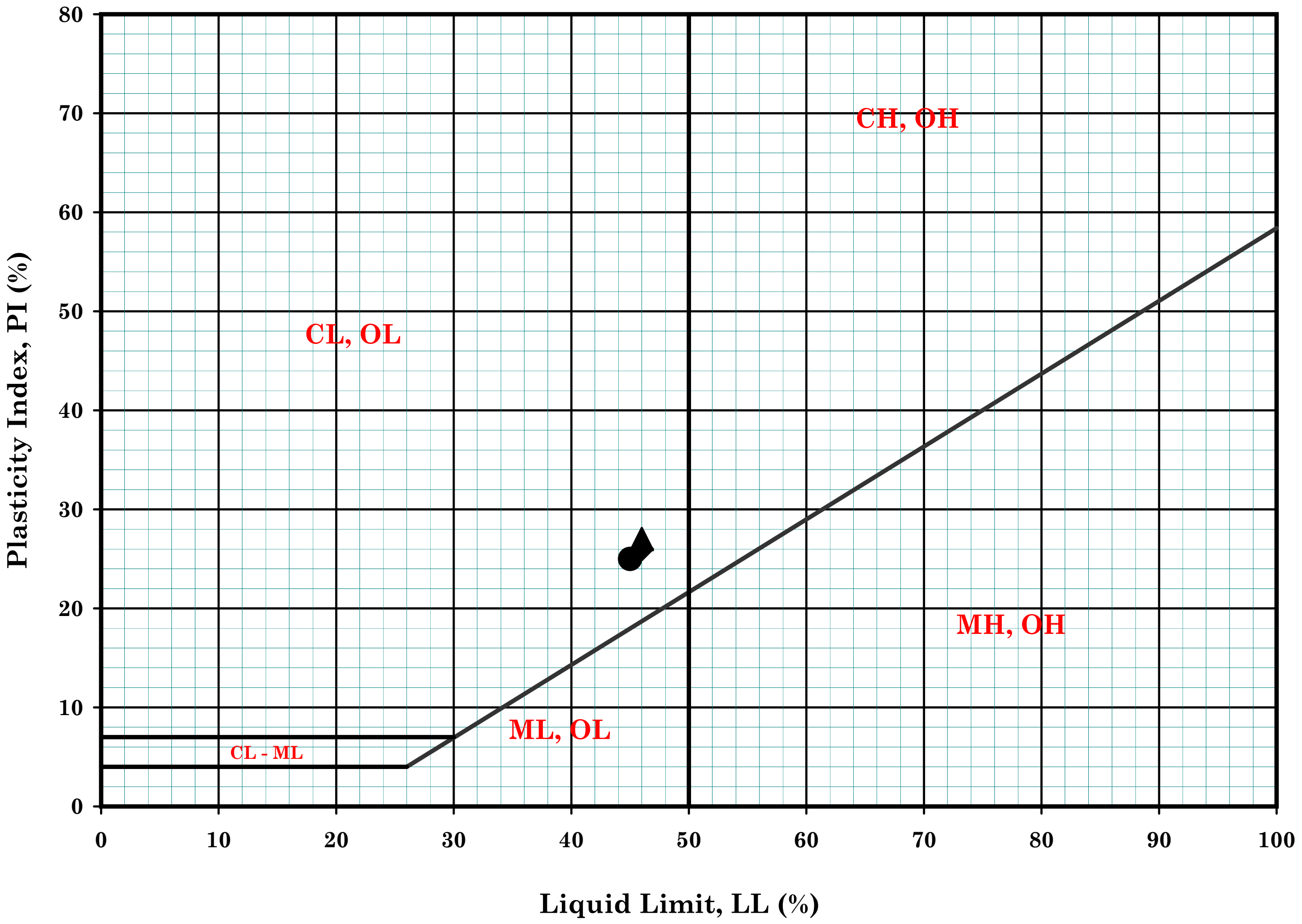
BORING NO	SAMPLE NO	DEPTH (FT)	SOIL TYPE	PH CALTRANS 643	SULFATE CONTENT CALTRANS 417 (ppm)	CHLORIDE CONTENT CALTRANS 422 (ppm)	MINIMUM RESISTIVITY CALTRANS 532 (ohm-cm)
A-12-004	B-1	0-5	CL	8.06	20	106	581

Table B-3

R-Value Test Results

BORING NO	SAMPLE NO	DEPTH (feet)	SOIL TYPE	R-Value
A-12-001	B-1	0-5	CL	15
A-12-005	B-1	0-5	CL	12

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth				MC	LL	PL	PI	LI	Description
			(ft)		(m)		(%)					
●	A-12-001	R-2	2.5	4.0	0.8	1.2	23.3	45	20	25	0.13	Lean CLAY (CL)
▲	A-12-005	B-1	0.0	5.0	0.0	1.5	25.6	46	19	27	0.24	Lean CLAY with SAND (CL)
◆	A-12-006	B-1	0.0	5.0	0.0	1.5	16.1	46	20	26	-0.15	Lean CLAY (CL)
■												
○												
△												
◇												
□												

Remarks :

GROUP
DELTA
CONSULTANTS

Paseo de Valencia Widening Project

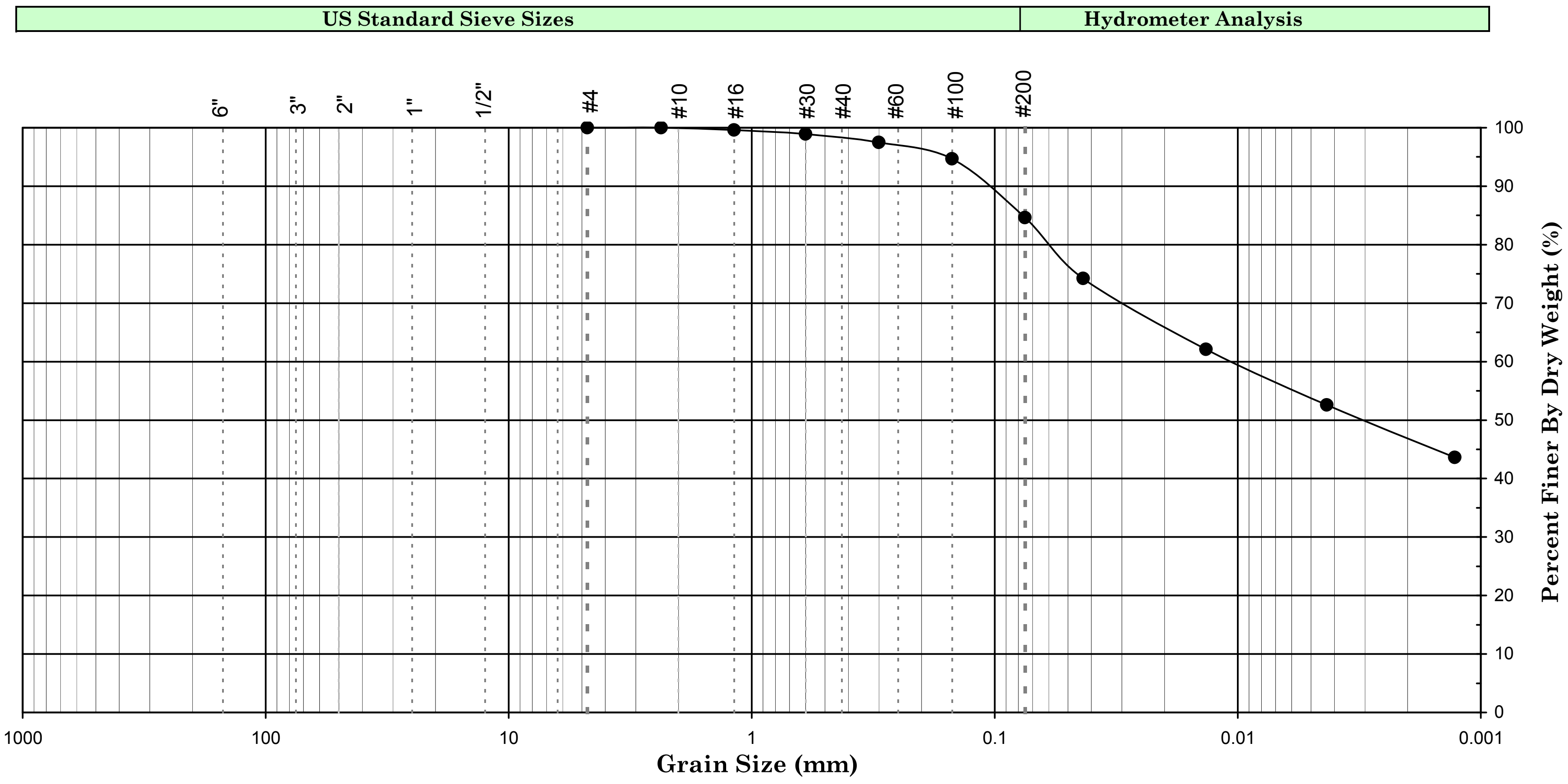
Project No. : *IR-556*

Date : *04/10/12*

ATTERBERG LIMITS

(ASTM D-4318 / CT-204 / T-89)

Figure No. : B-1



Boulders	Cobbles	Gravel		Sand			Fines (Silt / Clay)
		Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Sample Depth [from/to]				Grain Size Percentage			Atterberg Limits		Soil Description	U.S.C.S.
			(ft)		(m)		Gravel	Sand	Fines	LL	PI		
●	*A-12-004*	*R-2*	*2.5*	*4.0*	*0.76*	*1.22*	*0*	*15*	*85*	-	-	*Lean CLAY with SAND*	*CL*
▲													
■													
◆													
+													

GROUP DELTA CONSULTANTS

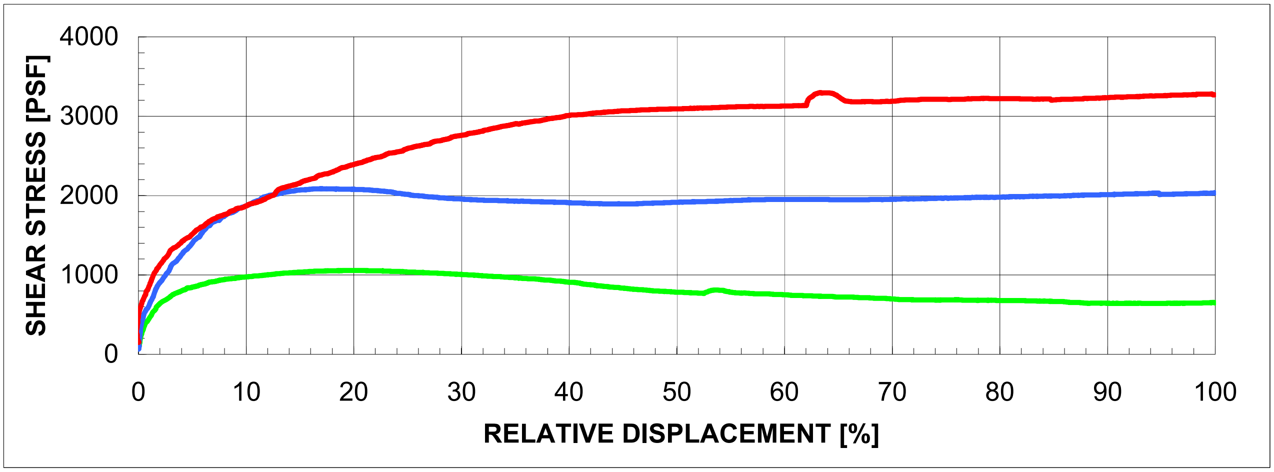
Paseo de Valencia Widening Project

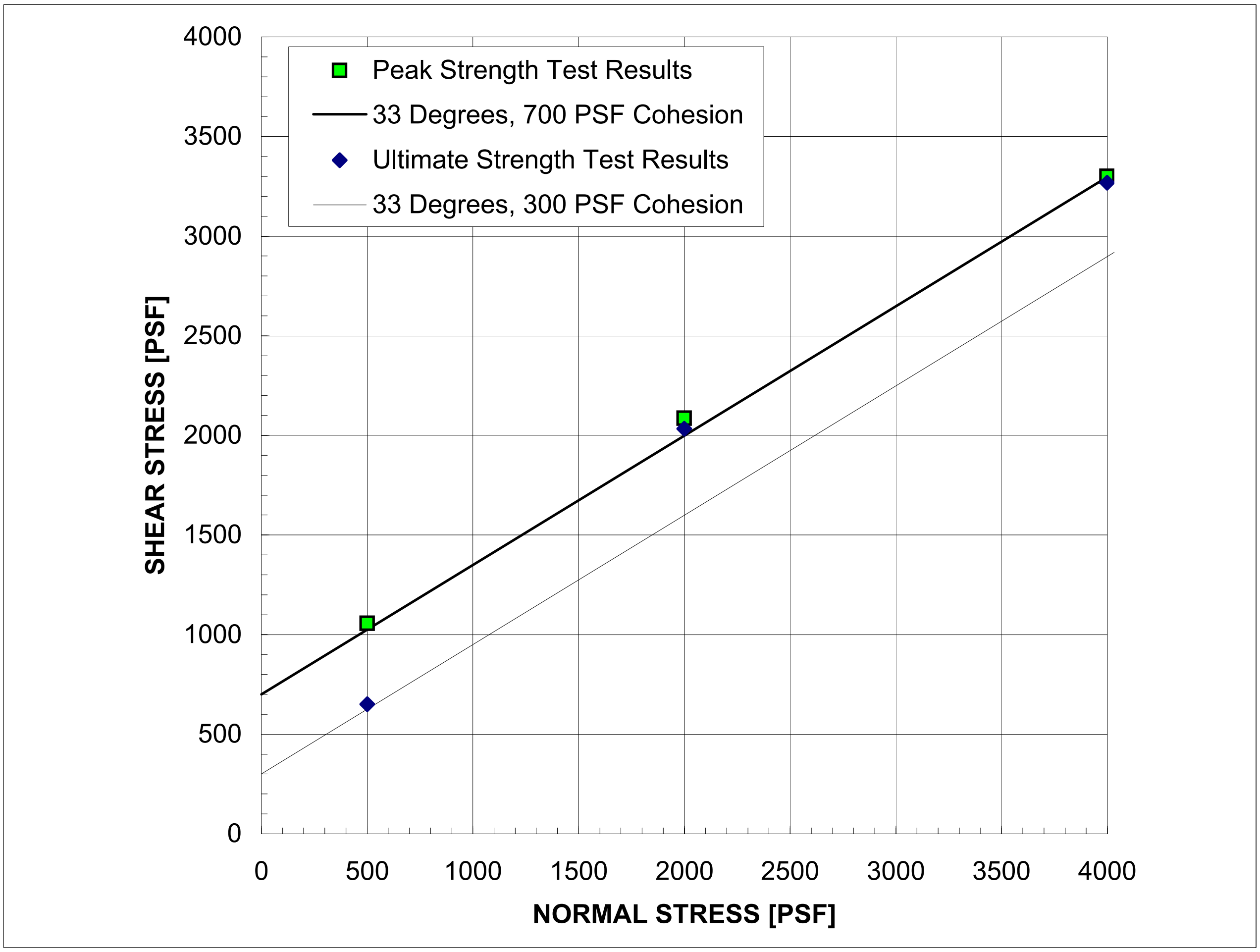
Project No. : *IR-556* **Date :** *04/11/12*

GRAIN SIZE ANALYSIS

(ASTM D-422)

Figure No. : **B-2**





SAMPLE: A-12-002 @ 6' - 6½'

Description: Brown sandy lean clay (CL)

STRAIN RATE: 0.0008 IN/MIN

(Sample was consolidated and drained)

	PEAK	ULTIMATE
ϕ'	33 °	33 °
C'	700 PSF	300 PSF

	IN-SITU	AS-TESTED
γ_d	114.8 PCF	114.8 PCF
w_c	13.2 %	17.3 %

DIRECT SHEAR TEST RESULTS

APPENDIX C
SITE PHOTOGRAPHS


Boring A-12-001


Boring A-12-002


Boring A-12-003


Boring A-12-004

Boring A-12-005

Boring A-12-006

Dig Alert markings on ground near boring B-2

Asphalt patch after borehole completion

Looking south along the northbound lanes

Looking south along the southbound lanes

Looking south along the northbound lanes

Looking south along the southbound lanes

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Appendix H

Supplemental Geotechnical Investigation – Paseo de Valencia Widening
Prepared by Group Delta Consultants, Inc.,
December 20, 2012

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SUPPLEMENTAL GEOTECHNICAL INVESTIGATION
POTENTIAL CONSTRUCTION IMPACTS TO RESIDENCES ALONG SUNSET PLACE WEST
PASEO DE VALENCIA WIDENING PROJECT
LAGUNA HILLS, CALIFORNIA

Prepared for

STV INCORPORATED
100 Pacifica, Suite 140
Irvine, CA 92618

Prepared by

GROUP DELTA CONSULTANTS, INC.
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Irvine, California 92618
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GDC Project No. IR-556 Phase 2
December 20, 2012

GROUP
DELTA
CONSULTANTS

Geotechnical Engineering

Geology

Hydrogeology

Earthquake Engineering

Materials Testing & Inspection

Forensic Services

December 20, 2012

STV Incorporated
100 Pacifica, Suite 140
Irvine, CA 92618

Attention: Tapas Dutta, P.E.

Subject: Supplemental Geotechnical Investigation
Potential Construction Impacts to
Residences along Sunset Place West
Paseo de Valencia Widening Project
Laguna Hills, California
GDC Project No. IR-556 Phase 2

Dear Tapas:

Group Delta Consultants, Inc. (GDC) is pleased to provide this report of additional geotechnical study to investigate geotechnical conditions within and adjacent to selected residential properties along Sunset Place West and to perform an engineering evaluation of the potential impacts of construction on these residences due to the proposed widening of Paseo de Valencia.

We appreciate the opportunity to provide geotechnical services for this project. If you have any questions pertaining to this report, or if we can be of further service, please do not hesitate to contact us.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

Curt Scheyhing

REGISTERED PROFESSIONAL ENGINEER
CURT SCHEYHING
No. 2766
Exp. 06-30-13
GEOTECHNICAL
STATE OF CALIFORNIA

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ALONG SUNSET PLACE WEST
PASEO DE VALENCIA WIDENING PROJECT
LAGUNA HILLS, CALIFORNIA

1.0 INTRODUCTION

This supplemental Geotechnical Report presents the results of additional geotechnical investigation and conclusions and recommendations regarding the potential impacts of project construction on existing residential structures along Sunset Place West adjacent to the project site. The site location is presented on the Vicinity Map in Figure 1A and Topographic Map in Figure 1B. This report supplements our geotechnical recommendations for project design and construction presented in our report dated May 21, 2012.

1.1 Project Description

STV is providing engineering services to the City of Laguna Hills (City) for the proposed widening of an approximately 0.4 mile section of Paseo de Valencia located between Kennington Drive and Laguna Hills Drive in Laguna Hills, California. An approximately 70 ft wide greenbelt with riding and hiking trails separates the existing Paseo de Valencia roadway from the toe of slope of the adjacent residential properties. To accommodate the roadway widening, the new roadway will encroach about 10 feet into the greenbelt, bringing the roadway slightly closer to the properties.

Construction will include demolition of the existing roadway pavements, limited grading consisting of cuts and fills less than a few feet, and construction of new pavements. Construction equipment may include excavators, graders, dozers, other truck mounted equipment, and pavement breakers.

Homeowners in residences along Sunset Place have expressed opposition to the project, citing concerns of noise, vibration, and adverse impacts to their homes from construction operations. In addition, the homeowners have reported existing distress to their residences, and the fact that the distress may be related to the homes being supported on expansive clay fill soils.

This study focuses on the area of the homes on Sunset Place West and the adjacent greenbelt and project area as shown in Figure 2A. The layout and typical cross sections of the proposed widening are shown as Figure 2B and 2C, respectively.

1.2 Homeowner Concerns

As a part of their community outreach efforts, the City held a Public Information Meeting on April 16th, 2012. During and subsequent to the meeting numerous local homeowners and their homeowners associations (particularly those along Sunset Place West, as shown in Figure 2A) submitted emails and comment cards voicing concerns and opposition to the project. In addition to general comments about open space encroachment, noise and need for soundwalls, pollution and related health concerns, reduced property values, and safety some homeowners cite existing problems with their homes and the concern that construction of the proposed project may exacerbate these problems. The residents reported problems generally include un-level house foundations, distress/cracks on ceilings, walls, hardscape and foundations, and building / slope movement indicated by tilted fence pilasters.

1.3 Purpose and Scope of Work

The purpose of our investigation is to evaluate from a geotechnical perspective, the potential effect of the proposed street widening on the adjacent private properties and the potential causes of existing reported distress on the residential property along Sunset Place West. Our scope of work included the following:

- Performing a visual and photographic site reconnaissance and visibly observing conditions along the front and rear property lines of residences on Sunset Place West;
- Reviewing published historical topographic maps, aerial photographs, residential tract grading plans, and residential development geotechnical reports to estimate the location and depth of fill soils placed within the study area;
- Obtaining an encroachment permit from the City of Laguna Hills;
- Marking and clearing utilities through DigAlert;
- Performing four (4) hollow stem auger borings along the property line between greenbelt and residences to investigate local subsurface conditions;
- Performing laboratory testing on samples recovered from the borings;
- Estimating the extent, depth, and engineering properties of fill materials underlying the Sunset Place West residences;
- Evaluating the likely causes of existing distress manifested at the residences;
- Evaluating the potential for settlement and vibrations at the residential properties caused by construction operations;

- Developing geotechnical recommendations for settlement and vibration monitoring during construction; and
- Presenting the data, conclusions, and recommendations in this report.

1.4 Pertinent Reports and Investigation

Our understanding of this project is based on discussions with engineers at STV, our review of available geologic and geotechnical information and preliminary engineering plans for the existing and proposed improvements. The key references are summarized below:

- H.V Lawmaster & Co., Inc. November 24, 1976, "*Soil Compaction Testing & Inspection, Final Report on Mass Grading Tract No. 8855, 25106 Paseo De Valencia, Laguna Hills, California*," prepared for 21st Century Builders, Inc., Newport Beach, CA.
- H.V Lawmaster & Co., Inc. July 8, 1976, "*Foundation Investigation, Proposed Residential Development, Tentative Tract No. 8855, El Toro, Orange County, California*," prepared for Bayshore/Olmstead Development, Newport Beach, CA.
- John F. Wiss, 1981, "*Construction Vibrations: State-of-the-Art*," Journal of the Geotechnical Engineering Division, Vol. 107, No.2, pp.167-181.
- Jones & Stokes, June 2004, "*Transportation- and Construction-Induced Vibration Guidance Manual*," prepared for California Department of Transportation, Sacramento, CA.
- Toups Corporation. August 5, 2976, "Precise Grading Plan for Tract No. 8855, Orange County, California."
- USGS, 1981, San Juan Capistrano Quadrangle, California-Orange County, 7.5 Minute Series (Topographic).
- USGS, 2008, California Department of Conservation, Division of Mines and Geology," Preliminary Geologic Map of the Santa Ana 30x60' Quadrangle.

2.0 FIELD AND LABORATORY INVESTIGATION

2.1 Previous Investigations

Borings were performed within the rough graded area of Tract No. 8855 in the original tract design soils investigation (H.V. Lawmaster, July 1976). Soil compaction and final grading observation was performed and documented in the compaction report by H.V. Lawmaster (November 1976). These reports and associated boring logs and laboratory test results are presented in Appendix D. Group Delta performed field investigation and laboratory testing for the overall project, submitted previously (Group Delta, May 21, 2012), and relevant field and lab data in the vicinity of this study are presented in Appendix E.

2.2 Current Field Investigation

The subsurface conditions along the boundary between the greenbelt and the Sunset Place West properties were further investigated by advancing four (4) hollow-stem auger borings at the locations shown in Figures 2A and 3. An additional two borings were planned, but could not be performed due to utility line conflicts. All four borings were performed adjacent to the toe of the Sunset Place West slope, at the eastern edge of the greenbelt, south of Beckenham Street. The borings were each advanced to a depth of 11.5 feet below the existing grade. Details of the investigation and the boring logs are presented in Appendix A.

2.3 Current Laboratory Testing

Laboratory testing was performed on selected samples of the subsurface materials recovered from the borings. Tests were conducted to develop index, classification, strength, and expansive properties of the subsurface materials. The tests included:

- Moisture Content (ASTM D 2216);
- Dry Density (ASTM D 2937);
- USCS Lab Soil Classification (ASTM D 2487);
- Visual / Manual Soil Classification (ASTM D 2488);
- Percent Passing #200 Sieve (ASTM D 1140);
- Atterberg Limits (ASTM D 4318);
- Expansion Index (ASTM D 4829); and
- Pocket Penetrometer (N/A).

Selected lab results are shown on the boring records in Appendix A, and detailed descriptions of the tests performed and their results are presented in Appendix B.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Conditions

A greenbelt easement (Aliso Creek Riding and Hiking trail) is located just east of Paseo De Valencia northbound sidewalk, and contains a paved bike path and an unpaved equestrian trail. Residential properties along Sunset Place West are located atop a slope at the east end of the greenbelt, south of Beckenham Street. The slope is approximately 15 to 20 feet high with 1.5H: 1V inclination. The greenbelt (Aliso Creek Riding and Hiking Trail) is vegetated with grass and small- to medium-sized trees. There are two trails that meander through the greenbelt, a paved walking path and an unpaved decomposed granite equestrian trail. The slope between the houses and greenbelt is heavily vegetated with tall trees, shrubs, and grass. Site photographs are shown in Appendix C, and site plans are shown in Figures 3 and 4.

Currently, the toe of the slope is about 72 to 77 feet away from the northbound sidewalk on Paseo de Valencia. The distance from the toe of the slope to the sidewalk after the improvement will range from 61 to 66 feet away from the sidewalk (see Figure 2C).

3.2 Topography

The approximate original site topography prior to residential development is shown on the USGS Topographic 7.5‘ Quadrangle Map in Figure 1B. Review of residential grading plans and geotechnical report (H.V Lawmaster, 07-08-76) indicates that the residential tract was graded in 1973 under observation of Woodward-McNeill & Associates by cutting into the natural hillside along the east side and placing compacted fill slopes inclined at 1.5h: 1v along the west side of Sunset Place. The USGS map contours are shown superimposed upon the site grading plan in Figure 4, along with the approximate cut-fill line and extent of existing fill. It can be seen that the homes along Sunset Place West are supported entirely on a variable depth of fill material ranging from a few feet near Sunset Place to about 15 to 20 feet near the top of slope, as shown in Cross-Section A-A’ in Figure 5. Existing site elevations range from about El. 375 to 388 feet along the top of slope, to El. 360 to 375 feet in the greenbelt (see Figures 3 and 4).

3.3 Existing Distress

The front yard and rear slope areas of the residential properties were visually observed for signs of movement or distress. The following features were noted:

- Surface runoff and algae growth on sidewalks and other hardscape from landscape irrigation;
- Numerous instances of transverse, longitudinal and alligator cracks in asphalt pavement, and cracking in concrete pavement, sidewalks, and curb and gutter;
- Numerous vertical and horizontal cracks on concrete hardscape including planter walls, front gate walls, and property separation walls;
- Numerous cases of separation and uplift at joints between sidewalk or hardscape concrete slabs with vertical offsets of ½ to 1 inch;
- Several cases of tilted front gate pilasters and distortion of the garage door frames were observed in front the properties.
- Several cases of leaning fence pilasters and separations of up to about 1 inch between fence pilasters and property side walls near top of slope;
- An electrical box on Beckenham Street tilted due to apparent uplift in the foundation;
- Circular cracks surrounding manholes.

Selected photos from our site reconnaissance are presented in Appendix C.

3.4 Geology

A regional geologic map of the site from the USGS Santa Ana 30' x 60' Quadrangle is presented in Figure 6 (USGS, 2008). The map shows that the site is underlain by Tertiary aged Capistrano Formation Siltstone Facies (Tcs). This formation is regionally described as white to pale gray, massive to crudely bedded, friable, siltstone and mudstone, which contains sandstone and calcareous mudstone beds, and sparse diatomaceous and tuffaceous beds. Technically the unit is claystone and known to be moderately to highly expansive. As previously mentioned, man-made fills have been placed over the Capistrano Formation under the residences along Sunset Place West. The fill materials were derived from cuts in Tcs, and are generally comprised of expansive clays. Numerous residential fills constructed out of Tcs materials in Orange County have experienced movements due to the expansive nature of the soils. A typical cross section illustrating the geologic profile is presented in Figure 5.

3.5 Subsurface Conditions

The current boring locations were done within the public right of way that is underlain by native Capistrano Formation (Tcs); therefore, our borings did not obtain any samples of fill soils for testing. However, H.V. Lawmaster drilled borings within the existing fill and performed laboratory testing on samples of fill. These borings indicate presence of 11 to 20 feet of fill under the residences along Sunset Place West. The fill is described as Lean Clay, Silty Clay, Clayey Silt, Sandy Lean Clay, and Clayey Sand. Test results indicate the soil is moderately to highly expansive. Refer to boring logs and lab test results in Appendix D.

Capistrano Formation Siltstone (Tcs) was encountered in our borings underlying approximately 6 inches of vegetated top soils. This formation is considered poorly-indurated sedimentary rock, and may be considered a “soft rock”. When classified as a soil, the Tcs is very stiff to hard clays of medium to high plasticity (CL and CH).

Based on Group Delta’s laboratory testing for the current and previous phase, Expansion Index (EI) of the Capistrano Formation (Tcs) tested ranges from 68 to 99 (average 89), which falls into the category of “medium” to “high” expansion potential in accordance with ASTM D 4829. H.V. Lawmaster (1976) indicated that the expansion index of the compacted fill ranged from 69 to 99, with an average of 86, which is consistent with data from the bedrock materials.

3.6 Groundwater

Upon auger withdrawal, boreholes remained open to the maximum depth with no caving. Groundwater was not encountered in our current or previous investigation to the maximum depth explored of 21.5 ft below existing grade. Evidence of localized perched water or seepage was not observed. In addition, H.V. Lawmaster performed large diameter bucket auger borings in 1976 and stated that “Groundwater or seepage was not encountered in the borings on date of drilling”.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Estimation of Fill/Formation Contact

To evaluate the areal extent and depth of fill underlying the residences the following data were used:

- USGS 7.5' Quadrangle map for the original site grades (Figures 1B and 4);
- Existing site topographic plan showing current site grades (Figure 3);
- Grading plans for Tract No. 8855 for tract finish grades (Figure 4);
- H.V. Lawmaster borings drilled within the graded fill areas (see Figure 4, Figure 5, and Appendix D).

The cut fill "daylight line" was estimated from original and as-graded site topography, as shown in Figure 4. The daylight line shown on the grading plan is slightly further east, indicating benching into the natural slope and/or overexcavation was likely done during grading (see Figures 4 and 5). The evaluation concludes that the homes on the west side of Sunset Place West are supported entirely on compacted fill ranging from about 5 to 16 feet in thickness. The fill is at its thickest at the slope crest, with the west and east limit of the fill estimated to be near the toe of the slope and somewhere along the width of Sunset Place West, respectively. The fill is underlain by Capistrano Formation Siltstone. The greenbelt and the homes located on the east side of Sunset Place West are underlain directly by Capistrano Formation Siltstone.

4.2 Potential Cause of Reported Distress

Based on the laboratory results from GDC and H.V. Lawmaster, both the fill soils and the Capistrano Formation Siltstone have medium to high expansion potential. Clayey soils are in general susceptible to volume change (shrinkage and swelling) due to changes in moisture contents of the soil. Expansive soils generally shrink when dried, swell when wetted under low pressure (near the ground surface), and compress when wetted under high pressures (deep in a fill). The shrinkage, swelling, and settlement can occur in cycles when subjected to repeated wetting and drying. When expansive soils form a slope, these volume changes can cause the slope to move outward and settle near the top. This process of slope deformation is known as "*Lateral Fill Extension*." When a fill slope has thicker fill on the downslope side and thinner fill on the upslope side (as is the case here), this tendency is increased, and the shallow fill areas may heave while the deeper fill settles and / or moves toward the slope. Group Delta has experience on numerous cases where fills constructed out of Capistrano Formation Siltstone have experienced swelling, settlement, and lateral fill extension resulting in damage to structures and hardscape.

During our site observation, clayey soils near the top of the slope exhibited desiccation / shrinkage cracks which typically occur when the clay soils dry out. In other areas we observed irrigation water flowing over sidewalks, algae growth, and wet soils indicating excessive irrigation. Selected site photos are presented in the selected photos in Appendix C. Based on these observations, the soils at the site are subjected to repeated cycles of drying and wetting.

It is Group Delta's opinion that changes in soil moisture content combined with highly expansive soils have resulted in volume changes, and these volume changes have resulted in heaving, settlement, and lateral fill extension which explains the frequent cracks in pavement and hardscape, uneven floors, distorted door frames, tilted pilasters, and other structural distress.

4.3 Potential Construction Impacts to Residential Properties

4.3.1 Potential Settlement

Construction vibrations can cause settlement of loose granular (cohesionless) fills or dumped clayey fills. Dense cohesionless soils, stiff clays, and bedrock materials are generally not subject to significant settlements due to vibration. During grading construction equipment operating within the Paseo de Valencia right of way will be supported on the surface of Capistrano Formation, which is considered not to be subject to settlement from vibrations. The fill material forming the slope and the foundation soils for the residences is comprised of compacted unsaturated cohesive fill material that would classify as stiff to very stiff in consistency. The potential for settlement of very stiff unsaturated clay soils due to construction vibrations is considered negligible. Therefore, it is our opinion that the vibration from construction machinery will not have an adverse impact on Sunset Place West homes in the form of soil settlement.

4.3.2 Vibration Impacts on Residents and Properties

The homeowners at the subject site have voiced concerns that construction vibrations may affect the integrity of the slope and homes located on top of the slope. We evaluated the vibration impacts in accordance with the following references:

- John F. Wiss, 1981, "*Construction Vibrations: State-of-the-Art*," Journal of the Geotechnical Engineering Division, Vol. 107, No.2, pp.167-181.
- Jones & Stokes, June 2004, "*Transportation- and Construction-Induced Vibration Guidance Manual*," prepared for California Department of Transportation, Sacramento, CA.

Assuming construction operations primarily occur in the roadway area, the distance between operation of the heavy construction equipment and the toe of the residential fill slope is estimated to be a minimum of 60 feet. The homes themselves will be an additional 25 to 35 feet from the equipment.

Wiss (1981) provides a chart to estimate peak particle velocity from various types of construction equipment, and threshold peak particle velocity for damage to residential and commercial structures (see Figure 7). Wiss's chart indicates threshold velocities of 1.5 inch/second for damage to residential structures, and 3 inches per second for commercial buildings. Caltrans (Jones and Stokes, 2004) uses more conservative threshold damage criteria of 0.5 inch/second for newer residential and 0.3 inch/second for older residential structures subjected to continuous vibration sources. The Caltrans criteria are shown in Figure 8.

The project will include demolition of the existing pavement, and therefore may require a pavement breaker. Cut fill grading of a few feet and construction of new pavement will require various types of grading and construction equipment including dozers, graders, and other truck mounted equipment.

Blasting with dynamite, wrecking balls, and diesel or vibratory pile drivers are not anticipated for this project. Referring to Figure 7 the pavement breaker with 6-foot drop will likely produce the highest vibrations during the construction of the roadway. Based on Figure 7, Evaluation of Vibration Effects, the predicted Peak Particle Velocity (PPV) at 60 to 85 feet away from the pavement breaker is approximately 0.07 to 0.1 inches per second. For automobiles, trucks, small dozer and large bulldozer, the level of resulting vibration (PPV) will be lower. Vehicles traveling on a smooth roadway are rarely the source of perceptible ground vibration. Even when pavement discontinuities are present, it is generally heavy trucks, not automobiles, are the source of the perceptible vibration.

According to the chart and various vibration criteria described in the Caltrans Manual, the vibration level resulting from the pavement breaker consistently stays below the threshold of vibration considered to cause damage to residential structures. The chart shown in Figure 7 suggests that for various types of equipment that may be used on this project, the minimum distance away from structures required to maintain peak particle velocity below 0.3 inches per second (Caltrans threshold for older residential structures) is as follows:

- Pavement breaker: 30 feet
- Caisson drilling: 11 feet
- Trucks: 10 feet
- Jack Hammers: 6 feet
- Crane Idling: <3 feet
- Small Dozer: <2 feet

If this or similar equipment maintains setbacks of this distance from residential properties, it is unlikely that construction operations would result in structural damage. If heavy equipment operates in closer proximity to these thresholds, there would be increased risk of potential damage.

Vibrations that do not exceed the threshold for structural damage can still be perceived by humans and may be considered annoying. Guideline Vibration Annoyance Potential Criteria in the Caltrans manual is shown in Figure 8, and suggests that continuous or frequent intermittent operation of a pavement breaker at a distance of 60 to 85 feet (with Peak Particle Velocity from Figure 7 of 0.07 to 0.1 inch/second) could range from distinctly to strongly perceptible. Potential annoyance caused by different types of equipment operating at various distances can be estimated using Figures 7 and 8.

4.4 Conclusions and Recommendations

The following summary conclusions are derived from this study:

- Prior to original site grading the area of Sunset Place, the adjacent greenbelt, and the Paseo de Valencia roadway were located on a natural hillside exposing bedrock of the Capistrano Formation Siltstone (Tcs), as shown in Figure 6;
- During rough grading of the residential tract in 1973, cuts were made into the hillside east of Sunset Place West, and fills were placed west of Sunset Place West, to create the residential pads shown in Figure 4;
- Final grading of the tract and home construction occurred in 1976. As a result, residences along Sunset Place West are supported on a variable thickness of compacted fill material ranging from several feet thick at the street to 15 or 20 feet thick near the crest of the slope, with a 15 to 20 foot high 1.5h: 1v fill slope descending to the greenbelt and Beckenham Street as shown in Figures 4 and 5;

- Native bedrock is exposed at the toe of slope along the greenbelt and under Paseo de Valencia, and is present under the residential fill (Figures 4 and 5).
- The compacted fill is composed of materials derived from the Capistrano Formation, and Expansion Index (EI) testing shows that the fill soil has “Medium” to “High” expansion potential;
- Reported and observed distress to the homes and surrounding areas includes the following (see Appendix C):
    - Cracking of pavements, slabs, walls, and other hardscape
    - Heaving and vertical offsets at pavement and slab joints and other hardscape
    - Racking of garage doors
    - Settlement / heave of structural slabs and foundations
    - Leaning of top-of-slope pilasters and separation of pilasters from property side walls
    - Excessive surface moisture and algae growth
- The above features are in our opinion a result of heave, settlement, and lateral fill extension resulting from volume changes in the expansive soil caused by moisture changes within the fill due to irrigation and wetting / drying cycles;
- The proposed heavy construction activity is expected to be located a minimum distance of 60 feet from toe of the residential fill and a minimum of 85 feet from the homes on top of the slope (Figure 2C);
- At this distance the proposed construction induced vibrations for the worst type of anticipated construction equipment are expected to be below the threshold of potential damage for older residential structures (see Figures 7 and 8);
- However, depending on the type of equipment and setback distance, vibration from certain construction operations may be considered annoying to occupants of the residential properties. The vibrations generally are expected to classify as distinctly perceptible, but for some equipment could classify as strongly perceptible (see Figure 8);
- Since the site is underlain by compacted cohesive soil and bedrock, settlement due to construction activity is considered highly unlikely.

In general, it is Group Delta's opinion that the planned construction activities are not likely to cause ground settlement, slope movements, or vibration induced damage to the subject properties. Larger, more disruptive equipment working at closer distance than assumed could modify this conclusion. However, vibrations from certain equipment may be perceptible and annoying to occupants. The following recommendations are provided for the City's consideration to monitor the impacts of construction activities and thereby guard against potential damage claims:

- Perform pre-construction inspection to identify existing damage or distress. The inspection could include photographic documentation, crack measurements, and floor level manometer survey;
- In the event of claims, post-construction surveys could be performed and compared to pre-construction conditions;
- Consider using equipment that generates lower vibrations, or require distance setbacks for certain equipment;
- Keep nearby residence and property owners informed about the work schedule and activities, and limit construction days and hours;
- Install and monitor survey points along the property line and/or within adjacent properties to document any vertical or horizontal movements of the ground.
- Install vibration monitoring instruments along the property line and/or within the residential properties to monitor peak particle velocities resulting from construction activities. Specify threshold values that if exceeded should trigger shutdown of construction operations. Instruments would typically include particle velocity sensors and a digital recorder/data logger.
- More details of the monitoring can be provided if desired.

5.0 LIMITATIONS

This investigation was performed in accordance with generally accepted geotechnical engineering principles and practice. The professional engineering work and judgments presented in this report meet the standard of care of our profession at this time. No other warranty, expressed or implied, is made.

6.0 REFERENCES

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http://dap3.dot.ca.gov/shake_stable/

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USGS, 1981, State of California Department of Water Resources, San Juan Capistrano Quadrangle, California - Orange County, 7.5 Minute Series (Topographic).

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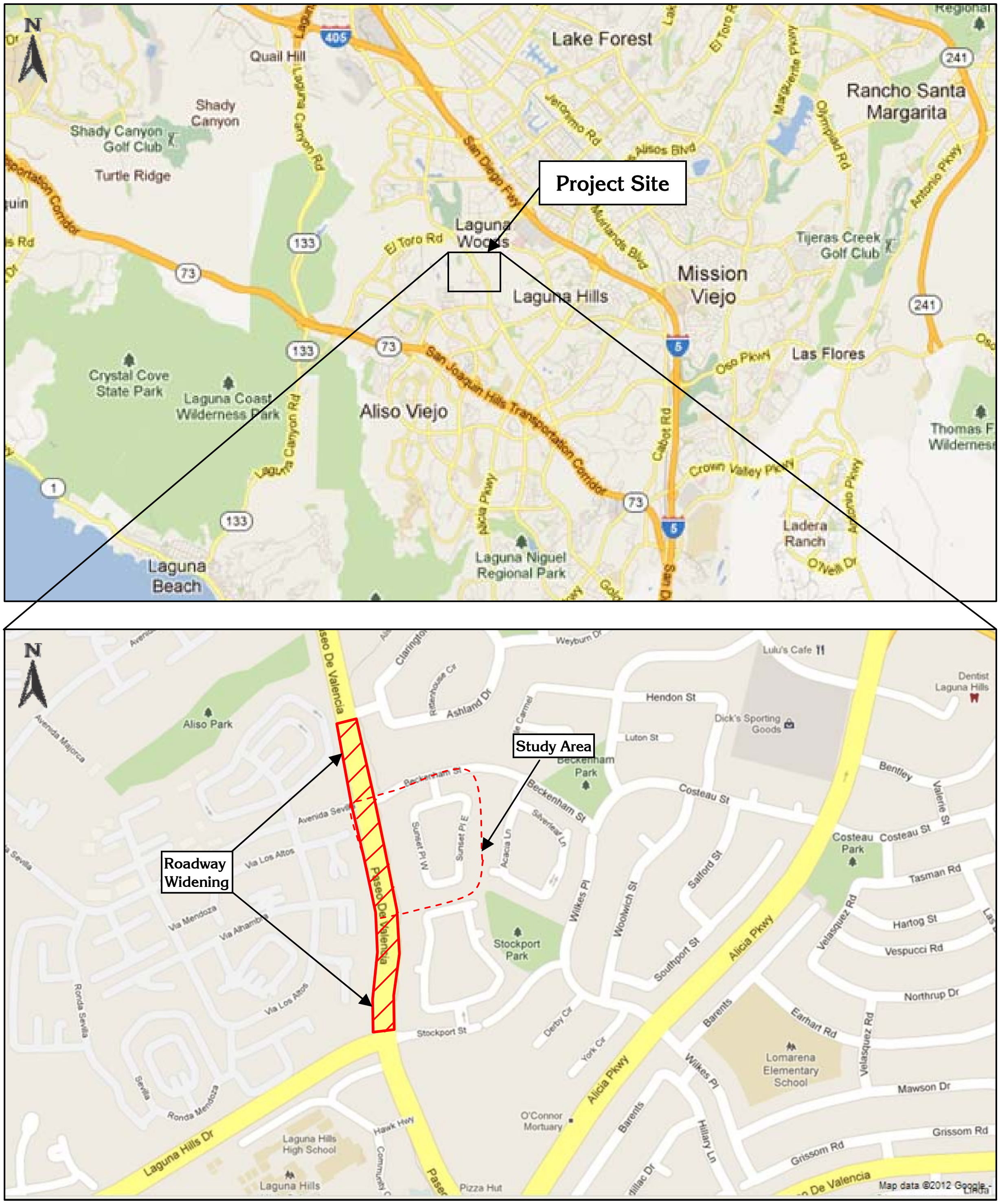
FIGURES



Reference: Google Maps

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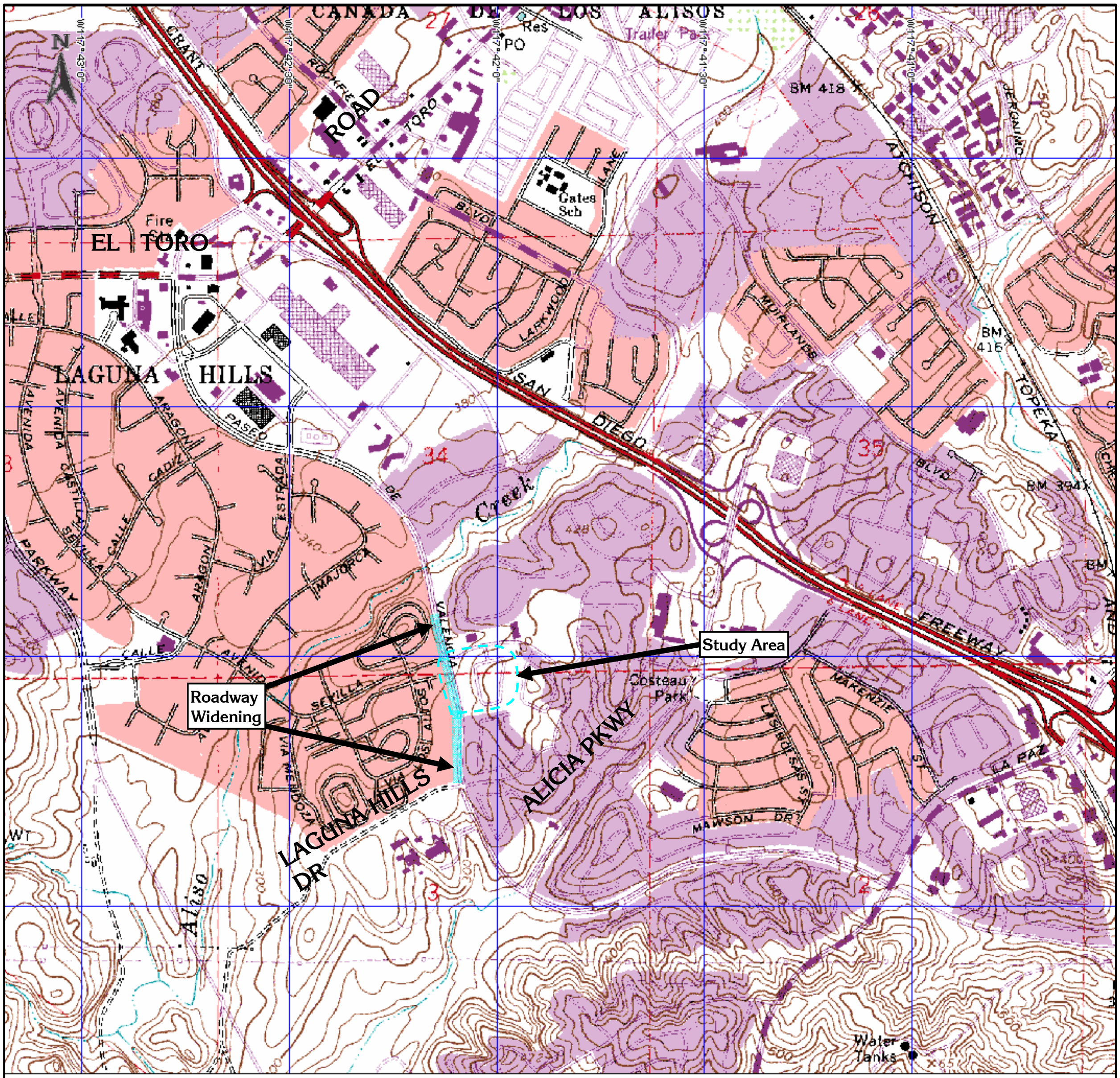
GDC Project No. IR-556 Phase II

Paseo de Valencia Widening Project
Laguna Hills, California

Vicinity Map

Figure 1A



1999 DeLorme Yarmouth, ME 04096 Source Data: USGS 600 ft Scale: 1 : 20,800 Detail: 13-3 Datum: WGS84

Reference: USGS, DeLorme Yarmouth, ME 04096

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GDC Project No. IR-556 Phase II

Paseo de Valencia Widening Project
Laguna Hills, California

USGS 7.5' Quadrangle Map

Figure 1B

Reference: Google Earth

⊕ = **Location of Current GDC Borings**

○ = **Location of Previous GDC Borings (May 2012)**

🟨 = **Potentially Affected Homes**

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GDC Project No. IR-556 Phase II

Paseo De Valencia Widening Project
Laguna Hills, California

Exploration Location Plan

Figure 2A

CITY OF LAGUNA HILLS

PASEO DE VALENCIA STREET WIDENING

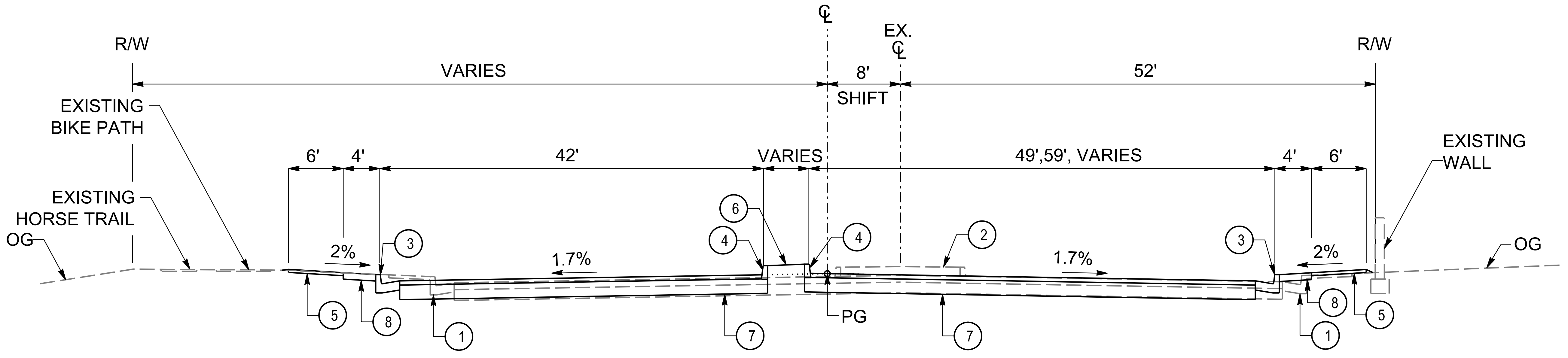
SCALE 1" : 80'
REVISED: 10/29/12

STV INCORPORATED
16261 LAGUNA CANYON ROAD, STE. 150
IRVINE, CA 92618

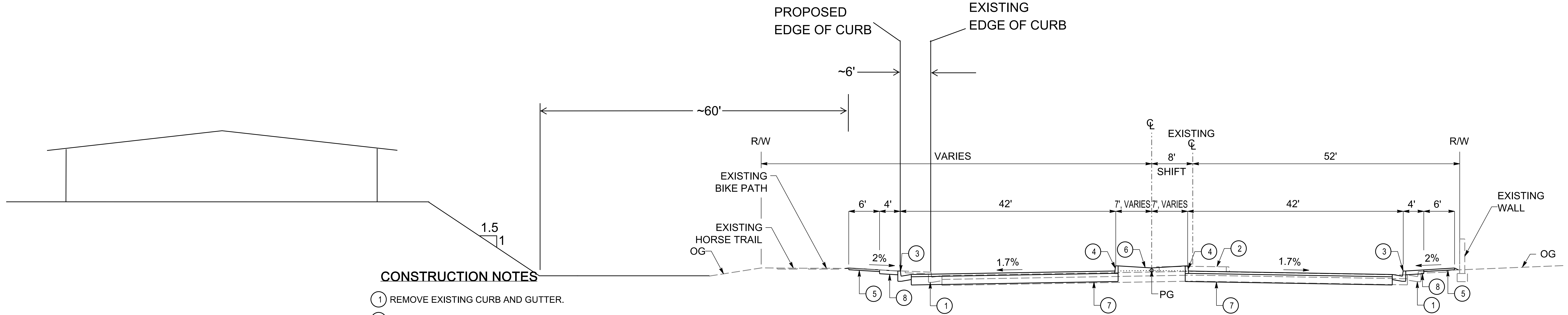
FIGURE 2B
Roadway Widening
Layout Plan

ABREVIATIONS

OC R&DMD	ORANGE COUNTY RESOURCE AND DEVELOPMENT MANAGEMENT DEPARTMENT
PCC	PORTLAND CEMENT CONCRETE
AB	AGGREGATE BASE
OCTA	ORANGE COUNTY TRANSPORTATION AUTHORITY
TOC	TOP OF CURB
OG	EXISTING GROUND
PG	PROPOSED GROUND/PROFILE LINE



PASEO DE VALENCIA
Sta 13+47 TO 15+37
Sta 28+75 TO 30+80
N.T.S



CONSTRUCTION NOTES

① REMOVE EXISTING CURB AND GUTTER.

② REMOVE EXISTING MEDIAN AND CURB.

③ CONSTRUCT TYPE A2-8 CURB AND GUTTER PER OC R&DMD STANDARD PLAN 120-1-OC.

④ CONSTRUCT TYPE A1-8 CURB AND GUTTER PER OC R&DMD STANDARD PLAN 120-1-OC.

⑤ CONSTRUCT 4" PCC SIDEWALK PER OC R&DMD STANDARD PLAN 1205.

⑥ CONSTRUCT LANDSCAPE MEDIAN. SEE LANDSCAPE PLANS.

⑦ CONSTRUCT NEW PAVEMENT. 0.45' HMA OVER 1.65 AB.

⑧ CONSTRUCT PARKWAY. SEE LANDSCAPE PLAN.

PASEO DE VALENCIA
Sta 10+46 TO 13+47
Sta 16+14 TO 28+75
N.T.S

11/30/2012 10:16:01 AM USER • martini
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G:\Cad\Standards\SCRRA\Standards\PenTable\PlotStamp.tbl
I:\Projects\4015510\4015510_0001\90_CAD Models and Sheets\16_R_Resource\Plot-Drivers\PVD_pdf_Full.pltcfg

65% PLANS **NOT FOR CONSTRUCTION**

811
Know what's below.
Call before you dig.

REVISIONS

NUMBER	DATE	INITIALS	DESCRIPTION	APP'VD

STV 100 Years
ENGINEERS/ARCHITECTS/PLANNERS/
CONSTRUCTION MANAGERS
16261 LAGUNA CANYON ROAD
SUITE 150
IRVINE CA, 92618-3608

PREPARED UNDER THE SUPERVISION OF:	DATE
R.C.E No. C0XXXXX (EXP. XX-XX-XX)	XX-XX-XX
DRAWN BY: X. XXXXXX	XX-XX-XX
CHECKED BY: X. XXXXXX	XX-XX-XX
DESIGNED BY: X. XXXXXX	XX-XX-XX

APPOVED:
CITY OF LAGUNA HILLS

KENNETH H. ROSENFIELD DATE
CITY ENGINEER/DIRECTOR OF PUBLIC SERVICES
R.C.E. NO. 33496
EXPIRES: 06-30-2014

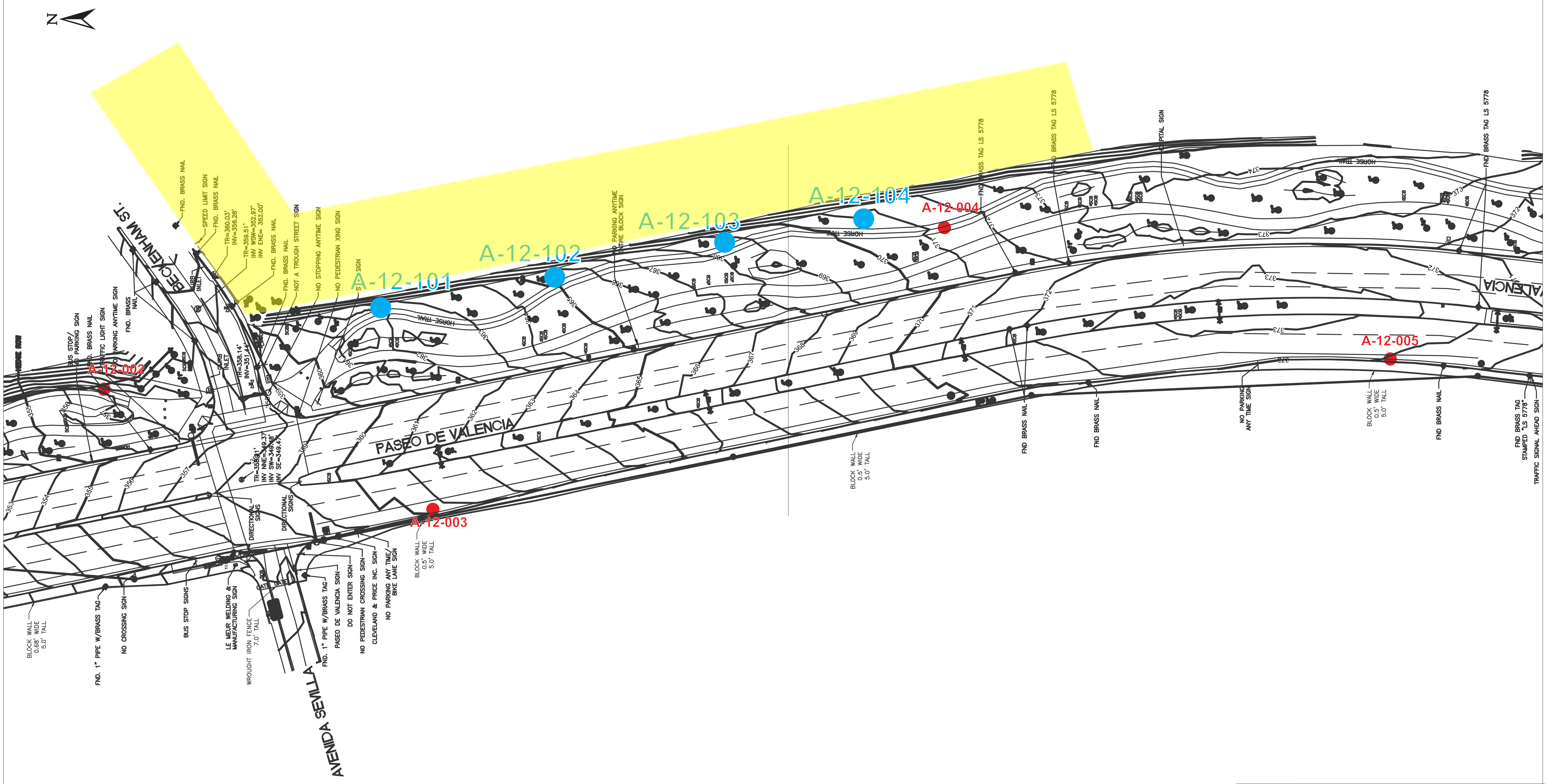
PASEO DE VALENCIA WIDENING
TYPICAL SECTIONS
KENNINGTON DRIVE TO LAGUNA HILLS DRIVE

CITY OF LAGUNA HILLS

C-1

SHEET 02 OF 28

FIGURE 2C



LEGEND

● LOCATION OF PREVIOUS BORING BY GDC

● LOCATION OF CURRENT BORING BY GDC

▨ POTENTIALLY AFFECTED HOMES

GROUP DELTA CONSULTANTS

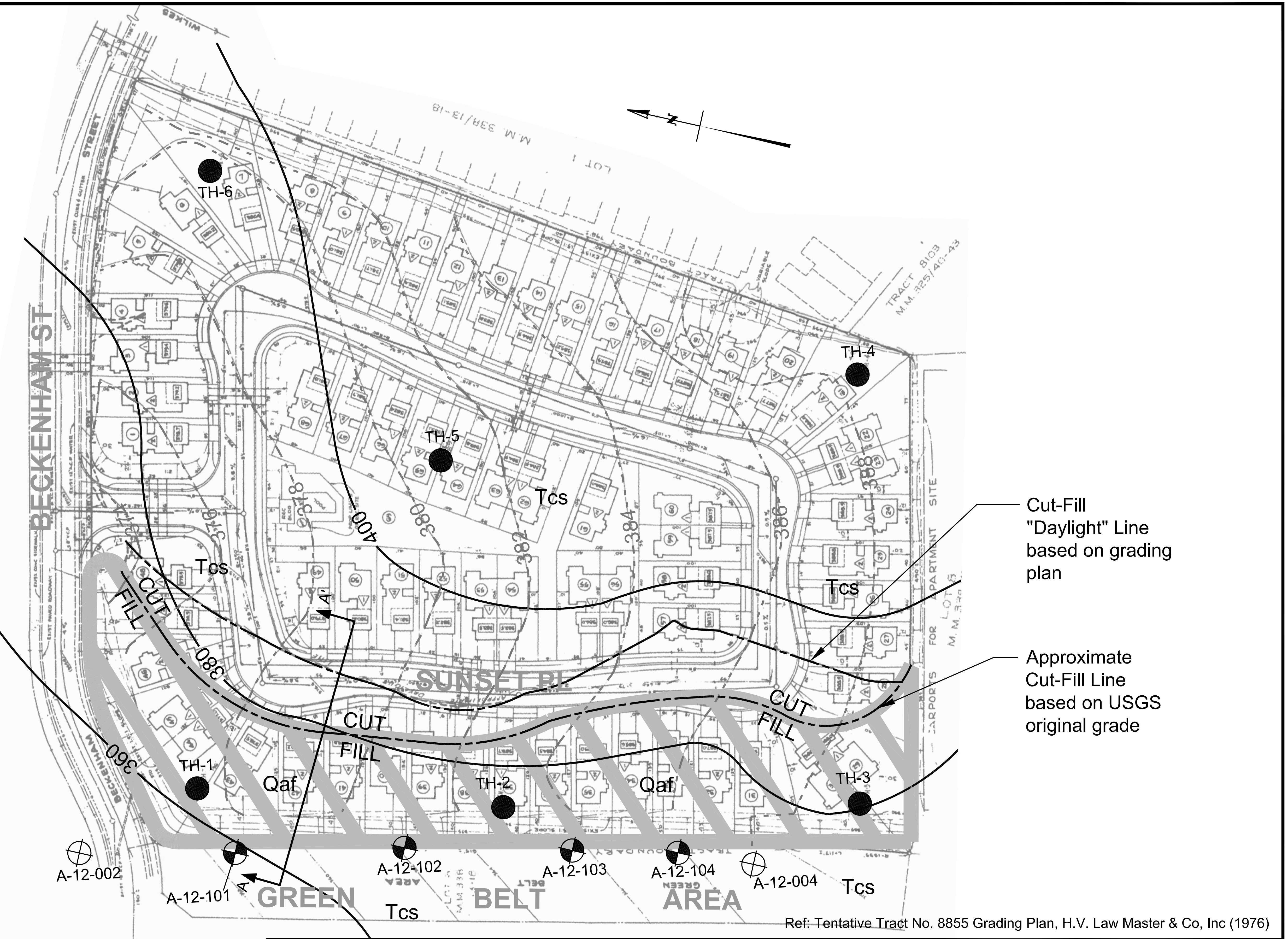
GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618 (949) 450-2100

FIGURE NUMBER
3

PROJECT NAME
PASEO DE VALENCIA WIDENING
LAGUNA HILLS, CALIFORNIA

PROJECT NUMBER
IR-556

SITE TOPOGRAPHIC MAP



Ref: Tentative Tract No. 8855 Grading Plan, H.V. Law Master & Co, Inc (1976)

LEGEND

▬	USGS 7.5 QUADRANGLE MAP ELEVATION CONTOURS
- - -	EXISTING GRADE ELEVATION CONTOURS
A-12-104 ◓	CURRENT GDC BORINGS
TH-6 ●	H.V. LAW MASTER & CO BORINGS (1976)
A-12-004 ⊕	PREVIOUS GDC BORINGS (MAY 2012)
▨	APPROXIMATE FILL LIMITS
A ↑ ↑ A'	CROSS-SECTION
Tcs	CAPISTRANO FORMATION SILTSTONE
Qaf	ARTIFICIAL FILL

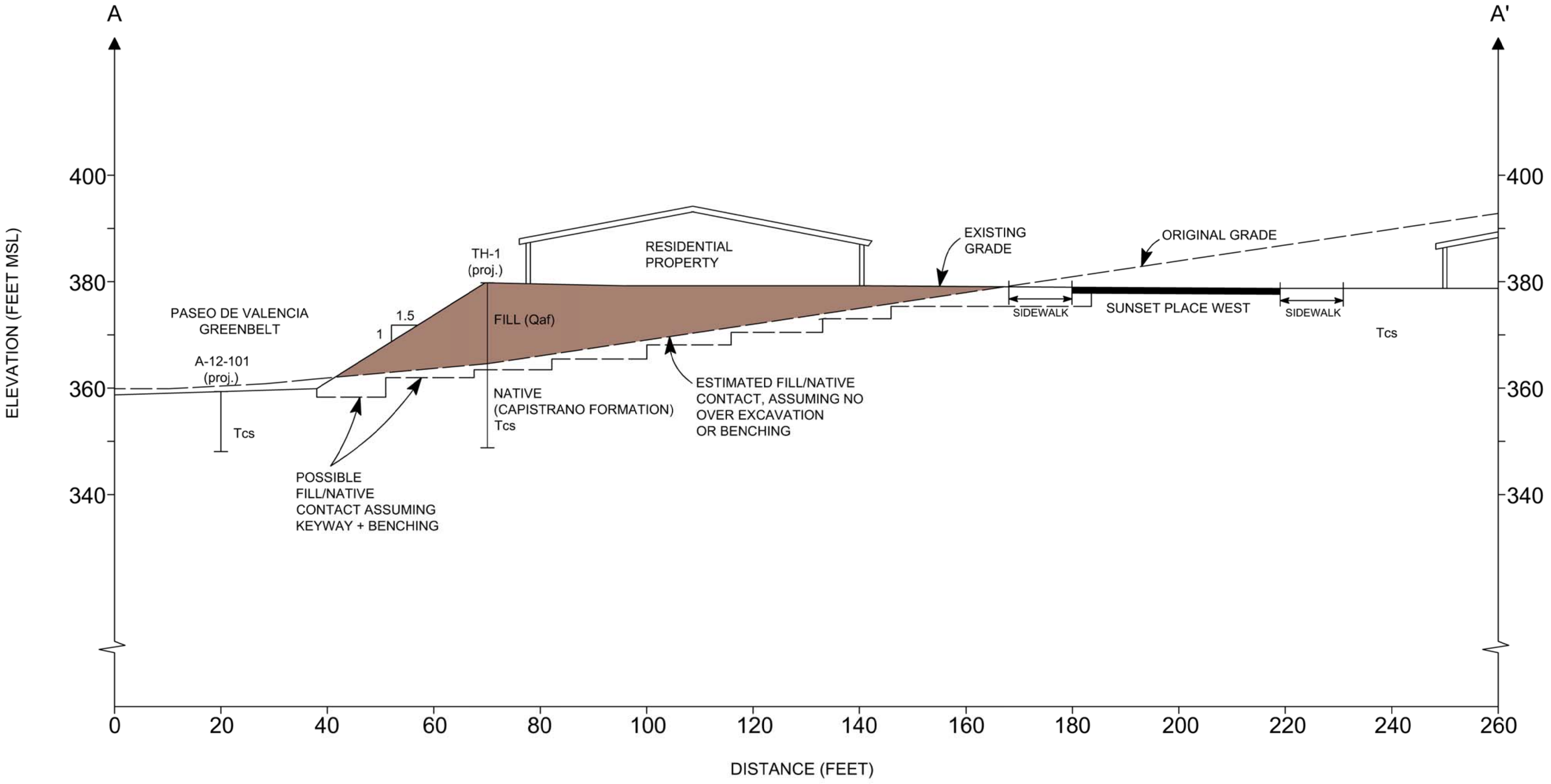
DATE: 12/19/2012
DRAWN BY: K. Madamba
REVISION:
APPROVED BY: C. Scheyhing
REVISION:

GROUP DELTA CONSULTANTS, INC
32 Mauchly
Suite B
Irvine, CA. 92618

CUT-FILL CONTOUR MAP

PASEO DE VALENCIA WIDENING PROJECT
LAGUNA HILLS, CA

PROJECT NUMBER: IR-556 PHASE 2
SCALE: 1" = 100'
FIGURE NUMBER: 4

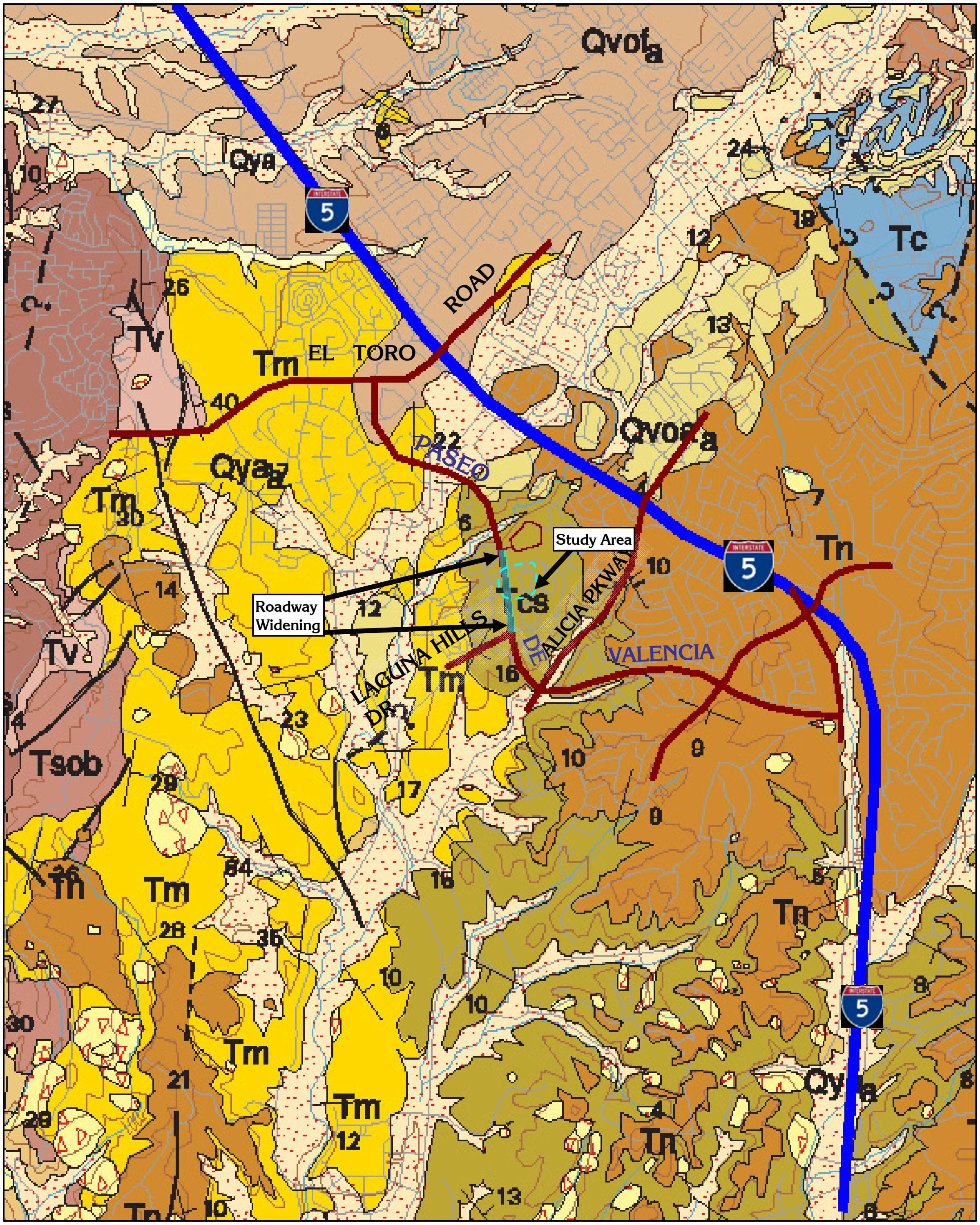


A-12-101	Current GDC Boring
TH-1	H.V. Lawmaster Boring (1976)

DATE: 12/19/2012	DRAWN BY: K. Madamba	GROUP DELTA CONSULTANTS, INC 32 Mauchly Suite B Irvine, CA. 92618	PROJECT NUMBER: IR-556 Phase 2
REVISION:	APPROVED BY: C. Scheyhing		SCALE: 1" = 20'
REVISION:			FIGURE NUMBER: 5

CROSS SECTION A - A'

PASEO DE VALENCIA WIDENING PROJECT
LAGUNA HILLS, CA



Reference: *USGS, Preliminary Geologic Map of the Santa Ana 30' x 60' Quadrangle.*

LEGEND

Qal = Alluvium
Tcs = Capistrano Formation (Siltstone)
Tm = Monterey Formation
Tn = Niguel Formation

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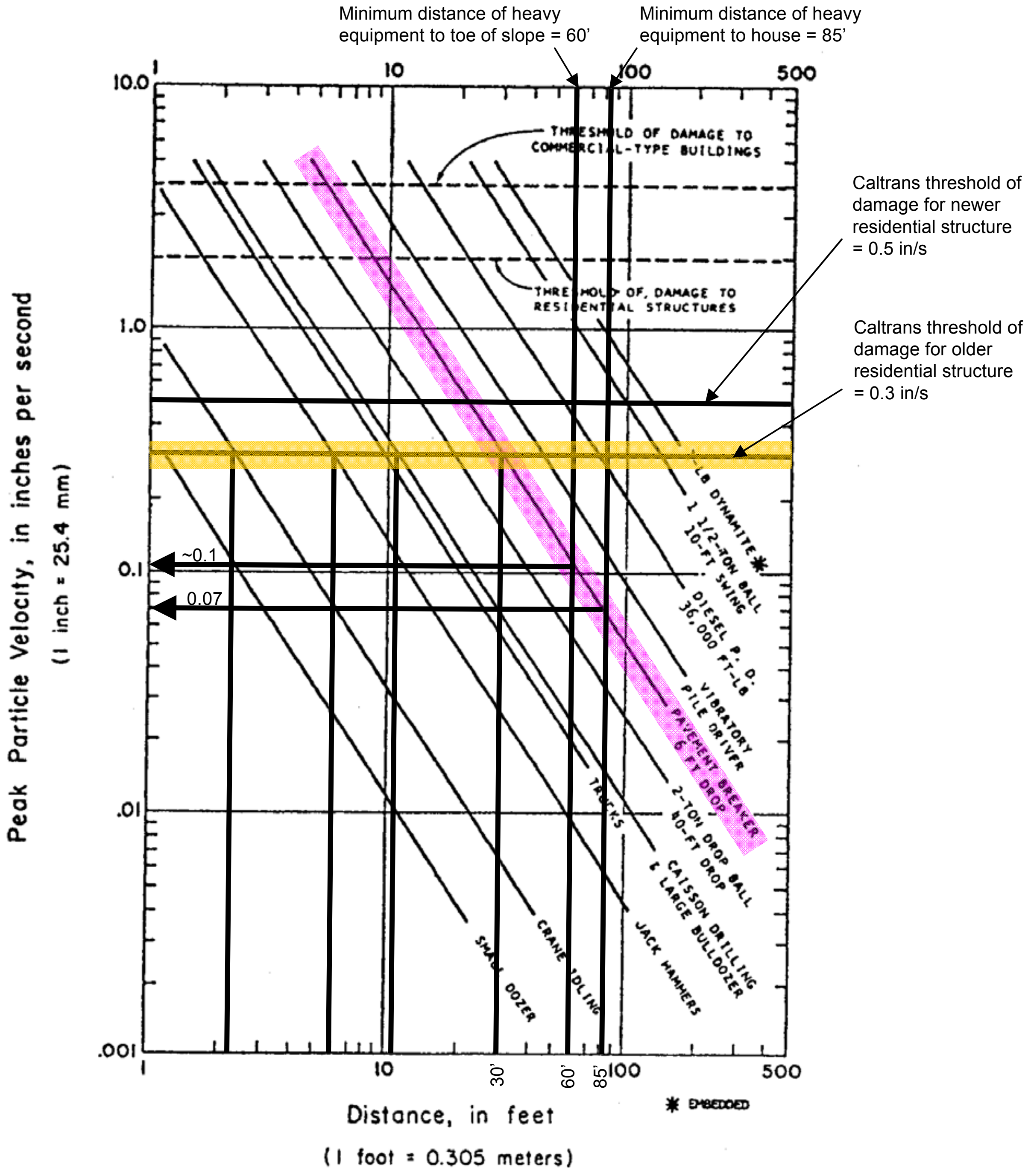
GDC Project No. IR-556 Phase II

Paseo de Valencia Widening Project
Laguna Hills, California

Regional Geologic Map

Figure 6



Construction Vibration Intensities Related to Damage Criteria

Ref: Wiss J.F. (1981) "Construction Vibrations: State of the Art"
Journal of the Geotechnical Engineering Division, Vol. 107, No. 2

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GDC Project No. IR-556 Phase II

Paseo de Valencia Widening Project
Laguna Hills, California

Evaluation of Vibration Effects

Figure 7

Guideline Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (in/sec) Transient Sources	Maximum PPV (in/sec) Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Guideline Vibration Annoyance Potential Criteria

Human Response	Maximum PPV (in/sec) Transient Sources	Maximum PPV (in/sec) Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Ref: Caltrans Transportation- and Construction-Induced Vibration Manual. Prepared by: Jones & Stokes (June 2004)

GROUP DELTA CONSULTANTS

GDC Project No. IR-556 Phase II

Paseo de Valencia Widening Project
Laguna Hills, California

Caltrans Guideline Vibration Damage and Annoyance Potential Criteria

Figure 8

APPENDIX A
FIELD INVESTIGATION

APPENDIX A
FIELD INVESTIGATION

A.1 Introduction

The subsurface conditions at the Paseo de Valencia site were investigated by performing four hollow-stem auger borings on November 27, 2012. The locations of the explorations are presented in Figure 2A and 3 of the main report. A summary of field explorations is presented in Table A-1.

Prior to beginning the exploration program, access permission and drilling permits were obtained as necessary from the City of Laguna Hills. Underground Service Alert (USA) was notified and each exploration location was cleared for underground utilities. The exploration methods are described in the following sections.

A.2 Soil Drilling and Sampling

Drilling, Logging, and Soil Classification

Borings were performed by GDC's drilling subcontractor Scott's Drilling Service under the continuous technical supervision of a GDC field engineer, who visually inspected the soil samples, measured groundwater levels, maintained detailed records of the borings, and visually / manually classified the soils in accordance with the ASTM D 2488 and the Unified Soil Classification System (USCS). Logging and classification was performed in general accordance with Caltrans "Soil and Rock Logging, Classification, and Presentation Manual (2010 Edition)". A Boring Record Legend and Key for Soil Classification are presented in Figures A-1A through A-1E. The boring records are presented in Figures A-2 through Figure A-5.

Sampling

Bulk samples of soil cuttings were collected at selected depths and drive samples were collected at a typical interval of 2.5 feet from the borings. The sampling was performed using Standard Penetration Test (SPT) samplers in accordance with ASTM D 1586 and Ring-Lined "California" Split Barrel samplers in accordance with ASTM D 3550.

Bulk samples were collected from auger cuttings and placed in plastic bags.

SPT drive samples were obtained using a 2-inch outside diameter and 1.375-inch inside diameter split-spoon sampler without lining. The soil recovered from the SPT sampling was sealed in plastic bags to preserve the natural moisture content.

California drive samples were collected with a 3-inch outside diameter 2.5-inch inside diameter split barrel sampler with a 2.42-inch inside diameter cutting shoe. The sampler barrel is lined with 18-inches of metal rings for sample collection and has an additional length of waste barrel. Stainless steel or brass liner rings for sample collection are 1-inch high, 2.42-inch inside diameter, and 2.5-inch outside diameter. California samples were removed from the sampler, retained in the metal rings and placed in sealed plastic canisters to prevent loss of moisture.

At each sampling interval, the drive samplers were fitted onto sampling rod, lowered to the bottom of the boring, and driven 18 inches or to refusal (50 blows per 6 inches) with a 140-lb hammer free-falling a height of 30-inches using a rope and cathead hammer.

Compared to the SPT, the California sampler provides less disturbed samples.

Penetration Resistance

SPT blow counts adjusted to 60% hammer efficiency (N_{60}) are routinely used as an index of the relative density of coarse grained soils, and are sometimes used (but less reliable) to estimate consistency of cohesive soils. For samples collected using non-SPT samplers, different hammer weight and drop height, and/or efficiency different than 60%, correction factors can be applied to estimate the equivalent SPT N_{60} value following the approach of Burmister (1948) as follows:

$$N^*_{60} = N_R * C_E * C_H * C_S$$

where

N^*_{60} = equivalent SPT N_{60}

N_R = Raw Field Blowcount (blows per foot)

C_E = Hammer Efficiency Correction = Er_i / 60%

C_H = Hammer Energy Correction = (W * H) / (140 lb * 30 in)

C_S = Sampler Size Correction = $[(2.0\text{ in})^2-(1.375\text{ in})^2]/[D_o^2-D_i^2]$

Er_i = hammer efficiency, %

W= actual drive hammer weight, lbs

H = actual drive hammer drop, inch

D_o, D_i = actual sampler outside and inside diameter, respectively, inches

Burmister's correction assumes that penetration resistance (blowcount) is inversely proportional to the hammer energy. For a hammer other than a 140# hammer with 30" drop the hammer energy correction is equal to the ratio of the theoretical hammer energy (weight times drop) to the theoretical SPT hammer energy, or C_H = (W * H) / (140 lb * 30 in).

Burmister's correction assumes that penetration resistance (blowcount) is proportional to the annular end area of the drive sampler. For California drive samplers with D_o=3 inch and D_i=2.42 inch the sampler size correction factor is the ratio of the annular area of an SPT split spoon to that of the California Sampler, or $C_S = [2.0^2 - 1.375^2]/[3^2 - 2.42^2] = 0.67$.

To normalize the field SPT and California blowcounts to a hammer with 60% efficiency, an energy correction factor equal to Hammer Efficiency (%) / 60% was applied to the field blowcounts. Hammer efficiency was determined by published correlations with the CME Automatic Hammer blow count rate (USBR, 1999).

The correction factors applied to obtain N^*_{60} are summarized in the following table:

Borings	**Hammer Type**	**Hammer Weight and Drop**	**C_H**	**Hammer Efficiency (%)**	**C_E**	**Cal Sampler Dimensions**	**C_S**	**Combined Correction Factor SPT Samples**	**Combined Correction Factor CAL Samples**
A-12-101 A-12-102 A-12-103 A-12-104	Rope and Cathead	140# 30"	1.0	60	ERi/60	D_o=3.0" D_i=2.42"	0.67	1.0	0.67

Corrected N^*_{60} are generally used, with due engineering judgment, only for qualitative assessment of in place density or consistency, and are not used for other more critical analyses such as liquefaction.

Relative Density and Consistency

Equivalent SPT N_{60} values were used as the basis for classifying relative density of granular/cohesionless soils. Wherever possible consistency classification of cohesive soils was based on undrained shear strength estimated in the field with a pocket penetrometer or by testing in the laboratory. Where pocket penetrometer or other tests could not be performed, consistency of cohesive soils was estimated by correlations to Equivalent SPT N_{60}. The correlations for consistency and relative density are shown in the Boring Record Legend, Figures A-1A through A-1C. Drive sample field blow counts, SPT N^*_{60} values, pocket penetrometer readings, and corresponding density/consistency classifications are presented on the boring records.

Borehole Abandonment

At the completion of the drilling groundwater was measured and the borings were abandoned by backfilling the borehole with drill cuttings, as indicated on the records. Notes describing the borehole abandonment are presented at the bottom of each boring record.

Sample Handling and Transport

Geotechnical samples were sealed to prevent moisture loss, packed in appropriate protective containers, and transported to the geotechnical laboratory for further examination and geotechnical testing.

Laboratory Testing

The soils were further examined and tested in the laboratory and classified in accordance with the Unified Soil Classification System following ASTM D 2487 and D 2488 (see Figures A-1D and A-1E). Field classifications presented on the records were modified where necessary on the basis of the laboratory test results. Descriptions of the laboratory tests performed and a summary of the results are presented in Appendix B.

A.3 List of Attached Tables and Figures

The following tables and figures are attached and complete this appendix:

List of Tables

List of Figures

TABLE A-1
SUMMARY OF FIELD EXPLORATIONS

Exploration No.	Approximate Exploration Location		Date	Exploration			Figure No.
	Latitude	Longitude		Type	Surface Elevation (ft)	Total Depth (ft)	
A-12-101	33°35.984'N	117°42.082'W	11/27/12	HSA	362	11.5	A-2
A-12-102	33°35.956'N	117°42.083'W	11/27/12	HSA	365	11.5	A-3
A-12-103	33°35.931'N	117°42.075'W	11/27/12	HSA	369	11.5	A-4
A-12-104	33°35.915'N	117°42.071'W	11/27/12	HSA	371	11.5	A-5

Notes: 1) Boring locations are illustrated in Figures 2A and 3 of the main report.

2) Elevations estimated to nearest 0.5 ft using measuring wheel and topographic map.

3) Ground water was not encountered in the borings in this field investigation.

HSA = Hollow-Stem Auger

SOIL IDENTIFICATION AND DESCRIPTION SEQUENCE

Sequence	Identification Components	Refer to Section		Required	Optional
		Field	Lab		
1	Group Name	2.5.2	3.2.2	●	
2	Group Symbol	2.5.2	3.2.2	●	
	Description Components				
3	Consistency of Cohesive Soil	2.5.3	3.2.3	●	
4	Apparent Density of Cohesionless Soil	2.5.4		●	
5	Color	2.5.5		●	
6	Moisture	2.5.6		●	
7	Percent or Proportion of Soil	2.5.7	3.2.4	●	⬬
	Particle Size	2.5.8	2.5.8	●	⬬
	Particle Angularity	2.5.9			○
	Particle Shape	2.5.10			○
8	Plasticity (for fine-grained soil)	2.5.11	3.2.5		○
9	Dry Strength (for fine-grained soil)	2.5.12			○
10	Dilatency (for fine-grained soil)	2.5.13			○
11	Toughness (for fine-grained soil)	2.5.14			○
12	Structure	2.5.15			○
13	Cementation	2.5.16		●	
14	Percent of Cobbles and Boulders	2.5.17		●	
	Description of Cobbles and Boulders	2.5.18		●	
15	Consistency Field Test Result	2.5.3		●	
16	Additional Comments	2.5.19			○

Describe the soil using descriptive terms in the order shown

Minimum Required Sequence:

USCS Group Name (Group Symbol); Consistency or Density; Color; Moisture; Percent or Proportion of Soil; Particle Size; Plasticity (optional).

⬬ = optional for non-Caltrans projects

Where applicable:

Cementation; % cobbles & boulders; Description of cobbles & boulders; Consistency field test result

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

HOLE IDENTIFICATION

Holes are identified using the following convention:

H – YY – NNN

Where:

H: Hole Type Code

YY: 2-digit year

NNN: 3-digit number (001-999)

Hole Type Code and Description

Hole Type Code	Description
A	Auger boring (hollow or solid stem, bucket)
R	Rotary drilled boring (conventional)
RC	Rotary core (self-cased wire-line, continuously-sampled)
RW	Rotary core (self-cased wire-line, not continuously sampled)
P	Rotary percussion boring (Air)
HD	Hand driven (1-inch soil tube)
HA	Hand auger
D	Driven (dynamic cone penetrometer)
CPT	Cone Penetration Test
O	Other (note on LOTB)

Description Sequence Examples:

SANDY lean CLAY (CL); very stiff; yellowish brown; moist; mostly fines; some SAND, from fine to medium; few gravels; medium plasticity; PP=2.75.

Well-graded SAND with SILT and GRAVEL and COBBLES (SW-SM); dense; brown; moist; mostly SAND, from fine to coarse; some fine GRAVEL; few fines; weak cementation; 10% GRANITE COBBLES; 3 to 6 inches; hard; subrounded.

Clayey SAND (SC); medium dense, light brown; wet; mostly fine sand,; little fines; low plasticity.

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GDC Project No. IR-556 Phase 2

Paseo de Valencia Widening Project
Laguna Hills, CA

BORING RECORD LEGEND #1

Figure A-1A

GROUP SYMBOLS AND NAMES

Graphic / Symbol		Group Names	Graphic / Symbol		Group Names
▨	GW	Well-graded GRAVEL Well-graded GRAVEL with SAND	▨	CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
▨	GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND			
▨	GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND	▨	CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
▨	GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)			
▨	GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND	▨	ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
▨	GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)			
▨	GM	SILTY GRAVEL SILTY GRAVEL with SAND	▨	OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
▨	GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND			
▨	GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND	▨	OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
▨	SW	Well-graded SAND Well-graded SAND with GRAVEL			
▨	SP	Poorly graded SAND Poorly graded SAND with GRAVEL	▨	CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
▨	SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL			
▨	SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	▨	MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
▨	SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL			
▨	SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	▨	OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
▨	SM	SILTY SAND SILTY SAND with GRAVEL			
▨	SC	CLAYEY SAND CLAYEY SAND with GRAVEL	▨	OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
▨	SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL			
▨	PT	PEAT	▨	OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
▨		COBBLES COBBLES and BOULDERS BOULDERS			

FIELD AND LABORATORY TESTING

C	Consolidation (ASTM D 2435)
CL	Collapse Potential (ASTM D 5333)
CP	Compaction Curve (CTM 216)
CR	Corrosion, Sulfates, Chlorides (CTM 643; CTM 417; CTM 422)
CU	Consolidated Undrained Triaxial (ASTM D 4767)
DS	Direct Shear (ASTM D 3080)
EI	Expansion Index (ASTM D 4829)
M	Moisture Content (ASTM D 2216)
OC	Organic Content (ASTM D 2974)
P	Permeability (CTM 220)
PA	Particle Size Analysis (ASTM D 422)
PI	Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89, AASHTO T 90)
PL	Point Load Index (ASTM D 5731)
PM	Pressure Meter
R	R-Value (CTM 301)
SE	Sand Equivalent (CTM 217)
SG	Specific Gravity (AASHTO T 100)
SL	Shrinkage Limit (ASTM D 427)
SW	Swell Potential (ASTM D 4546)
UC	Unconfined Compression - Soil (ASTM D 2166) Unconfined Compression - Rock (ASTM D 2938)
UU	Unconsolidated Undrained Triaxial (ASTM D 2850)
UW	Unit Weight (ASTM D 4767)

SAMPLER GRAPHIC SYMBOLS

☒	Standard Penetration Test (SPT)		
⧗	Standard California Sampler		
⧗	Modified California Sampler (2.4" ID, 3" OD)		
▯	Shelby Tube	▯	Piston Sampler
▯	NX Rock Core	▯	HQ Rock Core
▩	Bulk Sample	◪	Other (see remarks)

DRILLING METHOD SYMBOLS

▯	Auger Drilling	▯	Rotary Drilling	▯	Dynamic Cone or Hand Driven	☒	Diamond Core

WATER LEVEL SYMBOLS

▽	First Water Level Reading (during drilling)
▼	Static Water Level Reading (after drilling, date)

Definitions for Change in Material

Term	Definition	Symbol
Material Change	Change in material is observed in the sample or core and the location of change can be accurately located.	———
Estimated Material Change	Change in material cannot be accurately located either because the change is gradational or because of limitations of the drilling and sampling methods.	— — — —
Soil / Rock Boundary	Material changes from soil characteristics to rock characteristics.	〰

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

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Paseo de Valencia Widening Project
Laguna Hills, CA

BORING RECORD LEGEND #2

Figure A-1B

CONSISTENCY OF COHESIVE SOILS

Description	Shear Strength (tsf)	Pocket Penetrometer, PP, Measurement (tsf)	Torvane, TV, Measurement (tsf)	Vane Shear, VS, Measurement (tsf)
Very Soft	Less than 0.12	Less than 0.25	Less than 0.12	Less than 0.12
Soft	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
Stiff	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
Very Stiff	1 - 2	2 - 4	1 - 2	1 - 2
Hard	Greater than 2	Greater than 4	Greater than 2	Greater than 2

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (blows / 12 inches)
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Greater than 50

MOISTURE

Description	Criteria
Dry	No discernable moisture
Moist	Moisture present, but no free water
Wet	Visible free water

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 - 10%
Little	15 - 25%
Some	30 - 45%
Mostly	50 - 100%

PARTICLE SIZE

Description		Size (in)
Boulder		Greater than 12
Cobble		3 - 12
Gravel	Coarse	3/4 - 3
	Fine	1/5 - 3/4
Sand	Coarse	1/16 - 1/5
	Medium	1/64 - 1/16
	Fine	1/300 - 1/64
Silt and Clay		Less than 1/300

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010), with the exception of consistency of cohesive soils vs. N_{60}.

Plasticity

Description	Criteria
Nonplastic	A 1⁄8-in. thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

CONSISTENCY OF COHESIVE SOILS

Description	SPT N_{60} (blows/12 inches)
Very Soft	0 - 2
Soft	2 - 4
Medium Stiff	4 - 8
Stiff	8 - 15
Very Stiff	15 - 30
Hard	Greater than 30

Ref: Peck, Hansen, and Thornburn, 1974, "Foundation Engineering," Second Edition.

Note: Only to be used (with caution) when pocket penetrometer or other data on undrained shear strength are unavailable. Not allowed by Caltrans Soil and Rock Logging and Classification Manual, 2010.

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BORING RECORD LEGEND #3

Figure A-1C

LEGEND OF ROCK MATERIALS

⊠	IGNEOUS ROCK
☰	SEDIMENTARY ROCK
▨	METAMORPHIC ROCK

BEDDING SPACING

Description	Thickness/Spacing
Massive	Greater than 10 ft
Very Thickly Bedded	3 ft - 10 ft
Thickly Bedded	1 ft - 3 ft
Moderately Bedded	4 in - 1 ft
Thinly Bedded	1 in - 4 in
Very Thinly Bedded	1/4 in - 1 in
Laminated	Less than 1/4 in

WEATHERING DESCRIPTORS FOR INTACT ROCK

	Diagnostic Features					
	Chemical Weathering-Discoloration-Oxidation		Mechanical Weathering and Grain Boundary Conditions	Texture and Leaching		
Description	Body of Rock	Fracture Surfaces		Texture	Leaching	General Characteristics
Fresh	No discoloration, not oxidized	No discoloration or oxidation	No separation, intact (tight)	No change	No leaching	Hammer rings when crystalline rocks are struck.
Slightly Weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull	Minor to complete discoloration or oxidation of most surfaces	No visible separation, intact (tight)	Preserved	Minor leaching of some soluble minerals	Hammer rings when crystalline rocks are struck. Body of rock not weakened.
Moderately Weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty"; feldspar crystals are "cloudy"	All fracture surfaces are discolored or oxidized	Partial separation of boundaries visible	Generally preserved	Soluble minerals may be mostly leached	Hammer does not ring when rock is struck. Body of rock is slightly weakened.
Intensely Weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in situ disaggregation, grain boundary conditions	All fracture surfaces are discolored or oxidized; surfaces friable	Partial separation, rock is friable; in semi-arid conditions, granitics are disaggregated	Texture altered by chemical disintegration (hydration, argillation)	Leaching of soluble minerals may be complete	Dull sound when struck with hammer; usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures or veinlets. Rock is significantly weakened.
Decomposed	Discolored of oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay		Complete separation of grain boundaries (disaggregated)	Resembles a soil; partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete		Can be granulated by hand. Resistant minerals such as quartz may be present as "stringers" or "dikes".

PERCENT CORE RECOVERY (REC)

$$\frac{\Sigma \text{ Length of the recovered core pieces (in.)}}{\text{Total length of core run (in.)}} \text{ x } 100$$

ROCK QUALITY DESIGNATION (RQD)

$$\frac{\Sigma \text{ Length of intact core pieces } \geq 4 \text{ in.}}{\text{Total length of core run (in.)}} \text{ x } 100$$

RQD* indicates soundness criteria not met.

ROCK HARDNESS

Description	Criteria
Extremely Hard	Cannot be scratched with a pocketknife or sharp pick. Can only be chipped with repeated heavy hammer blows
Very Hard	Cannot be scratched with a pocketknife or sharp pick. Breaks with repeated heavy hammer blows.
Hard	Can be scratched with a pocketknife or sharp pick with difficulty (heavy pressure). Breaks with heavy hammer blows.
Moderately Hard	Can be scratched with a pocketknife or sharp pick with light or moderate pressure. Breaks with moderate hammer blows
Moderately Soft	Can be grooved 1/16 in. deep with a pocketknife or sharp pick with moderate or heavy pressure. Breaks with light hammer blow or heavy manual pressure.
Soft	Can be grooved or gouged easily with a pocketknife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure.
Very Soft	Can be readily indented, grooved or gouged with fingernail, or carved with a pocketknife. Breaks with light manual pressure.

FRACTURE DENSITY

Description	Observed Fracture Density
Unfractured	No fractures
Very Slightly Fractured	Core lengths greater than 3 ft.
Slightly Fractured	Core lengths mostly from 1 to 3 ft.
Moderately Fractured	Core lengths mostly 4 in. to 1 ft.
Intensely Fractured	Core lengths mostly from 1 to 4 in.
Very Intensely Fractured	Mostly chips and fragments.

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

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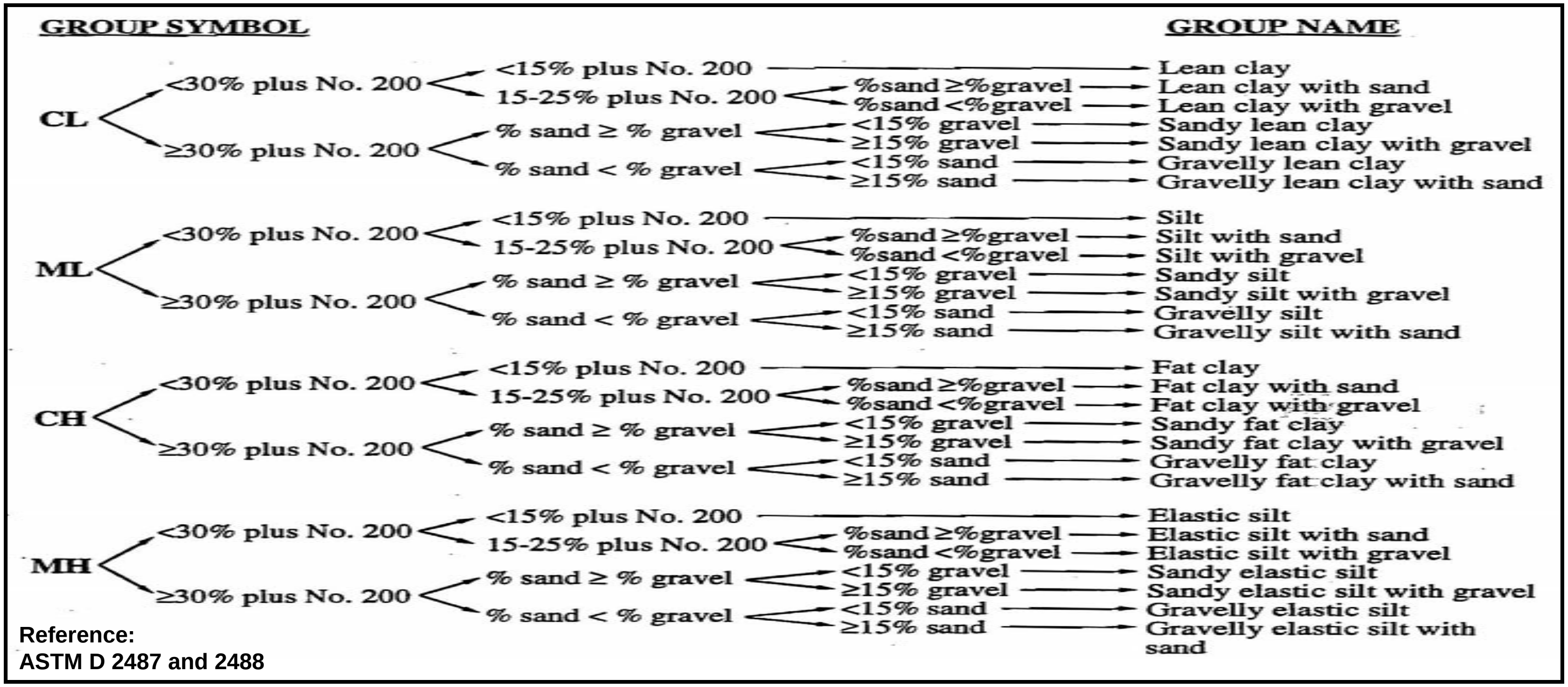
Paseo de Valencia Widening Project
Laguna Hills, CA

BORING RECORD LEGEND #4

Figure A-1D

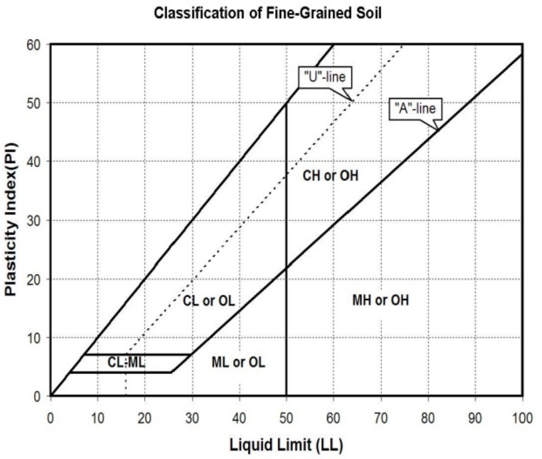
CLASSIFICATION OF INORGANIC FINE GRAINED SOILS (Soils with >50% finer than No. 200 Sieve)



Reference:
ASTM D 2487 and 2488

Laboratory Classification of Clay and Silt

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).



CL: LL<50; above A-Line.

CH: LL>50; above A-Line.

ML: LL<50; below A-Line, or PI<4,
or Non-Plastic

MH: LL>50; below A-Line.

CL-ML: above A-Line and PI=4 to 7

CL/CH, ML/MH: at or near LL=50

ML/CL, MH/CH: at or near the A-Line

Field Identification of Clays and Silts

Group Symbol	Dry Strength	Dilatancy	Toughness	Plasticity
ML	None to low	Slow to rapid	Low or thread cannot be formed	Low to nonplastic
CL	Medium to high	None to slow	Medium	Medium
MH	Low to medium	None to slow	Low to medium	Low to medium
CH	High to very high	None	High	High

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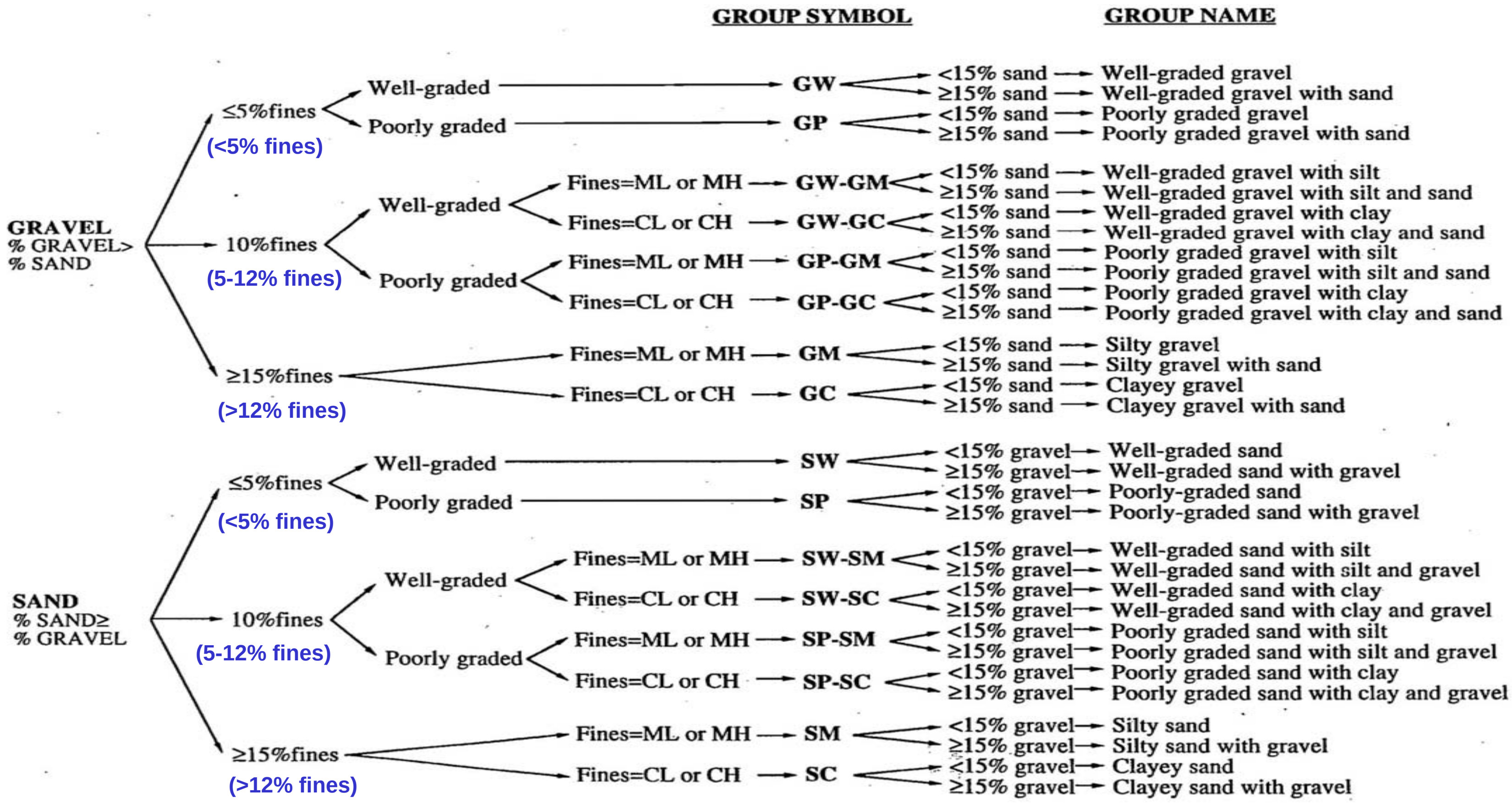
Paseo de Valencia Widening Project
Laguna Hills, CA

KEY FOR SOIL CLASSIFICATION #1

Figure A-1E

CLASSIFICATION OF COARSE-GRAINED SOILS (Soils with <50% “fines” passing No. 200 Sieve)



Reference:

ASTM D 2487 and 2488

Note: Values estimated to nearest 5% to be used for visual identification, values in parentheses to be used for classification when based on laboratory grain size data.

Granular Soil Gradation Parameters

Coefficient of Uniformity: $C_u = D_{60}/D_{10}$

Coefficient of Curvature: $Cc = D_{30}^2 / (D_{60} \times D_{10})$

D_{10} = 10% of soil is finer than this diameter

D_{30} = 10% of soil is finer than this diameter

D_{60} = 10% of soil is finer than this diameter

Group Symbol	Gradation or Plasticity Requirement
SW	$C_u > 6$ and $1 \le C_c \le 3$
GW	$C_u > 4$ and $1 \le C_c \le 3$
GP or SP	Clean gravel or sand not meeting requirement for SW or GW
SM or GM	Non-plastic fines or below A-Line or PI<4
SC or GC	Plastic fines or above A-Line and PI>7

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Paseo de Valencia Widening Project
Laguna Hills, CA

KEY FOR SOIL CLASSIFICATION #2

Figure A-1F

BORING RECORD

PROJECT NAME Paseo De Valencia Widening Project
PROJECT NUMBER I-556 Phase 2
HOLE ID **A-12-101**
SITE LOCATION Laguna Hills, CA
START 11/27/2012
FINISH 11/27/2012
SHEET NO. 1 of 1
DRILLING COMPANY Scott's Drilling
DRILL RIG Ingersoll-Rand A300
DRILLING METHOD Hollow Stem Auger
LOGGED BY S. Gunawan
CHECKED BY C. Scheyhing
HAMMER TYPE (WEIGHT/DROP) 140 lbs., Drop: 30"
HAMMER EFFICIENCY (ERi) 60
BORING DIA. (in) 6
TOTAL DEPTH (ft) 11.5
GROUND ELEV (ft) 359
DEPTH/*ELEV.* GW (ft) ▽ / na **DURING DRILLING**; ▼ / na **AFTER DRILLING**
DRIVE SAMPLER TYPE(S) & SIZE (ID) SPT (1.4") & CAL (2.4")
NOTES $N^*_{60} = N_{SPT} = 0.67N_{CAL}$

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
															6" of top soil.
		▨													SEDIMENTARY ROCK (POORLY INDURATED SILTSTONE); soft; (Lean Clay with SAND (CL); dark olive brown; moist; little fine SAND; low plasticity); (CAPISTRANO FORMATION).
		▨	B-1						18.3			EI			
	355	⧖	S-2	7 7 11	18	18	100		16.5			PA			PP>4.5; hard; olive gray; moist; little fine SAND; moderate amount of oxidation stains; trace calcareous veins. 77% fines; 23% SAND.
5		⧗	R-3	24 50/5"	34 /5"	34 /5"	61		20.6	98					PP>4.5; tan to olive brown; increased plasticity; decreased amount of calcareous deposits.
	350	⧖	S-4	8 11 17	28	28	100		23.0						PP=4.0; tan to olive brown; high plasticity; trace calcareous deposits.
10		⧗	R-5	18 34 36	47	47	100		23.2	98	40:21	PI			PP=3.75; very stiff; light brownish gray; medium plasticity.
															Boring terminated at 11.5'. No groundwater encountered. No caving. Boring backfilled with soil cuttings and tamped to surface.
	345														
15															
	340														
20															
	335														

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Irvine, CA 92618

FIGURE
A-2

BORING RECORD

PROJECT NAME Paseo De Valencia Widening Project
PROJECT NUMBER I-556 Phase 2
HOLE ID **A-12-102**
SITE LOCATION Laguna Hills, CA
START 11/27/2012
FINISH 11/27/2012
SHEET NO. 1 of 1
DRILLING COMPANY Scott's Drilling
DRILL RIG Ingersoll-Rand A300
DRILLING METHOD Hollow Stem Auger
LOGGED BY S. Gunawan
CHECKED BY C. Scheyhing
HAMMER TYPE (WEIGHT/DROP) 140 lbs., Drop: 30"
HAMMER EFFICIENCY (ERi) 60
BORING DIA. (in) 6
TOTAL DEPTH (ft) 11.5
GROUND ELEV (ft) 362
DEPTH/*ELEV.* GW (ft) ∇ / na DURING DRILLING; ▼ / na AFTER DRILLING
DRIVE SAMPLER TYPE(S) & SIZE (ID) SPT (1.4") & CAL (2.4")
NOTES $N^*_{60} = N_{SPT} = 0.67N_{CAL}$

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
															6" of top soil.
	360														SEDIMENTARY ROCK (POORLY INDURATED SILTSTONE); soft; (Lean Clay (CL); dark olive brown; moist; little fine SAND; low plasticity); (CAPISTRANO FORMATION).
		⊠	S-1	8 9 20	29	29	100		19.9		46:26	EI PA PI			PP>4.5; hard; olive gray; moist; few fine SAND; moderate amount of oxidation stains; trace calcareous veins. 89% fines; 11% SAND.
5															
		⧗	R-2	20 42 50/5.5"	62 /11.5"	62 /11.5"	97		26.6	90					PP>4.5; tan to olive brown; increased plasticity; decreased amount of calcareous deposits.
	355														
		⊠	S-3	9 12 16	28	28			26.5						PP>4.5; tan to olive brown; high plasticity; trace calcareous deposits.
10															
		⧗	R-4	28 40 47	58	58			24.0	95		PA			PP=4.0; very stiff; light brownish gray; medium plasticity. 90% fines; 10% SAND.
	350														Boring terminated at 11.5'. No groundwater encountered. No caving. Boring backfilled with soil cuttings and tamped to surface.
15															
	345														
20															
	340														

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Irvine, CA 92618

FIGURE A-3

BORING RECORD

PROJECT NAME Paseo De Valencia Widening Project
PROJECT NUMBER I-556 Phase 2
HOLE ID A-12-103

SITE LOCATION Laguna Hills, CA
START 11/27/2012
FINISH 11/27/2012
SHEET NO. 1 of 1

DRILLING COMPANY Scott's Drilling
DRILL RIG Ingersoll-Rand A300
DRILLING METHOD Hollow Stem Auger
LOGGED BY S. Gunawan
CHECKED BY C. Scheyhing

HAMMER TYPE (WEIGHT/DROP) 140 lbs., Drop: 30"
HAMMER EFFICIENCY (ERi) 60
BORING DIA. (in) 6
TOTAL DEPTH (ft) 11.5
GROUND ELEV (ft) 366
DEPTH/*ELEV.* GW (ft) ▽ / *na* **DURING DRILLING**

DRIVE SAMPLER TYPE(S) & SIZE (ID) SPT (1.4") & CAL (2.4")
NOTES $N^*_{60} = N_{SPT} = 0.67N_{CAL}$
▼ / *na* **AFTER DRILLING**

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
															6" of top soil.
	365														SEDIMENTARY ROCK (POORLY INDURATED SILTSTONE); soft; (Lean Clay (CL); tan; moist; little fine SAND; low plasticity); (CAPISTRANO FORMATION).
			B-1						21.1			EI			
			S-2	15 21 29	50	50	100		20.8			PA			PP>4.5; hard; olive gray; moist; few fine SAND; low to medium plasticity; moderate amount of oxidation stains; trace calcareous deposits. 86% fines; 14% SAND.
5	360		R-3	27 50/5"	34 /5"	34 /5"	61		19.2	97	50:31	PI			Fat CLAY with SAND (CL); hard; olive gray; moist; little fine SAND; high plasticity; trace oxidation stains; trace calcareous deposits. PP>4.5
			S-4	11 15 22	37	37	100		24.5			PA			PP>4.5; trace mica. 85% fines; 15% SAND.
10															PP>4.5; olive gray.
	355		R-5	25 32 48	54	54	100		28.9	90					
															Boring terminated at 11.5'. No groundwater encountered. No caving. Boring backfilled with soil cuttings and tamped to surface.
15	350														
20	345														

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
Irvine, CA 92618

FIGURE

A-4

BORING RECORD

PROJECT NAME Paseo De Valencia Widening Project	**PROJECT NUMBER** I-556 Phase 2	**HOLE ID** **A-12-104**	
SITE LOCATION Laguna Hills, CA	**START** 11/27/2012	**FINISH** 11/27/2012	**SHEET NO.** 1 of 1
DRILLING COMPANY Scott's Drilling	**DRILL RIG** Ingersoll-Rand A300	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** S. Gunawan
CHECKED BY C. Scheyhing	**HAMMER TYPE (WEIGHT/DROP)** 140 lbs., Drop: 30"	**HAMMER EFFICIENCY (ERi)** 60	**BORING DIA. (in)** 6
TOTAL DEPTH (ft) 11.5	**GROUND ELEV (ft)** 368	**DEPTH/*ELEV.* GW (ft)** ∇ / *na* DURING DRILLING	▼ / *na* AFTER DRILLING
DRIVE SAMPLER TYPE(S) & SIZE (ID) SPT (1.4") & CAL (2.4")	**NOTES** $N^*_{60} = N_{SPT} = 0.67N_{CAL}$		

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
															6" of top soil.
															SEDIMENTARY ROCK (POORLY INDURATED SILTSTONE); tan to brown; soft; (Lean CLAY (CL); dark olive brown; moist; little fine SAND; low to medium plasticity); (CAPISTRANO FORMATION).
	365	☒	S-1	16 21 23	44	44	100		13.1			PA			PP>4.5; hard; tan; few fine SAND; weak cementation; moderate amount of oxidation stains; trace calcareous veins. 88% fines; 12% SAND.
5		■	R-2	45 50/3"	34 /3"	34 /3"	50		16.8	106					PP>4.5; olive gray; increased plasticity.
	360	☒	S-3	14 23 28	51	51	100		24.3		55:33	PA PI			Fat CLAY (CH); hard; olive gray; moist; few fine SAND; high plasticity; some calcareous deposits. 86% fines; 14% SAND.
10		■	R-4	30 50/5"	34 /5"	34 /5"	61		25.6	93					PP>4.5; trace to little oxidation stains & calcareous deposits.
															Boring terminated at 11.5'. No groundwater encountered. No caving. Boring backfilled with soil cuttings and tamped to surface.
	355														
15															
	350														
20															
	345														

GDC_LOG_BORING_2011 I-566 12-4-12.GPJ GDCLOG.GDT 12/17/12

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Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE

A-5

APPENDIX B
LABORATORY TESTING

APPENDIX B
LABORATORY TESTING

B.1 General

The laboratory testing was performed using appropriate American Society for Testing and Materials (ASTM) and Caltrans Test Methods (CTM).

Modified California drive samples, Standard Penetration Test (SPT) drive samples, and bulk samples collected during the field investigation were carefully sealed in the field to prevent moisture loss. The samples of earth materials were then transported to the laboratory for further examination and testing. Tests were performed on selected samples as an aid in classifying the earth materials and to evaluate their physical properties and engineering characteristics. Laboratory testing for this investigation included:

- Soil Classification: USCS (ASTM D 2487) and Visual Manual (ASTM D 2488);
- Moisture content (ASTM D 2216) and Dry Unit Weight (ASTM D 2937);
- Atterberg Limits (ASTM D 4318);
- % Passing #200 Sieve (ASTM D 1140);
- Expansion Index (ASTM D 4829);

Brief descriptions of the laboratory testing program and test results are presented below.

B.2 Soil Classification

Earth materials recovered from subsurface explorations were classified in general accordance with Caltrans' "Soil and Rock Logging Classification Manual, 2010". The subsurface soils were classified visually / manually in the field in accordance with the Unified Soil Classification System (USCS) following ASTM D 2488; soil classifications were modified as necessary based on testing in the laboratory in accordance with ASTM D 2487. The details of the soil classification system and boring records presenting the classifications are presented in Appendix A.

B.3 Moisture Content and Dry Unit Weight

The in-situ moisture content of selected bulk, SPT, and Ring samples was determined by oven drying in general accordance with ASTM D 2216. Selected California Ring samples were trimmed flush in the metal rings and wet weight was measured. After drying, the dry weight of each sample was measured, volume and weight of the metal containers was measured, and moisture content and dry density were calculated in general accordance with ASTM D 2216 and D 2937. Results of these tests are presented on the boring records in Appendix A.

B.4 Atterberg Limits

Characterization of the fine-grained fractions of soils was evaluated using the Atterberg Limits. This test includes Liquid Limit and Plastic Limit tests to determine the Plasticity Index in accordance with ASTM D 4318. Results of these tests are presented on the boring records in Appendix A and are plotted on a Plasticity Chart in Figure B-1 of this Appendix.

B.5 Grain Size Distribution and Percent Passing No. 200 Sieve:

Representative samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. The percentage of fines (soil passing No. 200 sieve) was determined for selected samples in accordance with ASTM D 1140. For selected samples the washed fraction retained on the No. 200 sieve was then screened on a No. 4 sieve, and the percentage retained on No. 4 was weighed to determine the percentage of gravel. The relative proportion (or percentage) by dry weight of gravel (retained on No. 4 sieve), sand (passing No. 4 and retained on No. 200 sieve), and fines (passing No. 200 sieve) are listed on the boring records in Appendix A.

B.6 Expansion Index

The expansion potential of the site soils was estimated using the Expansion Index Test in accordance with ASTM D 4829. The results of this test are listed in Table B-2.

B.7 List of Attached Figures

The following tables and figures are attached and complete this appendix:

List of Tables

List of Figures

TABLE B-1
SUMMARY OF LABORATORY TEST RESULTS
Paseo De Valencia Widening Project
IR556 Phase 2

Boring No.	Sample No.	Sample Depth (ft)	Sample Type[1]	USCS Group Symbol	Geologic Unit[2]	SPT N_{60} (blows/ft)	Undrained Shear Strength, Su (ksf)			Moisture Content (%)	Dry Unit Weight (pcf)	Total Unit Weight (pcf)	Atterberg Limits			Grain Size Distribution (%) by dry weight			
							Pocket Penetro-meter	Miniature Vane	Unconfined Compres-sion Test				LL	PL	PI	Gravel	Sand	Fines	Clay (2μ)
A-12-101	B-1	0-5	BULK	CL	Tcs	NA	NA	NA	NA	18.3	NA	NA	NA	NA	NA	NA	NA	NA	NA
	S-2	5	SPT	CL	Tcs	18	>4.5	NA	NA	16.5	NA	NA	NA	NA	NA	0	77	23	NA
	R-3	10	RING	CL	Tcs	34/5"	>4.5	NA	NA	20.6	98	118	NA	NA	NA	NA	NA	NA	NA
	S-4	15	SPT	CL	Tcs	28	4.0	NA	NA	23.0	NA	NA	NA	NA	NA	NA	NA	NA	NA
	R-5	20	RING	CL	Tcs	47	3.8	NA	NA	23.2	98	121	40	19	21	NA	NA	NA	NA
A-12-102	S-1	25	SPT	CL	Tcs	29	>4.5	NA	NA	19.9	NA	NA	46	20	26	0	11	89	NA
	R-2	30	RING	CL	Tcs	62/11.5	>4.5	NA	NA	26.6	90	114	NA	NA	NA	NA	NA	NA	NA
	S-3	35	SPT	CL	Tcs	28	>4.5	NA	NA	26.5	NA	NA	NA	NA	NA	NA	NA	NA	NA
	R-4	40	RING	CL	Tcs	58	4.0	NA	NA	24.0	95	118	NA	NA	NA	0	10	90	NA
A-12-103	B-1	45	BULK	CL	Tcs	NA	NA	NA	NA	21.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
	S-2	50	SPT	CL	Tcs	50	>4.5	NA	NA	20.8	NA	NA	NA	NA	NA	0	14	86	NA
	R-3	55	RING	CL	Tcs	34/5"	>4.5	NA	NA	19.2	97	116	50	19	31	NA	NA	NA	NA
	S-4	60	SPT	CL	Tcs	37	>4.5	NA	NA	24.5	NA	NA	NA	NA	NA	0	15	85	NA
	R-5	65	RING	CL	Tcs	54	>4.5	NA	NA	28.9	90	116	NA	NA	NA	NA	NA	NA	NA
A-12-104	S-1	70	SPT	CL	Tcs	44	>4.5	NA	NA	13.1	NA	NA	NA	NA	NA	0	12	88	NA
	R-2	75	RING	CL	Tcs	34/3"	>4.5	NA	NA	16.8	106	124	NA	NA	NA	NA	NA	NA	NA
	S-3	80	SPT	CL	Tcs	51	>4.5	NA	NA	24.3	NA	NA	55	22	33	0	14	86	NA
	R-4	0	RING	CL	Tcs	34/5"	>4.5	NA	NA	25.6	93	117	NA	NA	NA	NA	NA	NA	NA

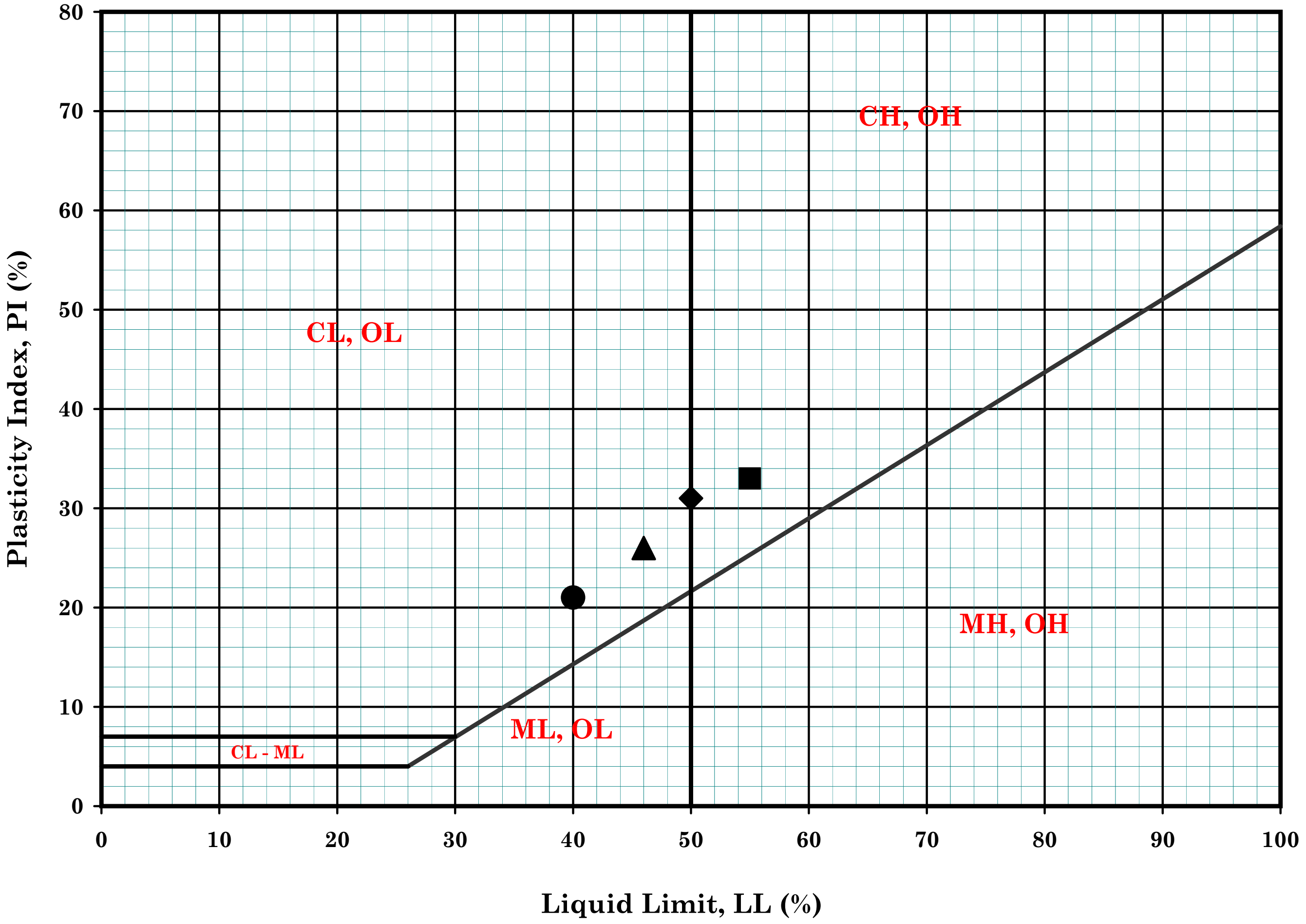
NA = Not Applicable   REF = Refusal

Note 1	SPT	Standard Penetration Test	Note 2	Tcs	Capistrano Formation
	MC	Modified California Sampler			
	BULK	Bulk Sample			
	GRAB	Grab Sample			

TABLE B-2
EXPANSION INDEX TEST RESULTS
Paseo De Valencia Widening Project
IR556 - Phase 2

BORING NO	SAMPLE NO	DEPTH (feet)	SOIL TYPE	EXPANSION INDEX	EXPANSION POTENTIAL
A-12-001	B-1	0.5-5	CL	98.5	“High”
A-12-002	S-1	2.5-4	CL	94.6	“High”
A-12-003	B-1	0.5-5	CL	94.1	“High”

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth				MC	LL	PL	PI	LI	Description
			(ft)		(m)		(%)					
●	*A-12-101*	*R-5*	*10.0*	*11.5*	*3.1*	*3.5*	*23.2*	*40*	*19*	*21*	*0.20*	*Lean CLAY with SAND (CL)*
▲	*A-12-102*	*S-1*	*2.5*	*4.0*	*0.8*	*1.2*	*19.9*	*46*	*20*	*26*	*0.00*	*Lean CLAY (CL)*
◆	*A-12-103*	*R-3*	*5.0*	*6.5*	*1.5*	*2.0*	*19.2*	*50*	*19*	*31*	*0.01*	*Fat CLAY with SAND (CH)*
■	*A-12-104*	*S-3*	*7.5*	*9.0*	*2.3*	*2.7*	*24.3*	*55*	*22*	*33*	*0.07*	*Fat CLAY (CH)*

Remarks :

GROUP
DELTA
CONSULTANTS

Paseo De Valencia Widening Project

Project No. : *IR556 P2*

Date : *12/11/12*

ATTERBERG LIMITS

(ASTM D-4318 / CT-204 / T-89)

Figure No. : B-1

APPENDIX C
SELECTED SITE PHOTOGRAPHS


ADT


25011


SUNSET







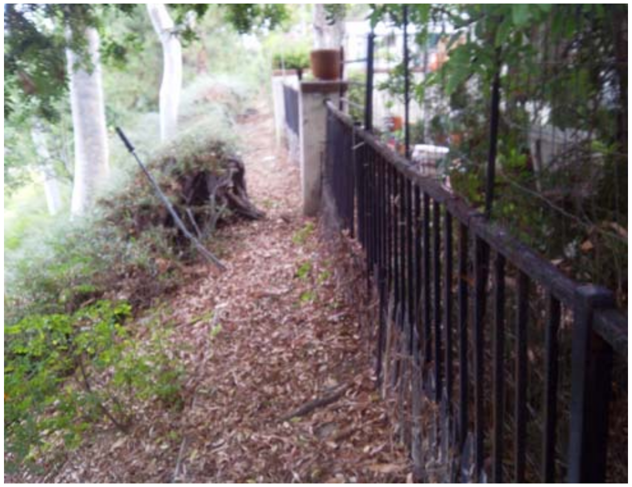


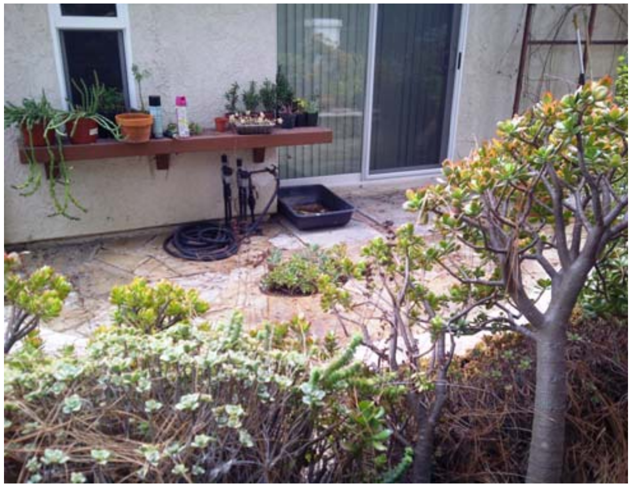










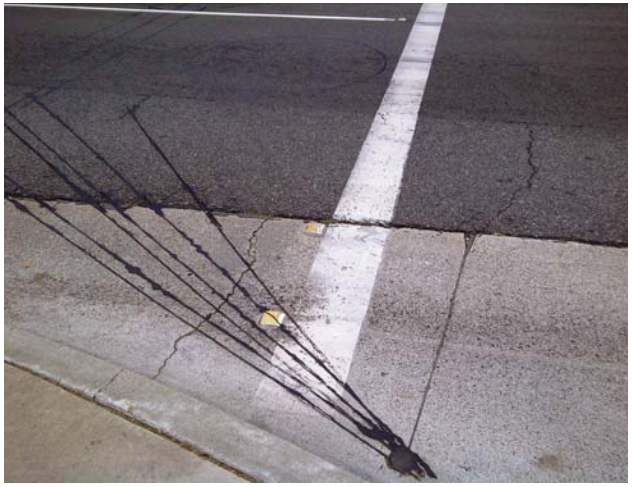

















HONDA



STOP


24975








DO NOT DUPLICATE


24985



APPENDIX D
H.V LAWMASTER GEOTECHNICAL REPORTS (1976)

FOUNDATION INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
TENTATIVE TRACT NO. 8855
EL TORO, ORANGE COUNTY, CALIFORNIA

Site Address..........
Location..........
☒ Report
☐ Plan
APPROVED
Engineering
Grading Permit #______
Date Issued______
☐ Unconditionally
☐ Conditionally (subject to corrections)
Date 8-4-76
Dept. of Building & Safety
County of Orange

wait for Harrington signed reports

PREPARED FOR

BAYSHORE/OLMSTEAD DEVELOPMENT
1600 DOVE STREET
NEWPORT BEACH, CALIFORNIA 92660

RECEIVED
ENGINEERING
AUG 4 1976
ORANGE COUNTY
Bldg. & Safety

July 8, 1976
File No. 76-6035

H.V.Lawmaster & CO., Inc.
TESTING AND INSPECTION ENGINEERS

H.V.Lawmaster & co., inc.
TESTING AND INSPECTION ENGINEERS

(714) 828-8040

7940 MAIN STREET
STANTON, CAL. 90680

H. V. LAWMASTER, PRESIDENT
B.S. GEOLOGY
JOHN K. EARNEST, V. PRES.
B.S. GEOLOGY
DON P. HARRINGTON, V. PRES.
R.C.E. NO. 18181
RAY A. EASTMAN, V. PRES.
C.E.G. NO. 423

July 8, 1976

Bayshore/Olmstead Development
1600 Dove Street
Newport Beach, California 92660

Attention: Mr. Dan Olmstead

Re: Tentative Tract No. 8855
El Toro, Orange County, California

File No. 76-8035

Gentlemen:

The following report presents the results of a foundation investigation of the referenced building site. The study was undertaken at the request of Mr. Dan Olmstead to determine pertinent soil conditions and to evaluate these conditions with respect to proposed grading and residential building construction on the property.

A site plan and preliminary information furnished this office were used in outlining the scope of work and the study was conducted in accordance with generally accepted geotechnical engineering practice.

General guidelines for grading the site and tentative criteria for designing the required foundation systems are discussed in the report.

Respectfully Submitted,
H. V. Lawmaster & Co., Inc.

H. V. Lawmaster
President

Don P. Harrington
R.C.E. No. 18181

HVL/DPH/ms
(8 copies submitted)

FOUNDATION INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
TENTATIVE TRACT NO. 8855
EL TORO, ORANGE COUNTY, CALIFORNIA

INTRODUCTION

This report presents the results of an investigation of foundation soil conditions at the subject building site. The study was authorized to determine the nature and pertinent physical properties of the site materials; to develop preliminary guidelines for grading the property; and to provide tentative recommendations for foundation design.

SCOPE

The investigation comprised field exploration and sampling which consisted of drilling six 20-inch-diameter borings to depths of 15- to 31-feet below existing grade and obtaining representative soil samples; routine examination of each sample in the laboratory and determination of field densities and moisture contents; performance of shear, consolidation and expansion tests, and sulfate analyses; evaluation of soil conditions; and preparation of this report.

A description of the methods used in performance of the work and supporting geotechnical data, on which our recommendations are based, are presented in Appendix A of this report.

STRUCTURES

The structures proposed for the site are one-story, single family dwellings of wood frame construction with slabs on grade.

Continuous footings are planned and we have assumed that bearing wall loads will be less than 1000 pounds per lineal foot.

SITE LOCATION AND SURFACE CONDITIONS

The property covered by this study is an irregular-shaped parcel, approximately 11 acres in size, situated along the southerly side of Beckenham Street, roughly 130 feet east of Paseo de Valencia, in the El Toro area of Orange County, California. It is bounded on the east and south by existing residential buildings and on the west by a green belt area with Paseo de Valencia beyond.

A considerable amount of soil has been stockpiled in the central area of the property. The surrounding area is fairly uniform, having been graded in the past, and slopes down toward the north on a grade of about two percent to Beckenbam Street.

Cut and fill slopes exist along the east and west side of the site, respectively, and a combined cut-fill slope exists off-site along the south property line. These slopes have been graded to a ratio of 1.5:1 to a maximum height of roughly 20 feet.

A moderately heavy growth of native grass and weeds covers most of the site.

SOIL AND GROUND WATER CONDITIONS

The site was previously graded in 1973 and brought to its present elevation. Grading operations were observed and tested by Woodward-McNeill & Associates and, according to their report dated December 26, 1973,(Project No. D267F), the work was completed in accordance with project specifications, the grading code then in effect, and to the satisfaction of their staff.

Our borings drilled along the west side of the property penetrated 11- to 15-feet of compacted fill, a three- to five-foot-thick topsoil zone, and siltstone bedrock throughout the remainder of the depths penetrated. No significant amounts of vegetation were encountered in the fill and topsoil zones.

The remaining borings, drilled near the center and along the east side of the site, encountered siltstone/claystone bedrock at grade and throughout the full depth of penetration.

Soil and bedrock conditions at the boring locations correspond with those indicated by a review of the previous grading plan and soil report for the site. Except for placement of the stockpiled materials, no work has been done on the site since completion of initial grading operations.

The cut-fill daylight line shown on the original grading plan has been added to the current plan included with this report for future references.

Ground water or seepage was not encountered in the borings on the date of drilling.

RECOMMENDATIONS

The following recommendations for grading the property and for designing suitable foundations for the proposed structures are based on conditions encountered at the boring locations and represent our best estimate of project requirements.

Grading

The tentative map indicates that only minimal grading is to be performed and that grade changes will be about two feet or less. No new slopes or significant alteration of the existing slopes are planned.

The following procedure is recommended for grading the property.

Prior to major grading, all surface vegetation and any debris shall be stripped and disposed of off site. Topsoil containing objectionable amounts of roots should be excavated and either used for surface fill in rear yards or mixed with additional soil to reduce the organic content to an acceptable level.

The stockpiled materials should be closely examined by the soil engineer's field representative and any material judged unsuitable for use should be removed from the site.

An allowable soil bearing pressure of at least 1500 pounds per square foot is applicable to 12-inch-wide continuous footings bottomed at the specified depths.

Soluble Sulfate

Chemical analyses disclosed relatively low percentages of water soluble sulfate in the site materials and, pursuant to UBC Section 2604(c)2G, Type V cement should not be required.

Backfills

All backfills must be adequately compacted to preclude detrimental settlement. It is recommended that backfills placed below building slabs and to a distance of five feet beyond building lines, below P.C. concrete flat work and asphalt pavement, and within 10 feet of any significant slope be compacted to at least 90% of maximum density. A minimum relative compaction of 85% is considered adequate for non-structural backfills placed elsewhere on site.

Site materials may be used for backfill, however it may be difficult to compact the material to the proper density. Due to the fine-grained structure of the materials, mechanical compaction should be employed; jetting or flooding methods are not recommended and should not be permitted within five feet of any structure or slope.

As an alternative to the use of site material, the trenches may be filled with imported sand mechanically compacted into place or they may be filled with a sand-cement slurry containing at least five percent cement per cubic yard. If a slurry is used, field density testing will be waived by this office, however batch plant tickets and periodic inspection during placement will be required.

If either of the alternatives is selected, it is recommended that an 18-inch-thick cap of compact site material be provided in areas to be landscaped to minimize water infiltration into the trenches and to promote plant growth.

SOIL CHARACTERISTICS

Shrinkage/Subsidence

The existing fill and native bedrock are dense and minimal losses due to shrinkage are anticipated. A shrinkage factor of 10 percent should be adequate for yardage determination; ground subsidence in areas to be filled may be neglected if the

All areas to receive fill should be scarified about a foot deep, or to greater depths if deemed necessary on the basis of field inspection, brought to approximate optimum moisture content, and compacted to at least 90 percent of maximum density.

Cut areas should be scarified and compacted if deemed necessary by the soil engineer.

Fill material should be spread in loose lifts limited to about six inches in thickness, brought to approximate optimum moisture content, and compacted to at least 90 percent of maximum density.

The specified relative compaction should be based on maximum densities determined by ASTM Test Method D1557-70.

Grading operations should be continuously inspected and all compacted fill adequately tested by a representative of the soil engineer. A final report containing the test results, appropriate recommendations for final design of the foundation and floor slabs, and a statement as to the adequacy of the work should be prepared by the soil engineer at the completion of the grading operations.

Slope Stability

Stability analyses for the existing cut and fill slopes are presented in Appendix B which indicate amply safety factors for these slopes under static and pseudostatic loads.

Proper landscaping, drainage, and maintenance of the slopes are, of course, all necessary for continued stability.

Foundation/Floor Slab Design

Typical foundation systems for residential structures are described on page 7.

Preliminary data indicate that the site materials are moderately to highly expansive and that highly expansive material predominates. Accordingly, Type III and Type IV systems should be planned.

specified shrinkage factor is used.

Expansion

Site materials have been tentatively rated moderately to highly expansive on the basis of presently available data. Additional tests should be conducted at the completion of rough grading operations to verify expansion potentials at the site.

Settlement

It is anticipated that total and differential settlement of foundation systems designed as recommended and bearing on approved soil will be well within tolerable limits for the type of structure proposed.

Caving

Caving did not occur during drilling operations and this conditions is not expected to effect construction operations. The regulations of Cal/OSHA should be observed during performance of all underground construction.

CONCLUSIONS/LIMITATIONS

The recommendations and opinions expressed in this report reflect our best estimate of project requirements based on information obtained at the boring locations. It must be recognized, however, that evaluation of subsurface deposits is subject to the influence of undisclosed and unforeseen variations in soil conditions that may occur in intermediate and unexplored areas.

We have evaluated the property and prepared this report in accordance wigh generally accepted soil and foundation engineering practices and make no other warranties, either expressed or implied, as to the professional advice included in this report.

It shall be the responsibility of the owner and/or contractor to bring to the attention of this office any unusual condition, not covered by this report, which may be encountered in the course of project development.

o - O - o

FOUNDATION / SLAB SYSTEMS

FILE NUMBER 76-8035 **TRACT NUMBER** 8855 (Tent.)

Expansion Potential	Nil	Slight	Moderate	High	Critical
Footing Depth	TYPE I	TYPE II	TYPE III (1)	TYPE IV (1)	TYPE V (1)
One-Story / Two-Story	12" / 18"	12" / 18"	18"(2) / 18"(2)	24"(2) / 24"(2)	30"(2)(3) / 30"(2)(3)
Footing Reinforcement (4)	Not Req'd	1-#4 T&B	1-#5 T&B	2-#4 T&B	2-#5 T&B
Slab Reinforcement (4) Dwellings / Garages	Not Req'd / Not Req'd	6x6-10/10 / Not Req'd	6x6-6/6 / 6x6-10/10(6)	#3 @ 12" ac.(5) / 6x6-6/6(6)	#4 @ 12" a.c.(5) / #4 @ 24" ac.(5)(6)
Footing/Slab Dowels (7) (Dwellings Only)	Not Req'd	Not Req'd	#4 @ 24" ac.	#4 @ 24" a.c.	#4 @ 24" ac.
Aggregate Base (8) Dwellings / Garages	Not Req'd / Not Req'd	Not Req'd / Not Req'd	4" / Not Req'd	4" / 4"	6" / 4"
Vapor Barrier (Required Below Dwelling Slabs Only)	See Report For Any Req'ments	Required	Required	Required	Required

NOTES:

1. Properly designed post-tensioned slab foundation systems may be utilized in lieu of TYPE III, IV or V foundations.
2. Isolated piers or partial length footings not permitted below bearing walls.
3. Reduce to 24" for interior footings.
4. Different size bars providing an equivalent area of steel may be used.
5. Space each way.
6. Separate garage slabs from foundation wall with a perimeter expansion joint and provide control joint @ slab ℄ in both directions. Extend footing across garage door opening.
7. Embed dowels 10" into foundation wall and bend alternate bars 24" & 48" into floor slab. Reverse bend alternate dowels in interior footings 24" into floor slab.
8. Opened-Graded material approved by soils engineer.

SPECIAL NOTE: Consult local building department and any other governing agency to determine if additional or more stringent requirements apply.

APPENDIX A

This appendix contains information and laboratory test data to substantiate the engineering evaluation of soil conditions and recommendations presented in the report.

INDEX OF PLATES

FIELD INVESTIGATION

Exploration

On June 25, 1976, six exploratory borings were drilled on the site at the approximate locations shown on the plot plan. A drill rig with a 20-inch-diameter bucket auger was used to penetrate the soils to depths of 15, 26 and 31 feet below existing grade.

Caving did not occur in any boring and no difficulties in penetrating the site materials were experienced.

Ground water or seepage was not encountered in the borings on the date of exploring the soils.

Sampling

Rerpesentatives of this office performed the field work and secured classification and undisturbed core samples of the materials. Continuous logs of the soils were recorded as drilling progressed.

All samples were placed in moisture-resistant bags as soon as taken to preserve field moisture contents and brought to the laboratory for examination and testing.

LABORATORY PROGRAM

The samples were examined and classified in the laboratory and a testing program was established to develop the data necessary for evaluation of soil conditions. The program included: field moisture and density determinations, maximum density-optimum moisture tests, expansion and consolidation tests, direct shear tests, and chemical analysis to determine water soluble sulfate contents.

TEST RESULTS

Field Moisture and Field Density Data (Subsurface Soils)

Field moisture and density data for the subsurface soils are shown on the boring logs.

Maximum Density - Optimum Moisture Data (ASTM D1557-70)

Sample Location	Soil Classification/Type	Maximum Density, pcf	Optimum Moisture, %
Boring No. 1 @ 0;-2'	Light Gray-Brown Clayey Silt & Sand/A	114.5	17.0
Boring No. 1 @ 4'-6'	Light Gray Silty Clay/B	110.5	18.0
Boring No. 1 @ 12'-14'	Mottled Gray-Brown Silty Clay/C	117.0	14.5

Consolidation Test Results

Results of the consolidation tests conducted to establish the compressibility of the materials beneath the site are presented in the form of Pressure vs. Percent Consolidation curves on the attached plates. Water was added during the tests to determine the effect of water infiltration into the soils.

Expansion Test Results (UBC Std. 29-2)

Sample ID.	Moisture Contents, % Initial	Moisture Contents, % Final	Surcharge, psf	Relative Compaction, % Initial	Relative Compaction, % Final	Expansion Index
A	15.2	34.6	144	81.0	77.4	50
*	13.5	30.0	144	*	*	71

* Sample of light gray siltstone from Boring No. 6, maximum density-optimum moisture data not determined.

Sulfate Test Results

Chemical analyses were performed on typical soil samples by Associated Laboratories of Orange, California, and the following results obtained.

Sample Location	SO_4 %
Boring No. 1 @ 0'-2'	0.085
Boring No. 3 @ 2'-4'	0.132
Boring No. 5 @ 0'-2'	0.121

Direct Shear Test Results

Direct shear tests were performed on representative undisturbed soil samples to determine the strength of the materials. Samples were tested at field moisture contents and at increase moisture contents. Refer to Plate D-1 and D-2 for results.

o - 0 - o

APPENDIX B

STABILITY ANALYSIS

" METHOD OF SLICES "

ENTRIES:

SLOPE HT = 20.0 FEET Applicable to both cut and
SLOPE RATIO = 1.50: 1 fill slopes

Ø = 27°
C = 400 PSF
WT = 125 PCF

SEIS FACT = .150 GRAVITY

SEARCH CODE:0100 - 0101 - 0102 - 0103

BEGIN SEARCH : X= .00 Y = .00

* BEGIN RUN *

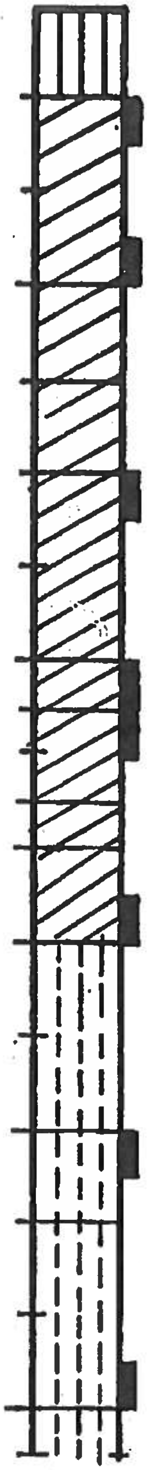
F. S.	X	Y	RADIUS
2.564	.00	.00	25.00
2.376	3.00	.00	23.32
2.300	6.00	.00	21.93
2.311	6.66	.00	21.66
2.486	.00	5.00	29.15
2.333	3.00	5.00	27.73
2.243	6.00	5.00	26.57
2.305	9.00	5.00	25.70
2.387	9.99	5.00	25.49
2.477	.00	10.00	33.54
2.343	3.00	10.00	32.31
2.249	6.00	10.00	31.32
2.237	9.00	10.00	30.59
2.388	12.00	10.00	30.14
2.551	13.33	10.00	30.04
2.502	.00	15.00	38.07
2.380	3.00	15.00	37.00
2.286	6.00	15.00	36.13
2.243	9.00	15.00	35.51
2.290	12.00	15.00	35.12
2.506	15.00	15.00	35.00
2.928	16.66	15.00	35.03
2.546	.00	20.00	42.72
2.432	3.00	20.00	41.76
2.338	6.00	20.00	41.00
2.280	9.00	20.00	40.44
2.279	12.00	20.00	40.11

Cont'd. on B-II

```
  F . S .             X              Y            RADIUS
  _______          _______        _______       ________

   2.373            15.00          20.00          40.00
   2.789            18.00          20.00          40.11
   3.201            19.99          20.00          40.31
   2.601              .00          25.00          47.43
   2.492             3.00          25.00          46.57
   2.398             6.00          25.00          45.89
   2.331             9.00          25.00          45.39
   2.304            12.00          25.00          45.09
   2.339            15.00          25.00          45.00
   2.594            18.00          25.00          45.09
   2.945            21.00          25.00          45.39
   3.493            23.33          25.00          45.76
   2.661              .00          30.00          52.20
   2.557             3.00          30.00          51.41
   2.463             6.00          30.00          50.80
   2.389             9.00          30.00          50.35
   2.346            12.00          30.00          50.08
   2.347            15.00          30.00          50.00
   2.520            18.00          30.00          50.08
   2.712            21.00          30.00          50.35
   3.102            24.00          30.00          50.80
   3.798            26.66          30.00          51.34


LOWEST FACTOR OF SAFETY (F.S.) FOUND :

 2.237 /  1.653*     9.00             10.00            30.59

* SEISMIC CONDITIONS - BASED ON A HORIZONTAL ACCELERATION OF 0.150 GRAVITY

* END RUN *
```

TEST BORING LOG

TN - 1



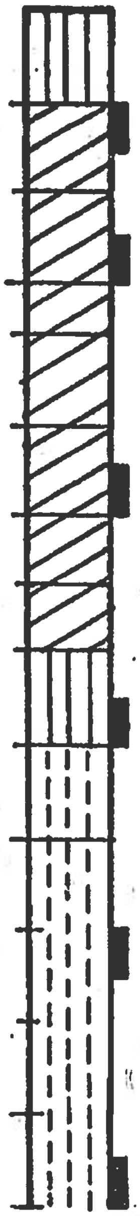
	Soil Classification	Moisture, %	Dry Density, pcf	U.S.C.
0'	Light Gray Brown Clayey Silt & Sand (Fill)	10.5		ML
2'	Light Gray Silty Clay (Fill)	22.0	97.6	CL
4'		20.5		
			99.7	
6'	Mottled Gray-Brown Silty Clay (Fill)	19.8		CL
8'	Light Gray Silty Clay (Fill)	19.1		CL
10'	Mottled Gray-Brown Silty Clay (Fill)	17.0	99.4	CL
12'		17.0		
14'	Brown Silty Clay W/Sand, Slightly Organic (Fill)	12.4	115.1	CL
15'	Dark Brown Silty Clay W/Sand, Slightly Calcareous (Native)	17.0	108.2	CL
16'		14.9		
17'	Mottled Brown Silty Clay W/Sand, Slightly Calcareous	16.3		CL
18'	Light Gray Silty Clay W/Calcareous Siltstone Fragments	19.8		CL
			102.5	
20'	Light Gray Siltstone, Slightly Calcareous	16.3		
22'		17.7		
24'	Gray Clayey Siltstone	16.3	103.4	
26'	Gray Clayey Siltstone W/FeO Stains	18.3		
28'		18.3		
			103.6	
30'	Gray Clayey Siltstone	20.5		
31'				

No ground water or seepage
No caving

VERTICAL SCALE: 1" = 4'
U.S.C. - Unified Soil Classification System Group Symbol

▮ Denotes Undisturbed Core

TEST BORING LOG

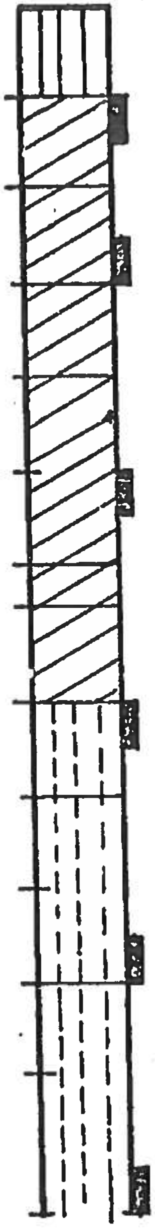


TH - 2	Soil Classification	Moisture, %	Dry Density, pcf	U.S.C.
0'	Light Brown-Gray Clayey Silt & Sand (Fill)	18.3		ML
2'	Light Gray Clayey Silt & Sand W/FeO Stains (Fill)	14.3	107.6	ML
4'	Mottled Dark Brown-Gray Sandy Clay (Fill)	17.0		CL
			108.2	
6'	Mottled Dark Brown-Gray Sandy Clay W/FeO Stains (Fill)	19.8		CL
7'	Dark Brown Silty Clay (Fill)	17.7		CL
9'	Mottled Gray-Brown Silty Clay (Fill)	18.3		CL
			109.3	
11'	Dark Brown Silty Clay W/Sand (Native)	12.4		CL
12.5'	Mottled Brown Silty Clay W/Sand	17.0		CL
14'	Light Brown-Gray Clayey Silt W/FeO Stains	17.0		ML
			102.0	
16'	Light Gray Siltstone W/FeO Stains	23.5		
18'	Light Gray Clayey Siltstone W/FeO Stains	23.5		
20'		23.5	99.6	
22'		23.5		
24'		29.0		
			91.6	
26'				

No ground water or seepage
No caving

TEST BORING LOG

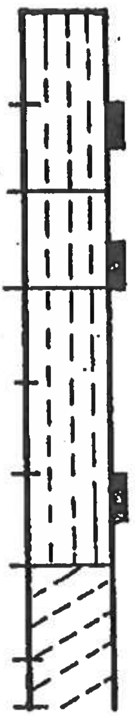
TH - 3



	Soil Classification	Moisture, %	Dry Density, pcf	U.S.C.
0'	Light Gray Clayey Silt W/FeO Stains (Fill)	10.5		ML
2'	Gray Silty Clay W/FeO Stains (Fill)	19.1	105.5	CL
4'	Motteld Gray-Brown Silty Clay W/FeO Stains (Fill)	18.3		CL
			107.7	
6'	Gray Silty Clay W/FeO Stains	19.1		CL
8'	Mottled Gray-Dark Brown Silty Clay (Fill)	16.3		CL
10'		14.3	112.7	
12'	Dark Brown Sandy Clay (Native)	13.0		CL
13'	Dark Brown Sandy Clay, Slightly Calcareous	13.0		CL
15'	Light Gray Clayey Siltstone, Slightly Calcareous	15.6	106.9	
17'	Light Gray Siltstone, Slightly Calcareous	14.9		
19'		13.6		
			111.6	
21'	Light Gray Clayey Siltstone	17.0		
23'		18.3		
			103.4	
26'				

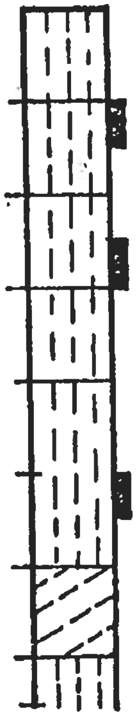
No ground water or seepage
No caving

TEST BORING LOG



TH - 4	Soil Classification	Moisture, %	Dry Density, pcf	U.S.C.
0'	Light Gray Siltstone	18.3		
2'		19.1	107.5	
4'	Light Gray Siltstone W/FeO Stains	14.3		
			104.4	
6'	Light Gray Clayey Siltstone W/FeO Stains	22.0		
8'		22.0		
10'		22.0	101.4	
12'	Light Gray Claystone W/FeO Stains	25.0		
14'		25.8		
15'				

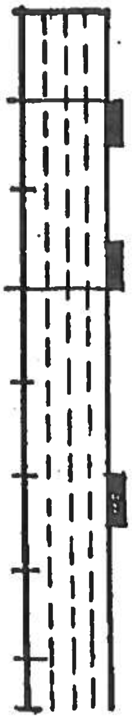
No ground water or seepage
No caving



TH - 5				
0'	Light Gray Siltstone W/FeO Stains	14.3		
2'	Light Gray Clayey Siltstone W/FeO Stains	22.7	101.3	
4'	Light Gray Siltstone	18.3		
			100.4	
6'	Light Gray Siltstone	18.3		
8'	Light Gray Clayey Siltstone W/FeO Stains	23.5		
10'		22.7	99.5	
12'	Light Gray Claystone	25.8		
14'	Light Gray Siltstone	23.5		
15'				

No ground water or seepage
No caving

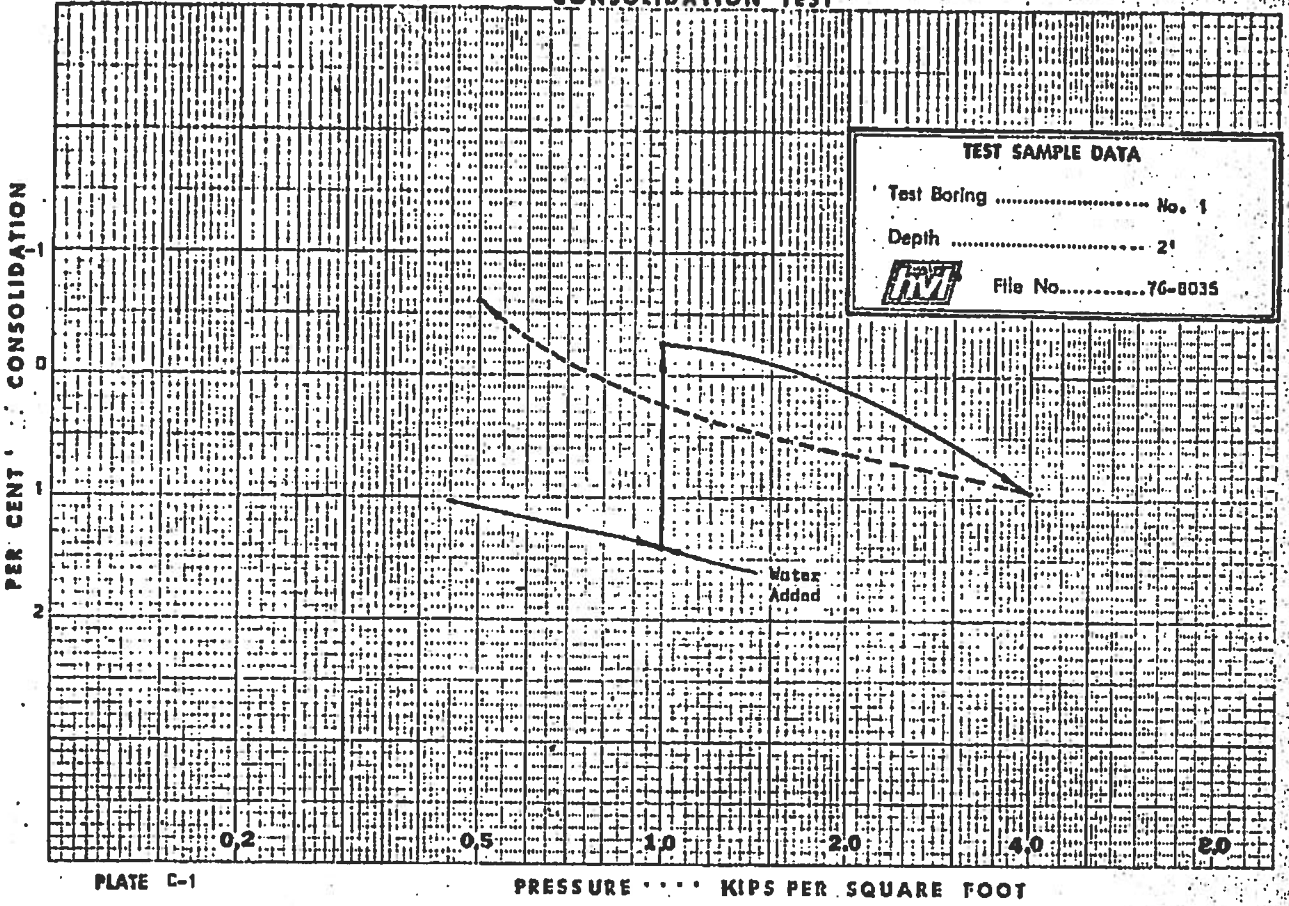
TEST BORING LOG



TH - 6	Soil Classification	Moisture, %	Dry Density, pcf	U.S.C.
0'	Light Gray Siltstone W/FeO Stains	13.6		
2'	Light Gray Siltstone	15.6	98.4	
4'		12.4		
			112.8	
6'	Light Gray Siltstone W/FeO Stains	16.3		
8'		18.3		
10'		21.2	94.9	
12'		21.2		
14'		22.0		
15'				

No ground water or seepage
No caving

CONSOLIDATION TEST



TEST SAMPLE DATA

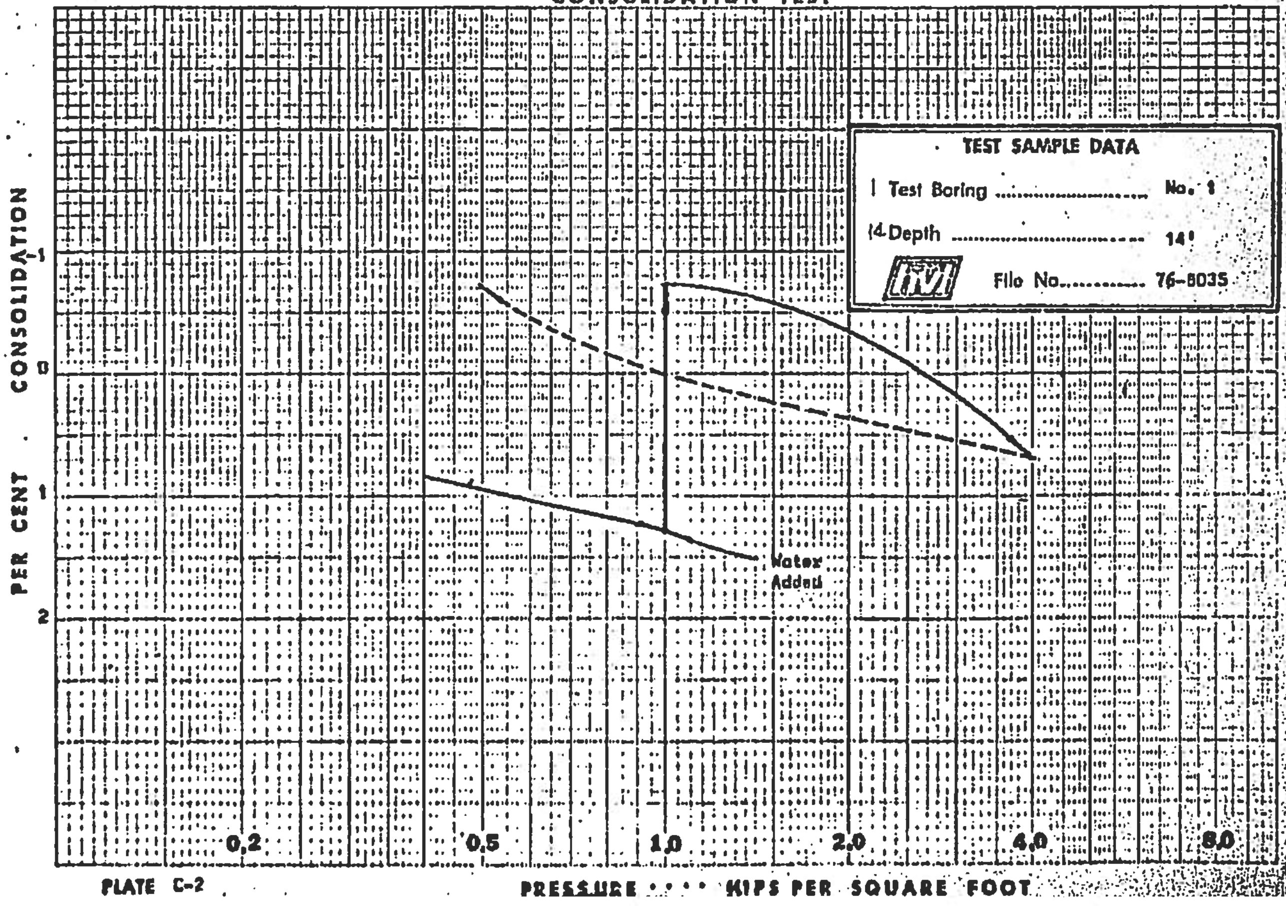
Test Boring .... No. 1

Depth .... 2'

File No............ 76-8035

PLATE C-1

CONSOLIDATION TEST



TEST SAMPLE DATA

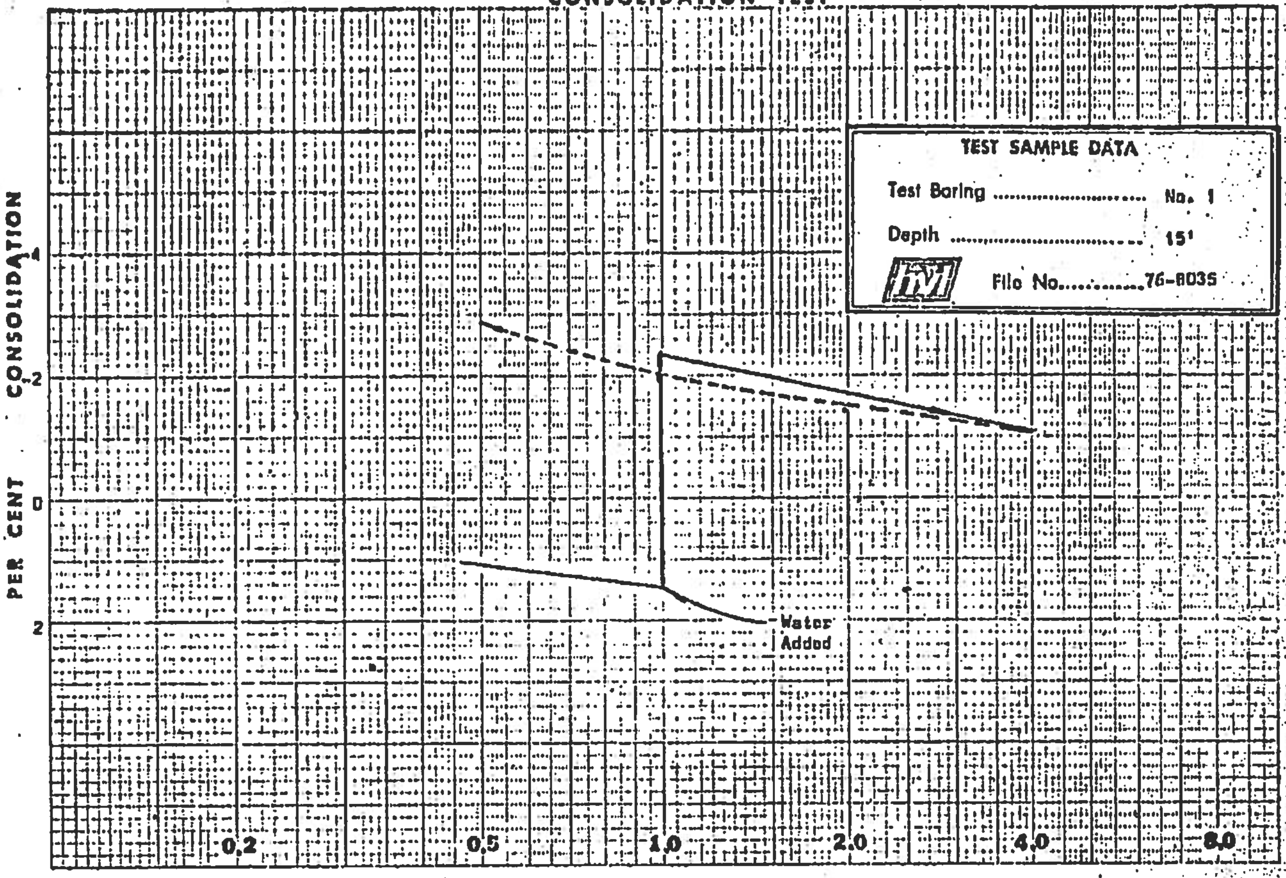
Test Boring .... No. 1

Depth .... 14'

File No............ 76-8035

PLATE C-2

CONSOLIDATION TEST



TEST SAMPLE DATA

Test Boring .... No. 1

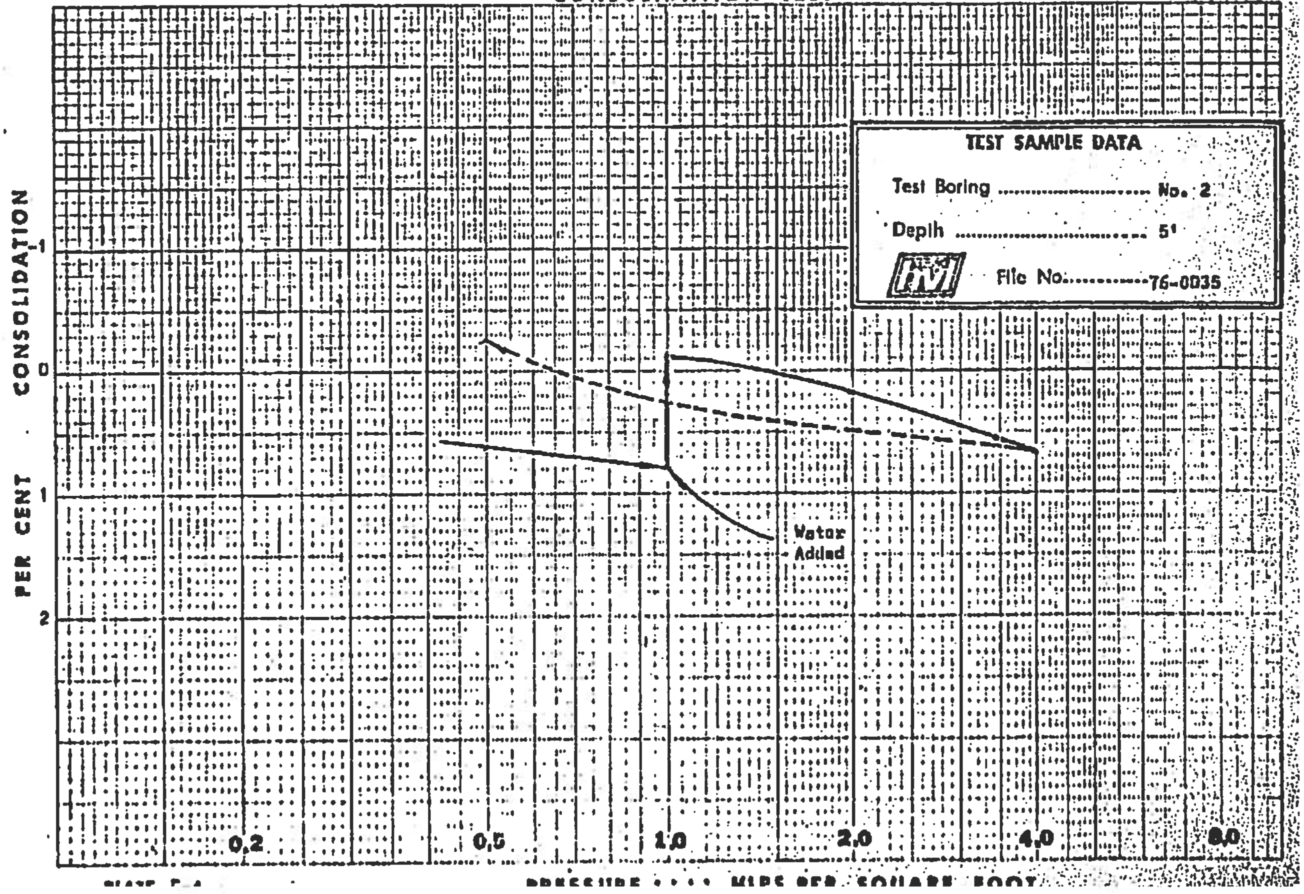
Depth .... 15'

File No.......... 76-0035

PLATE C-3

PRESSURE .... KIPS PER SQUARE FOOT.

CONSOLIDATION TEST



TEST SAMPLE DATA

Test Boring .... No. 2

Depth .... 5'

File No:.......... 76-0035

PRESSURE .... KIPS PER SQUARE FOOT

CONSOLIDATION TEST

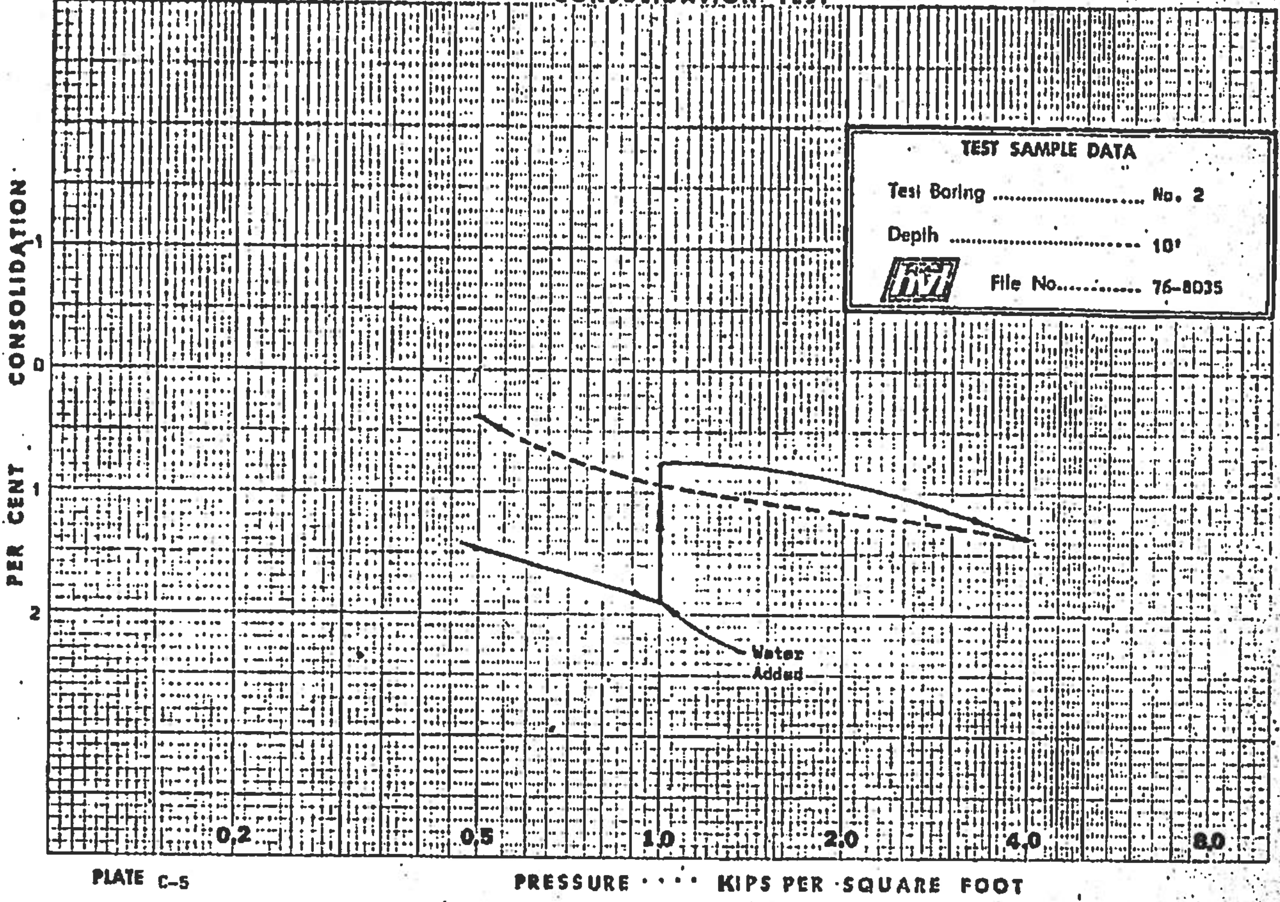


PLATE C-5

CONSOLIDATION TEST

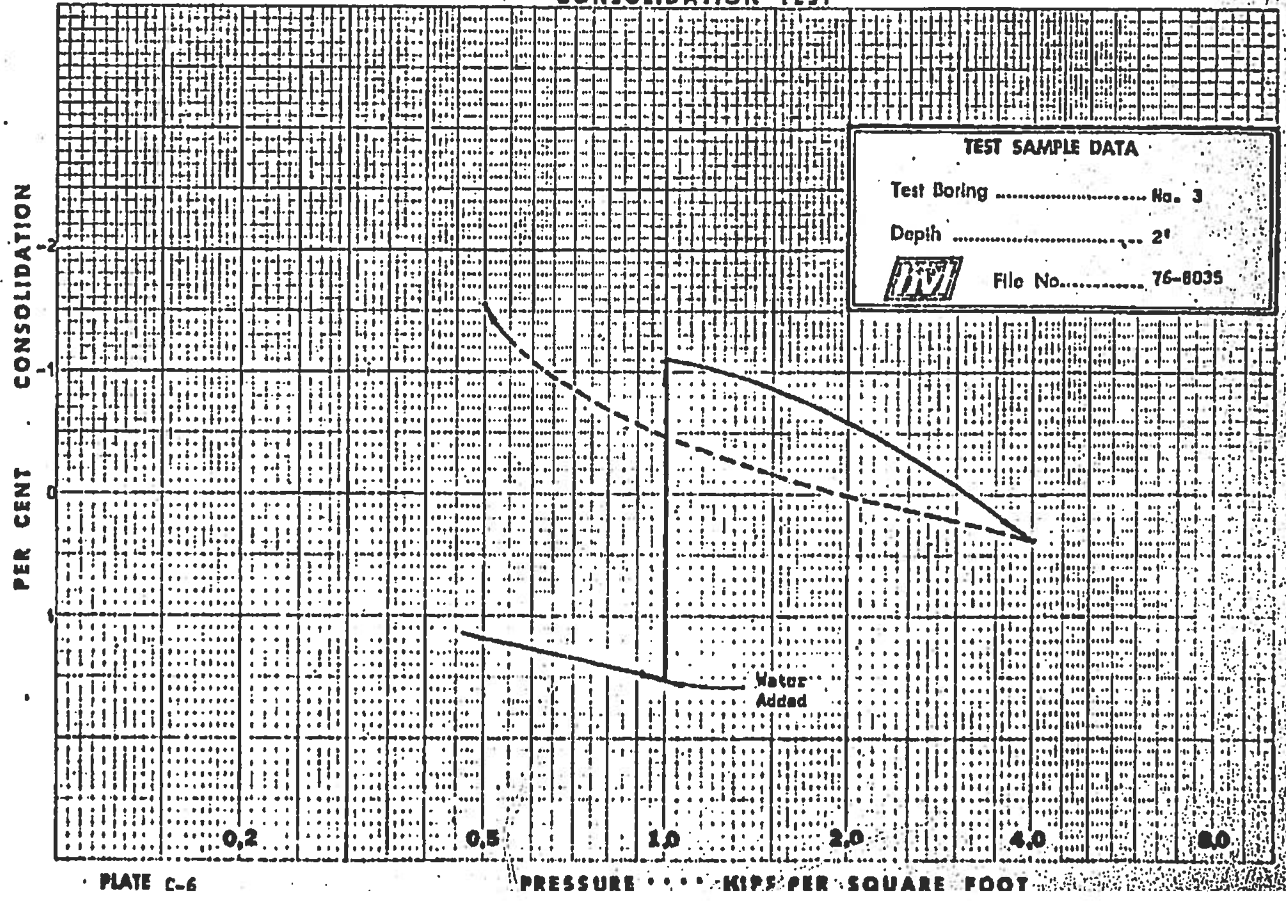
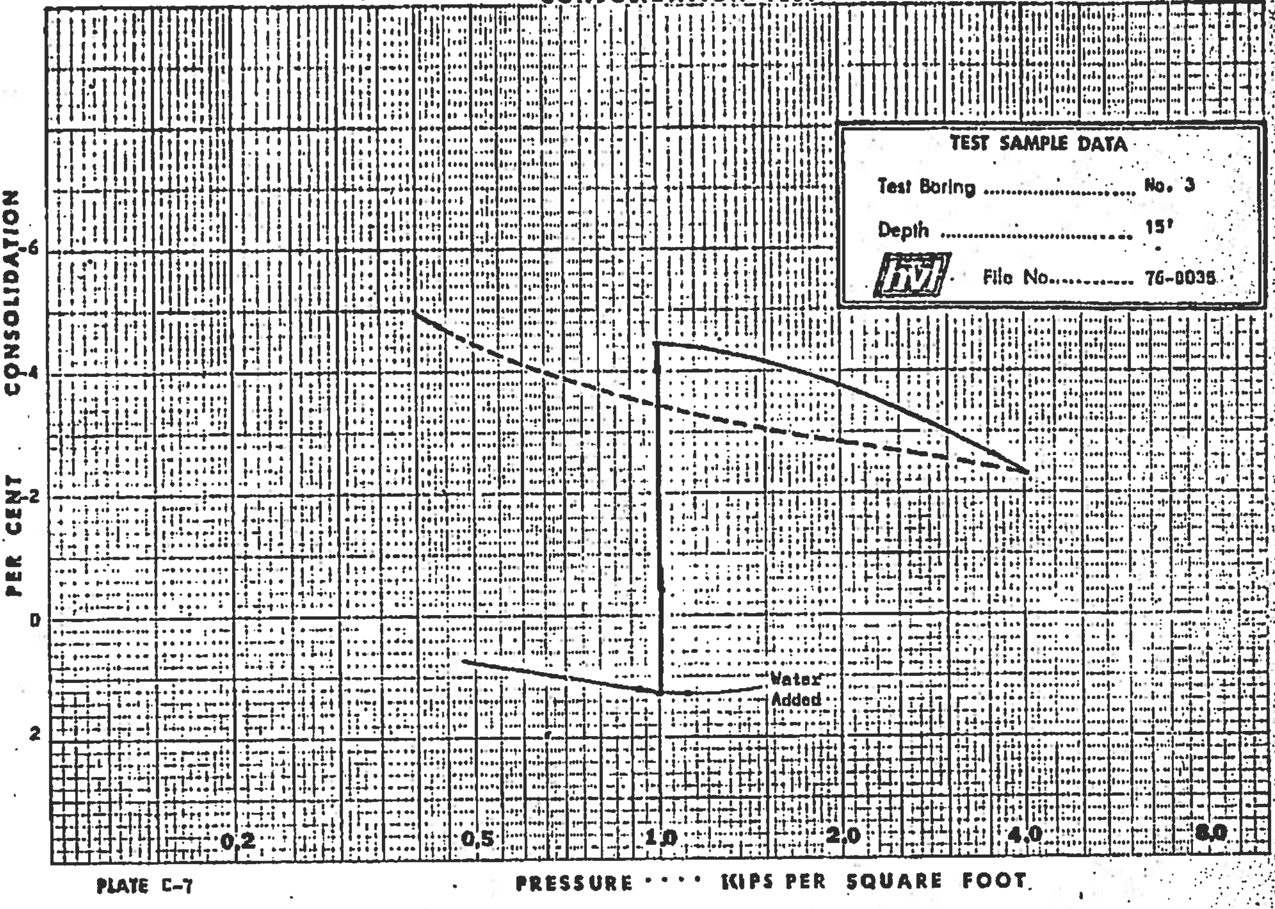


PLATE C-6

CONSOLIDATION TEST



TEST SAMPLE DATA

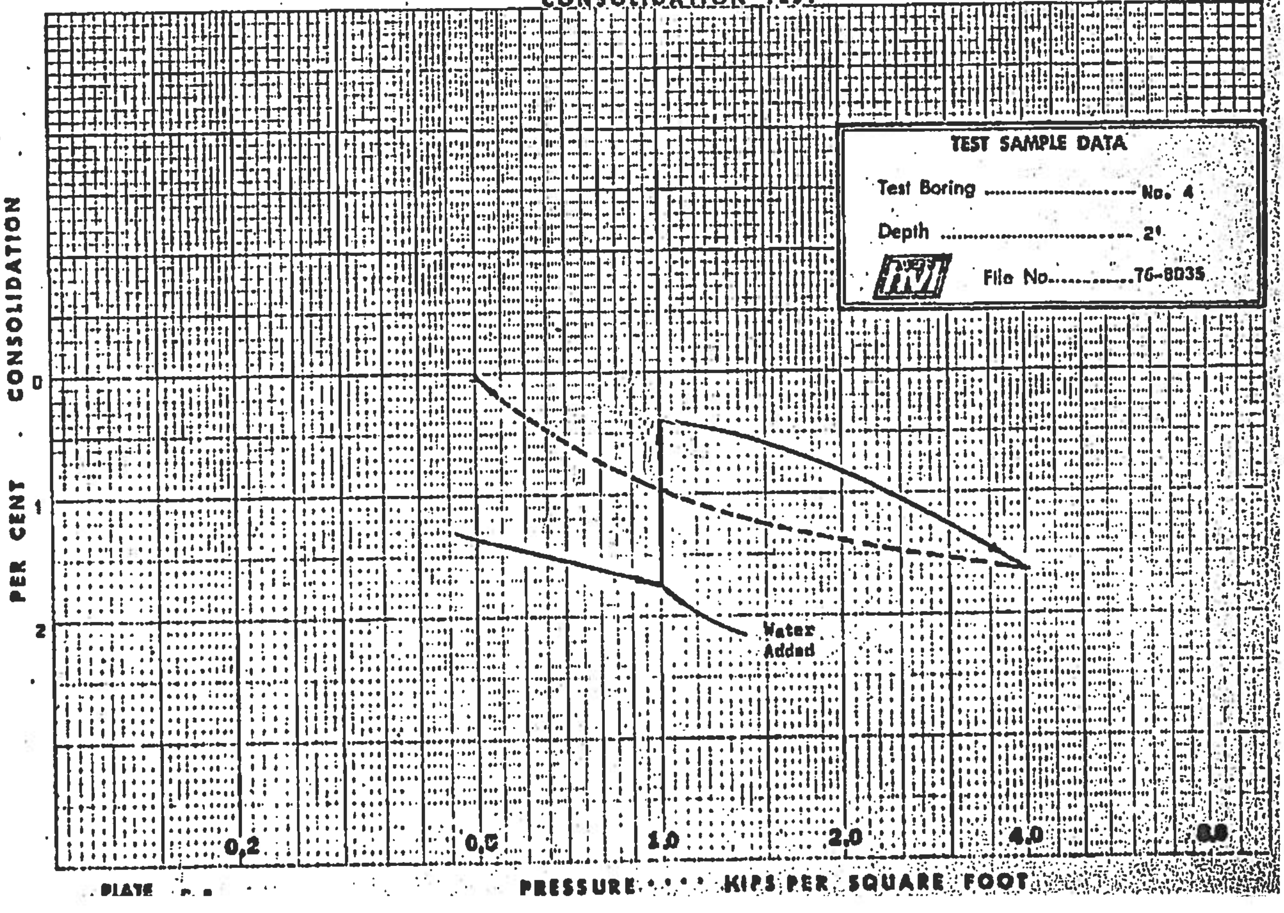
Test Boring .... No. 3

Depth .... 15'

File No............ 76-0035

PLATE C-7

CONSOLIDATION TEST



TEST SAMPLE DATA

Test Boring .... No. 4

Depth .... 2'

File No............ 76-0035

PLATE C-8

CONSOLIDATION TEST

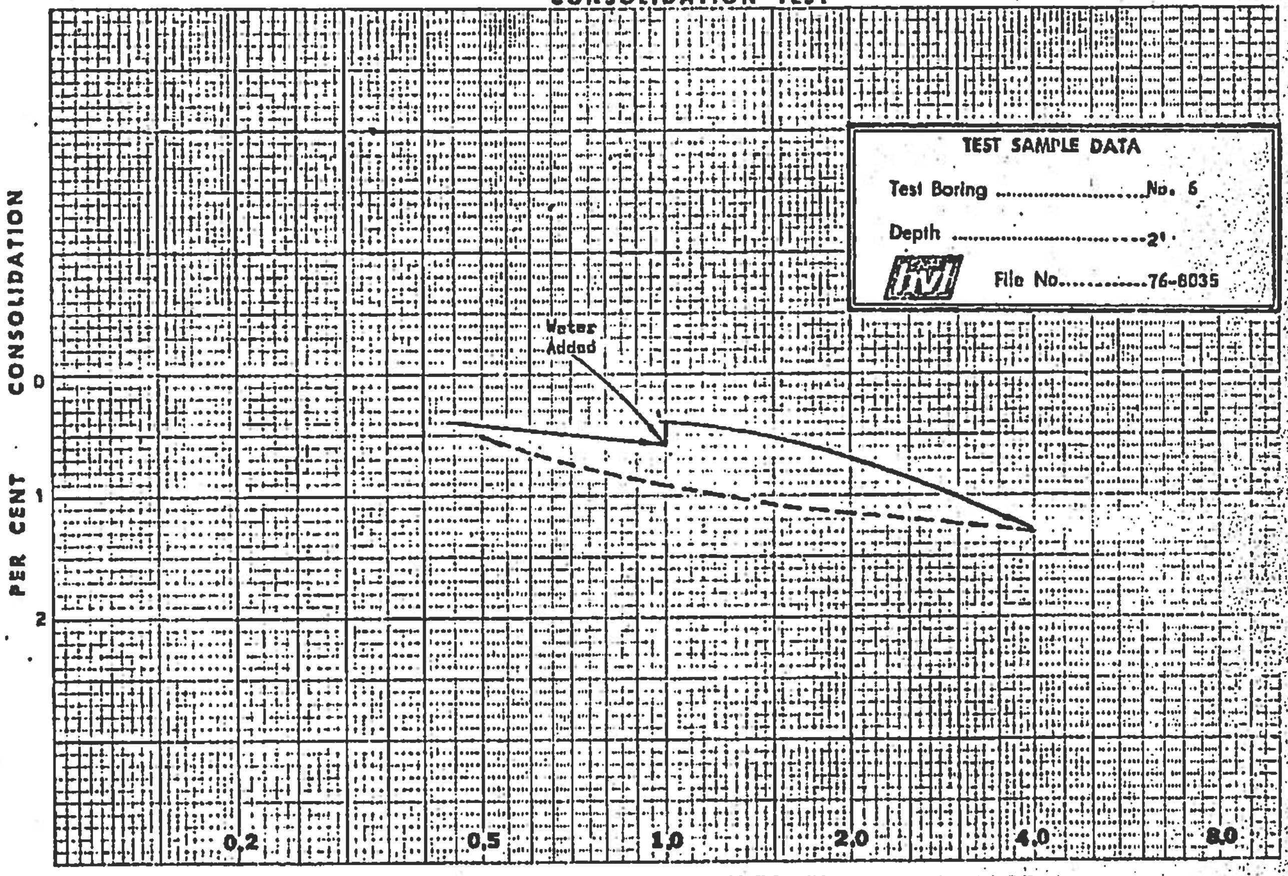
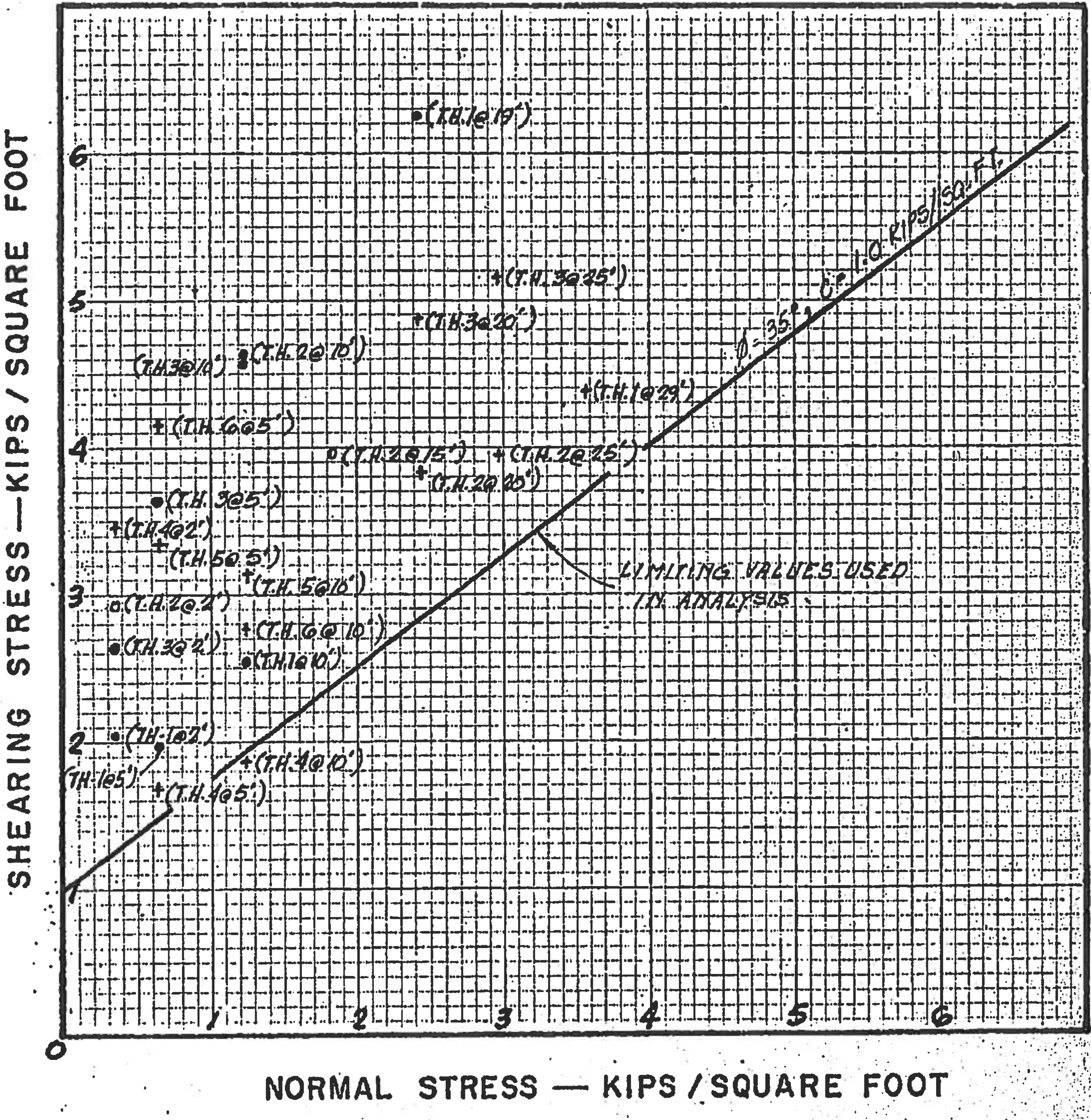


PLATE C-9

DIRECT SHEAR TEST DATA

(SAMPLES SHEARED AT FIELD MOISTURE CONTENTS)



SYMBOL	SOIL GROUP
●	CL
o	ML
+	BEDROCK

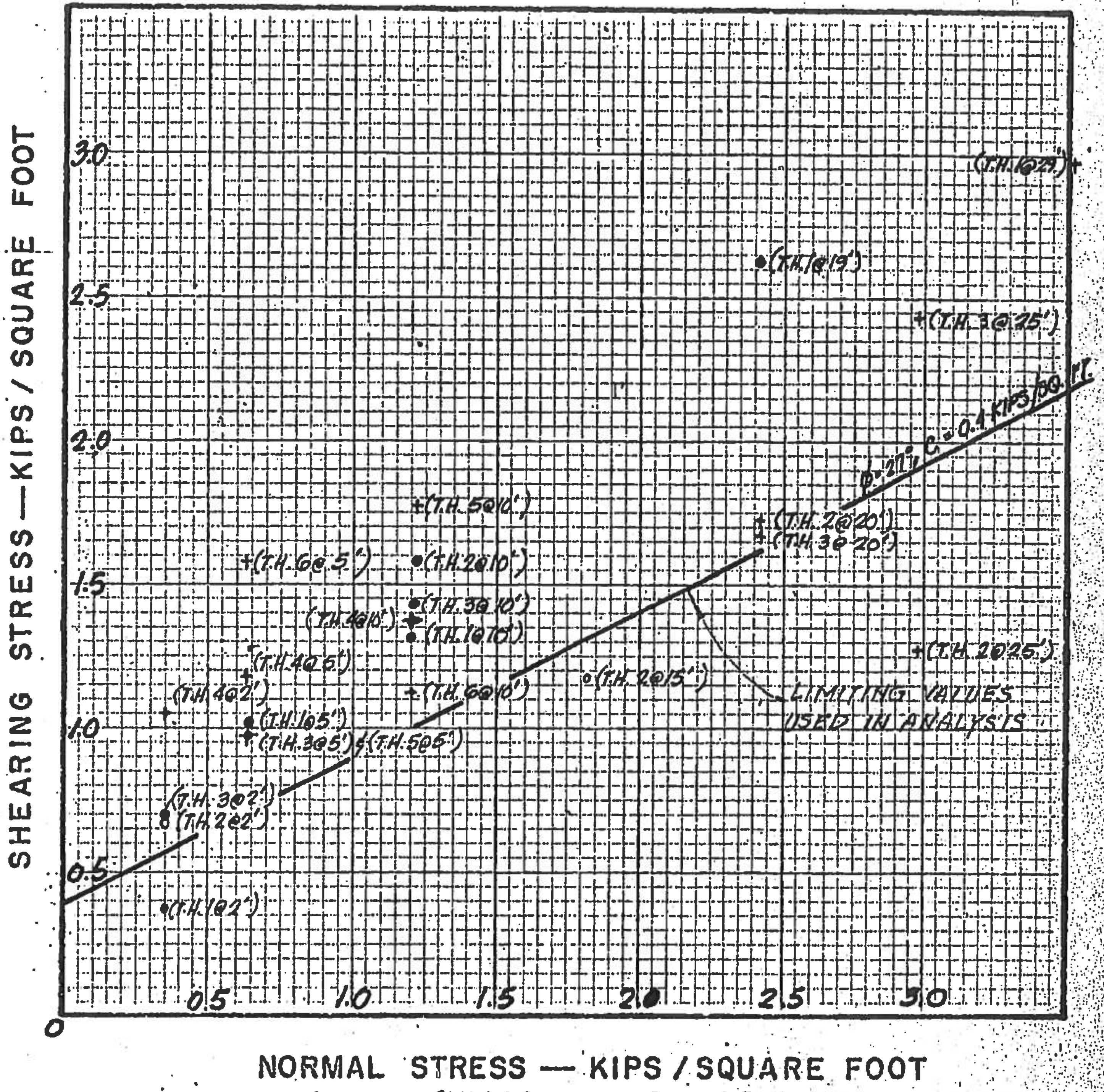
PROJECT: 76-8035

PLATE D-1

H. V. LAWMASTER & CO., INC.

DIRECT SHEAR TEST DATA

(SAMPLES TESTED AT SATURATED MOISTURE CONTENTS)



SYMBOL	SOIL GROUP
●	CL
○	ML
+	BEDROCK

PROJECT: 76-6035 **PLATE** D-2 **H. V. LAWMASTER & CO., INC.**

300937

Sent to Structural
12-1-76

SOIL COMPACTION
TESTING & INSPECTION
FINAL REPORT ON MASS GRADING
TRACT NO. 8855
25106 PASEO DE VALENCIA
LAGUNA HILLS, ORANGE COUNTY, CALIFORNIA

RECEIVED
E. M. A.
SO. COUNTY REGIONAL BRANCH
1 1976

Site Address 25106 Paseo de Valencia
Location El Toro
FOR
☒ Report
☐ Plan
APPROVED
Grading P. 300 937
Date Issued 10/30/76
☐ E. J. Naffziger ☐ Plan Ck/Curr. Pl/Adm.
☒ ☐ Unconditionally ☐ Inspection
☐ ☐ Conditionally ☑ Earth Sciences
(see corrections)
Jos. R. McIntyre
Engineering Geologist
12-1-76
Dept. of Building & Safety
County of Orange

21ST CENTURY BUILDERS, INC.
1601 DOVE STREET
NEWPORT BEACH, CALIFORNIA 92660

November 24, 1976
File No. 76-8167
O.C.P. No. 300 937

H.V.Lawmaster & Co., Inc.
TESTING AND INSPECTION ENGINEERS

*300937

H.V.Lawmaster & co., inc.
TESTING AND INSPECTION ENGINEERS

(714) 828-8040

7940 MAIN STREET
STANTON, CAL 90680

H. V. LAWMASTER, PRESIDENT
B.S. GEOLOGY
JOHN K. EARNEST, V. PRES.
B.S. GEOLOGY
DON P. HARRINGTON, V. PRES.
R.C.E. NO. 18181
RAY A. EASTMAN, V. PRES.
C.E.G. NO. 423

November 24, 1976

21st Century Builders, Inc.
1601 Dove Street
Newport Beach, California 92660

File No. 76-8167
D.C.P. No. 300 937

Gentlemen:

Attached is the report of soil compaction testing and inspection services provided during grading operations conducted on Tract No. 8855, a proposed single-family residential development, located at 25106 Paseo De Valencia, Laguna Hills area, Orange County, California, by McGrew Construction Co., Inc. during the period of October 11 thru November 23, 1976.

The services covered by this report have been conducted in accordance with generally accepted engineering practice and the test procedures used conform with applicable published standard methods and standards of the industry.

Respectfully Submitted,

H. V. LAWMASTER & CO., INC.

Stanley C. Davidson

Don P. Harrington
R.C.E. No. 18181

SCD/DPH/ms
(8 copies submitted)

SOIL COMPACTION
TESTING & INSPECTION
FINAL REPORT ON MASS GRADING
TRACT NO. 8855
25106 PASEO DE VALENCIA
LAGUNA HILLS, ORANGE COUNTY, CALIFORNIA

SCOPE OF REPORT

The following report presents the results of density tests, Nos. 1 thru 216, which were taken during grading operations on the subject project site. Refer to the attached plot plan for the approximate locations of the tests.

PREPARATION OF AREAS TO RECEIVE FILL

Prior to grading, the subject site was an undeveloped parcel of land which had been previously graded by others in 1973. The site has set idle since then and considerable amounts of soil and debris had been stockpiled in the central area of the property. A moderately heavy growth of native grasses and weeds covered most of the site prior to current grading.

Before placing any fill, the entire area was cleared of significant amounts of organic or other deleterious material. Clearing operations also included removal of debris which was disposed of off site.

After clearing, and removal of stockpile and old surface fill, the exposed surface was scarified to a depth of 10- to 12-inches, recompacted to at least 90% relative compaction, and approved by a representative of this office.

On lots where a transition from cut to fill occurred within the building area, the native soil in the cut area was tested and found to be adequately compacted (relative compaction 85% or better) and undercutting was not required.

The surface soil in other areas to receive fill was scarified to a depth of 10- to 12-inches and recompacted to at least 90% relative compaction to develop a bond between the existing soil and the superimposed fill.

SPECIAL PREPARATION

A key, 12 feet wide and 30- to 36-inches deep, was provided along top of slope at rear of Lots 30 thru 48 to improve the existing slope and to support additional fill.

In addition, the face of slope was recompacted by means of a vibrating sheepsfoot roller and grid rolled.

PLACEMENT OF FILL

The types of materials utilized as fill are classified in the maximum density-optimum moisture data.

The fill inspected and tested during the period covered by this report was placed in 4- to 6-inch-thick loose lifts; brought to the moisture contents indicated by the test results; and compacted to the relative compaction shown with a 5 X 5 sheepsfoot roller.

Fill areas falling below the specified relative compaction of 90 percent were called to the contractor's attention. These areas were then reworked, recompacted, and retested, as shown by the test results, until the proper compaction was obtained.

Tests were taken at a frequency sufficient to provide a representative cross-section of the relative compaction obtained.

PROGRESS OF JOB

Fill was placed and compacted on the subject project, during the period covered by this report, in the following areas: Lots 1 thru 18, 35 thru 68, and recreation building area.

Grading operations in the following areas were completed to rough grade elevations during the period covered by this report and are approved as being satisfactory. Lots 1 thru 68 and recreation building pad area.

SOIL BEARING CAPACITY

Engineering evaluation of the bearing capacity of material utilized as fill is predicated on the results of the field density tests; on the results of laboratory tests performed on representative samples of site materials during grading; and on the recommendations contained in the Foundation Investigation Report issued by this office on July 8, 1976 under File No. 76-8035.

An allowable bearing pressure of 1500 psf may be used in designing spread footings bottomed at least 12 inches below finished grade and resting upong approved fill or native soil.

EXPANSION DATA

The expansion potentials were determined for representative materials from the site to establish the magnitude and extent of expansive soil conditions. The determinations were made on material remolded to 90% relative compaction at 2% below optimum moisture and tested for expansion under a static load of 60 pounds per square foot, and by U.B.C. Standard 29-2, as indicated by the test results on pages A-1 and A-2. The following criteria has been used in evaluating the soil expansion potentials:

Percent Swell 60 psf Surcharge	Expansion Index U.B.C. Std. 29-2	Expansion Potential
<3.0	<15	Non-expansive
3.0 - 5.9	15 - 35	Slight
6.0 - 8.9	35 - 70	Moderate
9.0 - 11.9	70 - 100	High
>12.0	>100	Critical

FOOTING AND SLAB-ON-GRADE REQUIREMENTS

The expansion potential of the soil is in the high range, in accordance with the above criteria.

Based on the results of the expansion tests, it is recommended that the following footing embedment and reinforcement of footings and slabs be provided to compensate for expansive soil conditions.

Highly Expansive Soil Conditions

All footings for both one- and two-story structures shall be bottomed at least 24 inches below finished grade and reinforced with two No. 4 steel bars, top and bottom. All interior post or partial length bearing wall footings shall be extended or provided with reinforced grade beams to connect with the exterior footings.

Floor slabs in living areas shall be provided with 4 inches of open-graded rock, a vapor barrier, and reinforced with No. 3 steel bars placed 12 inches on center in both directions. The vapor barrier should be covered with about an inch of clean sand to aid in curing the concrete.

Dwelling floor slabs shall be tied to footings with No. 4 steel bars placed two feet on center. Tie bars should extend 10 inches into footings and alternate bars should extend 24 inches and 48 inches into the slab. Reverse bending of alternate tie bars in interior footings 24 inches into floor slab will be acceptable.

Garage slabs shall be provided with 4 inches of open-graded rock, cast independent of footings, and provided with a perimeter expansion joint to ensure positive separation between the foundation wall and slab. In addition, crack control joints shall be provided along the slab centerline in both directions and the slabs should be reinforced with 6" X 6" - #6/#6 welded wire mesh.

Reinforced grade beams should be provided across garage door openings to prevent spreading of perimeter wall footings.

Alternate Reinforcement

The recommended reinforcement will provide the steel area considered necessary to minimize the effect on the structure of volume changes in the expansive soils. Other sizes may be used in lieu of those specified as long as an equivalent area of steel is provided.

Alternate Foundation System

In lieu of the conventional footing - slab systems previously set forth, post-tensioned foundation systems may be used provided such systems are individually designed for each type of dwelling being constructed, and provided such systems will provide equivalent protection against structural distress resulting from volume changes in the expansive soils.

The preceding recommendations are tabulated on page B-1 of this report.

Driveways

Due to the expansive soil conditions on the site, it is recommended that special attention be given to the construction of driveways. Consideration may be given to the use of reinforced concrete, post-tensioned slabs, asphaltic concrete, or interlocking paving stones as a means of compensating for expansive soils in drive areas.

SOLUBLE SULFATE ANALYSIS

Chemical analyses were conducted by Associated Laboratories of Orange, California on representative samples of the soil from the project site to determine if water soluble sulfates are present in concentrations greater than the limits set forth in Section 2604(c)2G of the Uniform Building Code.

The tests indicate that the soluble sulfate contents are below the allowable upper limits set forth in the U.B.C. and therefore Type V cement will not be required for concrete which is in contact with the soil. Results are as follows:

Sample No.	Location	SO_4 %
1	22	0.044
2	28	0.032
3	33	0.022

MAXIMUM DENSITY - OPTIMUM MOISTURE DETERMINATION

Compaction Standard - ASTM D1557-70

Soil Classification	Maximum Density, pcf	Optimum Moisture, %
1. Light Brown to Yellowish Brown Siltstone W/Some Claystone	109.8	17.5
2. Brown Sandy Silty Clay W/Trace of Gravel	124.5	10.5
3. Light Gray Siltstone W/Trace of Sand	114.0	15.0
4. Grayish Brown Silty Clay	117.5	15.3
5. Light Drown Silty Clay	113.0	16.5
6. Light Gray Silty Clay	108.0	20.8
7. Dark Brown Silty Clay	119.0	14.0

FIELD DENSITY TESTS

Results of the field density tests taken during the period covered by this report are presented on pages C-1 thru C-7.

CONCLUSIONS/LIMITATIONS

Grading operations covered by this report have been completed in substantial compliance with the requirements of the Foundation Investigation Report; any special requirements necessitated by conditions exposed during grading; requirements of the grading code; and, if applicable, Data Sheet 79G of the Department of Housing and Urban Development.

The areas covered by this report are approved as being complete to rough grade only. Any additional grading of any magnitude and of any nature that may be conducted on the project must be inspected, tested and approved by the soil engineer.

All recommendations for foundations and slab floors contained herein must be followed and any alternative method proposed must be approved in writing by this office prior to being instituted.

This office should be consulted prior to the construction of swimming pools, fences, retaining walls or any other appurtenant structure, not shown on the present site development plans, to ascertain whether soil conditions are compatible with the proposed construction.

Tract No. 8855 **EXPANSION TESTS** November 24, 1976

Lot No.	Dry Density @ Compaction PCF	Maximum Density PCF	% Moisture @ Compaction	Saturated Moisture %	EXPANSION, % Under 60 PSF
1 thru 4	105.8	117.5 @ 15.3	14.4	29.3	11.3
5 thru 7	102.6	114.0 @ 15.0	13.0	30.0	10.2
8 thru 11	105.8	117.5 @ 15.3	13.3	29.3	11.3
12 thru 14	97.2	108.0 @ 20.8	18.8	34.1	10.7
15 & 16	97.2	108.0 @ 20.8	18.8	34.1	10.7
17	102.6	114.0 @ 15.0	13.0	30.0	10.2
18 thru 21	97.2	108.0 @ 20.8	18.8	34.1	10.7
22 thru 26	97.2	108.0 @ 20.8	18.8	34.1	10.7
27 & 28	97.2	108.0 @ 20.8	18.8	34.1	10.7
29 & 30	97.2	108.0 @ 20.8	18.8	34.1	10.7
31 thru 37	102.6	114.0 @ 15.0	13.0	30.0	10.2
38 thru 41	101.7	113.0 @ 16.5	14.5	34.0	11.2
42 thru 45	101.7	113.0 @ 16.5	14.5	29.2	10.5
46 thru 49	105.8	117.5 @ 15.3	13.3	29.3	11.3
50 thru 52	105.8	117.5 @ 15.3	13.3	29.3	11.3
53 thru 56	101.7	113.0 @ 16.5	14.5	34.0	11.2
57 thru 60	102.6	114.0 @ 15.0	13.0	30.0	10.2
61 thru 64	101.7	113.0 @ 16.5	14.5	34.0	11.2
65 thru 68	105.8	117.5 @ 15.3	13.3	29.3	11.3

PROJECT: Tract No. 8855 **File No.** 76-8167

EXPANSION TEST RESULTS

Lot No.	Moisture Contents, % Initial	Moisture Contents, % Final	Surcharge, psf	Dry Density, pcf Initial	Dry Density, pcf Final	Expansion Index, E.I.
1-4	11.1	29.5	144	105.2	102.0	69
5-7	13.8	33.3	144	96.2	88.6	86
8-11	13.3	29.9	144	98.8	90.6	91
12-14	14.7	32.4	144	94.5	87.2	84
15 & 16	14.7	32.4	144	94.5	87.2	84
17	14.7	32.4	144	94.5	87.2	84
18-21	14.7	32.4	144	94.5	87.2	84
22-26	14.7	32.4	144	94.5	87.2	84
27 & 28	12.4	30.2	144	100.8	93.1	83
29 & 30	14.3	35.5	144	95.5	86.9	99
31-37	13.3	31.1	144	98.8	90.4	93
38-41	13.0	33.7	144	98.4	90.8	84
42-45	13.0	33.7	144	98.4	90.8	84
46-49	13.1	30.9	144	97.8	90.2	84
50-52	13.8	33.3	144	96.2	88.6	86
53-56	14.3	35.5	144	95.5	86.9	99
57-60	14.1	31.3	144	96.3	88.7	86
61-64	14.3	35.5	144	95.5	86.9	99
65-68	11.1	29.5	144	105.2	102.0	69

FOUNDATION / SLAB SYSTEMS

FILE NUMBER 76-8167 **TRACT NUMBER** 8055

Expansion Potential	Nil	Slight	Moderate	High	Critical
Footing Depth	TYPE I	TYPE II	TYPE III(1)	TYPE IV(1)	TYPE V(1)
One-Story	12"	12"	18"(2)	24"(2)	30"(2)(3)
Two-Story	18"	18"	18"(2)	24"(2)	30"(2)(3)
Footing Reinforcement(4)	Not Req'd	1-#4 T&B	1-#5 T&B	2-#4 T&B	2-#5 T&B
Slab Reinforcement(4)					
Dwellings	Not Req'd	6x6-10/10	6x6-6/6	#3 @ 12" ac.(5)	#4 @ 12" ac.(5)
Garages	Not Req'd	Not Req'd	6x6-10/10(6)	6x6-6/6(6)	#4 @ 24" ac.(5)(6)
Footing /Slab Dowels(7) (Dwellings Only)	Not Req'd	Not Req'd	#4 @ 24" ac.	#4 @ 24" ac.	#4 @ 24" ac.
Aggregate Base(8)					
Dwellings	Not Req'd	Not Req'd	4"	4"	6"
Garages	Not Req'd	Not Req'd	Not Req'd	4"	4"
Vapor Barrier (Required Below Dwelling Slabs Only)	See Report For Any Req'ments	Required	Required	Required	Required

NOTES:

1. Properly designed post-tensioned slab foundation systems may be utilized in lieu of TYPE III, IV or V foundations.
2. Isolated piers or partial length footings not permitted below bearing walls.
3. Reduce to 24" for interior footings.
4. Different size bars providing an equivalent area of steel may be used.
5. Space each way.
6. Separate garage slabs from foundation wall with a perimeter expansion joint and provide control joint @ slab ℄ in both directions. Extend footing across garage door opening.
7. Embed dowels 10" into foundation wall and bend alternate bars 24" & 48" into floor slab. Reverse bend alternate dowels in interior footings 24" into floor slab.
8. Opened-Graded material approved by soils engineer.

SPECIAL NOTE: Consult local building department and any other governing agency to determine if additional or more stringent requirements apply.

FIELD DENSITY TESTS 76-8167

Date	Test No.	Location	Wet Density PCF	% Field Moisture	Dry Density PCF	Depth of Test	Depth of Fill	RELATIVE COMPACTION	MAX No.
10/21/ 76	1	46/47	115.2	18.3	97.4	6"	Bottom	88.7*	1
	2	44	123.2	22.0	101.0	"	" prep.	91.9	1
	3	40/41	114.8	20.5	95.3	"	"	86.8*	1
	4	38	122.2	25.8	97.1	"	"	88.5*	1
	5	35	121.8	22.7	99.3	"	"	90.4	1
10/22	6	46/47	126.4	25.0	101.1	Retest # 1		92.1	1
	7	43	124.0	21.2	102.3	6"	Bottom	93.1	1
	8	40/41	119.0	17.0	101.7	Retest # 3	prep.	92.6	1
	9	38	121.2	19.0	101.8	Retest # 4		92.7	1
	10	36	126.9	22.0	104.0	6"	Bottom	94.7	1
	11	49	115.8	14.3	101.3	"	" prep.	92.3	1
	12	50/51	116.0	20.5	96.3	"	"	87.7*	1
	13	52/53	116.8	21.2	96.4	"	"	87.8*	1
	14	55/56	124.2	22.0	101.8	"	"	92.7	1
	15	58/59	121.6	17.6	103.4	"	"	90.7	3
	16	61	122.2	19.0	102.5	"	"	90.0	3
	17	1	119.4	18.3	100.9	"	"	91.9	1
	18	2/3	127.6	21.2	105.3	"	"	95.9	1
	19	4/5	125.0	23.4	101.3	"	"	92.2	1
	20	6	117.8	17.6	100.2	"	"	91.2	1
	21	7/8	125.6	18.3	106.2	"	"	93.1	3
10/26	22	50/51	122.2	20.5	101.4	Retest # 12		92.3	1
	23	52/53	124.0	22.0	101.6	Retest # 13		92.6	1
	24	55	126.2	23.4	102.3	6"	Bottom	93.1	1
	25	59/60/61	120.6	16.3	103.7	"	" prep.	91.0	3
	26	68	116.6	20.5	96.8	4"	"	84.9*	3
	27	66	120.6	25.0	96.5	5"	"	84.6*	3
	28	63/64	113.4	16.3	99.5	6"	"	85.5*	3
10/27	29	1	129.6	14.9	112.8	24"	3'	90.6	2
	30	2	125.2	19.7	104.6	12"	2'	91.8	3
	31	3	120.6	14.9	105.0	"	1.5'	92.1	3
	32	4/5	122.4	17.0	104.6	"	2'	91.8	3
	33	6	130.6	14.9	113.7	8"	1.5'	91.3	2

FIELD DENSITY TESTS 76-8167

Date	Test No.	Location	Wet Density PCF	% Field Moisture	Dry Density PCF	Depth of Test	Depth of Fill	RELATIVE COMPACTION	HA N
10/27	34	8	131.0	13.6	115.3	6"	1'	92.6	2
	35	68	122.4	25.0	97.9	Retest # 26		85.9*	3
	36	66	124.6	26.6	98.4	Retest # 27		86.3*	3
	37	63/64	113.6	13.0	100.5	Retest # 28		88.2*	3
	38	9	112.4	13.0	99.5	6"	Bottom	87.2*	3
	39	11	118.8	16.3	102.1	"	" prep.	89.6*	3
	40	13	122.2	13.6	98.8	"	"	86.6*	3
	41	15	119.4	17.6	101.5	4"	"	89.1*	3
	42	49	124.4	20.5	103.2	6"	1'	90.6	3
	43	51	124.0	19.0	104.2	"	"	91.3	3
	44	53	125.4	19.7	104.6	"	"	91.7	3
	45	55	120.4	20.5	99.9	"	"	91.0	1
	46	57	122.8	19.0	103.2	"	0.5'	93.9	1
10/28	47	68	124.4	20.5	103.2	Retest # 35		90.6	3
	48	66	124.8	21.2	103.0	Retest # 36		90.3	3
	49	63/64	119.2	14.3	104.3	Retest # 37		91.5	3
	50	62	117.4	13.6	103.3	5"	Bottom	90.6	3
	51	39	126.5	20.5	105.0	6"	1' prep.	95.6	1
	52	41	127.4	22.0	104.4	"	"	91.6	3
	53	42	124.8	17.6	106.2	12"	1.5'	93.2	3
	54	44/45	124.6	16.3	107.1	6"	2'	91.2	4
	55	46/47	126.2	17.6	107.3	12"	"	91.3	4
	56	48	124.0	15.6	107.3	"	"	91.3	3
	57	9	119.6	14.9	104.1	Retest # 38		91.3	3
	58	11	123.8	17.6	105.3	Retest # 39		92.3	3
	59	13	124.0	18.3	104.0	Retest # 40		91.9	3
	60	15	121.2	15.6	104.8	Retest # 41		92.0	3
	61	Slot 32	122.8	23.4	99.5	6"	1'	90.6	1
	62	Slot 46/47	119.8	19.7	100.1	12"	1.5'	91.2	1
	63	Slot 38/39	127.6	20.5	105.9	6"	"	90.1	4
	64	Slot 43/44	117.0	17.6	99.5	12"	"	90.6	1
	65	Slot 46/47	116.8	17.6	99.3	10"	"	90.4	1
	66	58/59	110.0	17.0	94.0	12"	2'	85.6*	1

FIELD DENSITY TESTS 76-8167

Date	Test No.	Location	Wet Density PCF	% Field Moisture	Dry Density PCF	Depth of Test	Depth of Fill	RELATIVE COMPACTION	MAX No
10/28	67	61	129.0	20.5	107.0	6"	1.5'	91.1	4
	68	62/63	125.4	21.2	103.5	8"	"	90.7	3
	69	64/65	124.6	20.5	103.4	12"	2'	90.7	3
	70	66/67	124.0	18.3	104.8	"	"	91.9	3
10/29	71	50	127.0	17.0	108.5	10"	"	92.4	4
	72	52	122.6	17.6	104.2	6"	1.5'	91.4	3
	73	54	127.2	18.3	107.5	"	"	91.5	4
	74	56	120.6	17.0	103.1	10"	2'	90.4	3
	75	8	117.8	17.6	100.2	12"	"	87.9*	3
	76	10	125.6	21.2	103.6	6"	1.5'	88.2*	4
	77	12	117.6	16.3	101.1	9"	"	88.7*	3
	78	14	123.4	18.3	104.3	6"	1'	91.5	3
	79	60	117.2	20.5	97.3	"	"	88.8*	1
	80	61	125.3	21.2	103.4	12"	3'	90.7	3
	81	63	121.8	18.3	103.0	6"	2'	90.3	3
	82	65	128.0	18.3	108.2	12"	3'	92.1	4
	83	68	123.6	19.0	103.9	"	"	91.1	1
	84	7	122.8	18.3	103.8	"	2.5'	91.1	3
	85	5/6	120.6	15.6	104.3	"	"	91.5	3
	86	4	128.0	16.3	110.1	"	3'	93.7	4
	87	2	130.0	17.6	110.5	"	"	94.1	4
	88	1	128.6	17.6	109.3	18"	4.5'	93.1	4
11/1	89	48	110.2	18.3	93.1	30"	5.4'	84.8*	1
	90	48	118.8	22.0	97.3	12"	4.4'	85.4*	3
	91	48	112.2	19.7	93.7	"	3.5'	85.4*	1
	92	47	129.6	20.5	107.5	14"	3'	91.5	4
	93	46	129.4	21.2	106.8	16"	2.5'	90.9	4
	94	46	126.0	17.6	107.1	12"	3'	91.2	4
	95	45/46	123.0	17.6	104.6	24"	5.5'	91.7	3
	96	44/45	127.8	19.7	106.8	12"	3'	90.9	4
	97	43	125.0	19.7	104.4	"	2.5'	91.6	3
	98	43	116.0	16.3	99.7	16"	5'	90.8	1
	99	42	123.8	15.6	107.1	12"	2'	91.1	4

FIELD DENSITY TESTS 76-8167

Date	Test No	Location	Wet Density PCF	% Field Moisture	Dry Density PCF	Depth of Test	Depth of Fill	RELATIVE COMPACTION	MAX. No.
11/1	100	40	129.7	21.2	107.1	6"	1'	91.1	4
	101	37	128.0	20.5	106.2	10"	3'	90.4	4
	102	Rec. Bldg.	120.4	16.3	103.5	6"	Bottom	90.8	3
	103	Rec. Area	120.8	17.6	102.7	"	" prep.	90.1	3
	104	"	121.4	17.0	103.8	"	"	91.0	3
	105	58/59	116.4	17.0	99.5	Rutest # 66		90.6	1
	106	60	121.4	21.2	100.2	Retest # 79		91.2	1
	107	63	125.6	22.0	102.9	7"	3.3'	90.3	3
	108	64	122.4	14.9	106.5	12"	3'	90.7	4
	109	67	125.6	20.5	104.2	8"	3'	91.4	3
	110	68	122.8	14.9	106.9	12"	4.5'	90.9	4
11/2	111	48	120.6	20.5	100.1	Retest # 89		91.1	1
	112	48	121.4	15.6	105.0	Retest # 90		92.1	3
	113	48	123.2	20.5	102.2	Retect # 91		93.1	1
	114	8	125.6	18.3	106.2	Retest # 75		93.1	3
	115	9	122.4	17.6	104.1	12"	2'	91.3	3
	116	10	127.6	19.7	106.6	Retest # 76		90.7	4
	117	12	123.6	18.3	104.5	Retest # 77		91.6	3
	118	Rec. Bldg.	121.8	18.3	102.9	12"	2'	91.1	5
	119	Rec. Area	120.6	17.0	103.1	6"	1.5'	91.2	5
	120	"	124.5	19.0	104.6	"	"	91.8	5
11/3	121	Rec. Bldg.	122.0	19.7	101.9	12"	3'	90.2	5
	122	Rec. Area	115.0	14.9	100.1	6"	2.5'	88.6*	5
	123	"	119.6	16.3	102.8	Retest # 122		91.0	5
	124	"	122.4	17.6	104.1	12"	3'	91.3	3
	125	35	131.2	22.0	107.5	Surf.	Cut	95.6	5
	126	37	131.0	19.7	109.4	"	0.3'	96.8	5
	127	37	129.2	20.5	107.2	"	0.8'	94.9	5
	128	39	129.2	19.7	107.9	"	1'	95.5	5
	129	40	125.6	17.6	106.8	"	1.5'	94.5	5
	130	41	122.5	15.6	106.0	"	2'	93.8	5
	131	43	123.4	19.0	103.7	"	2.5'	91.8	5
	132	Rec. Area	124.8	20.5	103.6	12"	4.5'	91.6	5
	133	"	125.6	17.0	107.3	6"	3.5'	95.0	5

FIELD DENSITY TESTS 76-8167

Date	Test No.	Location	Wet Density PCF	% Field Moisture	Dry Density PCF	Depth of Test	Depth of Fill	RELATIVE COMPACTION	M
11/3	134	Rec. Area	126.6	19.0	106.4	10"	3.5'	94.1	5
11/4	135	"	123.8	19.7	103.4	12"	5.3'	90.7	3
	136	"	124.2	22.0	101.8	8"	4'	90.1	5
	137	11-12	121.2	21.2	100.0	24"	0.9'	87.7**	3
	138	13-14	117.6	17.0	100.5	18"	0.5'	88.2**	3
	139	15	113.8	14.9	99.0	12"	0.25'	86.9**	3
	140	17	122.7	12.4	100.3	"	Cut	88.0**	3
	141	19	118.4	19.0	99.5	16"	"	87.3**	3
11/5	142	Slot 42-43	122.2	17.6	103.9	18"	5'	91.9	5
	143	Slot 39-40	122.0	18.3	103.1	12"	4.5'	91.3	5
	144	Slot 36-37	130.2	19.0	109.4	"	3'	93.1	4
	145	Slot 33	121.8	17.6	103.6	"	2'	90.8	3
11/8	146	44-45	128.0	22.0	104.9	1"	3.4'	92.8	5
	147	47	124.4	20.5	103.2	Surf.	3'	91.3	5
	148	48	127.6	21.2	105.4	"	3.5'	93.2	5
	149	1	127.0	19.0	106.7	"	4.5'	90.8	4
	150	3	128.4	19.7	107.3	1"	3'	91.3	4
	151	4	130.2	17.6	110.7	Surf.	"	94.2	4
11/10	152	Slope 30	108.6	14.9	94.5	2"	Existing	86.1*	1
	153	Slope 31	120.4	21.2	99.3	8"	" slope	90.5	1
	154	Slope 33	119.0	19.7	99.4	1"	"	90.5	1
	155	Slope 35	120.0	33.3	90.0	4"	"	83.3*	6
	156	14	123.4	16.3	106.1	1"	1.1'	93.9	5
	157	15	121.8	17.0	104.1	Surf.	0.25'	92.1	5
	158	16	122.6	17.6	104.2	1"	0.5'	92.2	5
	159	16	117.4	14.9	102.2	Surf.	Cut	89.6**	3
	160	17	129.0	19.7	107.7	"	"	91.7	4
	161	18	111.6	14.3	97.6	"	"	85.6**	3
	162	19	112.	13.6	98.0	"	"	86.6**	3
	163	20	116.8	17.0	99.8	"	"	87.6**	3
	164	21	124.4	27.4	97.6	"	"	90.4	6
	165	22	120.2	19.0	101.0	16"	"	88.6**	3
	166	23	117.4	19.0	98.6	1"	"	91.3	6

FIELD DENSITY TESTS 76-8167

Date	Test No.	Location	Wet Density PCF	% Field Moisture	Dry Density PCF	Depth of Test	Depth of Fill	RELATIVE COMPACTION	M
11/10	167	25	114.6	18.3	96.9	Surf.	Cut	89.7**	6
	168	26	118.0	18.3	99.7	1"	"	92.3	6
	169	27	122.4	13.6	107.7	Surf.	"	90.5	7
11/18	170	Slope 35	121.2	23.4	98.2	Retest # 155		90.9	6
	171	Slope 37	127.2	22.7	103.7	Surf.	Existing	91.7	5
	172	Slope 39	125.4	23.4	101.6	1"	" Slope	92.5	1
	173	Slope 41	125.6	22.0	102.9	Surf.	"	91.1	5
	174	Slope 43	121.8	22.0	99.8	1"	2.5'	90.9	1
	175	13	123.8	15.6	107.1	Surf.	1'	94.8	5
	176	12	127.4	19.0	107.0	1"	"	94.7	5
	177	11	127.4	17.6	108.3	Surf.	1.5'	92.2	4
	178	10	128.0	18.3	108.2	"	"	92.1	4
	179	9	129.4	19.0	108.7	"	"	92.5	4
	180	8	122.8	14.3	107.4	1"	2.5'	91.4	4
11/19	181	7	131.6	20.5	109.2	"	2.8'	92.9	4
	182	6	125.9	17.6	107.1	Surf.	2.5'	91.1	4
	183	5	125.0	22.0	102.5	"	3'	90.7	5
	184	2	128.4	19.7	107.3	1"	3.3'	91.3	4
	185	57	118.6	17.0	101.4	"	1.5'	92.3	1
	186	58	124.6	25.0	99.7	Surf.	1.2'	90.8	1
	187	59	125.0	17.6	106.3	1"	1.5'	90.5	4
	188	60	119.4	19.7	99.7	"	2.3'	90.8	1
	189	61	127.1	17.6	108.1	1"	3'	91.9	4
	190	62	129.2	18.3	109.2	"	2.8'	92.9	4
	191	64	127.6	22.0	104.6	"	2.5'	92.6	5
	192	65	124.6	16.3	107.1	"	3'	91.2	4
	193	66	125.0	19.0	105.0	"	2.9'	92.9	5
	194	67	122.4	17.0	104.6	"	3.8'	92.6	5
	195	55/56	123.3	18.3	104.2	"	2'	92.2	5
11/22	196	Slope 43/44	117.2	16.3	100.8	Surf.	Existing	91.8	1
	197	Slope 44	123.6	20.5	102.6	"	2' Slope	90.8	5
	198	Slope 45	124.0	23.6	100.5	"	Existing	91.5	1
	199	Slope 46	121.8	22.7	99.3	"	2.5' Slope	90.4	1

FIELD DENSITY TESTS 76-8167

Date	Test No.	Location	Wet Density PCF	% Field Moisture	Dry Density PCF	Depth of Test	Depth of Fill	RELATIVE COMPACTION	MA
11/22	200	Slope 48	127.8	20.5	106.1	Surf.	3'	90.3	4
	201	53/54	128.6	19.7	107.4	1"	1.5'	91.4	4
	202	52	126.2	20.5	104.7	"	2.2'	92.7	5
	203	51	124.4	19.7	103.9	"	1.9'	92.0	5
	204	50	129.4	20.5	107.4	"	1.5'	95.0	5
	205	49	128.6	22.0	105.4	"	2'	93.3	5
	206	Rec. Bldg.	126.0	25.0	100.8	Surf.	4.4'	93.3	6
	207	68	124.6	19.7	104.1	1"	3'	92.1	5
	208	Slope 30	114.4	15.6	99.0	Retest # 152		90.1	1
	209	28	123.6	14.9	107.6	Surf.	Cut	90.4	7
	210	29/30	123.2	14.9	107.2	1"	"	91.2	4
	211	31/32	125.0	22.0	102.5	"	"	90.7	5
	212	33	120.6	17.6	102.5	"	"	90.7	5
	213	34	129.6	22.0	106.2	"	"	94.0	5
11/23	214	46	127.0	18.3	107.3	Surf.	3.2'	95.0	5
	215	47	124.8	19.0	104.9	"	2.5'	92.8	5
	216	48	127.6	22.0	104.6	1"	3.5'	92.5	5

* Denotes areas of low compaction that were reworked, recompacted and retested.

** Denotes tests taken in cut areas where a relative compaction of 85% or better is acceptable.

APPENDIX E
PREVIOUS GROUP DELTA GEOTECHNICAL DATA

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Paseo de Valencia Widening Project	IR-556	**A-12-002**

SITE LOCATION	START	FINISH	SHEET NO.
Laguna Hills, California	3/30/2012	3/30/2012	1 of 1

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Scott's Drilling Service	Ingersoll-Rand 6015	Hollow Stem Auger	MSL	CS

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
140 lb, 30"	60	8	16.5	357	∇ NE / *na* DURING DRILLING

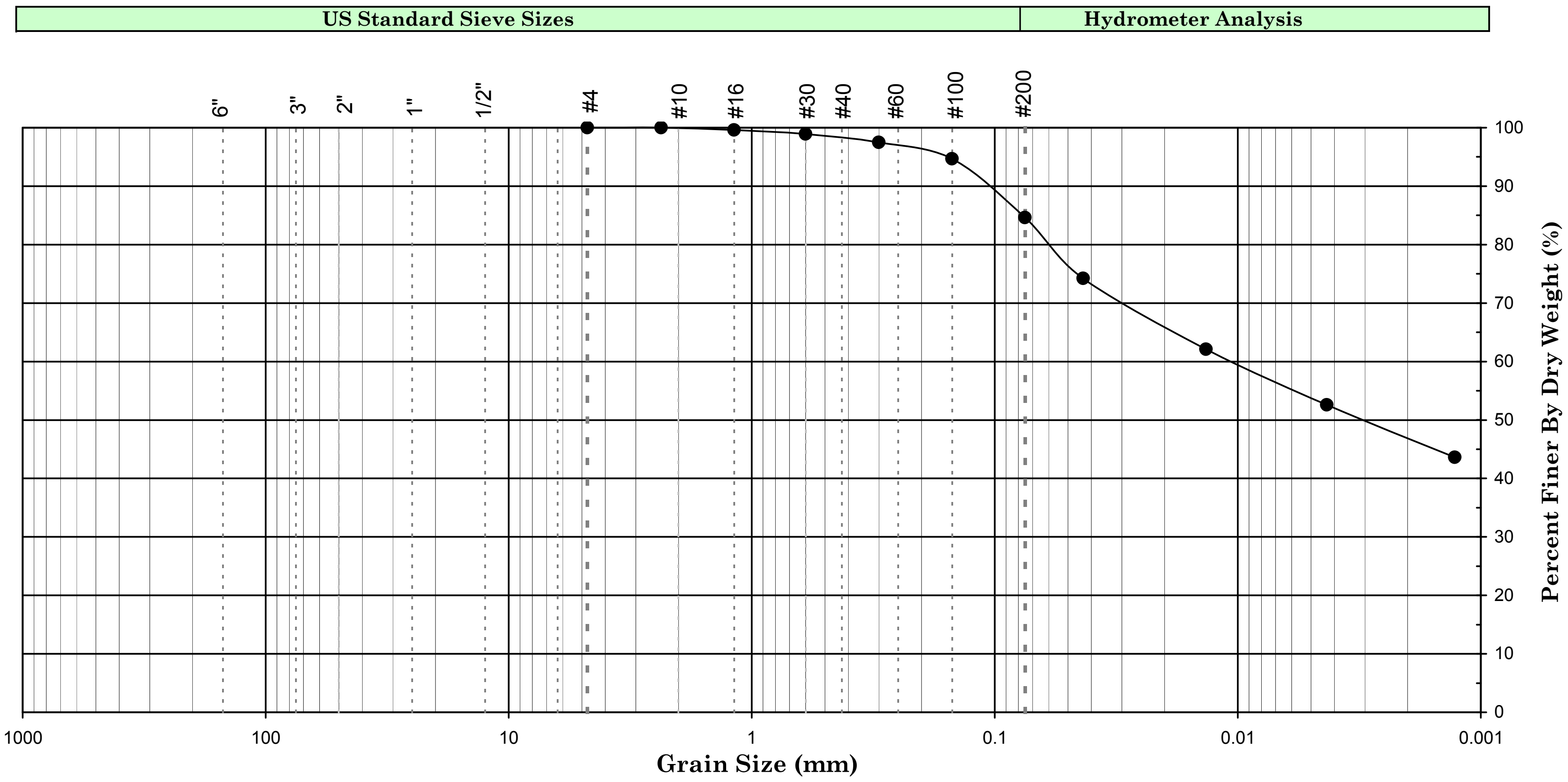
DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	
SPT (1.4"), CAL (2.4")	N*60=Nspt=0.67Ncal	▼ NE / *na* AFTER DRILLING

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
															Lean CLAY with SAND (CL); moist; brown; fine SAND; medium plasticity; (CAPISTRANO FORMATION).
	355														
			B-1												
			S-2	4 4 5	9	9			16.5			PA			PP=3.75; very stiff. 78% fines; 22% SAND
5															Sandy Lean CLAY (CL); light brown/tan; moist; fine SAND; PP>4.5.
			R-3	21 46 50/6"	96	64						DS			
	350														Lean CLAY with SAND (CL); hard; olive-green/brown; moist; fine SAND; medium plasticity; abundant oxidation; PP>4.5; (CAPISTRANO FORMATION).
			S-4	8 12 17	29	29									
10															Tan; mottled with orange oxidation; PP>4.5.
			R-5	20 33 37	70	47			25.5	97					
	345														
15															PP>4.5.
			S-6	9 11 12	23	23									
	340														Boring terminated at 16.5 ft bgs. Ground water not encountered. No caving. Borehole backfilled with soil cuttings and tamped to surface.
20															
	335														

BORING RECORD

PROJECT NAME Paseo de Valencia Widening Project
PROJECT NUMBER IR-556
HOLE ID A-12-004
SITE LOCATION Laguna Hills, California
START 3/30/2012
FINISH 3/30/2012
SHEET NO. 1 of 1
DRILLING COMPANY Scott's Drilling Service
DRILL RIG Ingersoll-Rand 6015
DRILLING METHOD Hollow Stem Auger
LOGGED BY MSL
CHECKED BY CS
HAMMER TYPE (WEIGHT/DROP) 140 lb, 30"
HAMMER EFFICIENCY (ERi) 60
BORING DIA. (in) 8
TOTAL DEPTH (ft) 21.5
GROUND ELEV (ft) 371.5
DEPTH/*ELEV.* GW (ft) ▽ NE / *na* **DURING DRILLING** ▼ NE / *na* **AFTER DRILLING**
DRIVE SAMPLER TYPE(S) & SIZE (ID) SPT (1.4"), CAL (2.4")
NOTES N*60=Nspt=0.67Ncal

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		▨													Lean CLAY with SAND (CL); brown; moist; fine SAND; medium plasticity; (CAPISTRANO FORMATION).
	370														
		▨ ⧗	B-1 R-2	23 46 50/4"	96 /10"	64 /10"			13.1	115		CR EI PA			PP>4.5; hard; brown with white veins. 85% fines; 15% SAND
5															
		⧖	S-3	15 20 27	47	47									PP>4.5; tan with white spots; fine SAND; highly cemented.
	365														
		⧗	R-4	25 34 39	73	49			23.4	101					PP>4.5; light brown.
10															
		⧖	S-5	10 15 24	39	39									PP>4.5; olive green-brown; moist; fine SAND; medium plasticity; oxidation present; sample fractures on 45 degree planes that contain white fine SAND beds.
	360														
15															Lean CLAY (CL); hard; olive green-brown with white veins; moist; fine SAND; abundant oxidation; PP>4.5. 88% fines; 12% SAND
		⧗	R-6	10 22 36	58	39			29.2	96		PA			
	355														
20															PP>4.5.
		⧖	S-7	6 9 12	21	21									
	350														Boring terminated at 21.5 ft bgs. Ground water not encountered. No caving. Borehole backfilled with soil cuttings and tamped to surface.



Boulders	Cobbles	Gravel		Sand			Fines (Silt / Clay)
		Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Sample Depth [from/to]				Grain Size Percentage			Atterberg Limits		Soil Description	U.S.C.S.
			(ft)		(m)		Gravel	Sand	Fines	LL	PI		
●	*A-12-004*	*R-2*	*2.5*	*4.0*	*0.76*	*1.22*	*0*	*15*	*85*	-	-	*Lean CLAY with SAND*	*CL*
▲													
■													
◆													
+													

GROUP DELTA CONSULTANTS

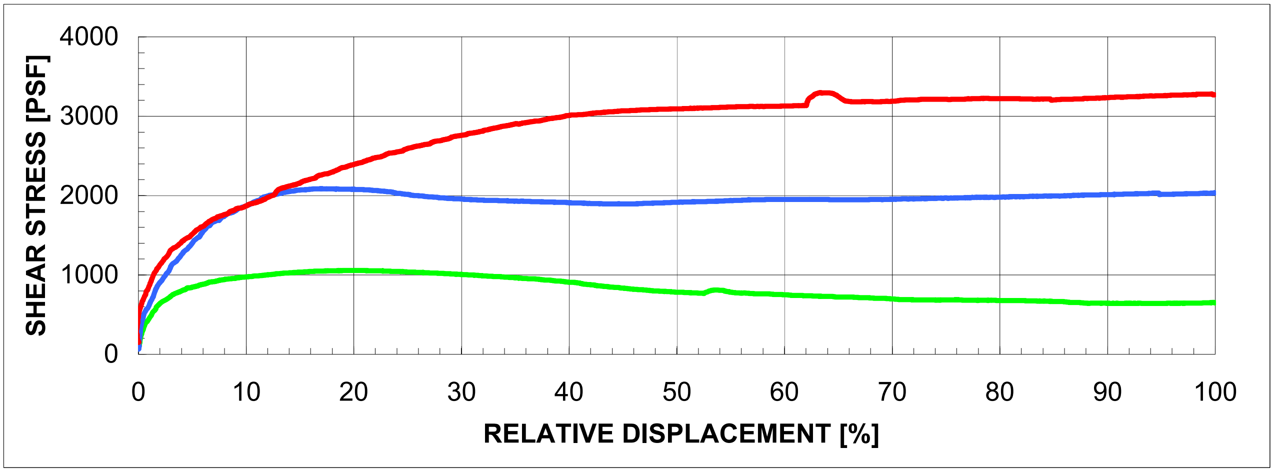
Paseo de Valencia Widening Project

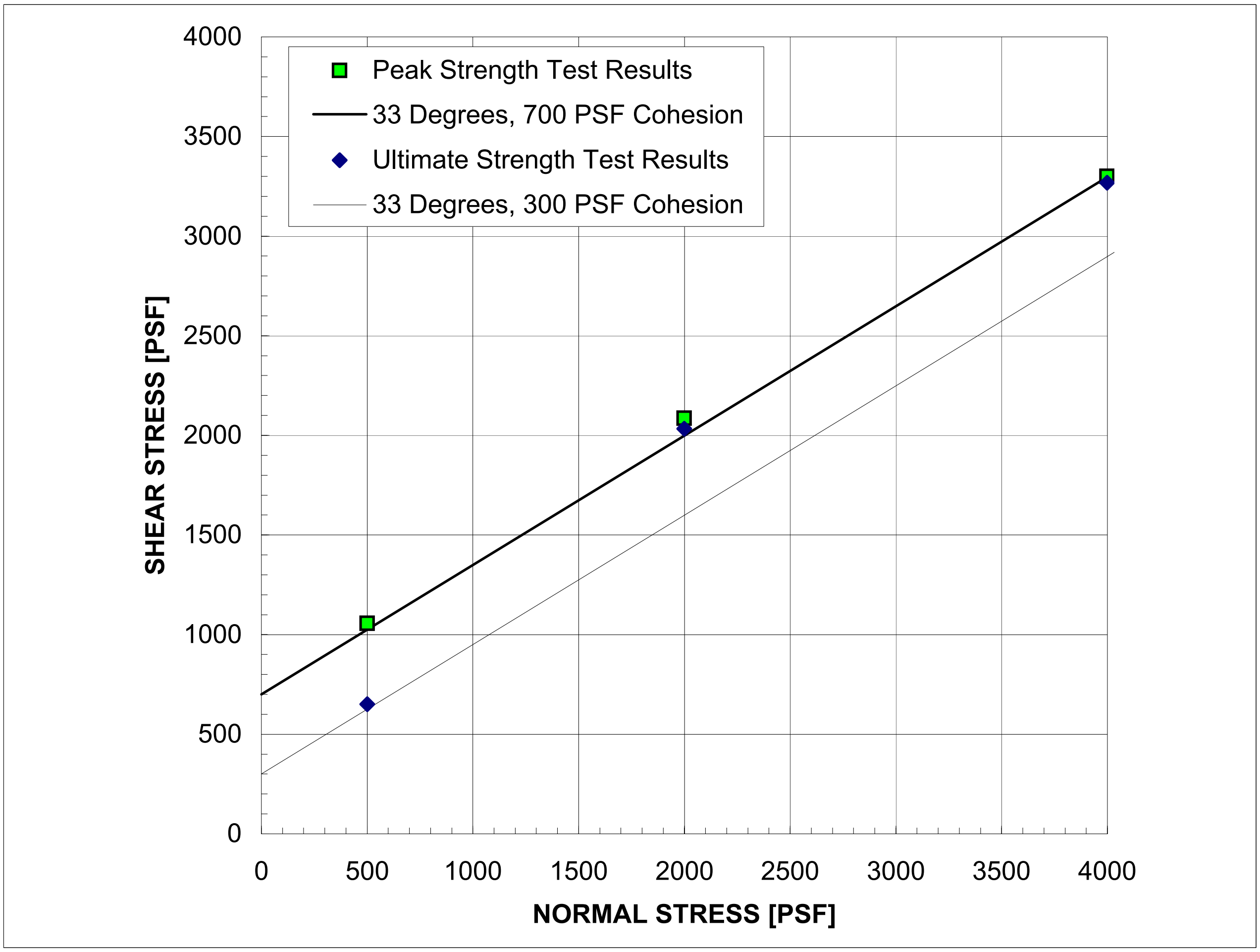
Project No. : *IR-556* **Date :** *04/11/12*

GRAIN SIZE ANALYSIS

(ASTM D-422)

Figure No. :**E-3**





SAMPLE: A-12-002 @ 6' - 6½'

Description: Brown sandy lean clay (CL)

STRAIN RATE: 0.0008 IN/MIN

(Sample was consolidated and drained)

	PEAK	ULTIMATE
ϕ'	33 °	33 °
C'	700 PSF	300 PSF

	IN-SITU	AS-TESTED
γ_d	114.8 PCF	114.8 PCF
w_c	13.2 %	17.3 %

370 Amapola Ave., Suite 212, Torrance, CA 90501
32 Mauchly, Suite B, Irvine, CA 92618
4201 Santa Ana St., Suite F, Ontario, CA 91761
9245 Activity Road, Suite 103, San Diego, CA 92126

DIRECT SHEAR TEST RESULTS

Project No. IR-556
FIGURE E-4

Table E-1

Expansion Index Test Results

BORING NO	SAMPLE NO	DEPTH (feet)	SOIL TYPE	EXPANSION INDEX	EXPANSION POTENTIAL
A-12-004	B-1	0-5	CL	68	"Medium"

Table E-2

Corrosion Test Results

BORING NO	SAMPLE NO	DEPTH (FT)	SOIL TYPE	PH CALTRANS 643	SULFATE CONTENT CALTRANS 417 (ppm)	CHLORIDE CONTENT CALTRANS 422 (ppm)	MINIMUM RESISTIVITY CALTRANS 532 (ohm-cm)
A-12-004	B-1	0-5	CL	8.06	20	106	581

Appendix I

Comments Received at Public Meeting, April 16, 2012

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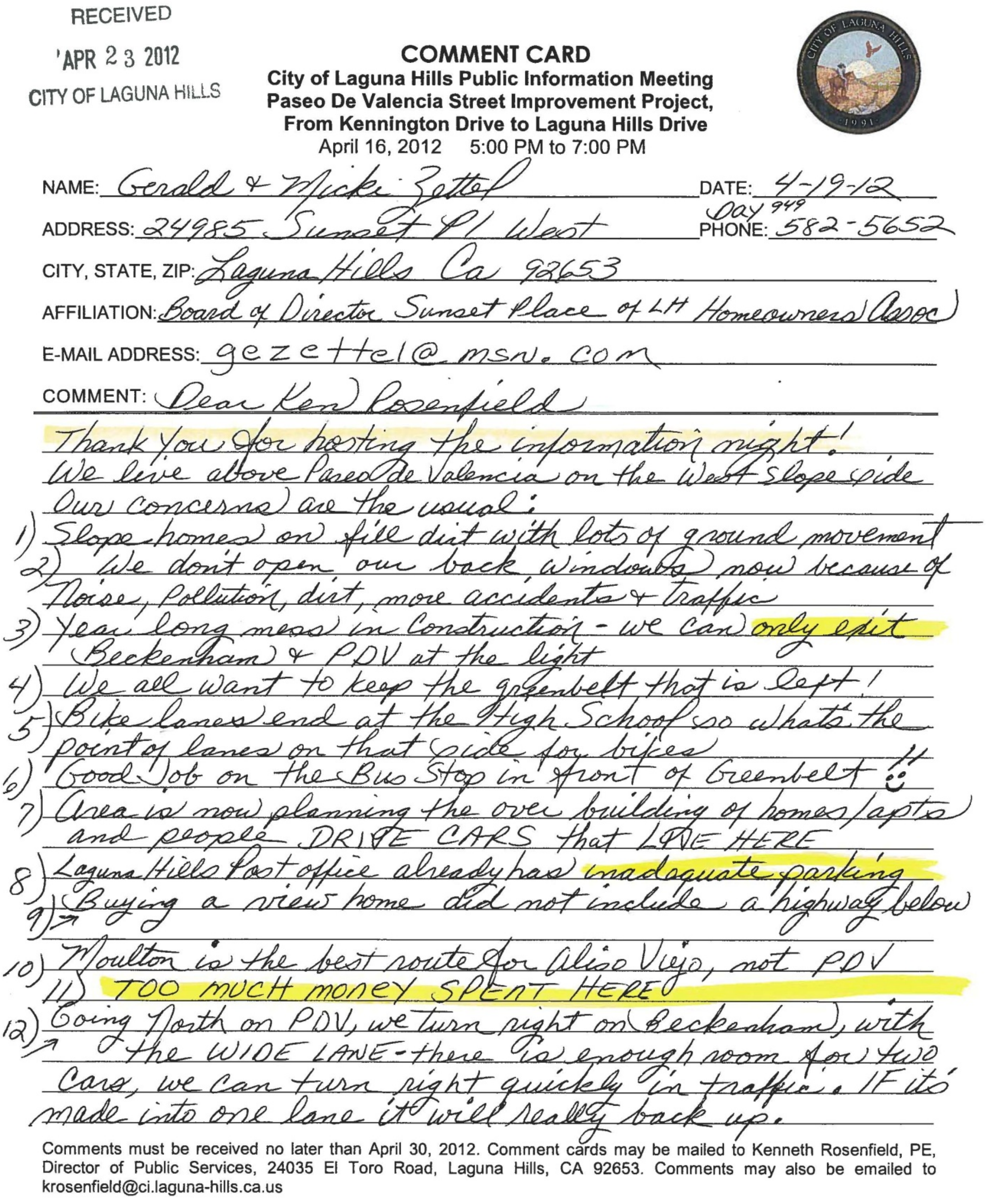
Comments Received at Public Meeting, April 16, 2012
Index

No.	Commenter Name	Comment	MND Section Comment Responded In
1	Gerald & Micki Zettel	Private property slope	VI
		Noise, air quality, traffic	XII, III, XVI
		Construction traffic	XVI
		Aliso Creek Riding and Hiking Trail Greenbelt	I, IV
		Bike lanes	XVI
		Bus stop	XVI
		Too much building of homes and apartments	Opinion of commenter
		Laguna Hills Post Office has inadequate parking	Not an issue with the proposed project
		Buying a home	Not a CEQA issue
		Moulton is best route for Aliso Viejo bound traffic, not Paseo de Valencia	Opinion of commenter
		Too much money spent	Opinion of commenter
		Right-turn movement from NB Paseo de Valencia onto Beckenham Street will get more congested	XVI
2	Ronald L. Schaffer	Opposed to proposed project	Opinion of commenter
		Traffic congestion and accidents	XVI
		Waste of taxpayer money	Opinion of commenter
		Reduce area on east side of street which will affect users of Aliso Creek Riding and Hiking Trail and scenic value	I
		Ruin the beauty of the area by over building	I
		Air quality, noise	III, XII
		Notification of residents	The City mailed notices to all residences within 300 feet of the project site
		Maintain the existing landscaping	I
		Project will impact entry into Sunset Place West community	XVI
		Fiscally irresponsible	Opinion of commenter
		Laguna Woods crime issue	Police issue
3	Teresa Gourdine	Opposed to loss of greenbelt	I
		Preserve the existing bike and horse trails	I
		Noise	XII
		Geotechnical issues and vibration	VI

No.	Commenter Name	Comment	MND Section Comment Responded In
4	Micki Zettel	Slope movement along Sunset Place West	VI
5	DeeDee McGann-Gollwitzer	Slope movement along Sunset Place West	VI
6	Elizabeth TsuTsui	Keep encroachment into greenbelt as small as possible	I
		Install a glass sound wall for Sunset Place homes	XII
		NB bike lane not needed	XVI
		West side sidewalk not needed	Opinion of commenter
		Too many accidents	XVII
		Noise and air quality	XII, III
7	Sharon Hough	Noise	XII
		Slope movement along Sunset Place West	VI
8	Ron Beldner	A follow-up meeting to the April 16, 2012 meeting should be held to discuss the proposed project in more detail and the environmental process	A follow-up meeting was held on March 14, 2013
9	Heather & John Densmore	Opposed to proposed project	Opinion of commenter
		Traffic delays, accidents and roadwork on Paseo de Valencia	XVI
		Greenbelt views	I
		Noise and air quality	XII, III
		Home values will be hurt	Not a CEQA issue
		Install a glass sound wall	XII
10	Teresa Gourdine	Loss of greenbelt	I
		Affect on the greenbelt and bike and horse trail affects	I
		Noise, install a glass sound wall	XII
		Slope movement along Sunset Place West	VI
11	Russell Gourdiine	Noise, install a glass sound wall	XII
		Slope movement along Sunset Place West	VI
		Affect on the greenbelt	I
		Property values will be lowered	Not a CEQA issue
		Affect on the greenbelt and bike and horse trail affects	I
12	Mary Jimenez	Opposed to proposed project	Opinion of commenter
		Noise	XII

No.	Commenter Name	Comment	MND Section Comment Responded In
		Unsafe driving conditions at Beckenham Street and Paseo de Valencia	XVI
		Questions bike lane and sidewalk on west side of Paseo de Valencia	XVI
13	Mary and Joe Jimenez	Opposed to proposed project	Opinion of commenter
		Noise	XII
		Unsafe driving conditions at Beckenham Street and Paseo de Valencia	XVI
		Geotechnical issues and vibration	VI
		Property values will be lowered	Not a CEQA issue
14	Kaaren Juggert	Keep the encroachment into the greenbelt as small as possible	I
		Install a glass sound wall along Sunset Place West	XII
		Eliminate the NB bike lane as it is not needed	XVI
		Sidewalk on west side is not needed	Opinion of commenter
		Lower the speed limit	Opinion of commenter
15	Dr. Gary Steinberg	Install a glass sound wall along Sunset Place West	XII
		Keep the encroachment into the greenbelt as small as possible	I
		Increased traffic, noise and air quality	XVI, XII, III
		Geotechnical issues and vibration	VI
		Eliminate the NB bike lane as it is not needed	XVI
		Questions sidewalk on east (is it west?) side of Paseo de Valencia	XVI
		Accident potential with 2 new crosswalks	XVI
		Unsafe driving conditions at Beckenham Street and Paseo de Valencia	XVI
16	Terry & Jerry Whitley	No encroachment into the greenbelt	I
		Noise	XII
		Slope	VI
		Keep the encroachment into the greenbelt as small as possible	I
		Install noise barriers and reduce speed limit	Opinion of commenter
		Consider losing the sidewalk on the SB side.	Opinion of commenter
17	Erick Wendler	Opposed to proposed project	Opinion of commenter
		Noise	XII

No.	Commenter Name	Comment	MND Section Comment Responded In
		Air quality	III
		Slope slippage	VI
		Increased health risks	III
18	Sandra Wendler	Opposed to proposed project	Opinion of commenter
		Noise	XII
		Air quality	III
		Slope slippage	VI
		Increased health risks	III
		Opposed to proposed project	Opinion of commenter
19	Joanne (DeeDee) Gollwitzer	Loss of landscaping	I
		Concerned with loss of land along the east side of Paseo de Valencia	I
		Concerned with street lanes, bike lanes, medians, and sidewalk size	XVI
		Concerned with median size and landscaping	I
		Concerned with street lights	I
		Entry and exit on Beckenham Street	XVI
		Traffic flow on Paseo de Valencia	XVI
		Laguna Woods crime issue	Opinion of commenter
		Opposed to proposed project	Opinion of commenter
		The City doesn’t have the money to do this proposed project	Opinion of commenter
		Against adding 400 condos / apartments off Avenida de Carlota that will add crime and traffic	Not a project issue
20	Robert Glouser	Noise	XII
		Keep the encroachment into the greenbelt as small as possible	I
		NB bike lane and sidewalk are not necessary	Opinion of commenter



RECEIVED
'APR 23 2012
CITY OF LAGUNA HILLS

COMMENT CARD

City of Laguna Hills Public Information Meeting
Paseo De Valencia Street Improvement Project,
From Kennington Drive to Laguna Hills Drive
April 16, 2012 5:00 PM to 7:00 PM

NAME: Gerald & Micki Zettel DATE: 4-19-12

ADDRESS: 24985 Sunset Pl West PHONE: Day 949 582-5652

CITY, STATE, ZIP: Laguna Hills Ca 92653

AFFILIATION: Board of Director Sunset Place of LH Homeowners Assoc)

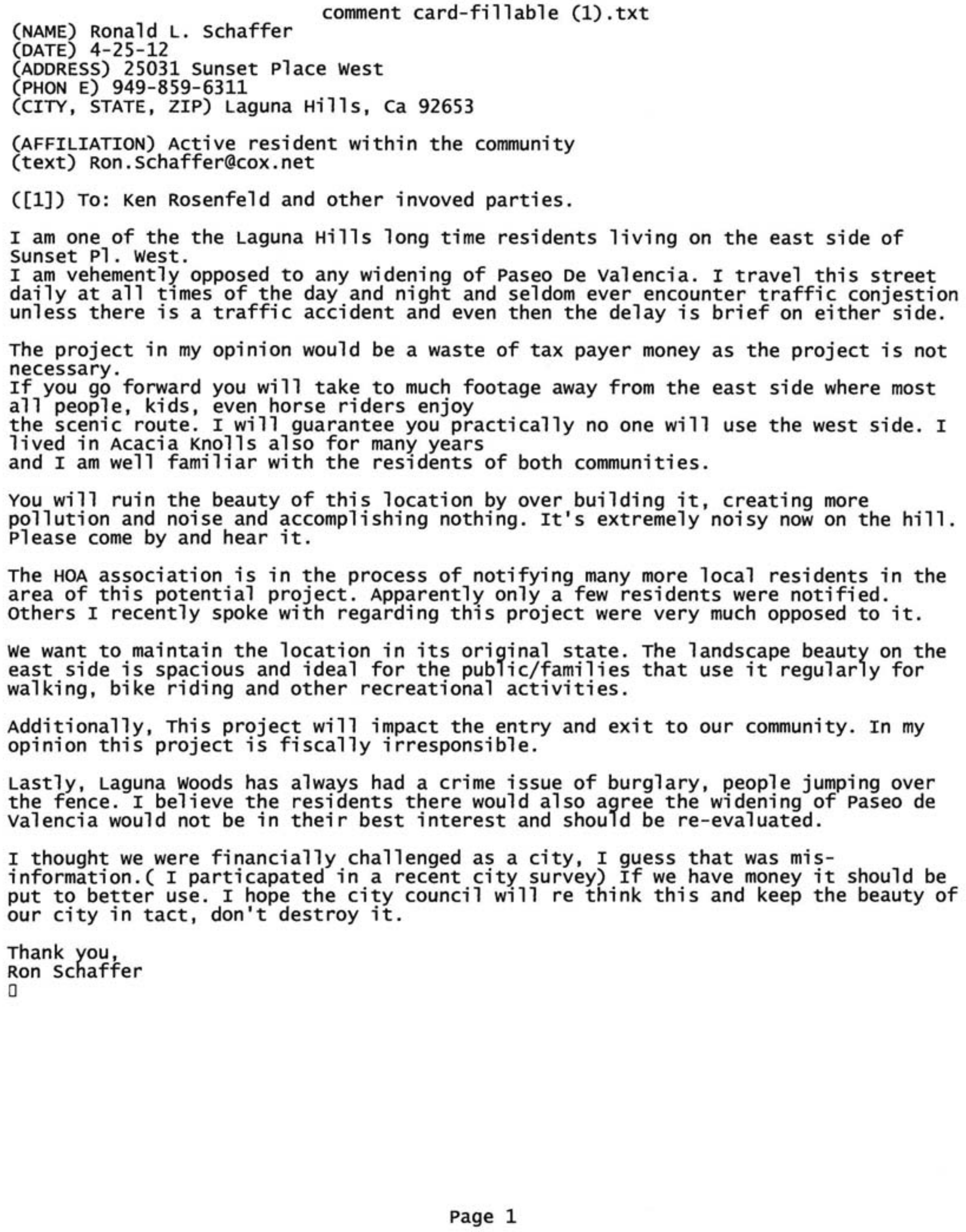
E-MAIL ADDRESS: gezettel@msn.com

COMMENT: Dear Ken Rosenfield

Thank You for hosting the information night!
We live above Paseo de Valencia on the West Slope side
Our concerns are the usual:
1) Slope homes on fill dirt with lots of ground movement
2) We don't open our back windows now because of
Noise, Pollution, dirt, more accidents & traffic
3) Year long mess in Construction - we can only exit
(Beckenham & PDV at the light
4) We all want to keep the greenbelt that is left!
5) Bike lanes end at the High School so whats the
point of lanes on that side for bikes
6) Good Job on the Bus Stop in front of Greenbelt!! ☺
7) Area is now planning the over building of homes/apts
and people DRIVE CARS that LIVE HERE
8) Laguna Hills Post office already has inadaquate parking
9) → Buying a view home did not include a highway below
10) Moulton is the best route for Aliso Viejo, not PDV
11) TOO MUCH MONEY SPENT HERE
12) → Going North on PDV, we turn right on Beckenham, with
the WIDE LANE - there is enough room for two
Cars, we can turn right quickly in traffic. IF it's
made into one lane it will really back up.

Comments must be received no later than April 30, 2012. Comment cards may be mailed to Kenneth Rosenfield, PE, Director of Public Services, 24035 El Toro Road, Laguna Hills, CA 92653. Comments may also be emailed to krosenfield@ci.laguna-hills.ca.us

Commenter No. 1



comment card-fillable (1).txt

(NAME) Ronald L. Schaffer
(DATE) 4-25-12
(ADDRESS) 25031 Sunset Place West
(PHON E) 949-859-6311
(CITY, STATE, ZIP) Laguna Hills, Ca 92653

(AFFILIATION) Active resident within the community
(text) Ron.Schaffer@cox.net

([1]) To: Ken Rosenfeld and other invoved parties.

I am one of the the Laguna Hills long time residents living on the east side of Sunset Pl. West.
I am vehemently opposed to any widening of Paseo De Valencia. I travel this street daily at all times of the day and night and seldom ever encounter traffic conjestion unless there is a traffic accident and even then the delay is brief on either side.

The project in my opinion would be a waste of tax payer money as the project is not necessary.
If you go forward you will take to much footage away from the east side where most all people, kids, even horse riders enjoy
the scenic route. I will guarantee you practically no one will use the west side. I lived in Acacia Knolls also for many years
and I am well familiar with the residents of both communities.

You will ruin the beauty of this location by over building it, creating more pollution and noise and accomplishing nothing. It's extremely noisy now on the hill. Please come by and hear it.

The HOA association is in the process of notifying many more local residents in the area of this potential project. Apparently only a few residents were notified. Others I recently spoke with regarding this project were very much opposed to it.

We want to maintain the location in its original state. The landscape beauty on the east side is spacious and ideal for the public/families that use it regularly for walking, bike riding and other recreational activities.

Additionally, This project will impact the entry and exit to our community. In my opinion this project is fiscally irresponsible.

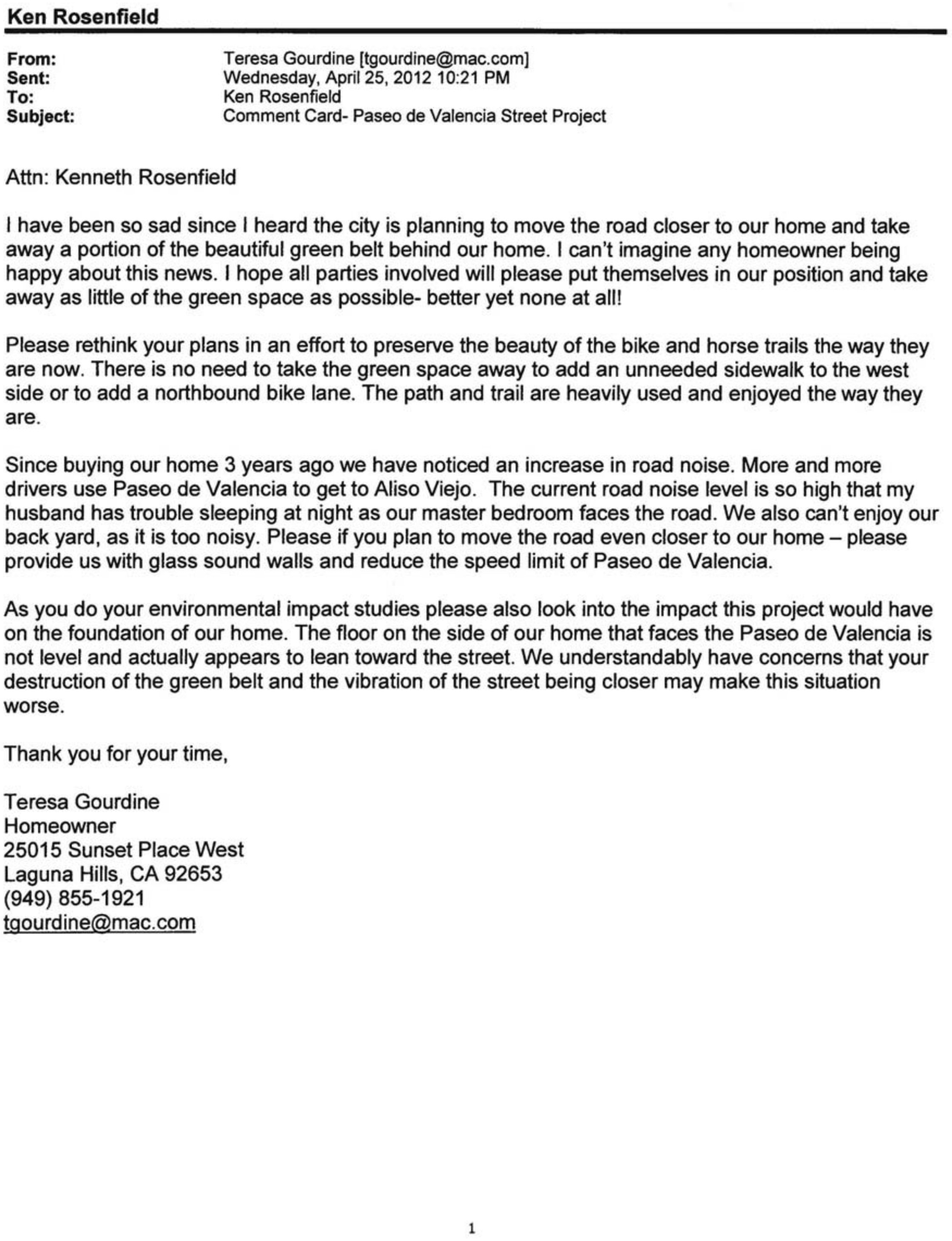
Lastly, Laguna Woods has always had a crime issue of burglary, people jumping over the fence. I believe the residents there would also agree the widening of Paseo de Valencia would not be in their best interest and should be re-evaluated.

I thought we were financially challenged as a city, I guess that was mis-information.(I particapated in a recent city survey) If we have money it should be put to better use. I hope the city council will re think this and keep the beauty of our city in tact, don't destroy it.

Thank you,
Ron Schaffer
▯

Page 1

Commenter No. 2



Ken Rosenfield

From: Teresa Gourdine [tgourdine@mac.com]
Sent: Wednesday, April 25, 2012 10:21 PM
To: Ken Rosenfield
Subject: Comment Card- Paseo de Valencia Street Project

Attn: Kenneth Rosenfield

I have been so sad since I heard the city is planning to move the road closer to our home and take away a portion of the beautiful green belt behind our home. I can't imagine any homeowner being happy about this news. I hope all parties involved will please put themselves in our position and take away as little of the green space as possible- better yet none at all!

Please rethink your plans in an effort to preserve the beauty of the bike and horse trails the way they are now. There is no need to take the green space away to add an unneeded sidewalk to the west side or to add a northbound bike lane. The path and trail are heavily used and enjoyed the way they are.

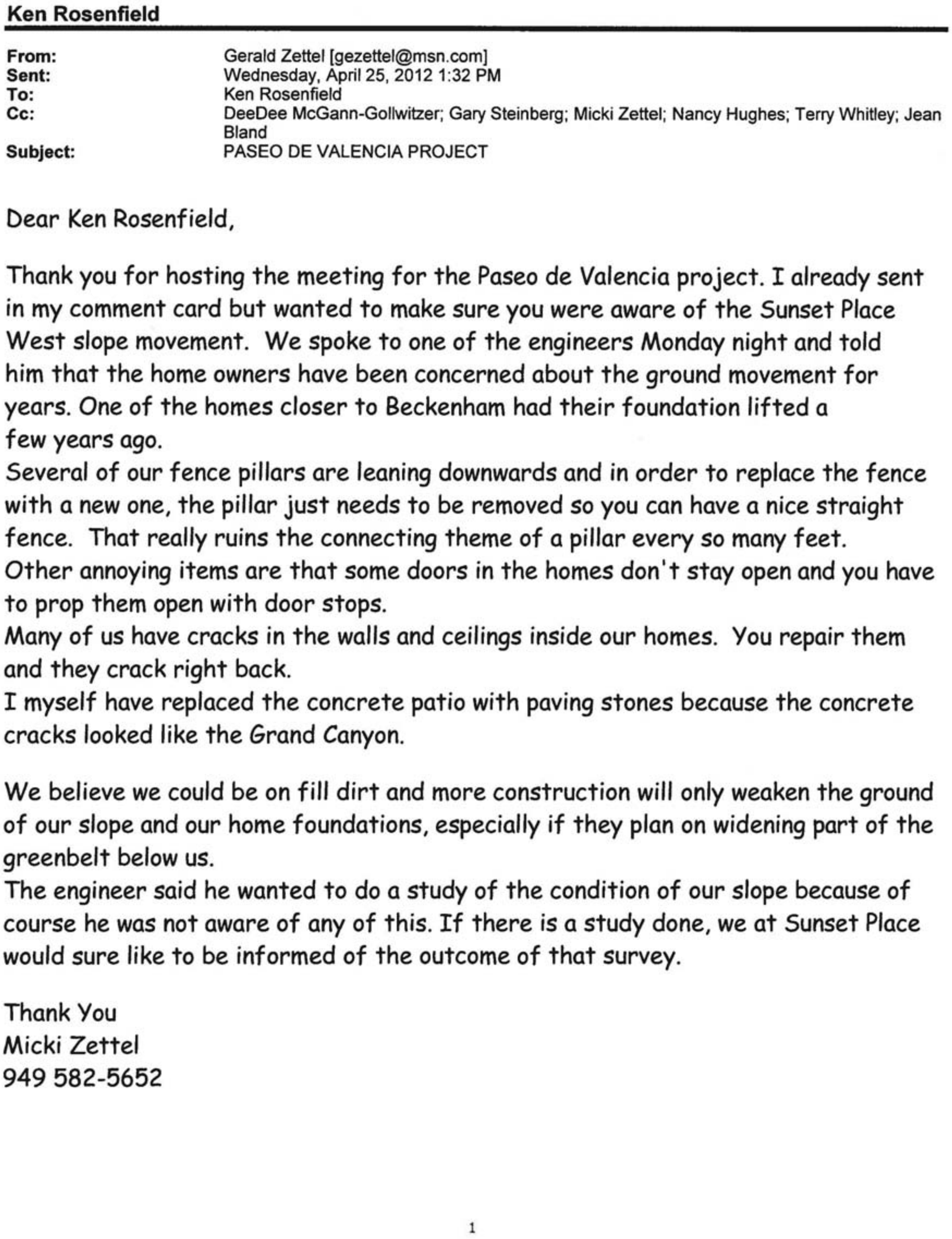
Since buying our home 3 years ago we have noticed an increase in road noise. More and more drivers use Paseo de Valencia to get to Aliso Viejo. The current road noise level is so high that my husband has trouble sleeping at night as our master bedroom faces the road. We also can't enjoy our back yard, as it is too noisy. Please if you plan to move the road even closer to our home – please provide us with glass sound walls and reduce the speed limit of Paseo de Valencia.

As you do your environmental impact studies please also look into the impact this project would have on the foundation of our home. The floor on the side of our home that faces the Paseo de Valencia is not level and actually appears to lean toward the street. We understandably have concerns that your destruction of the green belt and the vibration of the street being closer may make this situation worse.

Thank you for your time,

Teresa Gourdine
Homeowner
25015 Sunset Place West
Laguna Hills, CA 92653
(949) 855-1921
tgourdine@mac.com

Commenter No. 3



Ken Rosenfield

From:	Gerald Zettel [gezettel@msn.com]
Sent:	Wednesday, April 25, 2012 1:32 PM
To:	Ken Rosenfield
Cc:	DeeDee McGann-Gollwitzer; Gary Steinberg; Micki Zettel; Nancy Hughes; Terry Whitley; Jean Bland
Subject:	PASEO DE VALENCIA PROJECT

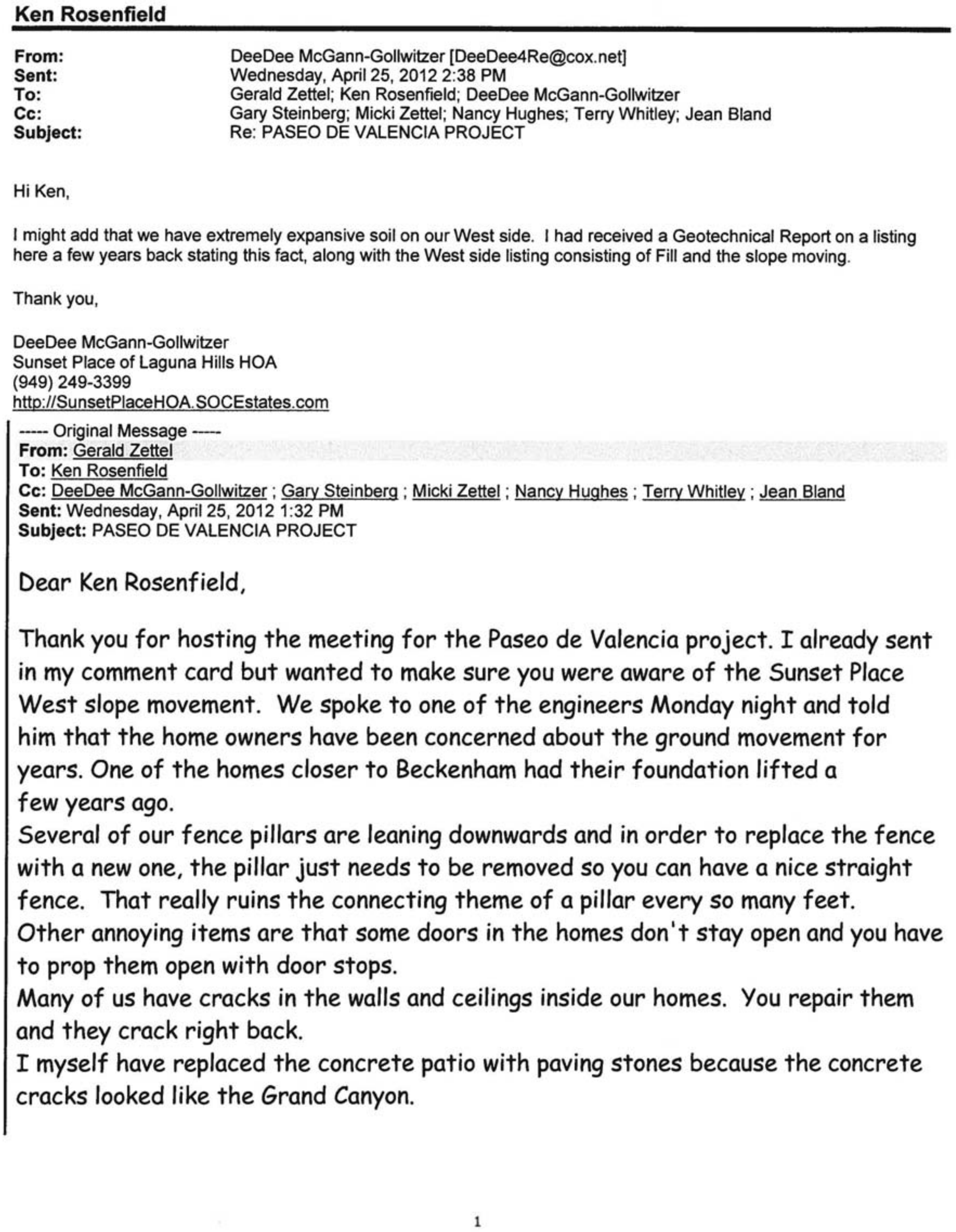
Dear Ken Rosenfield,

Thank you for hosting the meeting for the Paseo de Valencia project. I already sent in my comment card but wanted to make sure you were aware of the Sunset Place West slope movement. We spoke to one of the engineers Monday night and told him that the home owners have been concerned about the ground movement for years. One of the homes closer to Beckenham had their foundation lifted a few years ago.
Several of our fence pillars are leaning downwards and in order to replace the fence with a new one, the pillar just needs to be removed so you can have a nice straight fence. That really ruins the connecting theme of a pillar every so many feet.
Other annoying items are that some doors in the homes don't stay open and you have to prop them open with door stops.
Many of us have cracks in the walls and ceilings inside our homes. You repair them and they crack right back.
I myself have replaced the concrete patio with paving stones because the concrete cracks looked like the Grand Canyon.

We believe we could be on fill dirt and more construction will only weaken the ground of our slope and our home foundations, especially if they plan on widening part of the greenbelt below us.
The engineer said he wanted to do a study of the condition of our slope because of course he was not aware of any of this. If there is a study done, we at Sunset Place would sure like to be informed of the outcome of that survey.

Thank You
Micki Zettel
949 582-5652

Commenter No. 4



Ken Rosenfield

From: DeeDee McGann-Gollwitzer [DeeDee4Re@cox.net]
Sent: Wednesday, April 25, 2012 2:38 PM
To: Gerald Zettel; Ken Rosenfield; DeeDee McGann-Gollwitzer
Cc: Gary Steinberg; Micki Zettel; Nancy Hughes; Terry Whitley; Jean Bland
Subject: Re: PASEO DE VALENCIA PROJECT

Hi Ken,

I might add that we have extremely expansive soil on our West side. I had received a Geotechnical Report on a listing here a few years back stating this fact, along with the West side listing consisting of Fill and the slope moving.

Thank you,

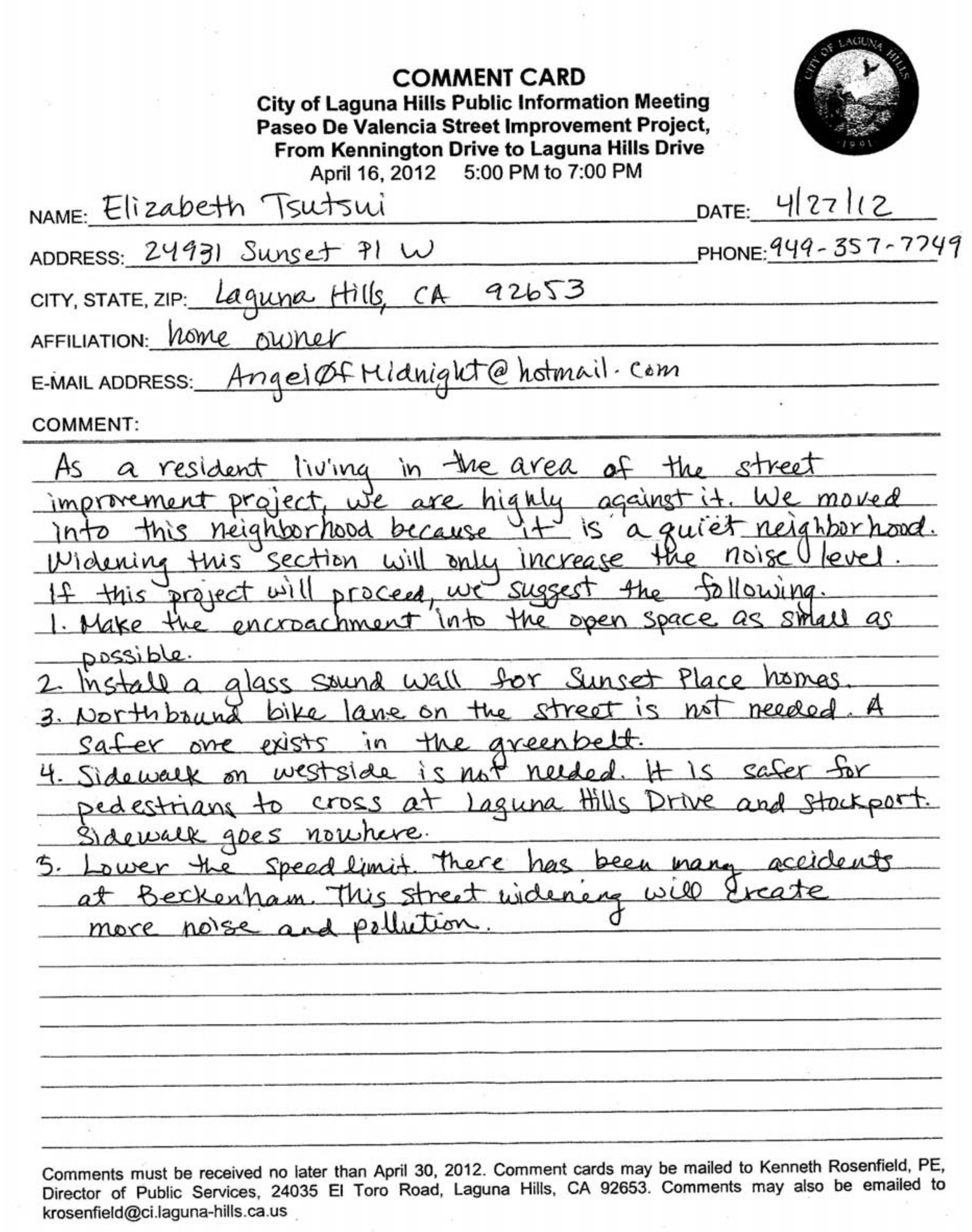
DeeDee McGann-Gollwitzer
Sunset Place of Laguna Hills HOA
(949) 249-3399
http://SunsetPlaceHOA.SOCEstates.com

> ----- Original Message -----
> **From:** Gerald Zettel
> **To:** Ken Rosenfield
> **Cc:** DeeDee McGann-Gollwitzer ; Gary Steinberg ; Micki Zettel ; Nancy Hughes ; Terry Whitley ; Jean Bland
> **Sent:** Wednesday, April 25, 2012 1:32 PM
> **Subject:** PASEO DE VALENCIA PROJECT
>
> Dear Ken Rosenfield,
>
> Thank you for hosting the meeting for the Paseo de Valencia project. I already sent in my comment card but wanted to make sure you were aware of the Sunset Place West slope movement. We spoke to one of the engineers Monday night and told him that the home owners have been concerned about the ground movement for years. One of the homes closer to Beckenham had their foundation lifted a few years ago.
> Several of our fence pillars are leaning downwards and in order to replace the fence with a new one, the pillar just needs to be removed so you can have a nice straight fence. That really ruins the connecting theme of a pillar every so many feet.
> Other annoying items are that some doors in the homes don't stay open and you have to prop them open with door stops.
> Many of us have cracks in the walls and ceilings inside our homes. You repair them and they crack right back.
> I myself have replaced the concrete patio with paving stones because the concrete cracks looked like the Grand Canyon.

We believe we could be on fill dirt and more construction will only weaken the ground of our slope and our home foundations, especially if they plan on widening part of the greenbelt below us.
The engineer said he wanted to do a study of the condition of our slope because of course he was not aware of any of this. If there is a study done, we at Sunset Place would sure like to be informed of the outcome of that survey.

Thank You
Micki Zettel
949 582-5652

Commenter No. 5



COMMENT CARD

City of Laguna Hills Public Information Meeting
Paseo De Valencia Street Improvement Project,
From Kennington Drive to Laguna Hills Drive
April 16, 2012 5:00 PM to 7:00 PM

NAME: Elizabeth Tsutsui DATE: 4/27/12

ADDRESS: 24931 Sunset Pl W PHONE: 949-357-7749

CITY, STATE, ZIP: Laguna Hills, CA 92653

AFFILIATION: home owner

E-MAIL ADDRESS: Angel0fMidnight@hotmail.com

COMMENT:

As a resident living in the area of the street improvement project, we are highly against it. We moved into this neighborhood because it is a quiet neighborhood. Widening this section will only increase the noise level. If this project will proceed, we suggest the following.

1. Make the encroachment into the open space as small as possible.
2. Install a glass sound wall for Sunset Place homes.
3. Northbound bike lane on the street is not needed. A safer one exists in the greenbelt.
4. Sidewalk on westside is not needed. It is safer for pedestrians to cross at Laguna Hills Drive and Stockport. Sidewalk goes nowhere.
5. Lower the speed limit. There has been many accidents at Beckenham. This street widening will create more noise and pollution.

Comments must be received no later than April 30, 2012. Comment cards may be mailed to Kenneth Rosenfield, PE, Director of Public Services, 24035 El Toro Road, Laguna Hills, CA 92653. Comments may also be emailed to krosenfield@ci.laguna-hills.ca.us

Commenter No. 6

RECEIVED
MAY 16 2012
CITY OF LAGUNA H

COMMENT CARD

City of Laguna Hills Public Information Meeting
Paseo De Valencia Street Improvement Project,
From Kennington Drive to Laguna Hills Drive
April 16, 2012 5:00 PM to 7:00 PM

NAME: SHARON HOUGH DATE: 4-28-12

ADDRESS: 24971 SUNSET PL WEST PHONE: 714-990-1616

CITY, STATE, ZIP: LAGUNA HILLS, CA 92625

AFFILIATION:

E-MAIL ADDRESS:

COMMENT:

My Concern is the increase noise if it goes beyond 6'

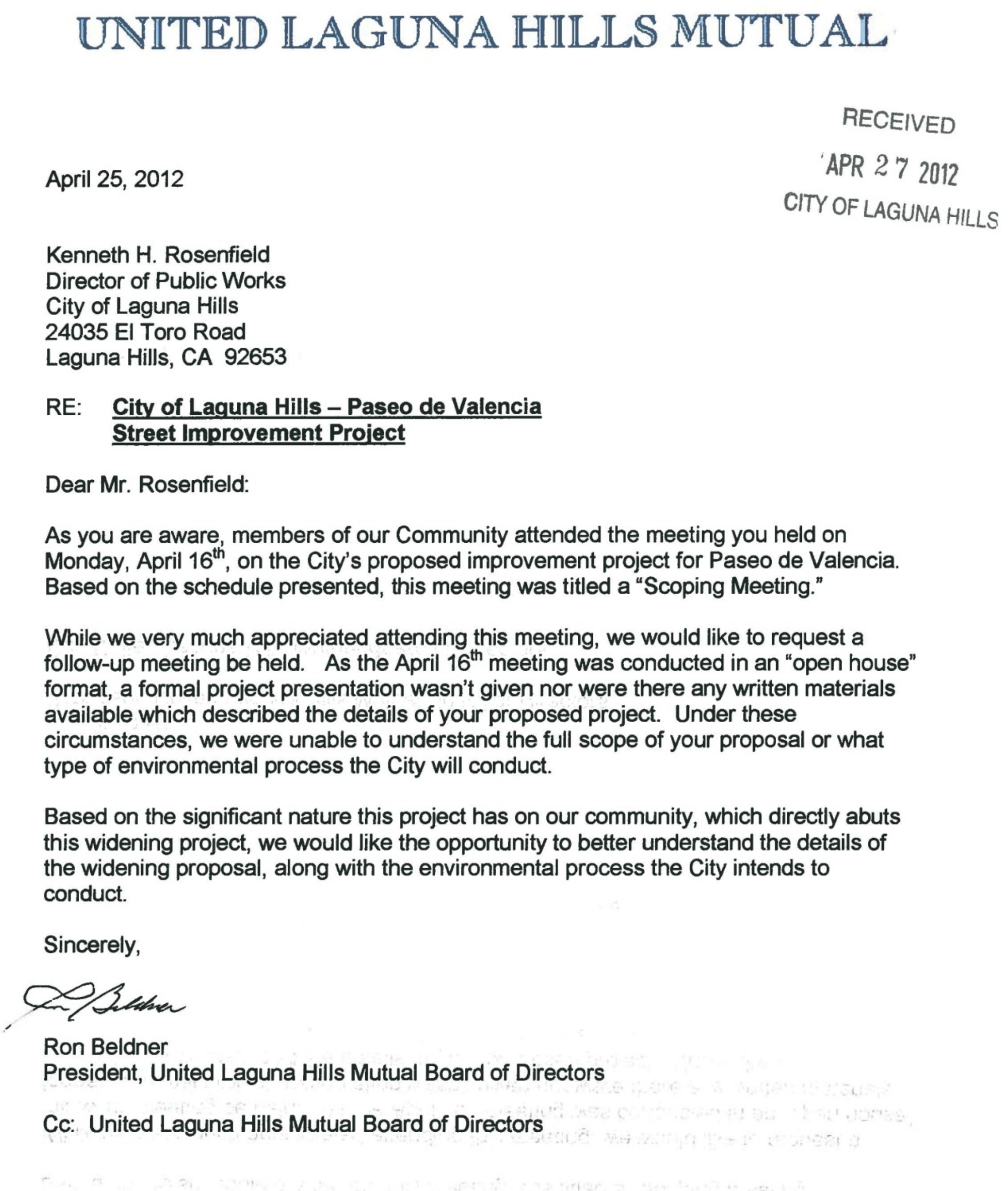
Also, the hill is a fill and some settling is an issue if the hill becomes impacted at all.

Thank you

Sharon Hough for Aaron Hough

Comments must be received no later than April 30, 2012. Comment cards may be mailed to Kenneth Rosenfield, PE, Director of Public Services, 24035 El Toro Road, Laguna Hills, CA 92653. Comments may also be emailed to krosenfield@ci.laguna-hills.ca.us

Commenter No. 7



UNITED LAGUNA HILLS MUTUAL

RECEIVED
APR 27 2012
CITY OF LAGUNA HILLS

April 25, 2012

Kenneth H. Rosenfield
Director of Public Works
City of Laguna Hills
24035 El Toro Road
Laguna Hills, CA 92653

RE: **City of Laguna Hills – Paseo de Valencia Street Improvement Project**

Dear Mr. Rosenfield:

As you are aware, members of our Community attended the meeting you held on Monday, April 16th, on the City's proposed improvement project for Paseo de Valencia. Based on the schedule presented, this meeting was titled a "Scoping Meeting."

While we very much appreciated attending this meeting, we would like to request a follow-up meeting be held. As the April 16th meeting was conducted in an "open house" format, a formal project presentation wasn't given nor were there any written materials available which described the details of your proposed project. Under these circumstances, we were unable to understand the full scope of your proposal or what type of environmental process the City will conduct.

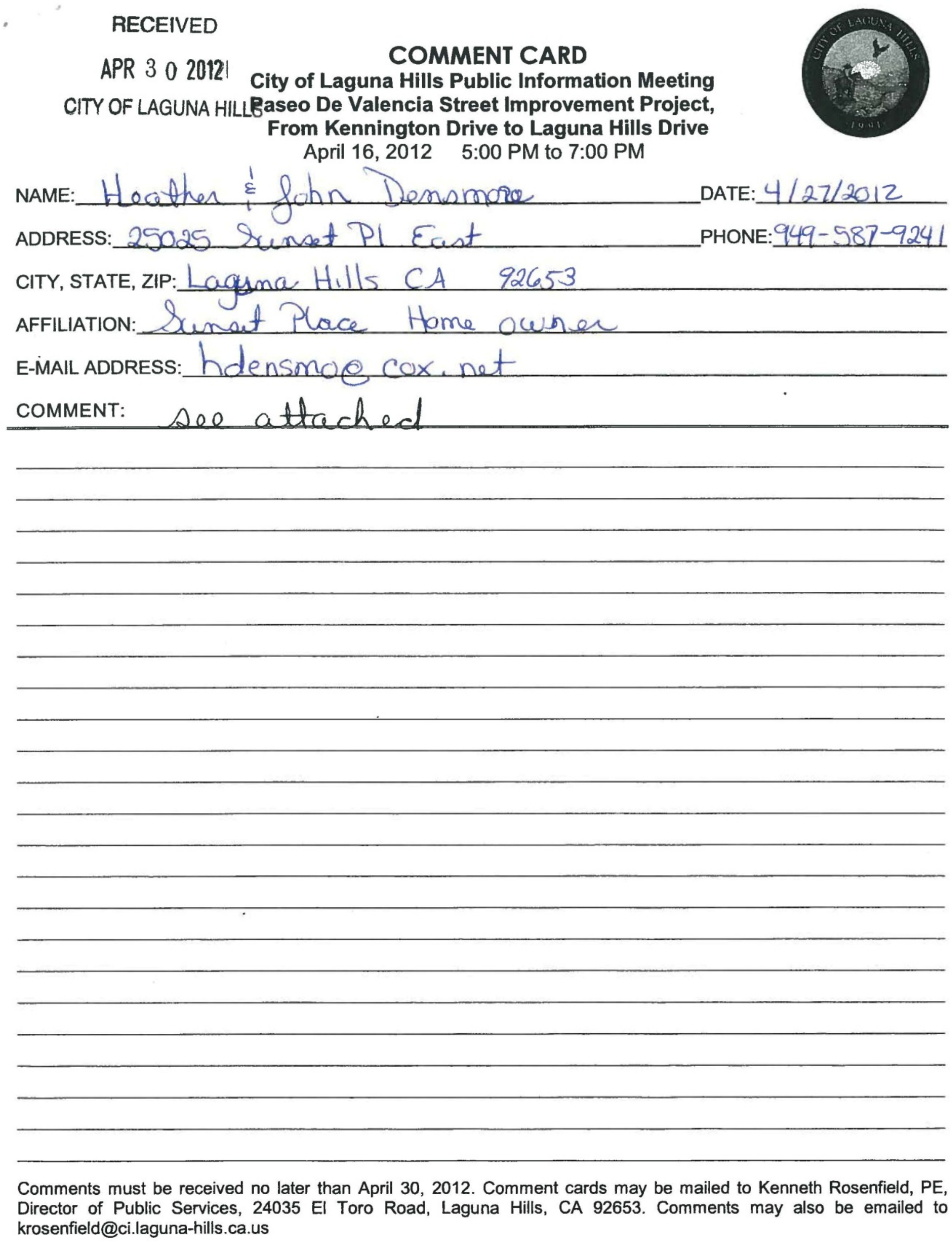
Based on the significant nature this project has on our community, which directly abuts this widening project, we would like the opportunity to better understand the details of the widening proposal, along with the environmental process the City intends to conduct.

Sincerely,

Ron Beldner
President, United Laguna Hills Mutual Board of Directors

Cc: United Laguna Hills Mutual Board of Directors

Commenter No. 8



RECEIVED
APR 30 2012
CITY OF LAGUNA HILLS

COMMENT CARD

City of Laguna Hills Public Information Meeting
Paseo De Valencia Street Improvement Project,
From Kennington Drive to Laguna Hills Drive
April 16, 2012 5:00 PM to 7:00 PM

NAME: Heather & John Densmore DATE: 4/27/2012

ADDRESS: 25025 Sunset Pl East PHONE: 949-587-9241

CITY, STATE, ZIP: Laguna Hills CA 92653

AFFILIATION: Sunset Place Home owner

E-MAIL ADDRESS: hdensmo@ cox.net

COMMENT: see attached

Comments must be received no later than April 30, 2012. Comment cards may be mailed to Kenneth Rosenfield, PE, Director of Public Services, 24035 El Toro Road, Laguna Hills, CA 92653. Comments may also be emailed to krosenfield@ci.laguna-hills.ca.us

Commenter No. 9

- We are against the widening of Paseo De Valencia (PDV). We don't see the need. There is no new construction or space to build on. So there is no need for a wider road. If there is unspent Government monies that must be spent, then let's spend it on helping needy people in our community.

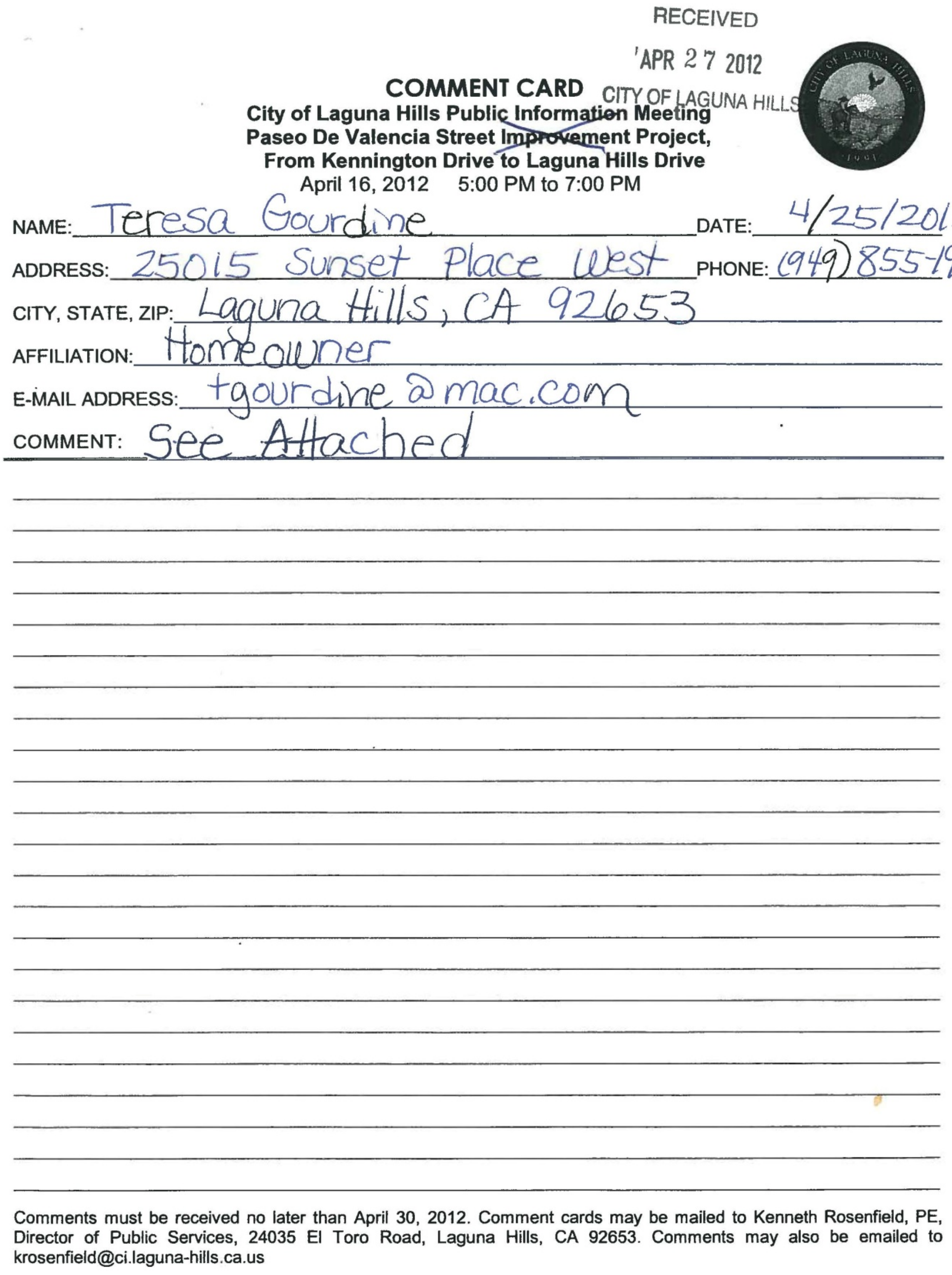
- In the time we have lived here we have never experienced any type of traffic delays while traveling in either direction on Paseo De Valencia. Unless there is an accident or road work.

- Paseo De Valencia has a nice view along the green belt and we are not in favor of losing that view. The nice open space of green belt and a nice bike trail as well as walking trails is one of the major reasons we moved to this area.

- Adding traffic lanes to Paseo de Valencia will increase traffic noise and environmental pollution for all surrounding homes and businesses.

- The widening of PDV will also hurt home values and in the last few years home values in this area have gone down substantially.

- If the City does inconvenience local residences with this unnecessary road expansion please consider putting in a very good glass sound wall that the city will maintain not the local residents of Sunset Place.



RECEIVED
'APR 27 2012
CITY OF LAGUNA HILLS

COMMENT CARD

City of Laguna Hills Public Information Meeting
Paseo De Valencia Street ~~Improvement~~ Project,
From Kennington Drive to Laguna Hills Drive
April 16, 2012 5:00 PM to 7:00 PM

NAME: Teresa Gourdine DATE: 4/25/2012

ADDRESS: 25015 Sunset Place West PHONE: (949)855-192

CITY, STATE, ZIP: Laguna Hills, CA 92653

AFFILIATION: Homeowner

E-MAIL ADDRESS: tgourdine@mac.com

COMMENT: See Attached

Comments must be received no later than April 30, 2012. Comment cards may be mailed to Kenneth Rosenfield, PE, Director of Public Services, 24035 El Toro Road, Laguna Hills, CA 92653. Comments may also be emailed to krosenfield@ci.laguna-hills.ca.us

Commenter No. 10

Attention: Kenneth Rosenfield

I have been so sad since I heard the city is planning to move the road closer to our home and take away a portion of the beautiful green belt behind our home. I can't imagine any homeowner being happy about this news. I hope all parties involved will please put themselves in our position and take away as little of the green space as possible- better yet none at all!

Please rethink your plans in an effort to preserve the beauty of the bike and horse trails the way they are now. There is no need to take the green space away to add an unneeded sidewalk to the west side or to add a northbound bike lane. The path and trail are heavily used and enjoyed the way they are.

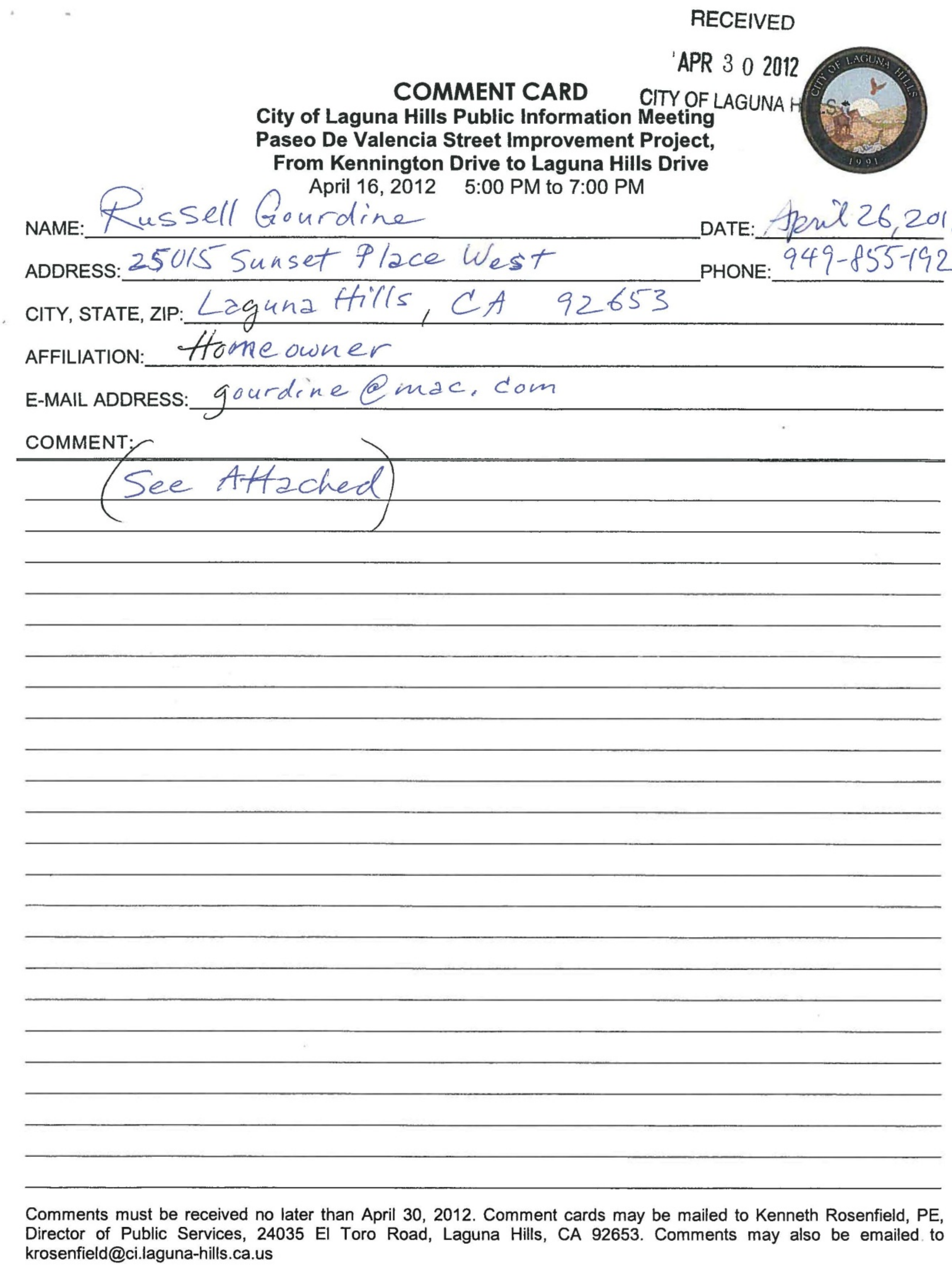
Since buying our home 3 years ago we have noticed an increase in road noise. More and more drivers use Paseo de Valencia to get to Aliso Viejo. The current road noise level is so high that my husband has trouble sleeping at night as our master bedroom faces the road. We also can't enjoy our back yard, as it is too noisy. Please if you plan to move the road even closer to our home – please provide us with glass sound walls and reduce the speed limit of Paseo de Valencia.

As you do your environmental impact studies please also look into the impact this project would have on the foundation of our home. The floor on the side of our home that faces the Paseo de Valencia is not level and actually appears to lean toward the street. We understandably have concerns that your destruction of the green belt and the vibration of the street being closer may make this situation worse.

Thank you for your time,

Teresa Gourdine

Teresa Gourdine
Homeowner
25015 Sunset Place West
Laguna Hills, CA 92653
(949) 855-1921
tgourdine@mac.com



RECEIVED
APR 30 2012
CITY OF LAGUNA HILLS

COMMENT CARD

City of Laguna Hills Public Information Meeting
Paseo De Valencia Street Improvement Project,
From Kennington Drive to Laguna Hills Drive
April 16, 2012 5:00 PM to 7:00 PM

NAME: Russell Gourdine DATE: April 26, 2012

ADDRESS: 25015 Sunset Place West PHONE: 949-855-1921

CITY, STATE, ZIP: Laguna Hills, CA 92653

AFFILIATION: Homeowner

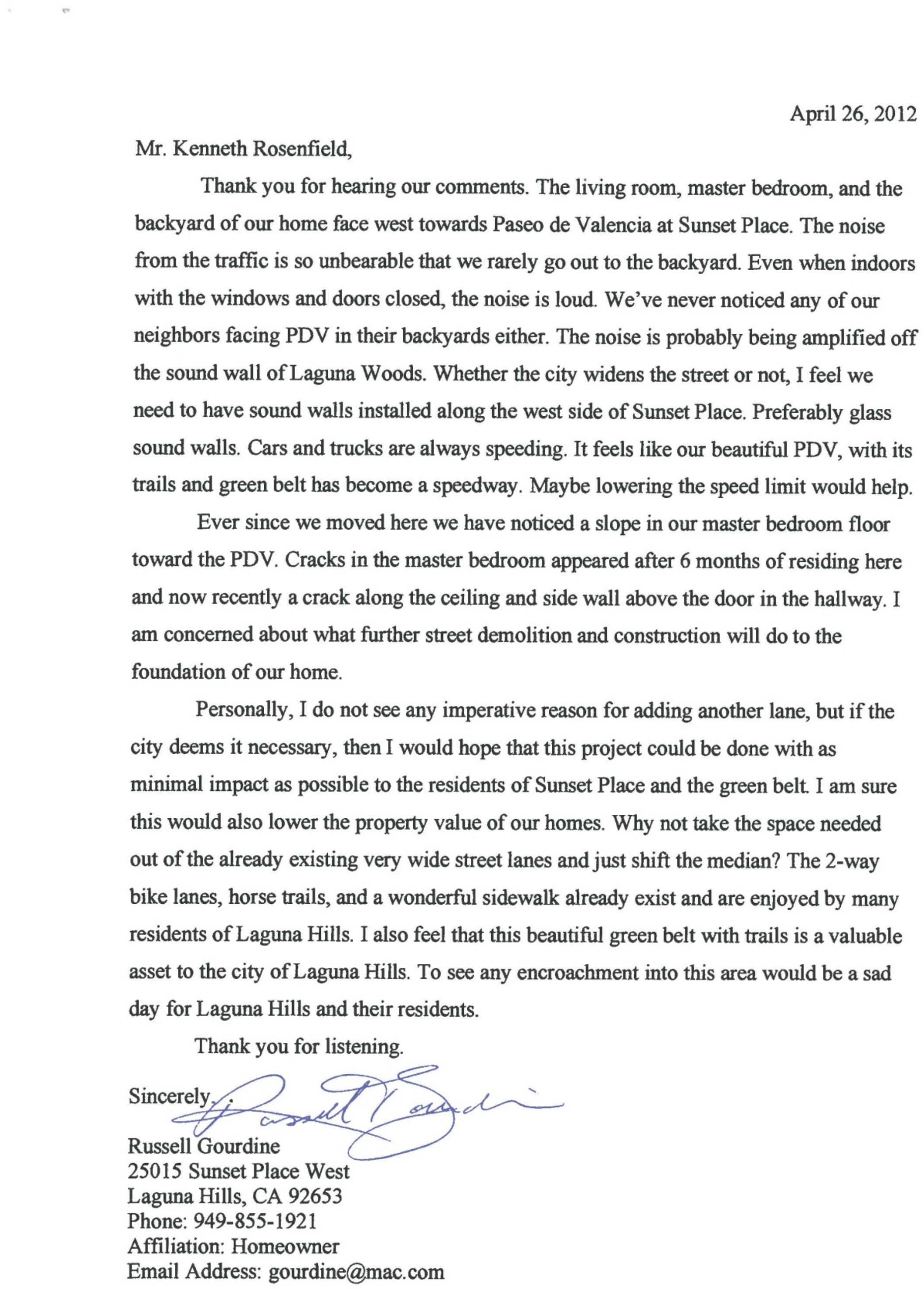
E-MAIL ADDRESS: gourdine@mac.com

COMMENT:

(See Attached)

Comments must be received no later than April 30, 2012. Comment cards may be mailed to Kenneth Rosenfield, PE, Director of Public Services, 24035 El Toro Road, Laguna Hills, CA 92653. Comments may also be emailed to krosenfield@ci.laguna-hills.ca.us

Commenter No. 11



April 26, 2012

Mr. Kenneth Rosenfield,

Thank you for hearing our comments. The living room, master bedroom, and the backyard of our home face west towards Paseo de Valencia at Sunset Place. The noise from the traffic is so unbearable that we rarely go out to the backyard. Even when indoors with the windows and doors closed, the noise is loud. We've never noticed any of our neighbors facing PDV in their backyards either. The noise is probably being amplified off the sound wall of Laguna Woods. Whether the city widens the street or not, I feel we need to have sound walls installed along the west side of Sunset Place. Preferably glass sound walls. Cars and trucks are always speeding. It feels like our beautiful PDV, with its trails and green belt has become a speedway. Maybe lowering the speed limit would help.

Ever since we moved here we have noticed a slope in our master bedroom floor toward the PDV. Cracks in the master bedroom appeared after 6 months of residing here and now recently a crack along the ceiling and side wall above the door in the hallway. I am concerned about what further street demolition and construction will do to the foundation of our home.

Personally, I do not see any imperative reason for adding another lane, but if the city deems it necessary, then I would hope that this project could be done with as minimal impact as possible to the residents of Sunset Place and the green belt. I am sure this would also lower the property value of our homes. Why not take the space needed out of the already existing very wide street lanes and just shift the median? The 2-way bike lanes, horse trails, and a wonderful sidewalk already exist and are enjoyed by many residents of Laguna Hills. I also feel that this beautiful green belt with trails is a valuable asset to the city of Laguna Hills. To see any encroachment into this area would be a sad day for Laguna Hills and their residents.

Thank you for listening.

Sincerely,
Russell Gourdine

Russell Gourdine
25015 Sunset Place West
Laguna Hills, CA 92653
Phone: 949-855-1921
Affiliation: Homeowner
Email Address: gourdine@mac.com

Ken Rosenfield

From: Mary Jimenez [maryjimenez1@cox.net]
Sent: Sunday, April 29, 2012 3:10 PM
To: Ken Rosenfield
Subject: Comment card re: Paseo de Valencia

Joe and Mary Jimenez • 24045 Sunset Place West, Laguna Hills, Ca 92653 • 949-206-0056 • Sunset Place Homeowner Association Resident •. maryjimenez1@cox.net

Ken,
I am writing you to let you know how we are strongly opposed to the street widening. We are one of the residents directly on the hill of paseo de Valencia. The street noise is so disturbingly loud already. We have new,double thick glass windows and a thick 7ft shrub to shield the noise but even with that it sounds like we are on a freeway. We can hear the conversations of people in their cars from the noise projection. Moving the road closer to our homes would only make this worse. I see cars coming out of the laguna woods entrance at beckenham and Valencia with extremely unsafe driving ability, I don't understand the logic of putting a bike line or sidewalk on that side of the street.

Sent from my iPhone

Commenter No. 12

Ken Rosenfield

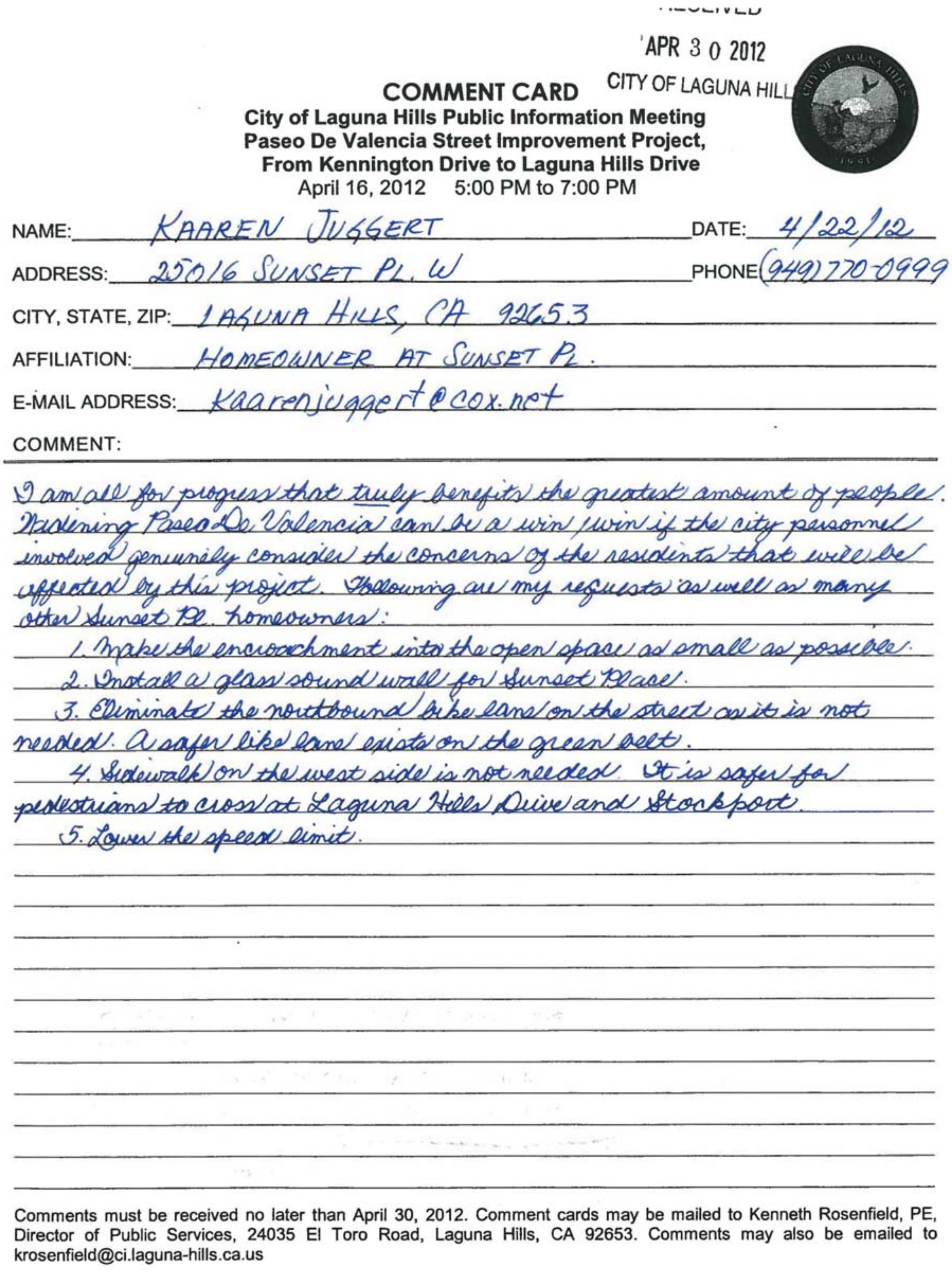
From: Mary Jimenez [maryjimenez1@cox.net]
Sent: Monday, April 30, 2012 12:34 PM
To: Ken Rosenfield
Cc: Me
Subject: COMMENT CARD for Paseo de Valencia street project

Mary & Joe Jimenez
25045 Sunset Place West
Laguna Hills, CA 92653
949-206-0056
Sunset Place Home Owner
maryjimenez1@cox.net

Dear Ken ,
I am writing to let you know how very opposed we are to the street widening on Paseo de Valencia. Our house sits directly on the hill above Valencia and we are extremely impacted by the noise from the traffic. We can hardly use our backyard as it is from the noise, I shudder to think about you moving the road closer to us. Living here for 12 years I have seen accidents and a plethora of unsafe drivers pulling out of the Laguna Woods exit on Beckenham I don't understand the logic behind adding a sidewalk or bikelane on that side when an extremely safe and functional one exists already on the east side. I urge you to please come into my backyard to take noise readings. It projects up 10 fold off the block wall on the west side of Valencia. How will the construction vibrations effect the stability of our homes? I truly am worried about the value of our homes dropping due to the road being moved closer to us. This will be worse than those houses that are next to the 5 freeway because they have a HUGE sound wall and we have shrubs. Please consider these issues in moving forward with this project.
Thank you
Mary and Joe Jimenez

Sent from my iPhone

Commenter No. 13



RECEIVED
APR 30 2012
CITY OF LAGUNA HILL

COMMENT CARD

City of Laguna Hills Public Information Meeting
Paseo De Valencia Street Improvement Project,
From Kennington Drive to Laguna Hills Drive
April 16, 2012 5:00 PM to 7:00 PM

NAME: KAAREN JUGGERT DATE: 4/22/12

ADDRESS: 25016 SUNSET PL. W PHONE (949) 770-0999

CITY, STATE, ZIP: LAGUNA HILLS, CA 92653

AFFILIATION: HOMEOWNER AT SUNSET PL.

E-MAIL ADDRESS: kaarenjuggert@cox.net

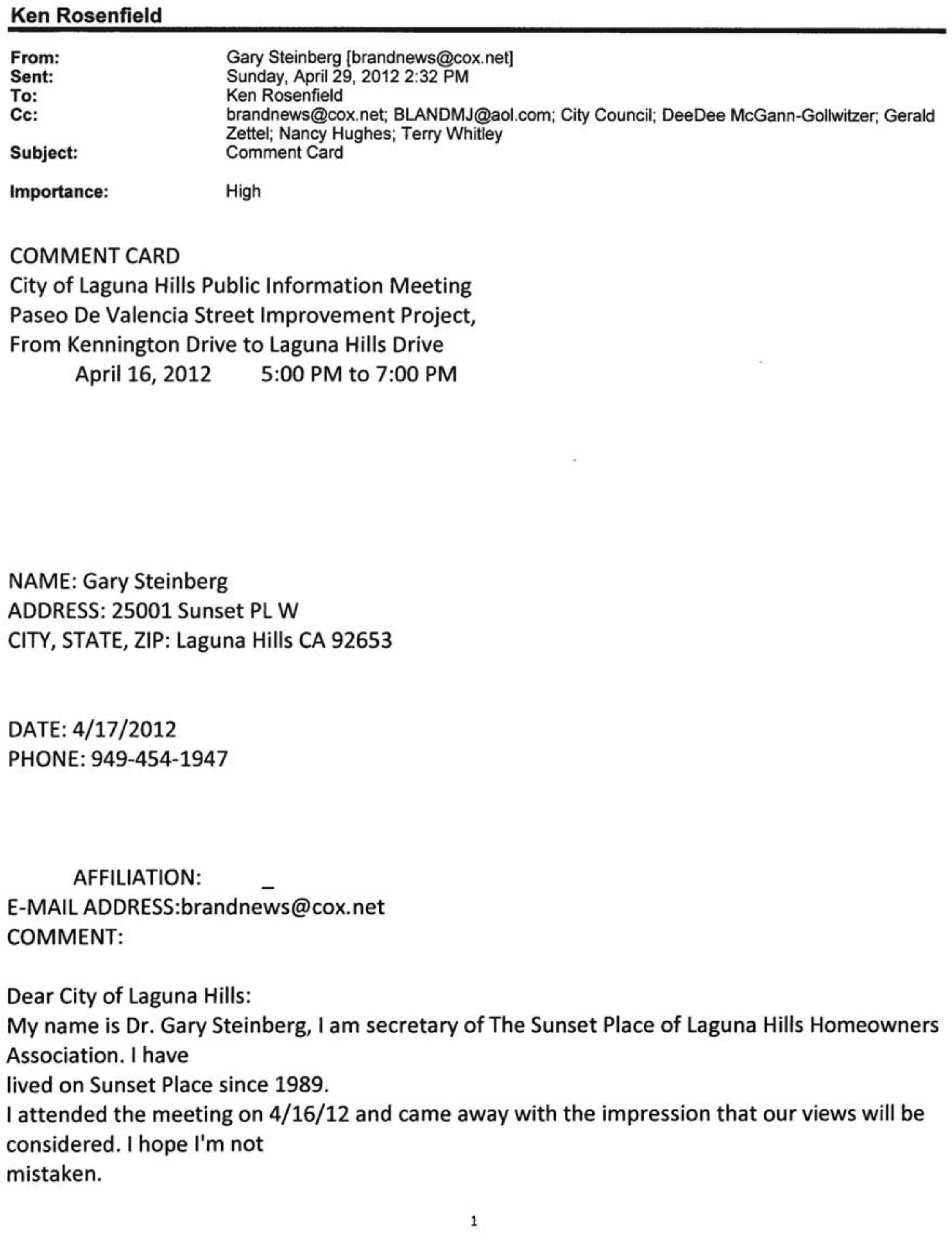
COMMENT:

I am all for progress that truly benefits the greatest amount of people. Widening Paseo De Valencia can be a win/win if the city personnel involved genuinely consider the concerns of the residents that will be affected by this project. Following are my requests as well as many other Sunset Pl. homeowners:

1. Make the encroachment into the open space as small as possible.
2. Install a glass sound wall for Sunset Place.
3. Eliminate the northbound bike lane on the street as it is not needed. A safer bike lane exists on the green belt.
4. Sidewalk on the west side is not needed. It is safer for pedestrians to cross at Laguna Hills Drive and Stockport.
5. Lower the speed limit.

Comments must be received no later than April 30, 2012. Comment cards may be mailed to Kenneth Rosenfield, PE, Director of Public Services, 24035 El Toro Road, Laguna Hills, CA 92653. Comments may also be emailed to krosenfield@ci.laguna-hills.ca.us

Commenter No. 14



Ken Rosenfield

From: Gary Steinberg [brandnews@cox.net]
Sent: Sunday, April 29, 2012 2:32 PM
To: Ken Rosenfield
Cc: brandnews@cox.net; BLANDMJ@aol.com; City Council; DeeDee McGann-Gollwitzer; Gerald Zettel; Nancy Hughes; Terry Whitley
Subject: Comment Card

Importance: High

COMMENT CARD
City of Laguna Hills Public Information Meeting
Paseo De Valencia Street Improvement Project,
From Kennington Drive to Laguna Hills Drive
April 16, 2012 5:00 PM to 7:00 PM

NAME: Gary Steinberg
ADDRESS: 25001 Sunset PL W
CITY, STATE, ZIP: Laguna Hills CA 92653

DATE: 4/17/2012
PHONE: 949-454-1947

AFFILIATION: _
E-MAIL ADDRESS:brandnews@cox.net
COMMENT:

Dear City of Laguna Hills:
My name is Dr. Gary Steinberg, I am secretary of The Sunset Place of Laguna Hills Homeowners Association. I have lived on Sunset Place since 1989.
I attended the meeting on 4/16/12 and came away with the impression that our views will be considered. I hope I'm not mistaken.

Commenter No. 15

I was here when land was taken from the open space/green belt for the 3rd north bound lane on PDV some years ago. The community center and skate park were created all increasing traffic. At that time I addressed the city council about a glass sound wall and the council referred it to Ken Rosenfield.

His response was that when mitigation studies and traffic increases, the issue would be addressed. As Mr. Rosenfield said to me at the meeting last night the time is now. He asked the engineers to take sound measurements behind our houses and he agreed to take readings behind my home at the top of the slope. He mentioned they take measurements during rush hour. I hope they consider other times of the day when traffic is light and cars travel at highway speeds creating a different kind of noise.

Let me say the meeting was informative.

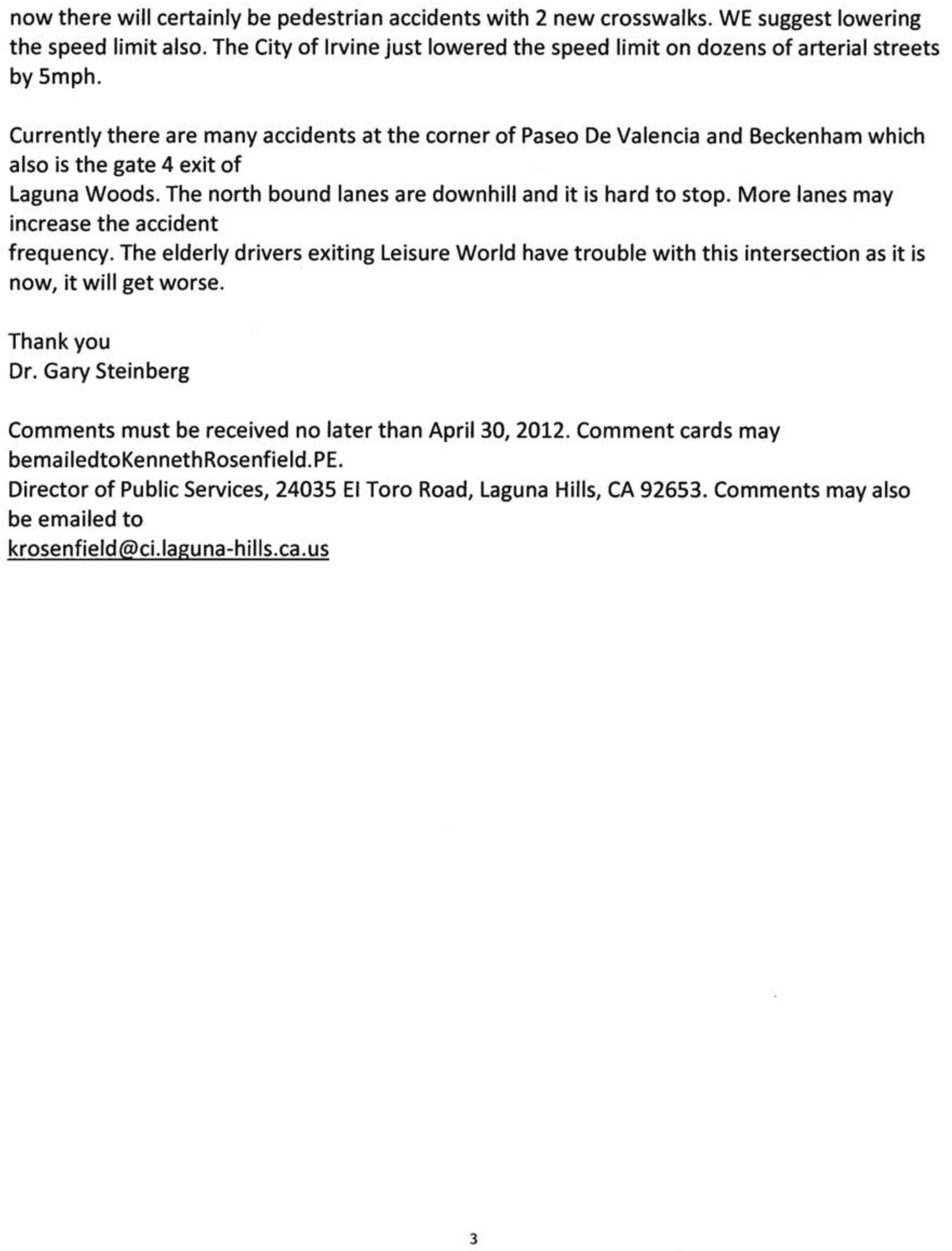
My home backs to Paseo De Valencia and the traffic noise makes useful enjoyment of our back yard impossible. The traffic can also be heard in our bedrooms and makes sleep difficult at times.

What the homeowners would like to see happen is taking the least amount of land possible from the green belt. In fact we feel the project is not needed at all. We were told at the meeting 6' to 10' but it may be up to 12' may be taken from the green belt. The closer the traffic is to our homes the louder it will be. Adding more lanes will increase traffic, with all that come with it including noise and air pollution. There is another concern with the added traffic being closer to our homes. Our houses are built on fill soil. There has been movement of our properties, including the rooms backing to Paseo de Valencia tilting downward. Our patios are pulling away from our homes and the fence pilasters are tilting toward the road. We feel the added construction and daily traffic vibrations closer to our home may pose a further problem with ground movement. It has increased since the completion of the 3rd northbound lane.

We would like to have our glass sound wall installed in any case as the traffic noise has steadily increased with the additional traffic lanes due to the added lanes and the community center/skate park. The high school has also added traffic with increased parking added with the community center project.

In using as little land as possible we suggest that the north bound bike lane be eliminated as it is redundant, there is already one on the green belt.

We feel there is no need for the sidewalk on the east side of the road. The cross walk at Stockport/Laguna Hills Drive is the safest alternative for pedestrians. Shifting pedestrians to cross at Kenninton and Sunset Place will put them at risk. This is a sidewalk to nowhere on the east side. There is no pedestrian traffic from Laguna Woods and it is walled in. If there are automobile accidents

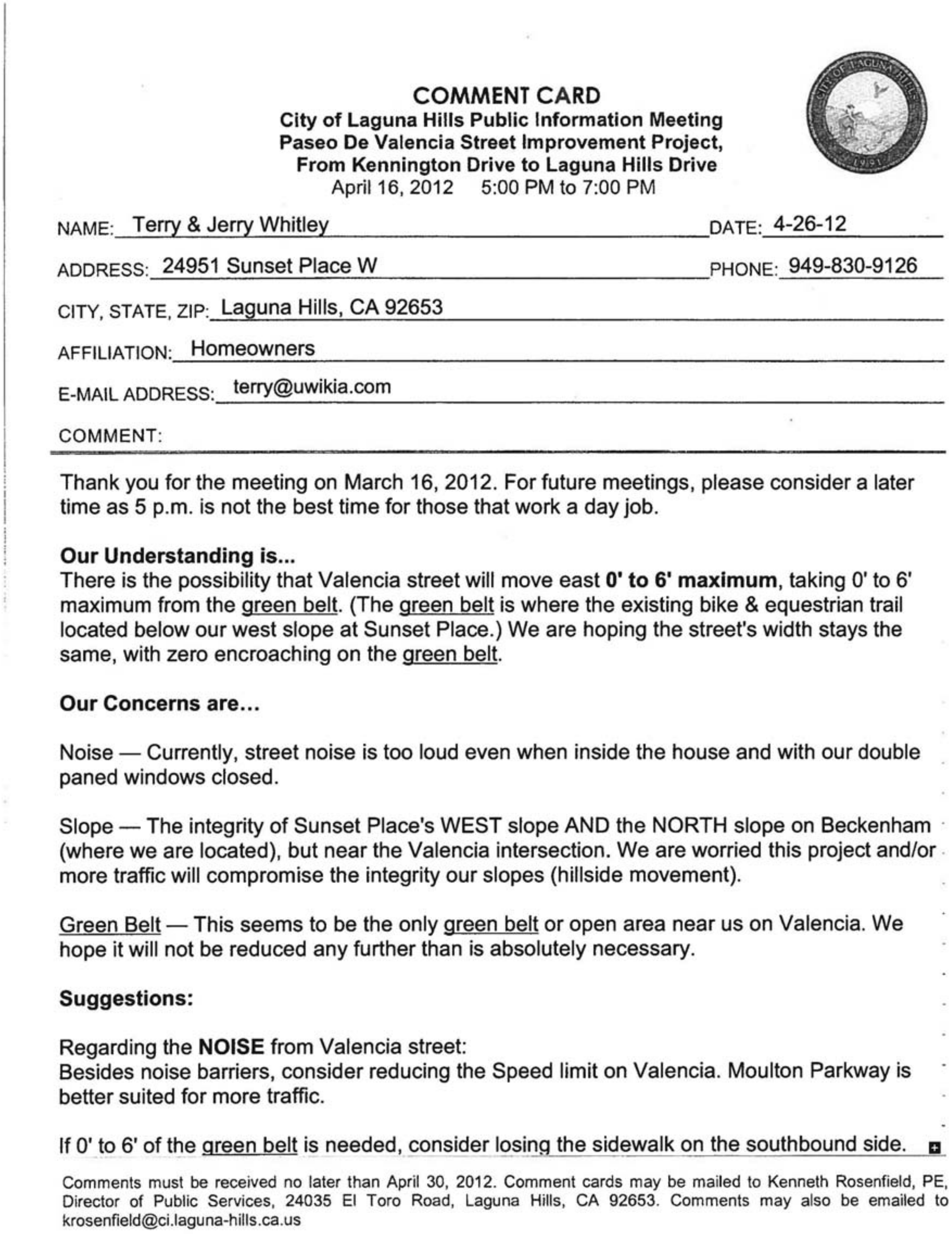


now there will certainly be pedestrian accidents with 2 new crosswalks. WE suggest lowering the speed limit also. The City of Irvine just lowered the speed limit on dozens of arterial streets by 5mph.

Currently there are many accidents at the corner of Paseo De Valencia and Beckenham which also is the gate 4 exit of Laguna Woods. The north bound lanes are downhill and it is hard to stop. More lanes may increase the accident frequency. The elderly drivers exiting Leisure World have trouble with this intersection as it is now, it will get worse.

Thank you
Dr. Gary Steinberg

Comments must be received no later than April 30, 2012. Comment cards may bemailedtoKennethRosenfield.PE.
Director of Public Services, 24035 El Toro Road, Laguna Hills, CA 92653. Comments may also be emailed to
krosenfield@ci.laguna-hills.ca.us



COMMENT CARD

City of Laguna Hills Public Information Meeting
Paseo De Valencia Street Improvement Project,
From Kennington Drive to Laguna Hills Drive
April 16, 2012 5:00 PM to 7:00 PM

1991

NAME: Terry & Jerry Whitley DATE: 4-26-12

ADDRESS: 24951 Sunset Place W PHONE: 949-830-9126

CITY, STATE, ZIP: Laguna Hills, CA 92653

AFFILIATION: Homeowners

E-MAIL ADDRESS: terry@uwikia.com

COMMENT:

Thank you for the meeting on March 16, 2012. For future meetings, please consider a later time as 5 p.m. is not the best time for those that work a day job.

Our Understanding is...
There is the possibility that Valencia street will move east **0' to 6' maximum**, taking 0' to 6' maximum from the green belt. (The green belt is where the existing bike & equestrian trail located below our west slope at Sunset Place.) We are hoping the street's width stays the same, with zero encroaching on the green belt.

Our Concerns are…

Noise — Currently, street noise is too loud even when inside the house and with our double paned windows closed.

Slope — The integrity of Sunset Place's WEST slope AND the NORTH slope on Beckenham (where we are located), but near the Valencia intersection. We are worried this project and/or more traffic will compromise the integrity our slopes (hillside movement).

Green Belt — This seems to be the only green belt or open area near us on Valencia. We hope it will not be reduced any further than is absolutely necessary.

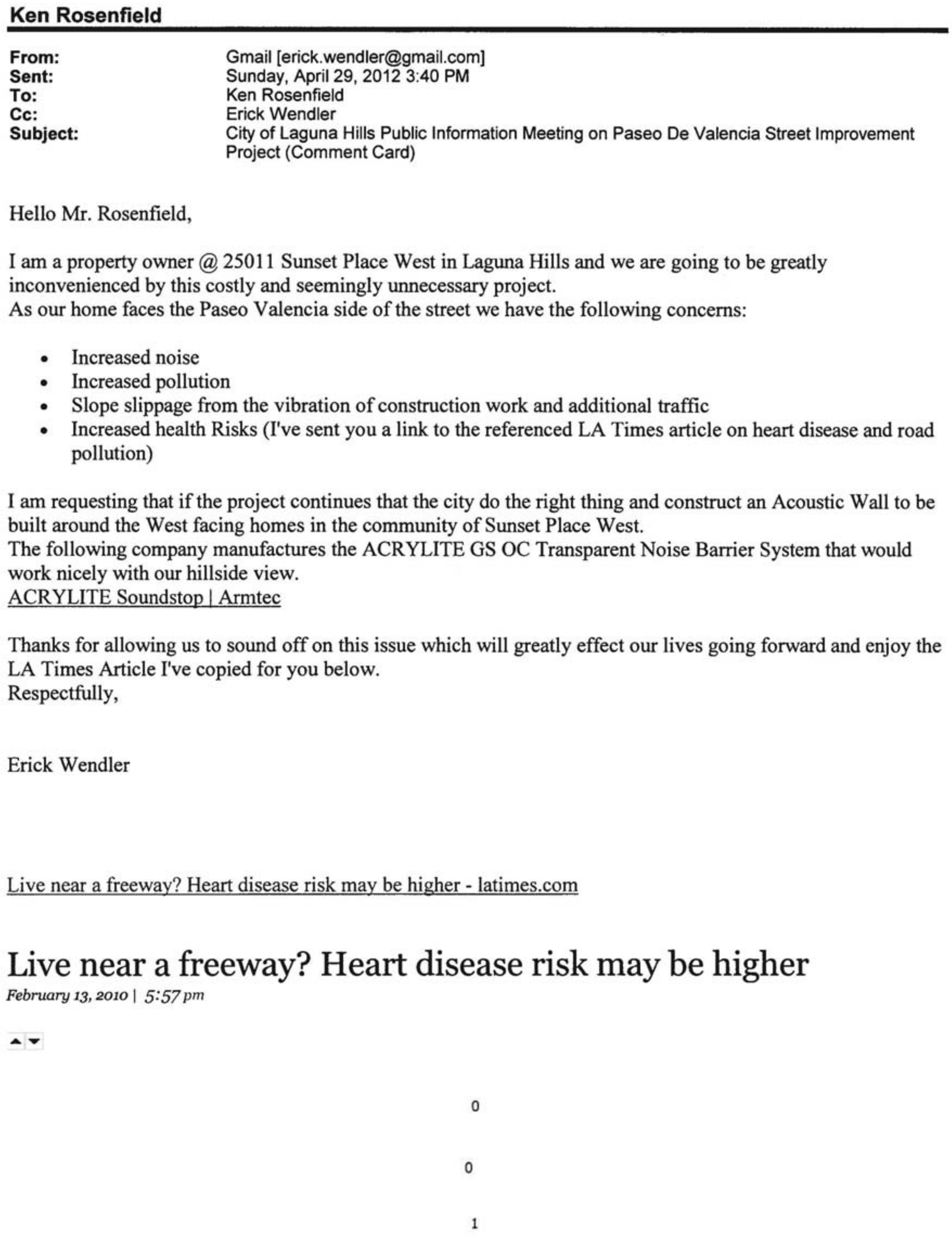
Suggestions:

Regarding the **NOISE** from Valencia street:
Besides noise barriers, consider reducing the Speed limit on Valencia. Moulton Parkway is better suited for more traffic.

If 0' to 6' of the green belt is needed, consider losing the sidewalk on the southbound side.

Comments must be received no later than April 30, 2012. Comment cards may be mailed to Kenneth Rosenfield, PE, Director of Public Services, 24035 El Toro Road, Laguna Hills, CA 92653. Comments may also be emailed to krosenfield@ci.laguna-hills.ca.us

Commenter No. 16



Ken Rosenfield

From: Gmail [erick.wendler@gmail.com]
Sent: Sunday, April 29, 2012 3:40 PM
To: Ken Rosenfield
Cc: Erick Wendler
Subject: City of Laguna Hills Public Information Meeting on Paseo De Valencia Street Improvement Project (Comment Card)

Hello Mr. Rosenfield,

I am a property owner @ 25011 Sunset Place West in Laguna Hills and we are going to be greatly inconvenienced by this costly and seemingly unnecessary project.
As our home faces the Paseo Valencia side of the street we have the following concerns:

- Increased noise
- Increased pollution
- Slope slippage from the vibration of construction work and additional traffic
- Increased health Risks (I've sent you a link to the referenced LA Times article on heart disease and road pollution)

I am requesting that if the project continues that the city do the right thing and construct an Acoustic Wall to be built around the West facing homes in the community of Sunset Place West.
The following company manufactures the ACRYLITE GS OC Transparent Noise Barrier System that would work nicely with our hillside view.
ACRYLITE Soundstop | Armtec

Thanks for allowing us to sound off on this issue which will greatly effect our lives going forward and enjoy the LA Times Article I've copied for you below.
Respectfully,

Erick Wendler

Live near a freeway? Heart disease risk may be higher - latimes.com

Live near a freeway? Heart disease risk may be higher

February 13, 2010 | 5:57 pm

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Commenter No. 17

Los Angeles residents living near freeways experience a hardening of the arteries that leads to heart disease and strokes at twice the rate of those who live farther away, a study has found. The paper is the first to link automobile and truck exhaust to the progression of atherosclerosis — or the thickening of artery walls — in humans. The study was conducted by researchers from USC and UC Berkeley, joined by colleagues in Spain and Switzerland, and was published this week in the journal PloS ONE.

Researchers used ultrasound to measure the wall thickness of the carotid artery in 1,483 people who lived within 100 meters, or 328 feet, of Los Angeles freeways. Taking measurements every six months for three years, they correlated their findings with levels of outdoor particulates -- the toxic dust that spews from tailpipes -- at the residents' homes. They found that artery wall thickness accelerated annually by 5.5 micrometers — one-twentieth the thickness of a human hair — or more than twice the average progression in study participants.

The findings show, according to co-author Howard N. Hodis, director of the Atherosclerosis Research Unit at USC's Keck School of Medicine, "that environmental factors may play a larger role in the risk for cardiovascular disease than previously suspected."

UC Berkeley co-author Michael Jerrett noted, "For the first time, we have shown that air pollution contributes to the early formation of heart disease, known as atherosclerosis, which is connected to nearly half the deaths in Western societies.... By controlling air pollution from traffic, we may see much larger benefits to public health than we previously thought."

The study comes at a time of growing alarm over the effects of freeway pollution in nearby schools and homes. In the four-county Los Angeles basin, 1.5 million people live within 300 meters, or 984 feet, of major freeways.

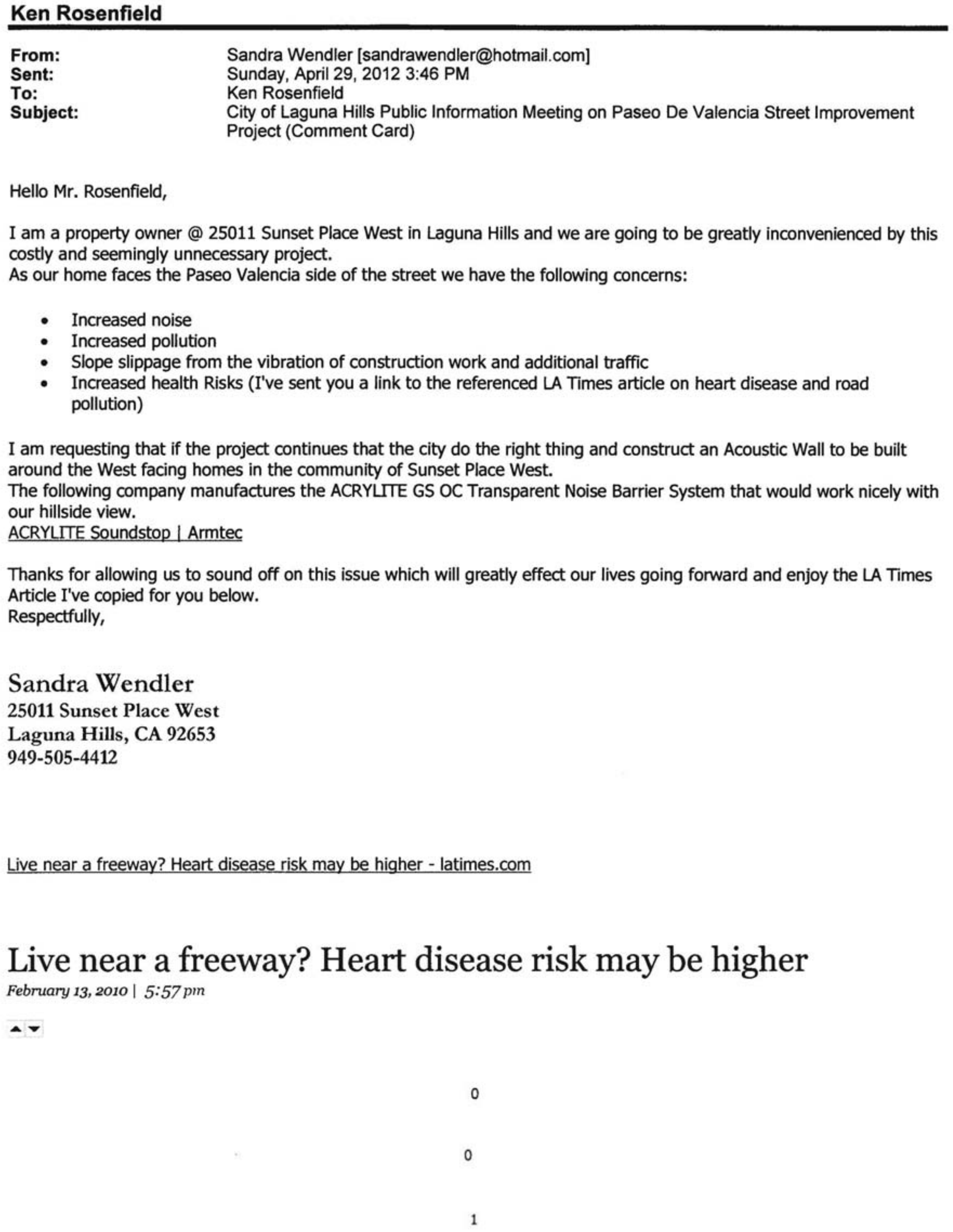
The Natural Resources Defense Council, an environmental group, is in a federal court battle to overturn the caps on motor vehicle emissions set by Southern California air quality officials, saying that they fail to account for higher pollution near freeways. And Los Angeles and Long Beach residents are fighting the expansion of the truck-clogged 710 Freeway, saying it will lead to higher rates of asthma and heart disease in densely populated areas.

In July, the U.S. Environmental Protection Agency launched a major study of air pollution near Detroit roadways to examine whether it leads to severe asthma attacks in children.

More than a third of Californians report that they or a family member have asthma or respiratory problems, according to a recent survey. The Obama administration is proposing tighter standards for two vehicle-related pollutants: nitrogen dioxide **(NO2) and** ground-level ozone**, the chief component of smog.**

--Margot Roosevelt

Photo: Cars hit a bottleneck as they emerge from the 710 Freeway in Alhambra. Credit: Gary Friedman/Los Angeles Times



Ken Rosenfield

From: Sandra Wendler [sandrawendler@hotmail.com]
Sent: Sunday, April 29, 2012 3:46 PM
To: Ken Rosenfield
Subject: City of Laguna Hills Public Information Meeting on Paseo De Valencia Street Improvement Project (Comment Card)

Hello Mr. Rosenfield,

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- Slope slippage from the vibration of construction work and additional traffic
- Increased health Risks (I've sent you a link to the referenced LA Times article on heart disease and road pollution)

I am requesting that if the project continues that the city do the right thing and construct an Acoustic Wall to be built around the West facing homes in the community of Sunset Place West.
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ACRYLITE Soundstop | Armtec

Thanks for allowing us to sound off on this issue which will greatly effect our lives going forward and enjoy the LA Times Article I've copied for you below.
Respectfully,

Sandra Wendler
25011 Sunset Place West
Laguna Hills, CA 92653
949-505-4412

Live near a freeway? Heart disease risk may be higher - latimes.com

Live near a freeway? Heart disease risk may be higher

February 13, 2010 | *5:57 pm*

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1

Commenter No. 18

Los Angeles residents living near freeways experience a hardening of the arteries that leads to heart disease and strokes at twice the rate of those who live farther away, a study has found. The paper is the first to link automobile and truck exhaust to the progression of atherosclerosis — or the thickening of artery walls — in humans. The study was conducted by researchers from USC and UC Berkeley, joined by colleagues in Spain and Switzerland, and was published this week in the journal PloS ONE.

Researchers used ultrasound to measure the wall thickness of the carotid artery in 1,483 people who lived within 100 meters, or 328 feet, of Los Angeles freeways. Taking measurements every six months for three years, they correlated their findings with levels of outdoor particulates -- the toxic dust that spews from tailpipes -- at the residents' homes. They found that artery wall thickness accelerated annually by 5.5 micrometers — one-twentieth the thickness of a human hair — or more than twice the average progression in study participants.

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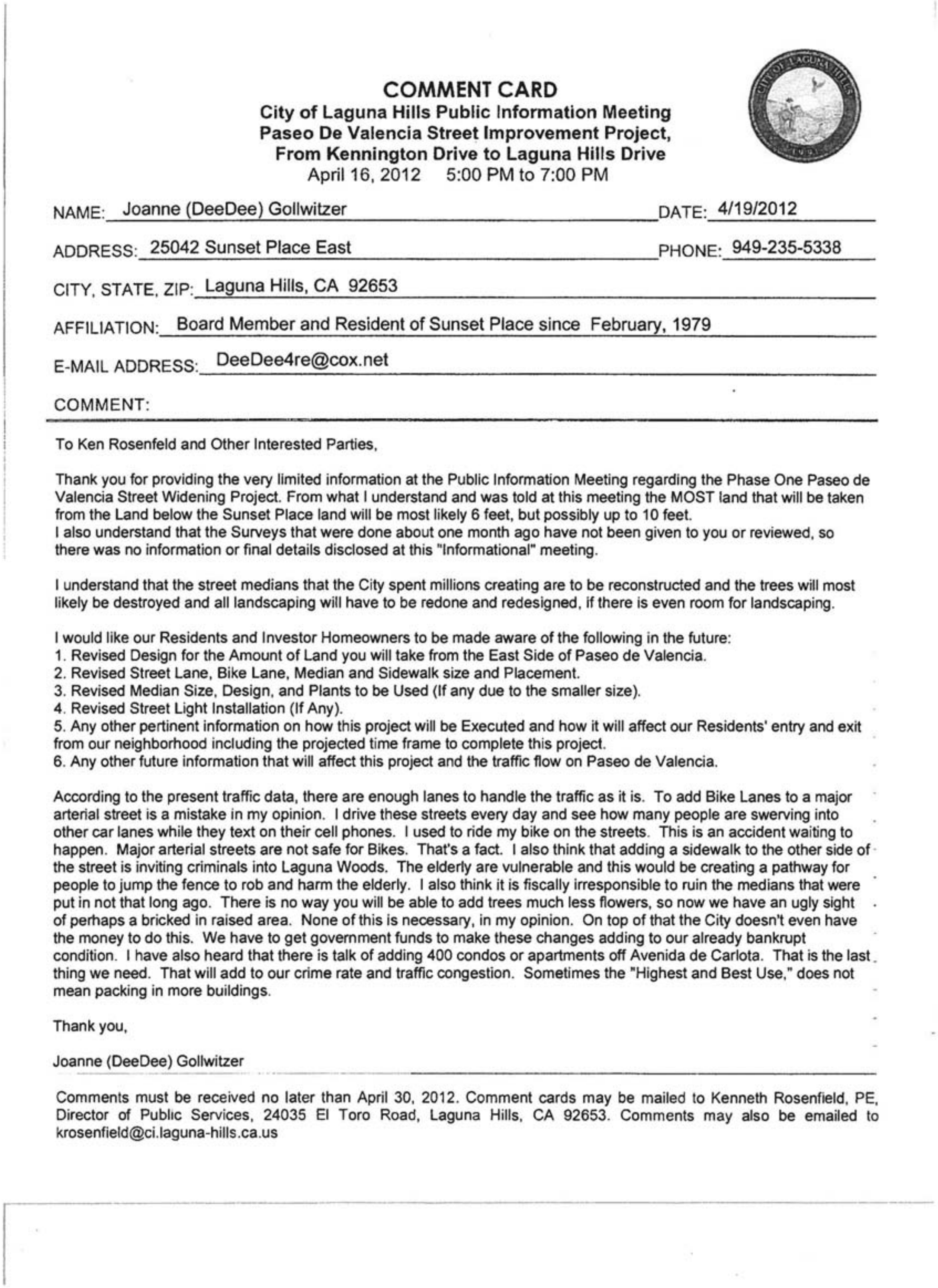
--Margot Roosevelt

Photo: Cars hit a bottleneck as they emerge from the 710 Freeway in Alhambra. Credit: Gary Friedman/Los Angeles Times



COMMENT CARD

City of Laguna Hills Public Information Meeting
Paseo De Valencia Street Improvement Project,
From Kennington Drive to Laguna Hills Drive

April 16, 2012 5:00 PM to 7:00 PM

NAME: Joanne (DeeDee) Gollwitzer DATE: 4/19/2012

ADDRESS: 25042 Sunset Place East PHONE: 949-235-5338

CITY, STATE, ZIP: Laguna Hills, CA 92653

AFFILIATION: Board Member and Resident of Sunset Place since February, 1979

E-MAIL ADDRESS: DeeDee4re@cox.net

COMMENT:

To Ken Rosenfeld and Other Interested Parties,

Thank you for providing the very limited information at the Public Information Meeting regarding the Phase One Paseo de Valencia Street Widening Project. From what I understand and was told at this meeting the MOST land that will be taken from the Land below the Sunset Place land will be most likely 6 feet, but possibly up to 10 feet.
I also understand that the Surveys that were done about one month ago have not been given to you or reviewed, so there was no information or final details disclosed at this "Informational" meeting.

I understand that the street medians that the City spent millions creating are to be reconstructed and the trees will most likely be destroyed and all landscaping will have to be redone and redesigned, if there is even room for landscaping.

I would like our Residents and Investor Homeowners to be made aware of the following in the future:
1. Revised Design for the Amount of Land you will take from the East Side of Paseo de Valencia.
2. Revised Street Lane, Bike Lane, Median and Sidewalk size and Placement.
3. Revised Median Size, Design, and Plants to be Used (If any due to the smaller size).
4. Revised Street Light Installation (If Any).
5. Any other pertinent information on how this project will be Executed and how it will affect our Residents' entry and exit from our neighborhood including the projected time frame to complete this project.
6. Any other future information that will affect this project and the traffic flow on Paseo de Valencia.

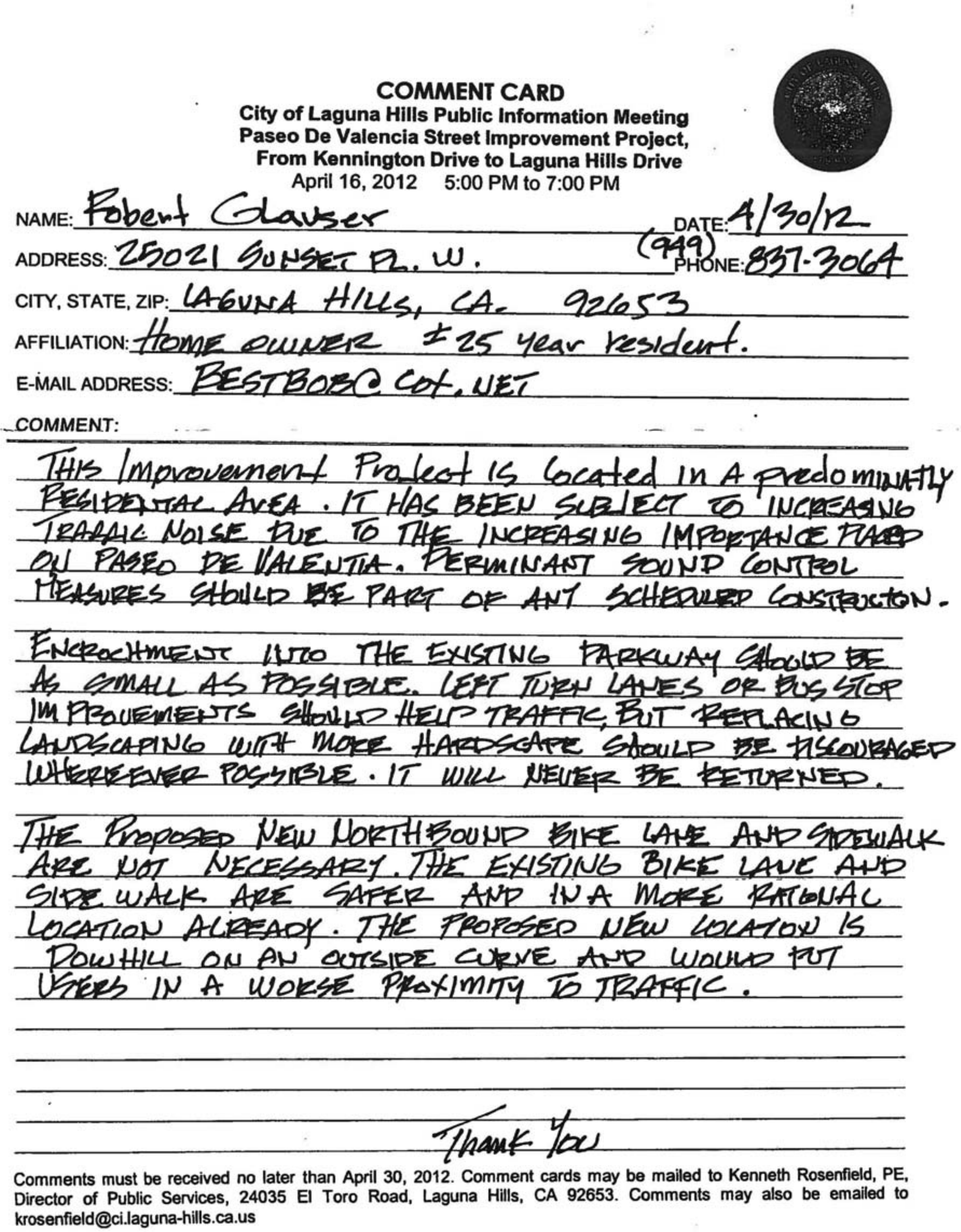
According to the present traffic data, there are enough lanes to handle the traffic as it is. To add Bike Lanes to a major arterial street is a mistake in my opinion. I drive these streets every day and see how many people are swerving into other car lanes while they text on their cell phones. I used to ride my bike on the streets. This is an accident waiting to happen. Major arterial streets are not safe for Bikes. That's a fact. I also think that adding a sidewalk to the other side of the street is inviting criminals into Laguna Woods. The elderly are vulnerable and this would be creating a pathway for people to jump the fence to rob and harm the elderly. I also think it is fiscally irresponsible to ruin the medians that were put in not that long ago. There is no way you will be able to add trees much less flowers, so now we have an ugly sight of perhaps a bricked in raised area. None of this is necessary, in my opinion. On top of that the City doesn't even have the money to do this. We have to get government funds to make these changes adding to our already bankrupt condition. I have also heard that there is talk of adding 400 condos or apartments off Avenida de Carlota. That is the last thing we need. That will add to our crime rate and traffic congestion. Sometimes the "Highest and Best Use," does not mean packing in more buildings.

Thank you,

Joanne (DeeDee) Gollwitzer

Comments must be received no later than April 30, 2012. Comment cards may be mailed to Kenneth Rosenfield, PE, Director of Public Services, 24035 El Toro Road, Laguna Hills, CA 92653. Comments may also be emailed to krosenfield@ci.laguna-hills.ca.us

Commenter No. 19



COMMENT CARD

City of Laguna Hills Public Information Meeting
Paseo De Valencia Street Improvement Project,
From Kennington Drive to Laguna Hills Drive
April 16, 2012 5:00 PM to 7:00 PM

NAME: Robert Glauser DATE: 4/30/12

ADDRESS: 25021 SUNSET PL. W. PHONE: (949) 837-3064

CITY, STATE, ZIP: LAGUNA HILLS, CA. 92653

AFFILIATION: HOME OWNER ± 25 year resident.

E-MAIL ADDRESS: BESTBOB@COX.NET

COMMENT:

THIS Improvement Project IS located in A predominatly RESIDENTIAL AREA. IT HAS BEEN SUBJECT TO INCREASING TRAFFIC NOISE DUE TO THE INCREASING IMPORTANCE PLACED ON PASEO DE VALENTIA. PERMINANT SOUND CONTROL MEASURES SHOULD BE PART OF ANY SCHEDULED CONSTRUCTION.

ENCROCHMENT INTO THE EXISTING PARKWAY SHOULD BE AS SMALL AS POSSIBLE. LEFT TURN LANES OR BUS STOP IMPROVEMENTS SHOULD HELP TRAFFIC, BUT REPLACING LANDSCAPING WITH MORE HARDSCAPE SHOULD BE DISCOURAGED WHEREEVER POSSIBLE. IT WILL NEVER BE RETURNED.

THE PROPOSED NEW NORTHBOUND BIKE LANE AND SIDEWALK ARE NOT NECESSARY. THE EXISTING BIKE LANE AND SIDE WALK ARE SAFER AND IN A MORE RATIONAL LOCATION ALREADY. THE PROPOSED NEW LOCATION IS DOWHILL ON AN OUTSIDE CURVE AND WOULD PUT USERS IN A WORSE PROXIMITY TO TRAFFIC.

Thank You

Comments must be received no later than April 30, 2012. Comment cards may be mailed to Kenneth Rosenfield, PE, Director of Public Services, 24035 El Toro Road, Laguna Hills, CA 92653. Comments may also be emailed to krosenfield@ci.laguna-hills.ca.us

Commenter No. 20

Appendix J

Comments Received at Public Meeting, March 14, 2013

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Comments Received at Public Meeting, March 14, 2013
Index

No.	Commenter Name	Comment	MND Section Comment Responded In
1	Gary Steinberg	Traffic, air quality	XVI, III
		Automobile pollution will cause more illness	Not a CEQA issue – the proposed project will not generate any new vehicle trips
		Decrease our quality of life and our home values	Not a CEQA issue
		Noise, need a sound wall	XII
		Adversely affected and should be compensated	Not a CEQA issue
		Greenbelt has already been widened in the 1990s and the proposed project will take an additional 8 feet	I
		The widening brings traffic closer to homes	I, III, XII, XVI
		Traffic on Southern California Freeways linked to autism in babies	The project site is not located adjacent to a freeway
2	Ann Downey	Noise, air quality	XII, III
		Noise, need a sound wall	XII
		Traffic bottleneck	XVI
3	Karl and Ann Downey	Noise, need a sound wall	XII
4	Gary Steinberg	Sound study was inadequate	XII The acoustic study was performed consistent with industry standards
		What are the actual noise levels in the AM and PM	XII
		Not able to use back yard	Not a CEQA issue
5	Gerald & Micki Zettel	We believe the project is a result of the new homes in Oakbrook Center	Opinion of commenter
		Bike lanes have more rights than cars and homeowner taxpayer	Opinion of commenter
		Prado Apts – have to park on Los Alisos (sic)	Opinion of commenter
		Traffic	XVI
		Sunset homeowners lose greenbelt	I
		Noise	XII
		Noise, need a sound wall	XII
		Like improvements – don't like more homes, water & electric use, rationing, more bike & bus stops	Opinion of commenter

No.	Commenter Name	Comment	MND Section Comment Responded In
		Manhole covers are too high – not flush with the road toward Cabot Road	This area is outside the project study area
6	Bertha A. Guizado	Kept me abreast of any new developments in regard to the proposed project	The City of Laguna Hills is providing all notices to Laguna Woods Village homeowners association (PCM) for their circulation to residents
		Removal of the sound-abating shrubbery will affect the noise level of our units, when the sidewalk is put into place	The proposed project will not affect any shrubbery within Laguna Woods Village; all physical changes to the environment caused by the proposed project will occur within Laguna Hills
		Building apartments at Oakbrook Village Shopping Center will have many negative ramifications	Opinion of commenter
		Traffic and air quality	XVI, III

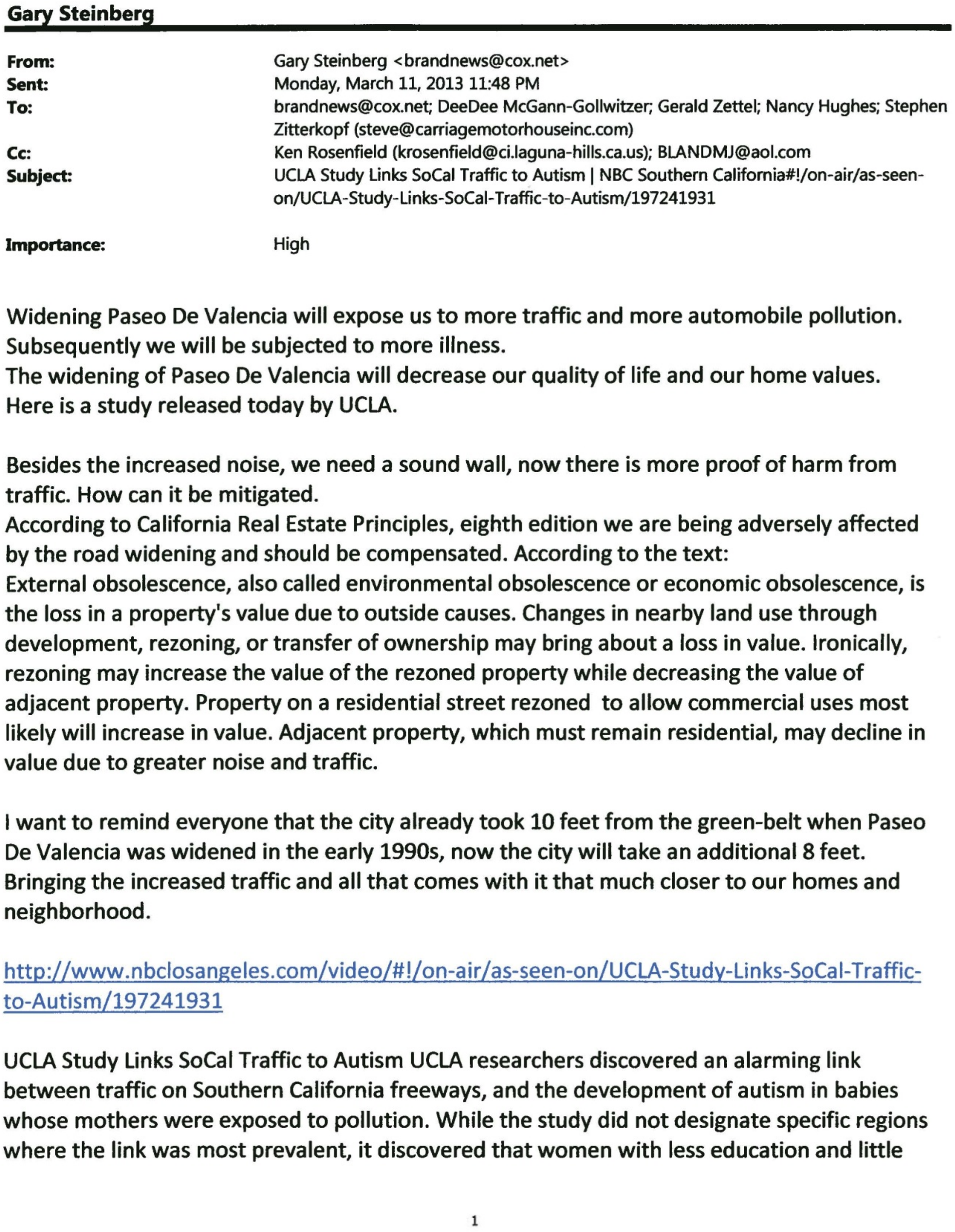
SIGN IN SHEET 3-14-13

CITY OF LAGUNA HILLS 6 - 8 PM

PASEO DE VALENCIA IMPROVEMENT PROJECT
FROM KENNINGTON DR TO LAGUNA HILLS DR

NAME	ADDRESS	EMAIL	PHONE
PENNY PERRY	25072 SUNSET Pl.		
Jeanne & Randy Davis	Sunset Place West		
CHRIS & CRISTINA VERSTEEGH	25041 SUNSET PLACE WEST	versteeghchris@gmail.com	
BERTHA & ARMANDO GUIZADO	627-A AVENIDA SEVILLA LAGUNA WOODS, CA 92637	bertie@COMLINE.com	
Jean Bland	27251 Lost Colt Dr. Laguna Hill's	BlandMJ@ AOL.com	
GARY STEINBERG	25001 SUNSET PLW L.H.	BRANDNEWS@ COX.NET	949 4541947
Lois Sturm	835-A RONDA SEVILLA LAGUNA WOODS 92637		
Douglas C. Reilly	City of Laguna Woods 24264 El Toro Rd., Laguna Woods, CA 92637	dreilly@lagunawoods city.org	949-639-0561
Terry & Jerry Whitley	24951 Sunset PLW.	Submit@designway.com	949-830926
Sharon Hough	24971 SUNSET PLW	SHOUGH49@YAHOO	
ANN DOWNEY	25051 SUNSET Pl. W	MAMADI@COX.NET	9/581 5962
Russell Gourdine	25015 Sunset PLW	gourdine@mac.com	
Teresa Gourdine	"	tgourdine@mac.com	
Charlene Sydow	646 "A" Ave Sevilla L.W 92637	csydow@ comline.com	n/A

NAME	ADDRESS	EMAIL	PHONE ④
MICKI ZETTEL	24985 Sunset Pl W	gezettel@ msn.com	582-5652
MIKE BLAND	27251 LOST COUT	35BLAND @GMAIL	831-6685
Darlene Crawford	648A Avenida sevilla	darlene_hi @yahoo. com	949 212-2196



Gary Steinberg

From: Gary Steinberg <brandnews@cox.net>
Sent: Monday, March 11, 2013 11:48 PM
To: brandnews@cox.net; DeeDee McGann-Gollwitzer; Gerald Zettel; Nancy Hughes; Stephen Zitterkopf (steve@carriagemotorhouseinc.com)
Cc: Ken Rosenfield (krosenfield@ci.laguna-hills.ca.us); BLANDMJ@aol.com
Subject: UCLA Study Links SoCal Traffic to Autism | NBC Southern California#!/on-air/as-seen-on/UCLA-Study-Links-SoCal-Traffic-to-Autism/197241931

Importance: High

Widening Paseo De Valencia will expose us to more traffic and more automobile pollution. Subsequently we will be subjected to more illness.
The widening of Paseo De Valencia will decrease our quality of life and our home values.
Here is a study released today by UCLA.

Besides the increased noise, we need a sound wall, now there is more proof of harm from traffic. How can it be mitigated.
According to California Real Estate Principles, eighth edition we are being adversely affected by the road widening and should be compensated. According to the text:
External obsolescence, also called environmental obsolescence or economic obsolescence, is the loss in a property's value due to outside causes. Changes in nearby land use through development, rezoning, or transfer of ownership may bring about a loss in value. Ironically, rezoning may increase the value of the rezoned property while decreasing the value of adjacent property. Property on a residential street rezoned to allow commercial uses most likely will increase in value. Adjacent property, which must remain residential, may decline in value due to greater noise and traffic.

I want to remind everyone that the city already took 10 feet from the green-belt when Paseo De Valencia was widened in the early 1990s, now the city will take an additional 8 feet. Bringing the increased traffic and all that comes with it that much closer to our homes and neighborhood.

http://www.nbclosangeles.com/video/#!/on-air/as-seen-on/UCLA-Study-Links-SoCal-Traffic-to-Autism/197241931

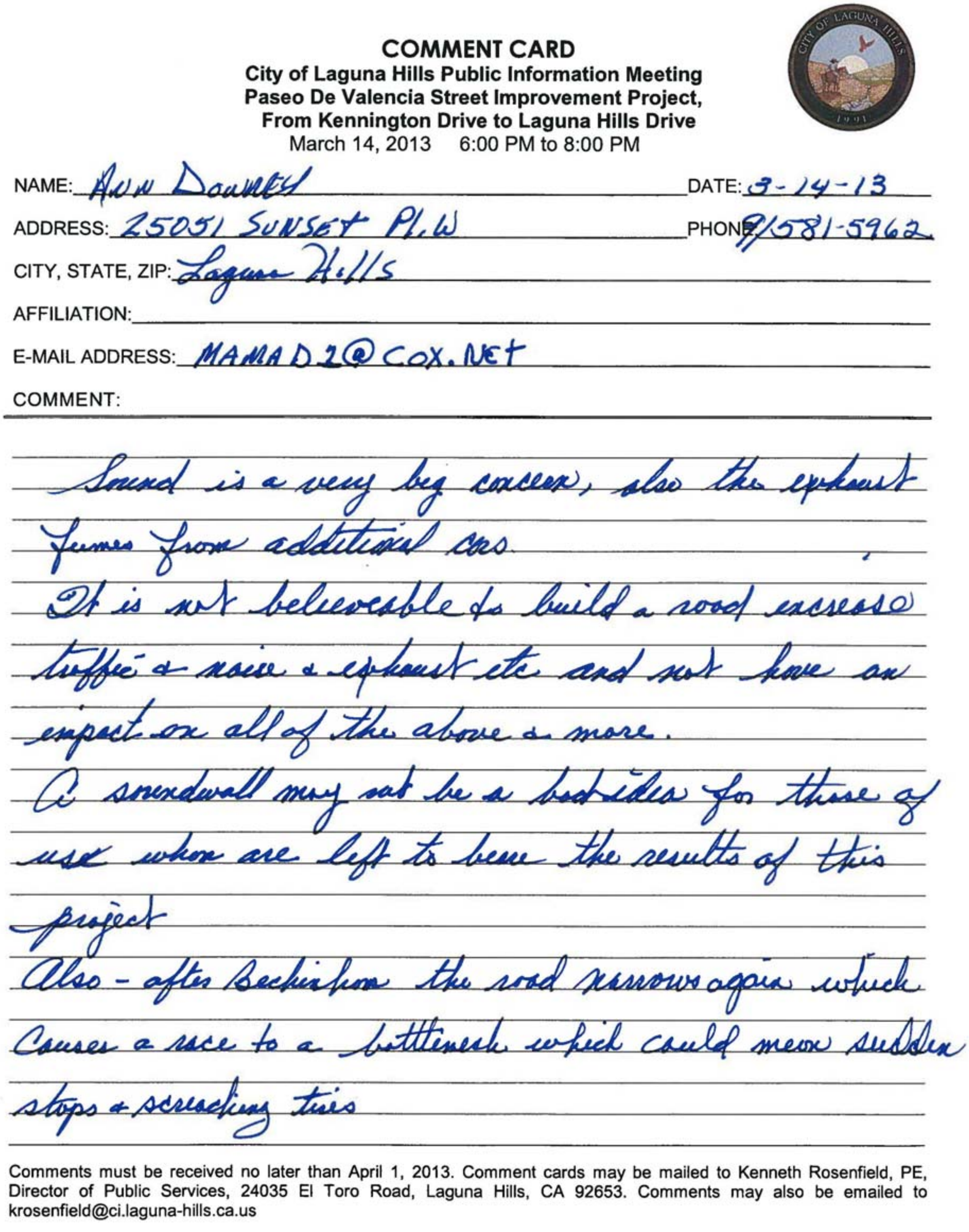
UCLA Study Links SoCal Traffic to Autism UCLA researchers discovered an alarming link between traffic on Southern California freeways, and the development of autism in babies whose mothers were exposed to pollution. While the study did not designate specific regions where the link was most prevalent, it discovered that women with less education and little

Commenter No. 1

available health resources lived in the high traffic-pollution communities. Lolita Lopez reports from Tarzana for the NBC4 News at 5 p.m. on March 11, 2013

Thank you

Gary Steinberg



1991

COMMENT CARD

City of Laguna Hills Public Information Meeting
Paseo De Valencia Street Improvement Project,
From Kennington Drive to Laguna Hills Drive
March 14, 2013 6:00 PM to 8:00 PM

NAME: Ann Downey DATE: 3-14-13
ADDRESS: 25051 Sunset Pl. W PHONE: 9/581-5962
CITY, STATE, ZIP: Laguna Hills
AFFILIATION:
E-MAIL ADDRESS: MAMAD2@COX.NET
COMMENT:

Sound is a very big concern, also the exhaust fumes from additional cars.

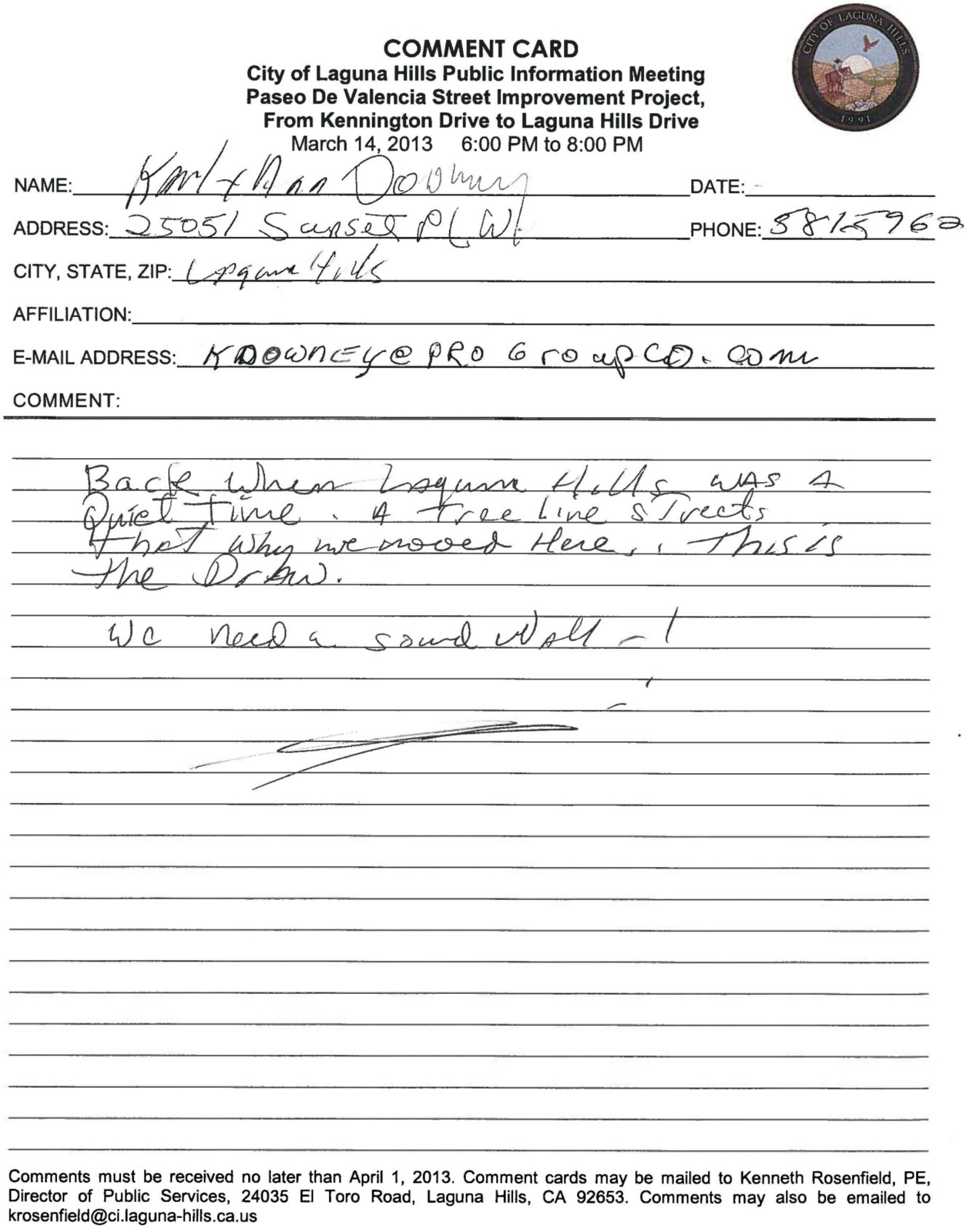
It is not believable to build a road increase traffic & noise & exhaust etc and not have an impact on all of the above & more.

A soundwall may not be a bad idea for those of use whom are left to bear the results of this project

Also - after Beckinham the road narrows again which Causes a race to a bottleneck which could mean sudden stops & screeching tires

Comments must be received no later than April 1, 2013. Comment cards may be mailed to Kenneth Rosenfield, PE, Director of Public Services, 24035 El Toro Road, Laguna Hills, CA 92653. Comments may also be emailed to krosenfield@ci.laguna-hills.ca.us

Commenter No. 2



COMMENT CARD

City of Laguna Hills Public Information Meeting
Paseo De Valencia Street Improvement Project,
From Kennington Drive to Laguna Hills Drive
March 14, 2013 6:00 PM to 8:00 PM

NAME: Karl + Nan Downey DATE:

ADDRESS: 25051 Sunset Pl W. PHONE: 5815962

CITY, STATE, ZIP: Laguna Hills

AFFILIATION:

E-MAIL ADDRESS: KDOWNEY@PRO GroupCO.com

COMMENT:

Back when Laguna Hills was a
Quiet time. A tree line streets
that why we moved here, . This is
the Draw.

We need a sound wall -!

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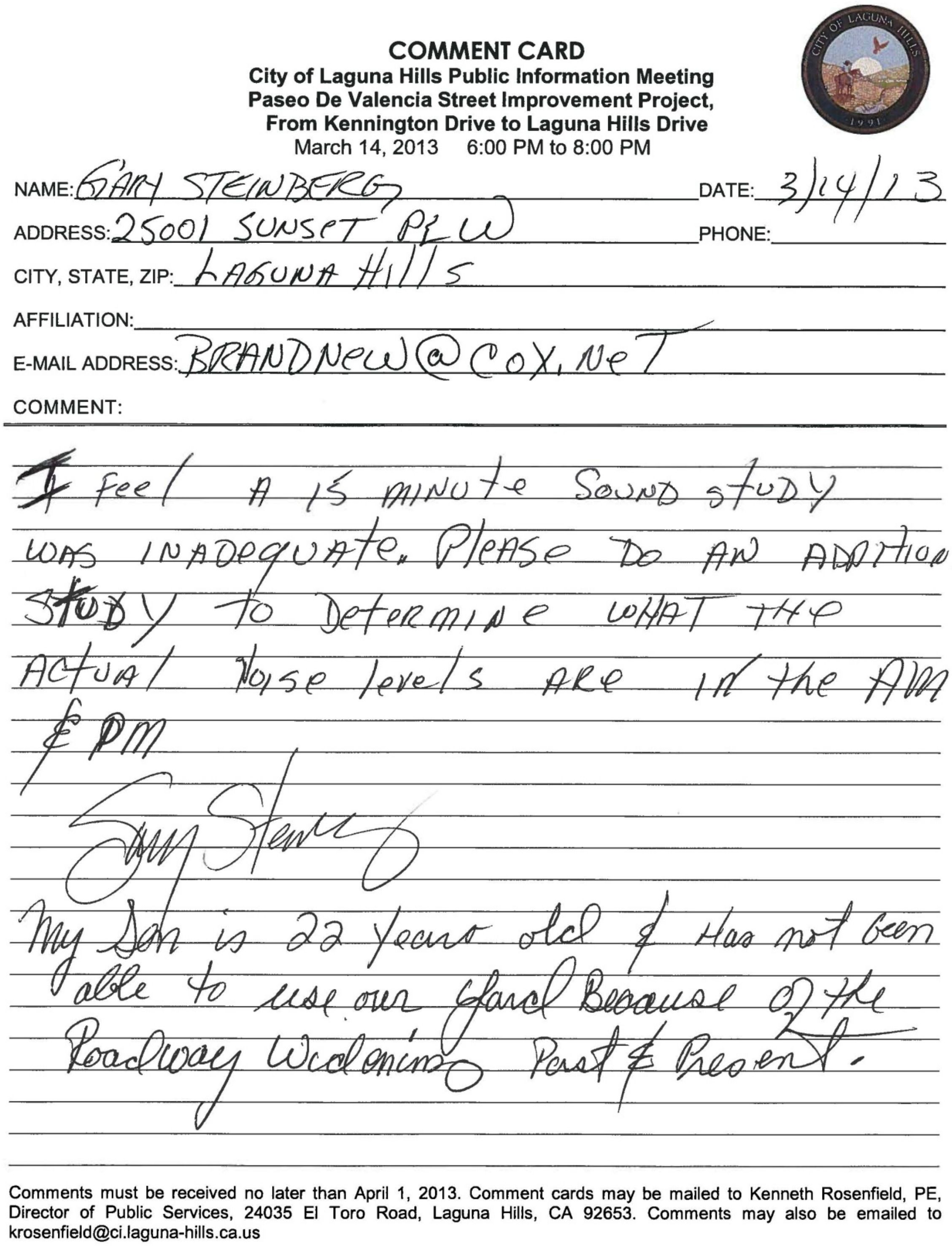
Commenter No. 3



COMMENT CARD

City of Laguna Hills Public Information Meeting
Paseo De Valencia Street Improvement Project,
From Kennington Drive to Laguna Hills Drive
March 14, 2013 6:00 PM to 8:00 PM

1991

NAME: GARY STEINBERG DATE: 3/14/13

ADDRESS: 25001 SUNSET PL W PHONE:

CITY, STATE, ZIP: LAGUNA HILLS

AFFILIATION:

E-MAIL ADDRESS: BRANDNEW@COX.NET

COMMENT:

I feel A 15 minute Sound study was inadequate. Please do an additional study to determine what the actual noise levels are in the AM & PM

My Son is 22 years old & Has not been able to use our yard Because of the Roadway Widening Past & Present.

Comments must be received no later than April 1, 2013. Comment cards may be mailed to Kenneth Rosenfield, PE, Director of Public Services, 24035 El Toro Road, Laguna Hills, CA 92653. Comments may also be emailed to krosenfield@ci.laguna-hills.ca.us

Commenter No. 4

RECEIVED
MAR 22 2013
CITY OF LAGUNA HILLS

COMMENT CARD

City of Laguna Hills Public Information Meeting
Paseo De Valencia Street Improvement Project,
From Kennington Drive to Laguna Hills Drive
March 14, 2013 6:00 PM to 8:00 PM

1991

NAME: DATE: 3-21-13

ADDRESS: PHONE: 582-5652

Mr. Gerald & Micki Zettel
24985 Sunset Pl W
Laguna Hills, CA 92653-4905

CITY, STATE, ZIP: FACING PASEO DE Valencia SLOPE

AFFILIATION: WIDEN PASEO DE VALENCIA

E-MAIL ADDRESS: gezettel@msn.com

COMMENT:

1) WE BELIEVE THE WIDENING IS GOING TO HAPPEN BECAUSE OF NEW HOMES IN THE OAKBROOK CENTER
2) BIKE LANES IN CITIES HAVE MORE RIGHTS THAN CARS & HOMEOWNER TAX PAYERS
3) PRADO APTS - RENTERS HAVE TO USE LOS ALISOS STREET TO PARK AS IT IS.
4) GOAL IS TO PASS MORE CARS THROUGH

5) Sunset H/O's LOSE GREEN Belt
6) THE NOISE WILL STILL AFFECT US. WE DON'T OPEN OUR BACK DOOR NOW, HAVE NOT FOR MANY YEARS

RESIDENT ↓
7) GARY HAS BEEN ASKING FOR A SOUND WALL FOR OVER 20 YEARS FOR Sunset PLACE Slope

8) WE LIKE IMPROVEMENTS - WE DON'T LIKE MORE HOMES, MORE WATER & ELECTRIC USE RATIONING, MORE BIKES & BUS STOPS

9) MAN HOLE COVERS ARE TOO HIGH - NOT FLUSH WITH THE PASEO DE VALENCIA NORTH ROAD TOWARD CABOT RD

Comments must be received no later than April 1, 2013. Comment cards may be mailed to Kenneth Rosenfield, PE, Director of Public Services, 24035 El Toro Road, Laguna Hills, CA 92653. Comments may also be emailed to krosenfield@ci.laguna-hills.ca.us

Commenter No. 5

From: Bertie <bertie@comline.com>
Date: March 26, 2013, 1:09:53 PM PDT
To: Ken Rosenfield <KRosenfield@ci.laguna-hills.ca.us>
Subject: Request for information.

We wish to be kept abreast of any new developments in regard to the Paseo de Valencia Street Improvement Project. We live in Laguna Woods Village and the removal of the sound-abating shrubbery will affect the noise level of our units, when the sidewalk is put into place.

Also, the building of apartments at Oakbrook Village Shopping Center will have many negative ramifications for those of us who shop there now. We'll lose some of the services we have had in the past. Also, the extra traffic created by residents there and pouring out onto Valencia will not be good because of the congestion and the reduction of air quality from auto exhaust. Please keep us posted on developments there.

Thank you. Bertha A. Guizado, Laguna Woods Village resident near gate #4.

Commenter No. 6

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