DRAINAGE STUDY

FOR

311 SEA RIDGE DRIVE
APN: 415-031-07
DATE: March 01, 2016

OWNER:
311 SR LLC
1900 WESTERN AVE.
LAS VEGAS, NV 89102

PREPARED BY:
SAN DIEGO LAND SURVEYING AND ENGINEERING INC.
9665 CHESAPEAKE DRIVE, SUITE 445
SAN DIEGO, CA. 92123

CITY OF SAN DIEGO
PTS NO. 451591

TABLE OF CONTENTS

APPENDICES

EXHIBITS

PROJECT DESCRIPTION:

EXISTING PROJECT SITE DESCRIPTION:
The site is 0.1647 acres in size and is occupied by a single family home. The site is padded with an existing cliff down to the ocean located at the south end of the project. The majority of the site drains to the north and west, to Sea Ridge Drive. No offsite storm water drains onto the site. Storm water on Sea Ridge Drive runs to the west and takes the majority of the storm runoff via sidewalk underdrains. See the vicinity map in Appendix A and the Hydrology Map, Existing Conditions in Exhibit A, for more details about the location of the project. There are two existing sidewalk underdrains onsite to Sea Ridge Drive. There are no existing concrete channels, detention facilities or storm water treatment facilities other than the limited existing landscaping. There is a limited underground onsite storm drain system to bring storm water from the rear of the site to the street.

The existing impervious area for this project is 5,397 sf. or 0.1239 acres. 75.2% of the site.

PROPOSED PROJECT DESCRIPTION:
The proposed project will consist of a single family home with two enclosed garage spaces. The disturbed area for this project is 0.1517 acres. For more details on the location of site facilities, see the Hydrology Map, Proposed Conditions in Exhibit B. The majority of the site and surrounding area will continue to drain to Sea Ridge Drive through the sidewalk underdrains. Earth work will consist of grading and compaction of the area underneath the proposed structure. On site drainage will consist of roof drains, an underground pipe system consisting of minor landscape inlets, PVC piping, water polisher, cleanout and the existing sidewalk underdrains. In some areas in the front yard, storm runoff will flow through landscaped areas and then discharge to the street gutter. The majority of the storm runoff will be captured in landscape and patio inlets or roof drains connected to the private underground storm drain system. This storm drain system is connected to a water polisher and pump system. This unit will discharge to a storm drain cleanout behind the property line and two sidewalk under-drains to Sea Ridge Drive. The site work will include minimal street improvements, limited hardscape, landscaping and irrigation.

The proposed impervious area for this project is 5,153 sf. or 0.1183 acres. 71.8% of the site.

This is a decrease of 3.4% of the impervious area over the existing condition. This decrease in impervious area will likely decrease the amount of storm runoff and aid in not disrupting the downstream facility.

STANDARDS AND METHODS

PURPOSE OF CALCULATIONS:

Compare the "pre" and "post" construction storm drain runoff quantities. Determine the adequacy of any storm drain inlets, pipes or flow through planters.

HYDROLOGIC MODEL AND METHODS USED:

This report uses the "Rational Method" as demonstrated in the County of San Diego Storm Drain Manual.

Q = CIA

WATER QUALITY DESIGN STORM:

The design storm for private storm water flow, drain inlets and pipes shall be the 50 year storm. The design storm for public storm water flow, drain inlets and pipes shall be the 100 year storm. The design storm for treatment will be the first 0.2" of runoff.

ANALYSIS AND CONCLUSIONS

PRE-DEVELOPMENT RUNOFF VOLUMES AND PEAK FLOWS:

Runoff factor "C" for Residential, 7.3 DU/A or less, soil group "D" from table 3-1 "Runoff Coefficients for Urban Areas" from the above manual and attached in Appendix "B" is **0.57.** See Exhibit "A" for plan view of the drainage area.

Time of concentration equals Initial time of concentration (Ti) and concentrated flow time over the rest of the lot (Tc). Initial time of concentration for 7.3 DU/A or less, 2% grade from table 3-2 "Maximum overland flow length" from the above manual and attached in Appendix "C" is 7.4 minutes.

Intensity-duration-frequency curves from the chart in Appendix "D". Determine rainfall intensity "I". For 7.4 min., 50 year storm, the rainfall intensity = **3.72.**

Intensity-duration-frequency curves from the chart in Appendix "D". Determine rainfall intensity "I". For 7.4 min., 100 year storm, the rainfall intensity = **4.12.**

The majority of the site drains to the street by inlets and pipe or sheet flow over the curb gutter and sidewalk.
Zone Existing Area E1 = 0.1517 acres
Q = CIA = .57 x 4.12 x 0.1517 = 0.36 CFS

This area consists of a cliff down to the ocean. The only storm water to contact this area is rainfall. It flows directly to the Pacific Ocean.

Zone Existing Area E2 = 0.0130 acres
Q = CIA = .57 x 4.12 x 0.0130 = 0.03 CFS

Total runoff for the existing condition is 0.39 CFS

POST-PROJECT RUNOFF VOLUMES AND PEAK FLOWS:

Runoff factor "C" for Residential, 7.3 DU/A or less, soil group "D" from table 3-1 "Runoff Coefficients for Urban Areas" from the above manual and attached in Appendix "B" is **0.57.** See Exhibit "A" for plan view of the drainage area.

Time of concentration equals Initial time of concentration (Ti) and concentrated flow time over the rest of the lot (Tc). Initial time of concentration for 7.3 DU/A or less, 2% grade from table 3-2 "Maximum overland flow length" from the above manual and attached in Appendix "C" is 7.4 minutes.

Intensity-duration-frequency curves from the chart in Appendix "D". Determine rainfall intensity "I". For 7.4 min., 50 year storm, the rainfall intensity = **3.72.**

Intensity-duration-frequency curves from the chart in Appendix "D". Determine rainfall intensity "I". For 7.4 min., 100 year storm, the rainfall intensity = **4.12.**

The majority of the site drains to the street by inlets and pipe or sheet flow over the curb gutter and sidewalk.
Zone Proposed Area P1= 0.1517 acres
Q = CIA = .57 x 4.12 x 0.1517 = 0.36 CFS

This area consists of a cliff down to the ocean. The only storm water to contact this area is rainfall. It flows directly to the Pacific Ocean.

Zone Proposed Area P2= 0.0130 acres
Q = CIA = .57 x 4.12 x 0.0130 = 0.03 CFS

Total runoff for the propose condition is 0.39 CFS

There is in decrease in runoff using the Rational Method as applied to such a small site. It is possible that there will be a 3.4% decrease in runoff as there is a decrease in impervious area between the existing conditions and the proposed conditions.

CONCLUSION:

The decrease in impervious area of the proposed project compared to the existing site has created a decrease in runoff of as much as 0.01 CFS. The proposed water polisher will treat the storm runoff before it is discharged to the public right-of-way. There is no possible damage to the downstream drainage infrastructure as the storm runoff travels in the curb and gutter of Sea Ridge Drive.

CERTIFICATION STATEMENT:

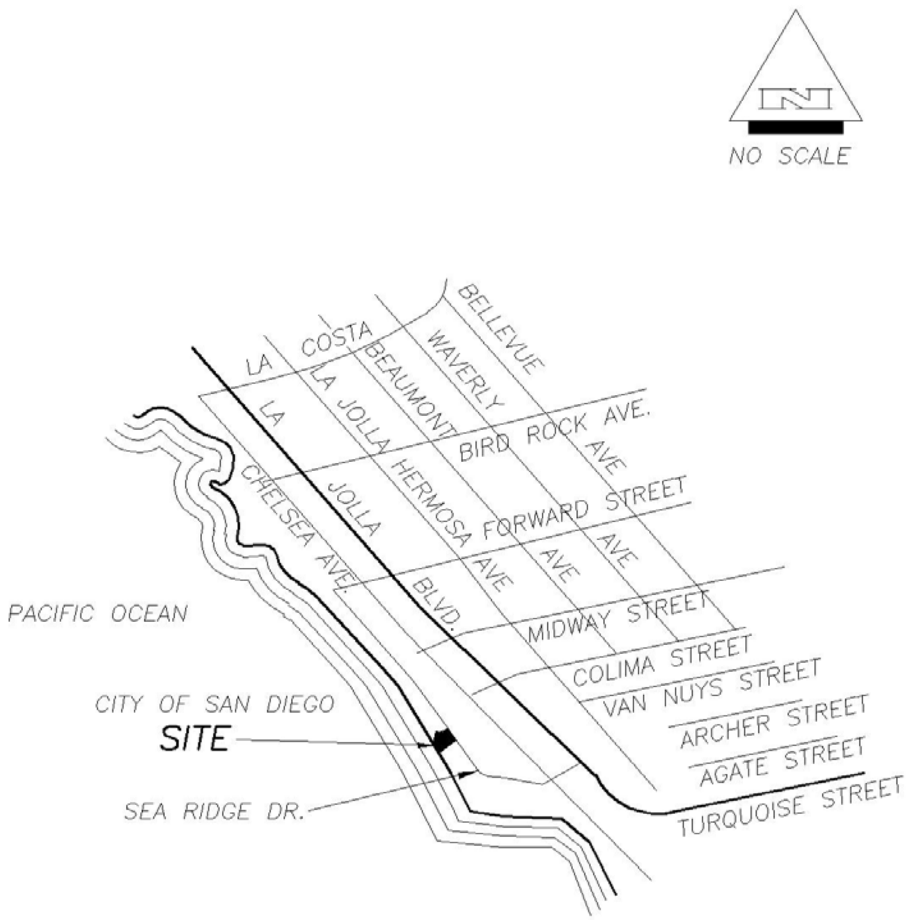
This Hydrology Report has been prepared under the direction of the following registered civil engineer. The registered civil engineer (Engineer) attests to the technical information contained herein and the engineering data upon which the following design, recommendations, conclusions and decisions are based. The selection, sizing, and design of storm water treatment and other control measures in this report meet the requirements of the Regional Water Quality Control Board Order R9-3013-0001, PDES NO. CAS0109266.

ENGINEER OF WORK:

DATE: 03-01-2016

MICHAEL LEE SMITH, RCE 35471
MY REGISTRATION EXPIRES ON
9/30/2017

APPENDIX A



VICINITY MAP

NOT TO SCALE

APPENDIX B

COUNTY OF SAN DIEGO STORM DRAIN MANUAL
TABLE 3-1, RUNOFF COEFFICIENTS FOR URBAN AREA

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service

APPENDIX C

COUNTY OF SAN DIEGO STORM DRAIN MANUAL TABLE 3-2, MAXIMUM OVERLAND FLOW LENGTH AND INITIAL TIME OF CONCENTRATION (Ti)

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

Table 3-2

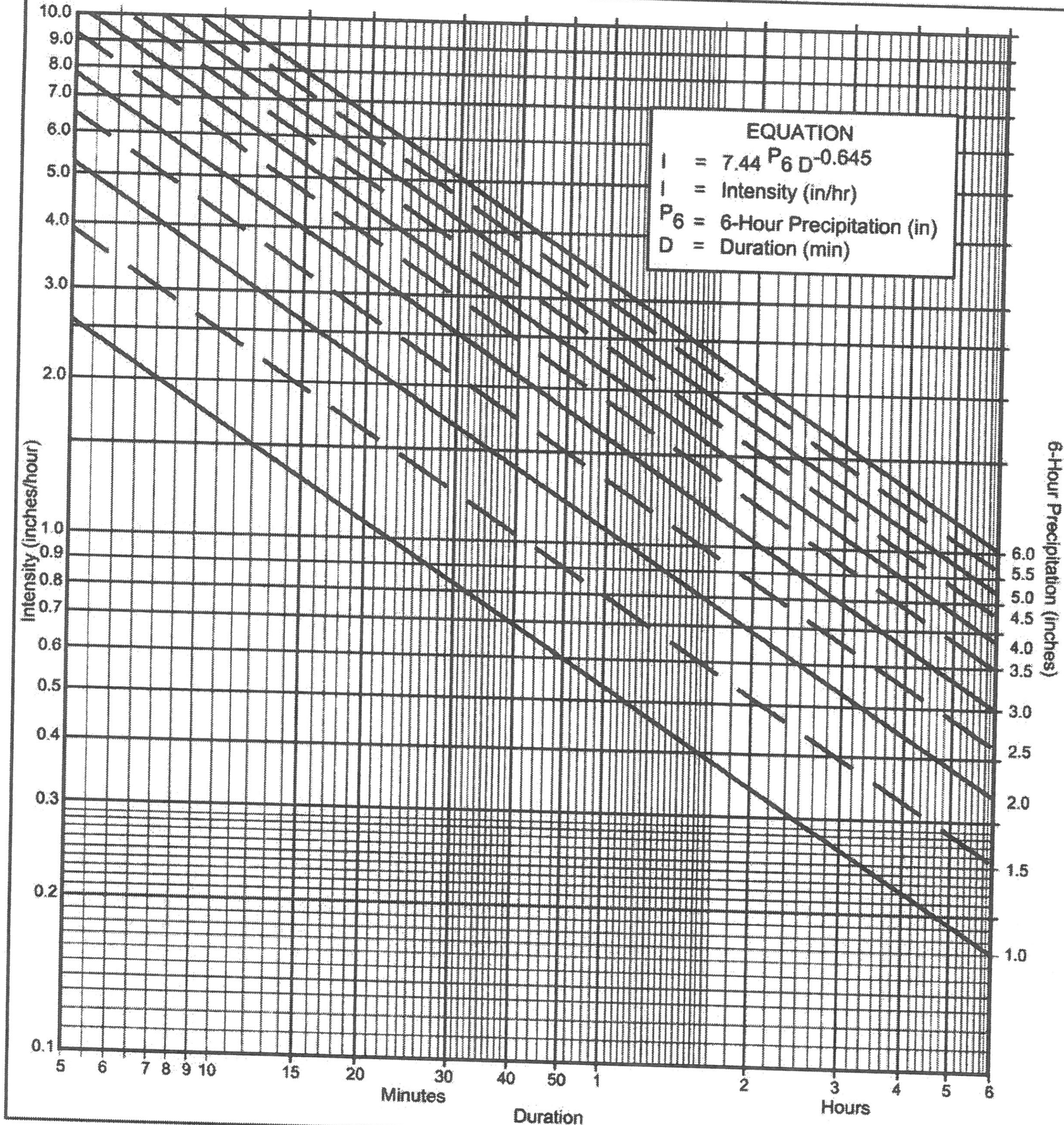
**MAXIMUM OVERLAND FLOW LENGTH (L_M)
& INITIAL TIME OF CONCENTRATION (T_i)**

Element*	DU/	.5%		1%		2%		3%		5%		10%	
	Acre	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

*See Table 3-1 for more detailed description

APPENDIX D

COUNTY OF SAN DIEGO STORM DRAIN MANUAL
FIGURE 3-2, INTENSITY DURATION DESIGN CHART



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 50 year

(b) P_6 = 1.8 in., P_{24} = 3.4, $\frac{P_6}{P_{24}}$ = 53 %(2)

(c) Adjusted $P_6^{(2)}$ = 1.8 in.

(d) t_x = 7.4 min.

(e) I = 3.72 in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

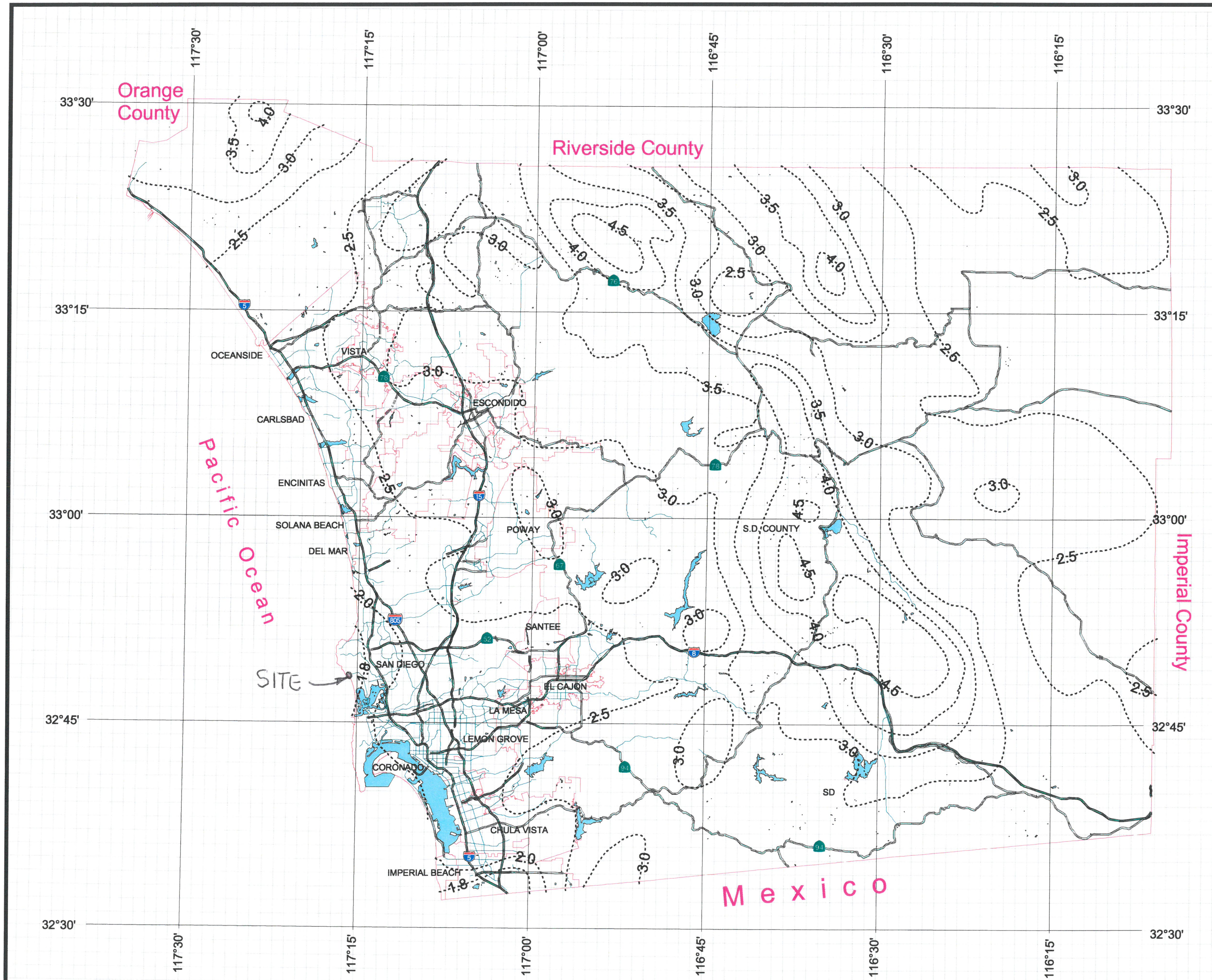
P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

	1.5	1.8	2.0
7	3.18	3.82	4.24
7.4		3.72	
10	2.53	3.03	3.37

FIGURE

3-1



County of San Diego Hydrology Manual

Rainfall Isopluvials

50 Year Rainfall Event - 6 Hours

-------- Isopluvial (inches)

1.8

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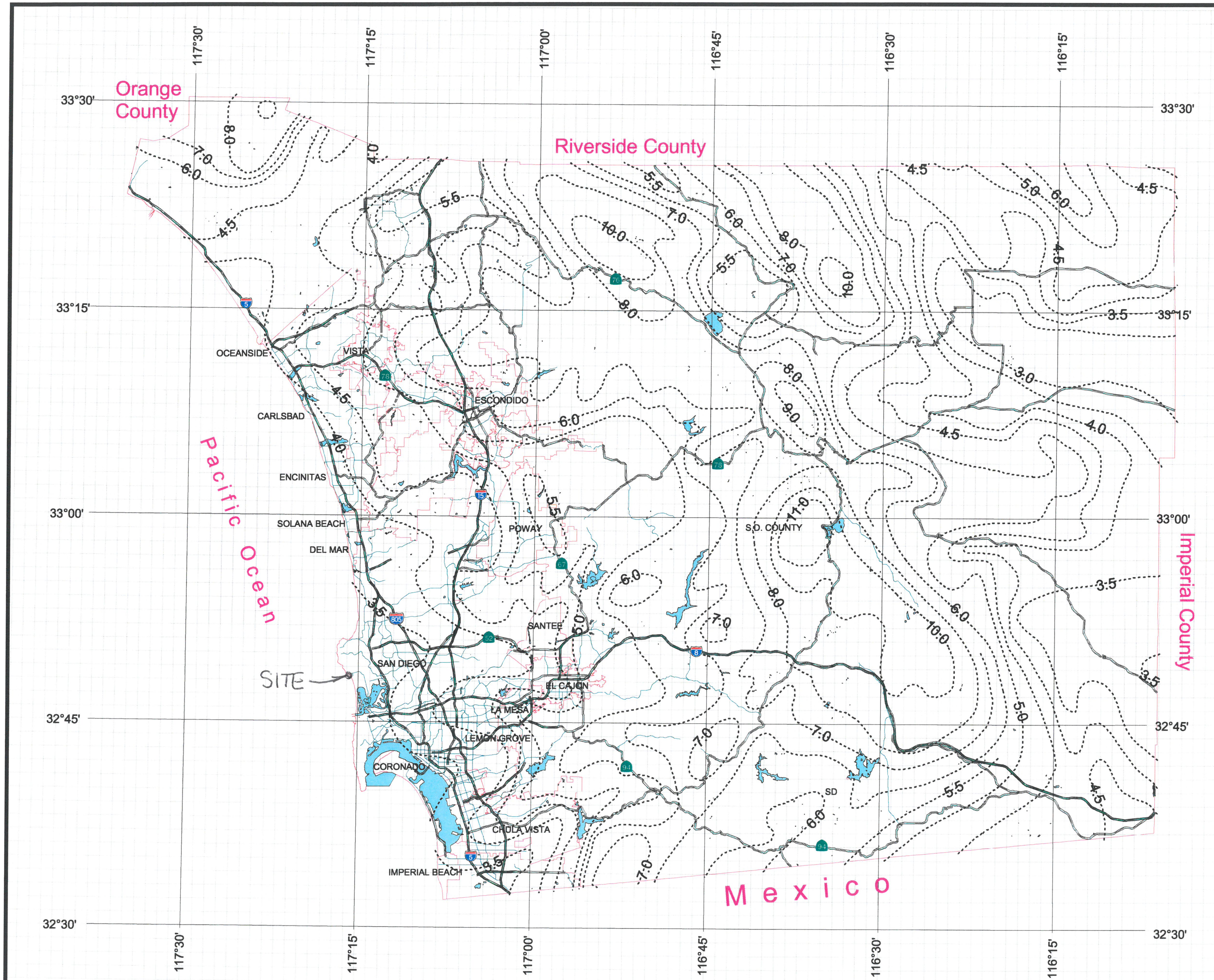
3 0 3 Miles



County of San Diego Hydrology Manual

Rainfall Isopluvials

50 Year Rainfall Event - 24 Hours

Isopluvial (inches)

3.4

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Geographic Information Services

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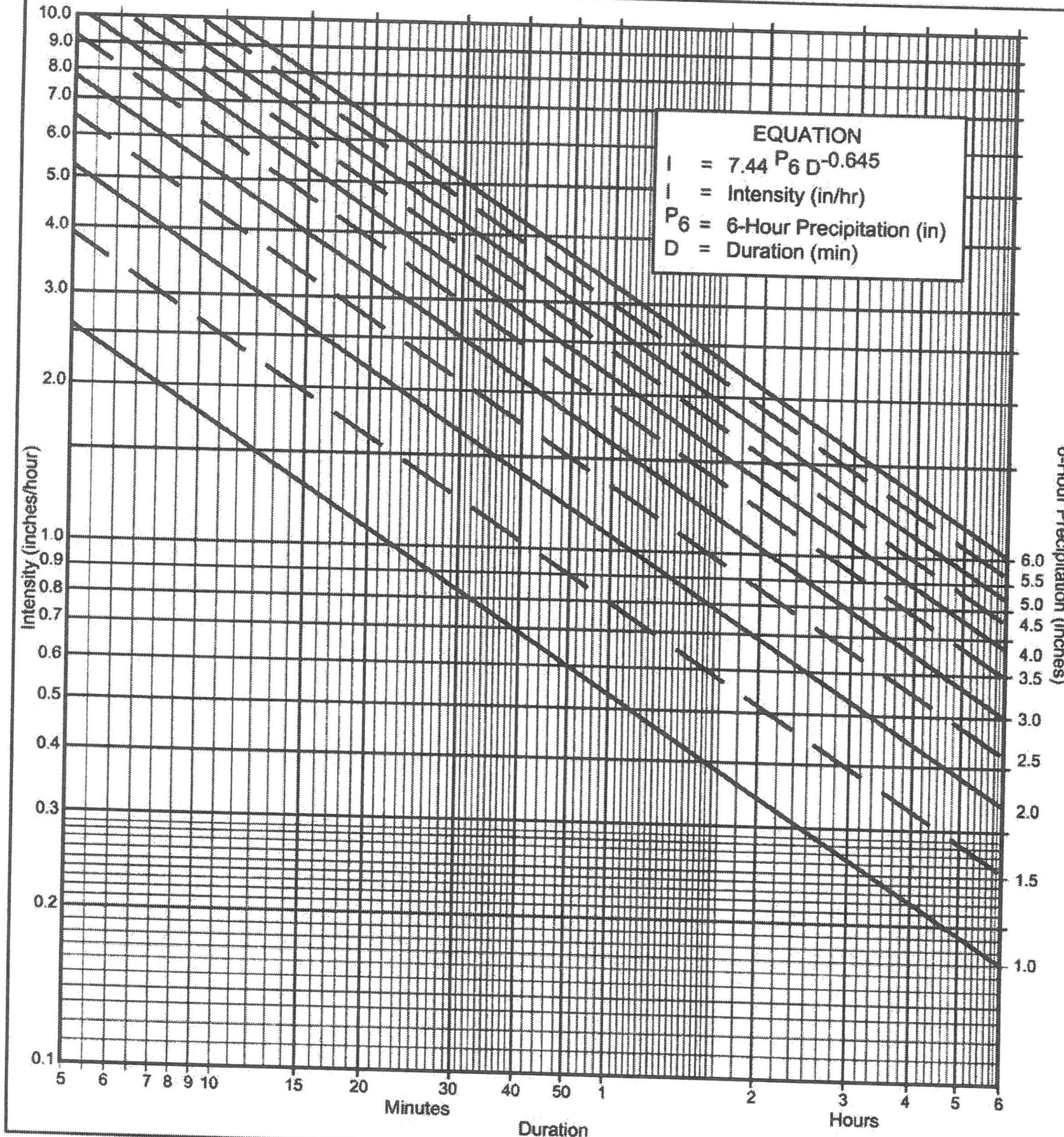
N
W
E
S

3 0 3 Miles



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(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 2.0 in., P_{24} = 3.8, $\frac{P_6}{P_{24}}$ = 53 %$^{(2)}$

(c) Adjusted $P_6^{(2)}$ = 2.0 in.

(d) t_x = 7.4 min.

(e) I = 4.12 in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

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Duration	I	I	I	I	I	I	I	I	I	I	I
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15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
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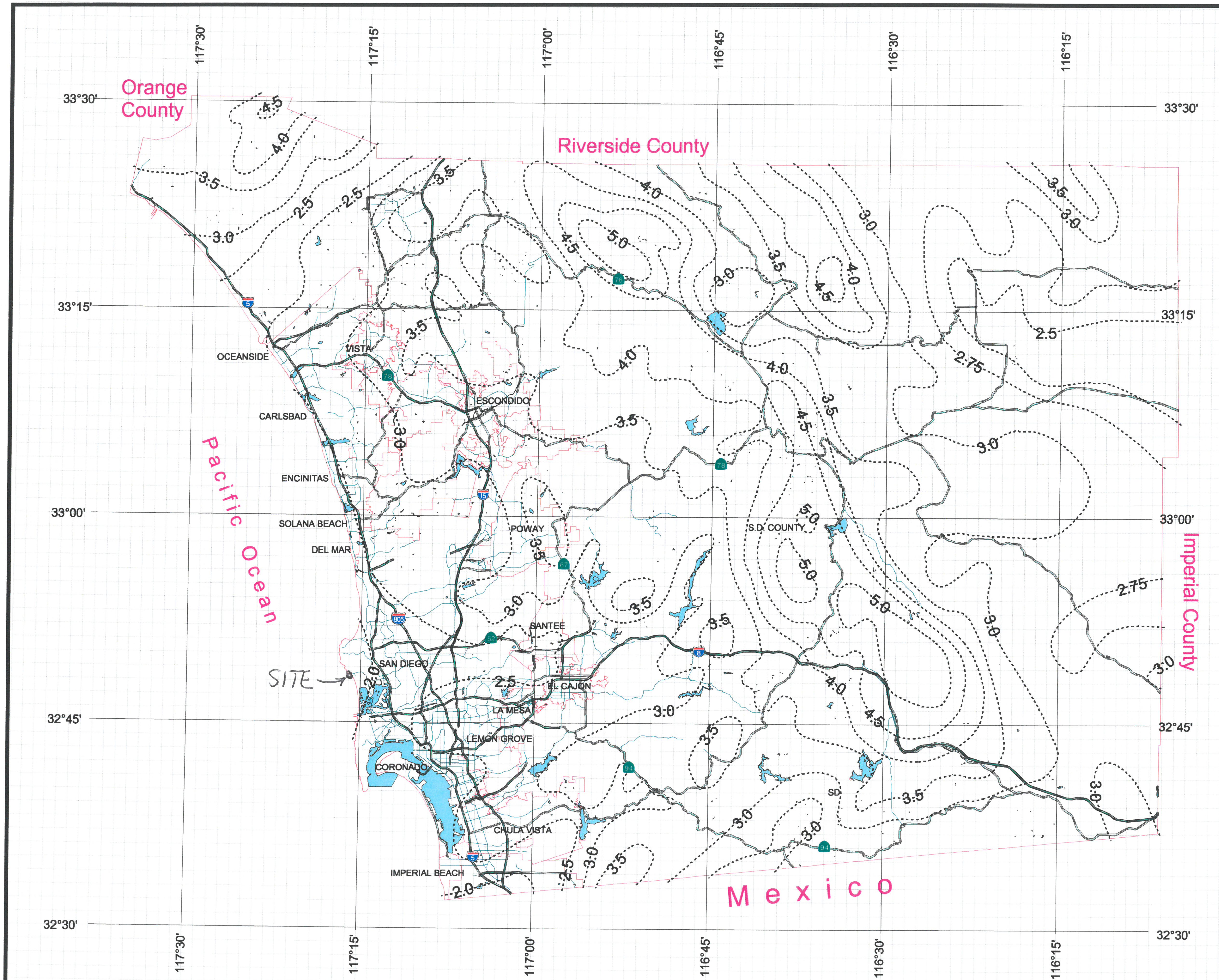
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

7 2.0
7.4 4.24
10 4.12
3.37

FIGURE

3-1



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

2.0

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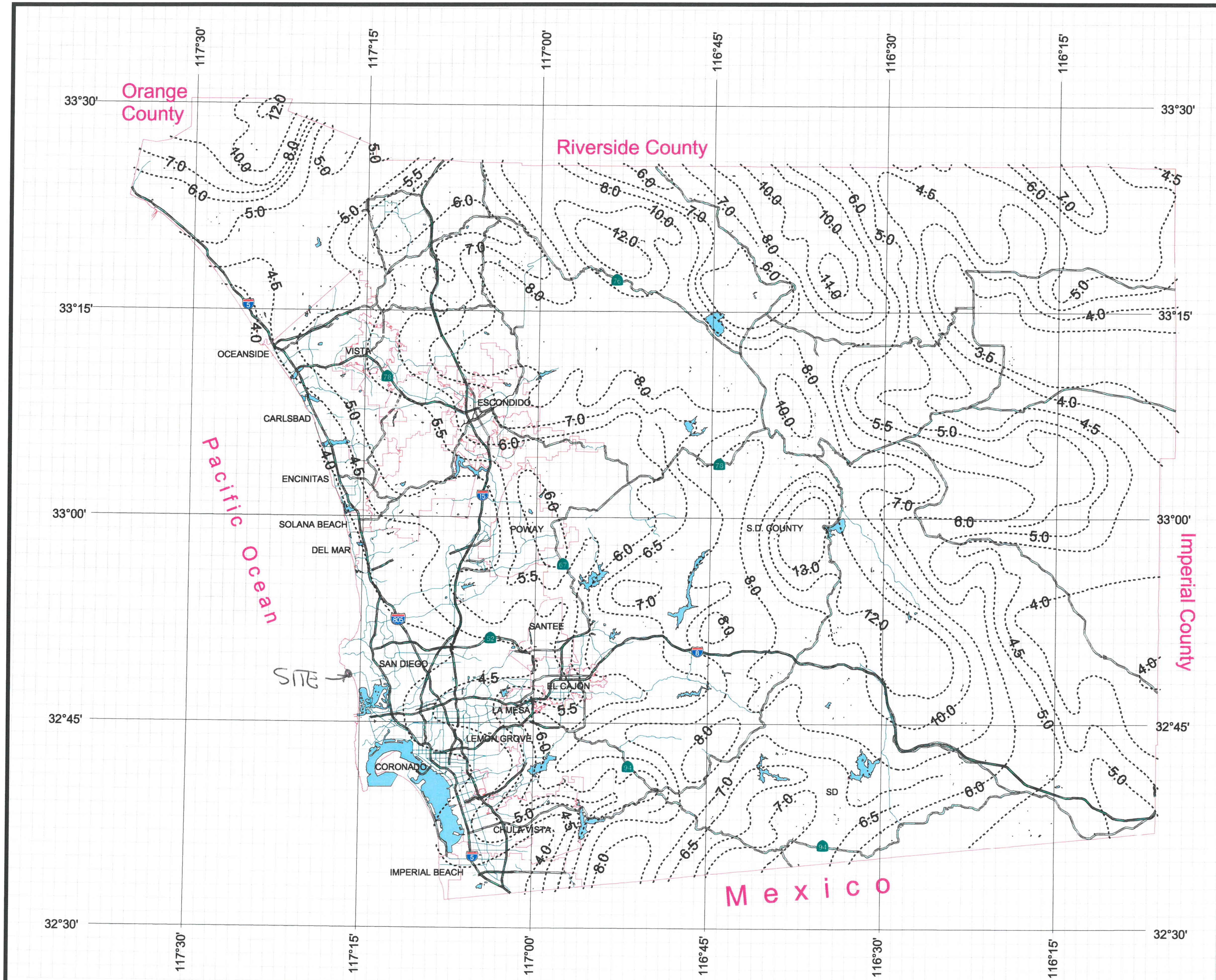
3 0 3 Miles



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

-------- Isopluvial (inches)

3.8

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Department of Public Works Geographic Information Services

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N S W E

3 0 3 Miles

EXHIBIT A AND B

EXISTING DRAINAGE CONDITIONS
PROPOSED DRAINAGE CONDITIONS

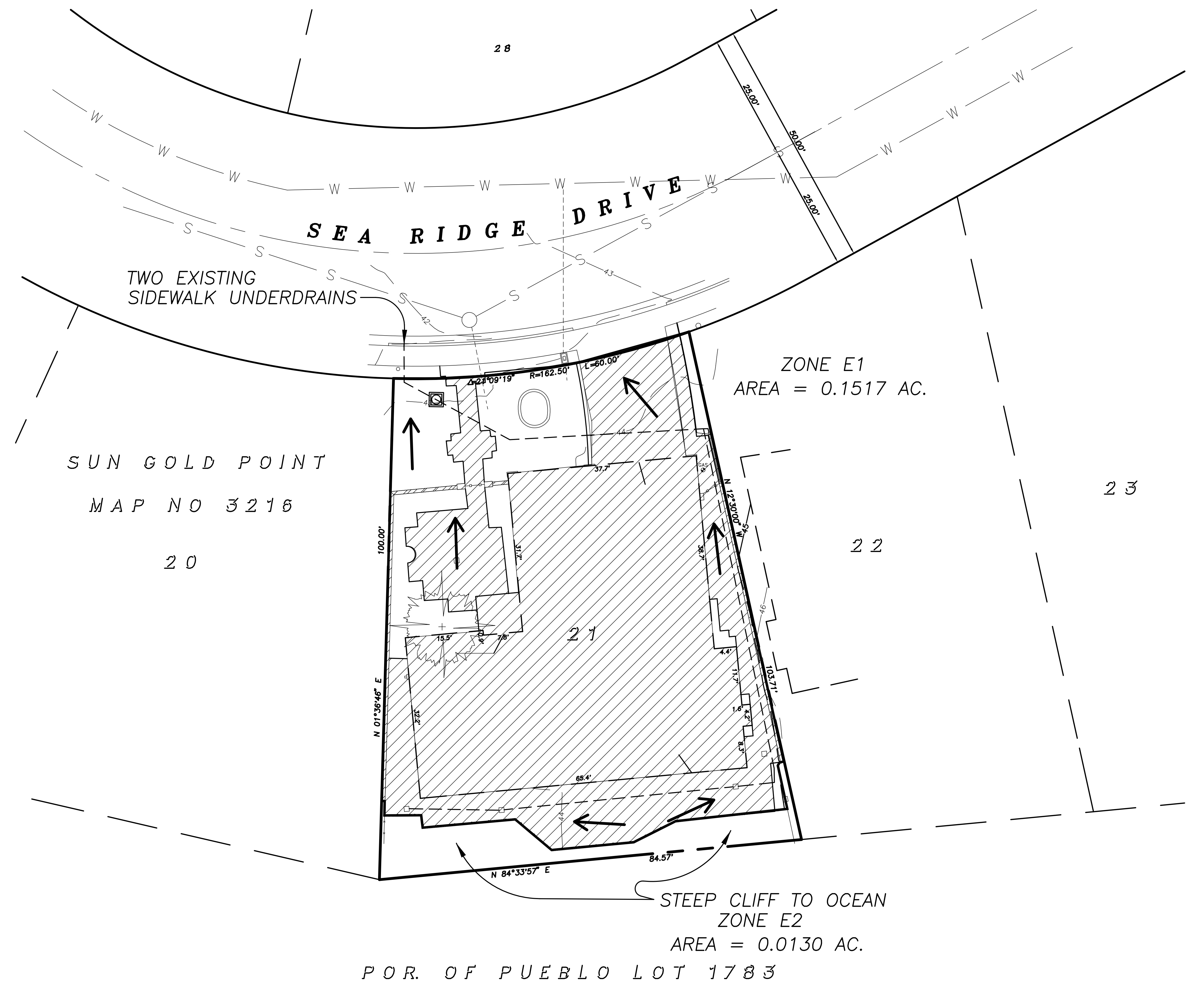


EXHIBIT A

SCALE 1" = 20'

PROJECT AREA
AREA = 0.1647 AC. OR 7174 SF.

ZONE E1
AREA = 0.1517 AC.

ZONE E2
AREA = 0.0130 AC.

IMPERVIOUS AREA
AREA = 0.1239 AC.
PERCENTAGE OF
TOTAL AREA = 75.2

LANDSCAPED AREA
AREA = 0.0408 AC.
PERCENTAGE OF
TOTAL AREA = 24.8

HYDROLOGY MAP

EXISTING CONDITIONS

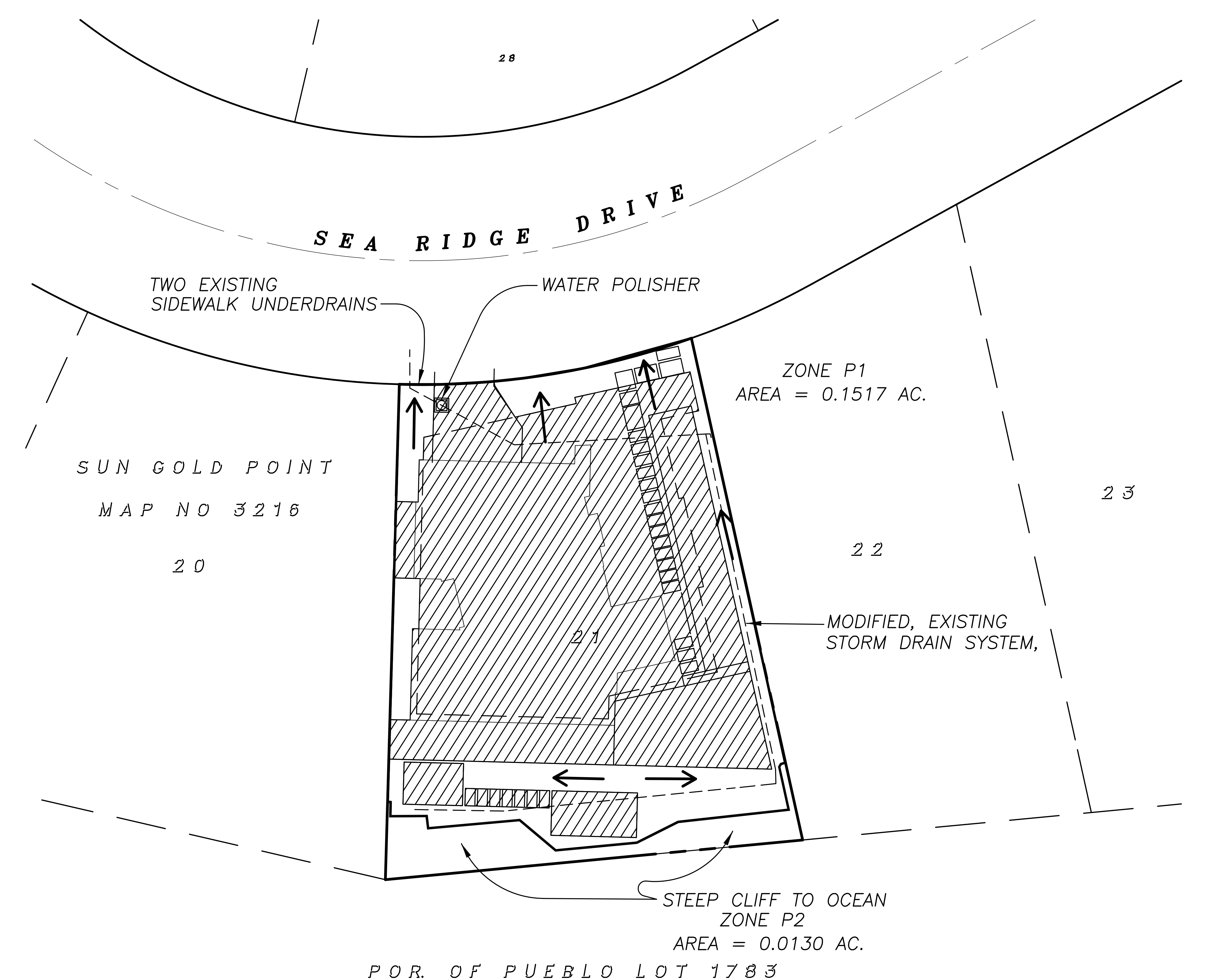


EXHIBIT B

SCALE 1" = 20'

SITE AREA
AREA = 0.1647 AC. OR 7174 SF.

ZONE P1
AREA = 0.1517 AC.

ZONE P2
AREA = 0.0130 AC.

IMPERVIOUS AREA
AREA = 0.1183 AC.
PERCENTAGE OF
TOTAL AREA = 71.8

LANDSCAPED AREA
AREA = 0.0464 AC.
PERCENTAGE OF
TOTAL AREA = 28.2

HYDROLOGY MAP
PROPOSED CONDITIONS

CITY OF SAN DIEGO
WATER QUALITY STUDY

Prepared by: San Diego Land Surveying and Engineering, INC.
9665 Chesapeake Drive, Suite 445, San Diego, Ca. 92123
Michael L. Smith, Project Engineer, RCE 35471

Date: March 1, 2016

PROJECT SITE LOCATION: **City PTS No. 451591**

The project is located at 311 Sea Ridge Drive, San Diego, Ca.
Assessor's Parcel Number 415-031-07

EXISTING PROJECT SITE DESCRIPTION:

The existing site is occupied by one single family home. The site drains to the north to Sea Ridge Drive and a small portion to the Pacific Ocean. Sea Ridge Drive drains to the east. The storm runoff from the site sheet flows to the public right-of-way or is carried there by a private storm drain system of inlets and pipes and is not treated.

The impervious area of the existing site is 5395 square feet or 75.2% of the site.

PROPOSED PROJECT DESCRIPTION:

The disturbed area for this project is 0.1400 acres. Earth work will consist of minor grading and compaction of the area underneath the proposed structure. One new home and a 2 two car garage are proposed. Installation of landscaping will require minor grading on site. No grading or work off site is expected. The existing single family home is to be removed. A private storm drain system will collect the storm runoff and direct it to a water polisher located in the front driveway. This device will discharge to a cleanout located behind the property line and connect to two sidewalk underdrains.

The impervious area of the proposed site is 5153 square feet or 71.8% of the site.

Required Permanent Best Management Practices for Standard Development Projects

Source Control (SC) BMP Requirements:

SC-1: Prevent illicit discharges into the MS4

An illicit discharge is any discharge to the MS4 that is not composed entirely of storm water except discharges pursuant to a National Pollutant Discharge Elimination System permit and discharges resulting from firefighting activities. Projects must effectively eliminate discharges of non-storm water into the MS4. This may involve a suite of housekeeping BMPs which could include effective irrigation, dispersion of non-storm water discharges into landscaping for infiltration, and controlling wash water from vehicle washing.

DISCUSSION:

The proposed irrigation and landscape design is done by a registered professional and will be submitted to the City of San Diego to comply with Municipal Code. It shall include flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines. Any vehicle maintenance conducted by the home owner will follow good housekeeping practices such as not allowing contaminated water to run into the public street. This is accomplished by the utilization of a temporary flow diverter to a landscaped area.

SC-2: Identify the storm drain system using stenciling or signage

Storm drain signs and stencils are visible source controls typically placed adjacent to the inlets. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Stenciling shall be provided for all storm water conveyance system inlets and catch basins within the project area. Inlet stenciling may include concrete stamping, concrete painting, placards, or other methods approved by the local municipality. In addition to storm drain stenciling, projects are encouraged to post signs and prohibitive language (with graphical icons) which prohibit illegal dumping at trailheads, parks, building entrances and public access points along channels and creeks within the project area.

Language associated with the stamping (e.g., "No Dumping-Drains to Ocean") must be satisfactory to the City Engineer. Stamping may also be required in Spanish.

DISCUSSION:

The existing storm drain system and as modified by the proposed project will be on private property and not accessible by the general public. It will consist of small landscape inlets and 6" brass grates in the patio. It will be the responsibility of the home owner to prevent pollutants from entering the storm drain system.

SC-3: Protect outdoor material storage areas from rainfall, run-on, runoff, and wind dispersal

Materials with the potential to pollute storm water runoff shall be stored in a manner that prevents contact with rainfall and storm water runoff. Contaminated runoff shall be managed for treatment incorporate the following structural or pollutant control BMPs for outdoor material storage areas, as applicable and feasible:

Materials with the potential to contaminate storm water shall be:

• Placed in an enclosure such as, but not limited to, a cabinet, or similar structure, or under a roof or awning that prevents contact with rainfall runoff or spillage to the storm water conveyance system; or
• Protected by secondary containment structures such as berms, dikes, or curbs.
• The storage areas shall be paved and sufficiently impervious to contain leaks and spills, where necessary.
(continued below)
• The storage area shall be sloped towards a sump or another equivalent measure that is effective to contain spills.
• Runoff from downspouts/roofs shall be directed away from storage areas.
• The storage area shall have a roof or awning that extends beyond the storage area to minimize collection of storm water within the secondary containment area. A manufactured storage shed may be used for small containers.

DISCUSSION:

This project is the construction of a single family home. There are no outdoor material storage areas included in the design.

SC-4: Protect materials stored in outdoor work areas from rainfall, run-on, runoff, and wind dispersal

Outdoor work areas have an elevated potential for pollutant loading and spills. All development projects shall include the following structural or pollutant control BMPs for any outdoor work areas with potential for pollutant generation, as applicable and feasible:

• Create an impermeable surface such as concrete or asphalt, or a prefabricated metal drip pan, depending on the size needed to protect the materials.
• Cover the area with a roof or other acceptable cover.
• Berm the perimeter of the area to prevent water from adjacent areas from flowing on to the surface of the work area.

• Directly connect runoff to sanitary sewer or other specialized containment system(s), as needed and where feasible. This allows the more highly concentrated pollutants from these areas to receive special treatment that removes particular constituents. Approval for this connection must be obtained from the appropriate sanitary sewer agency.
• Locate the work area away from storm drains or catch basins.

DISCUSSION:

This project is the construction of a single family home. There are no materials stored in outdoor work area included in the design.

SC-5: Protect trash storage areas from rainfall, run-on, runoff, and wind dispersal
Storm water runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. All development projects shall include the following structural or pollutant control BMPs, as applicable:

• Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This can include berming or grading the waste handling area to prevent run-on of storm water.
• Ensure trash container areas are screened or walled to prevent offsite transport of trash.
• Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
• Locate storm drains away from immediate vicinity of the trash storage area and vice versa.
• Post signs on all dumpsters informing users that hazardous material are not to be disposed.

DISCUSSION:

This is a single family home; the trash storage area will be limited to the City approved trash containers that will be stored in the garage.

SC-6: Use any additional BMPs determined to be necessary by the Copermittee to minimize pollutant generation at each project site
Appendix E.1 provides guidance on permanent controls and operational BMPs that are applicable at a project site based on potential sources of runoff pollutants at the project site. The project shall implement all applicable and feasible source control BMPs listed in Appendix E.1. In addition to the source control BMPs in Appendix E.1, additional source control requirements apply for the following project types within the City jurisdiction. Guidance for implementing these additional source control requirements are presented in Appendix E.
• **SC-6A: Large Trash Generating Facilities**: Includes but are not limited to restaurants, supermarkets, "big box" retail stores serving food, and pet stores. Refer to Appendix E.20

• **SC-6B: Animal Facilities**: Includes but are not limited to animal shelters, dog daycare centers, veterinary clinics, groomers, pet care stores, and breeding, boarding, and training facilities. Refer to Appendix E.21

• **SC-6C: Plant Nurseries and Garden Centers**: Includes but are not limited to commercial facilities that grow, distribute, sell, or store plants and plant material. Refer to Appendix E.22

• **SC-6D: Automotive-related Uses**: include but are not limited to facilities that perform maintenance or repair of vehicles, vehicle washing facilities, and retail gasoline outlets. Refer to Appendix E.23

DISCUSSION:

This is a single family home, this is not a large trash generation facility, animal facility, plant nursery or for automotive related uses.

Site Design (SD) BMP Requirements:

How to comply: Projects shall comply with this requirement by using all of the site design BMPs listed in this section that are applicable and practicable to their project type and site conditions. Applicability of a given site design BMP shall be determined based on project type, soil conditions, presence of natural features (e.g. streams), and presence of site features (e.g. parking areas). Explanation shall be provided by the applicant when a certain site design BMP is considered to be not applicable or not practicable/feasible. Site plans shall show site design BMPs and provide adequate details necessary for effective implementation of site design BMPs. The "Site Design BMP Checklist for All Development Projects" located in Appendix I-5 shall be used to document compliance with site design BMP requirements.

SD-1: Maintain natural drainage pathways and hydrologic features
Maintain or restore natural storage reservoirs and drainage corridors (including topographic depressions, areas of permeable soils, natural swales, and ephemeral and intermittent streams)

Buffer zones for natural water bodies (where buffer zones are technically infeasible, require project applicant to include other buffers such as trees, access restrictions, etc.)

During the site assessment, natural drainages must be identified along with their connection to creeks and/or streams, if any. Natural drainages offer a benefit to storm water management as the soils and habitat already function as a natural filtering/infiltrating swale. When determining the development footprint of the site, altering natural drainages should be avoided. By providing a development envelope set back from natural drainages, the drainage can retain some water quality benefits to the watershed. In some situations, site constraints, regulations, economics, or other factors may not allow avoidance of drainages and sensitive areas. Projects proposing to dredge or fill materials in Waters of the U.S. must obtain Clean Water Act Section 401 Water Quality Certification. Projects proposing to dredge or fill waters of the State must obtain waste discharge requirements. Both the 401 Certification and the Waste Discharge Requirements are administered by the San Diego Water Board. The project applicant shall consult the local jurisdiction for other specific requirements.

Projects can incorporate SD-1 into a project by implementing the following planning and design phase techniques as applicable and practicable:

• Evaluate surface drainage and topography in considering selection of Site Design BMPs that will be most beneficial for a given project site. Where feasible, maintain topographic depressions for infiltration.
• Optimize the site layout and reduce the need for grading. Where possible, conform the site layout along natural landforms, avoid grading and disturbance of vegetation and soils, and replicate the site's natural drainage patterns. Integrating existing drainage patterns into the site plan will help maintain the site's predevelopment hydrologic function.
• Preserve existing drainage paths and depressions, where feasible and applicable, to help
• Structural BMPs cannot be located in buffer zones if a State and/or Federal resource agency (e.g. SDRWQCB, California Department of Fish and Wildlife; U.S. Army Corps of Engineers, etc.) prohibits maintenance or activity in the area.

DISCUSSION:

This project is the construction of a single family home on a previously developed home site. The existing surface drainage and topography are maintained. The design of the new housed conforms to the existing graded pad.

SD-2: Conserve natural areas, soils and vegetation

• Conserve natural areas within the project footprint including existing trees, other vegetation, and soils

To enhance a site's ability to support source control and reduce runoff, the conservation and restoration of natural areas must be considered in the site design process. By conserving or restoring the natural drainage features, natural processes are able to intercept storm water, thereby reducing the amount of runoff. The upper soil layers of a natural area contain organic material, soil biota, vegetation, and a configuration favorable for storing and slowly conveying storm water and establishing or restoring vegetation to stabilize the site after construction. The canopy of existing native trees and shrubs also provide a water conservation benefit by intercepting rain water before it hits the ground. By minimizing disturbances in these areas, natural processes are able to intercept storm water, providing a water quality benefit. By keeping the development concentrated to the least environmentally sensitive areas of the site and set back from natural areas, storm water runoff is reduced, water quality can be improved, environmental impacts can be decreased, and many of the site's most attractive native landscape features can be retained. In some situations, site constraints, regulations, economics, and/or other factors may not allow avoidance of all sensitive areas on a project site. Project applicant shall consult the local municipality for jurisdictional specific requirements for mitigation of removal of sensitive areas.

Projects can incorporate SD-2 by implementing the following planning and design phase techniques as applicable and practicable:

• Identify areas most suitable for development and areas that should be left undisturbed. Additionally, reduced disturbance can be accomplished by increasing building density and increasing height, if possible.
• Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.
• Avoid areas with thick, undisturbed vegetation. Soils in these areas have a much higher capacity to store and infiltrate runoff than disturbed soils, and reestablishment of a mature vegetative community can take decades. Vegetative cover can also provide additional volume storage of rainfall by retaining water on the surfaces of leaves, branches, and trunks of trees during and after storm events.
• Preserve trees, especially native trees and shrubs, and identify locations for planting additional native or drought tolerant trees and large shrubs.
• In areas of disturbance, topsoil should be removed before construction and replaced after the project is completed. When handled carefully, such an approach limits the disturbance to native soils and reduces the need for additional (purchased) topsoil during later phases.
• Avoid sensitive areas, such as wetlands, biological open space areas, biological mitigation sites, streams, floodplains, or particular vegetation communities, such as coastal sage scrub and intact forest. Also, avoid areas that are habitat for sensitive plants and animals, particularly those, State or federally listed as endangered, threatened or rare. Development in these areas is often restricted by federal, state and local laws.

DISCUSSION:

This project is the construction of a single family home on a previously developed home site. There is minimal natural area or vegetation remaining on the site due to the construction of the existing house. Much of the existing vegetation will be preserved.

SD-3: Minimize impervious area

• **Construct streets, sidewalks or parking lots aisles to the minimum widths necessary, provided public safety is not compromised**

• **Minimize the impervious footprint of the project**

One of the principal causes of environmental impacts by development is the creation of impervious surfaces. Imperviousness links urban land development to degradation of aquatic ecosystems in two ways:

• First, the combination of paved surfaces and piped runoff efficiently collects urban pollutants and transports them, in suspended or dissolved form, to surface waters. These pollutants may originate as airborne dust, be washed from the atmosphere during rains, or may be generated by automobiles and outdoor work activities.

• Second, increased peak flows and runoff durations typically cause erosion of stream banks and beds, transport of fine sediments, and disruption of aquatic habitat. Measures taken to control stream erosion, such as hardening banks with riprap or concrete, may permanently eliminate habitat. Impervious cover can be minimized through identification of the smallest possible land area that can be practically impacted or disturbed during site development. Reducing impervious surfaces retains the permeability of the project site, allowing natural processes to filter and reduce sources of pollution.

Projects can incorporate SD-3 by implementing the following planning and design phase techniques as applicable and practicable:

• Decrease building footprint through (the design of compact and taller structures when allowed by local zoning and design standards and provided public safety is not compromised.
• Construct walkways, trails, patios, overflow parking lots, alleys and other low-traffic areas with permeable surfaces.
• Construct streets, sidewalks and parking lot aisles to the minimum widths necessary, provided that public safety and alternative transportation (e.g. pedestrians, bikes) are not compromised.
• Consider the implementation of shared parking lots and driveways where possible.
• Landscaped area in the center of a cul-de-sac can reduce impervious area depending on configuration. Design of a landscaped cul-de-sac must be coordinated with fire department personnel to accommodate turning radii and other operational needs.
• Design smaller parking lots with fewer stalls, smaller stalls, more efficient lanes.
• Design indoor or underground parking.
• Minimize the use of impervious surfaces in the landscape design.

DISCUSSION:

This project is the construction of a single family home on a previously developed home site. The proposed project will reduce the impervious area by 3.4% compared to the existing development.

SD-4: Minimize soil compaction

• Minimize soil compaction in landscaped areas

The upper soil layers contain organic material, soil biota, and a configuration favorable for storing and slowly conveying storm water down gradient. By protecting native soils and vegetation in appropriate areas during the clearing and grading phase of development the site can retain some of its existing beneficial hydrologic function. Soil compaction resulting from the movement of heavy construction equipment can reduce soil infiltration rates. It is important to recognize that areas adjacent to and under building foundations, roads and manufactured slopes must be compacted with minimum soil density requirements in compliance with local building and grading ordinances.

Projects can incorporate SD-4 by implementing the following planning and design phase techniques as applicable and practicable:

• Avoid disturbance in planned green space and proposed landscaped areas where feasible. These areas that are planned for retaining their beneficial hydrological function should be protected during the grading/construction phase so that vehicles and construction equipment do not intrude and inadvertently compact the area.
• In areas planned for landscaping where compaction could not be avoided, re-till the soil surface to allow for better infiltration capacity. Soil amendments are recommended and may be necessary to increase permeability and organic content. Soil stability, density requirements, and other geotechnical considerations associated with soil compaction must be reviewed by a qualified landscape architect or licensed geotechnical, civil or other professional engineer.

DISCUSSION:

The proposed irrigation and landscape design is done by a registered professional and will be submitted to the City of San Diego to comply with Municipal Code. It shall include flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines. Soil will be compacted to maximize the infiltration of storm water.

SD-5: Disperse impervious areas

Disconnect impervious surfaces through disturbed pervious areas

Design and construct landscaped or other pervious areas to effectively receive and infiltrate, retain and/or treat runoff from impervious areas prior to discharging to the MS4

Impervious area dispersion (dispersion) refers to the practice of essentially disconnecting impervious areas from directly draining to the storm drain system by routing runoff from impervious areas such as rooftops, walkways, and driveways onto the surface of adjacent pervious areas. The intent is to slow runoff discharges, and reduce volumes while achieving incidental treatment. Volume reduction from dispersion is dependent on the infiltration characteristics of the pervious area and the amount of impervious area draining to the pervious area. Treatment is achieved through filtration, shallow sedimentation, sorption, infiltration, evapotranspiration, biochemical processes and plant uptake.

The effects of imperviousness can be mitigated by disconnecting impervious areas from the drainage system and by encouraging detention and retention of runoff near the point where it is generated. Detention and retention of runoff reduces peak flows and volumes and allows pollutants to settle out or adhere to soils before they can be transported downstream. Disconnection practices may be applied in almost any location, but impervious surfaces must discharge into a suitable receiving area for the practices to be effective. Information gathered during the site assessment will help determine appropriate receiving areas.

Project designs should direct runoff from impervious areas to adjacent landscaping areas that have higher potential for infiltration and surface water storage. This will limit the amount of runoff generated, and therefore the size of the mitigation BMPs downstream. The design, including consideration of slopes and soils, must reflect a reasonable expectation that runoff will soak into the soil and produce no runoff of the DCV. On hillside sites, drainage from upper areas may be collected in conventional catch basins and piped to landscaped areas that have higher potential for infiltration. Or use low retaining walls to create terraces that can accommodate BMPs.

Projects can incorporate SD-5 by implementing the following planning and design phase techniques as applicable and practicable:

• Implement design criteria and considerations listed in impervious area dispersion fact sheet (SD-5) presented in Appendix E.
• Drain rooftops into adjacent landscape areas.
• Drain impervious parking lots, sidewalks, walkways, trails, and patios into adjacent landscape areas.
• Reduce or eliminate curb and gutters from roadway sections, thus allowing roadway runoff to drain to adjacent pervious areas.
• Replace curbs and gutters with roadside vegetated swales and direct runoff from the paved street or parking areas to adjacent LID facilities. Such an approach for alternative design can reduce the overall capital cost of the site development while improving the storm water quantity and quality issues and the site's aesthetics.
• Plan site layout and grading to allow for runoff from impervious surfaces to be directed into distributed permeable areas such as turf, landscaped or permeable recreational areas, medians, parking islands, planter boxes, etc.
• Detain and retain runoff throughout the site. On flatter sites, landscaped areas can be interspersed among the buildings and pavement areas. On hillside sites, drainage from upper areas may be collected in conventional catch basins and conveyed to landscaped areas in lower areas of the site.
• Pervious area that receives run on from impervious surfaces shall have a minimum width of 10 feet and a maximum slope of 5%.

DISCUSSION:

This project is the construction of a single family home on a previously developed home site. The proposed project will reduce the impervious area by 3.4% compared to the existing development.

SD-6: Collect runoff

• Use small collection strategies located at, or as close to as possible to the sources (i.e. the point where storm water initially meets the ground) to minimize the transport of runoff and pollutants to the MS4 and receiving waters

• Use permeable material for projects with low traffic areas and appropriate soil conditions

Distributed control of storm water runoff from the site can be accomplished by applying small collection techniques (e.g. green roofs), or integrated management practices, on small sub-catchments or on residential lots. Small collection techniques foster opportunities to maintain the natural hydrology provide a much greater range of control practices. Integration of storm water management into landscape design and natural features of the site, reduce site development and long-term maintenance costs, and provide redundancy if one technique fails. On flatter sites, it typically works best to intersperse landscaped areas and integrate small scale retention practices among the buildings and paving.

Permeable pavements contain small voids that allow water to pass through to a gravel base. They come in a variety of forms; they may be a modular paving system (concrete pavers, grass-pave, or gravel-pave) or poured in place pavement (porous concrete, permeable asphalt). Project applicants should identify locations where permeable pavements could be substituted for impervious concrete or asphalt paving. The O&M of the site must ensure that permeable pavements will not be sealed in the future. In areas where infiltration is not appropriate, permeable paving systems can be fitted with an under drain to allow filtration, storage, and evaporation, prior to drainage into the storm drain system.

Projects can incorporate SD-6 by implementing the following planning and design phase techniques as applicable and practicable:

• Implementing distributed small collection techniques to collect and retain runoff
• Installing permeable pavements (see SD-6B in Appendix E)

DISCUSSION:

This project is the construction of a single family home on a previously developed home site. The small proposed site does not support bio-retentions or infiltration trenches. Mechanical means will be used to treat the storm water before discharging it to the public street.

SD-7: Landscape with native or drought tolerant species

All development projects are required to select a landscape design and plant palette that minimizes required resources (irrigation, fertilizers and pesticides) and pollutants generated from landscape areas. Native plants require less fertilizers and pesticides because they are already adapted to the rainfall patterns and soils conditions. Plants should be selected to be drought tolerant and not require watering after establishment (2 to 3 years). Watering should only be required during prolonged dry periods after plants are established. Final selection of plant material needs to be made by a landscape architect experienced with LID techniques. Microclimates vary significantly throughout the region and consulting local municipal resources will help to select plant material suitable for a specific geographic location.

Projects can incorporate SD-7 by landscaping with native and drought tolerant species. Recommended plant list is included in Appendix E (Fact Sheet PL).

DISCUSSION:

This project will be landscaped with native and drought tolerant species.

SD-8: Harvest and use precipitation

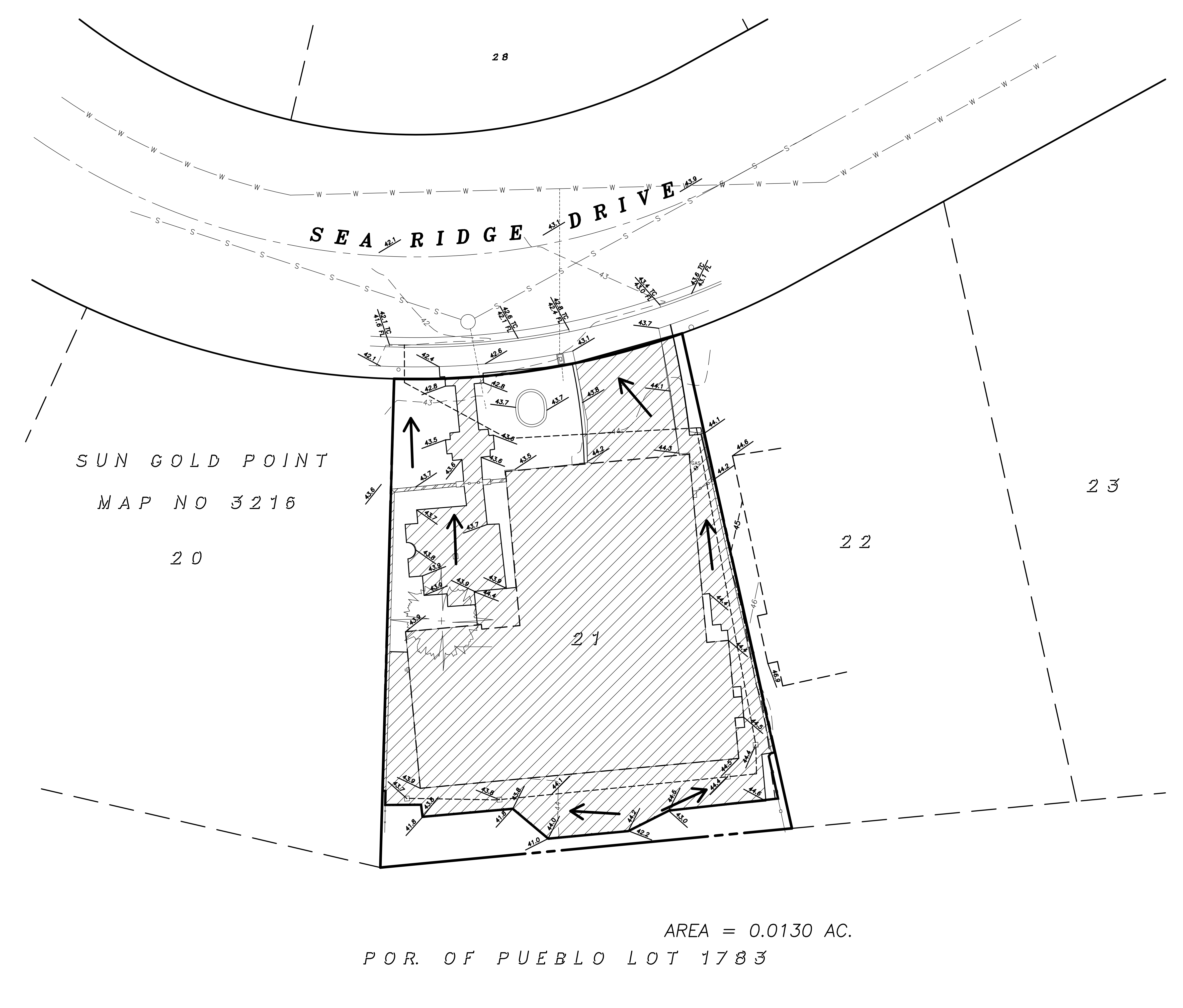
Harvest and use BMPs capture and stores storm water runoff for later use. Harvest and use can be applied at smaller scales (Standard Projects) using rain barrels or at larger scales (PDPs) using cisterns. This harvest and use technique has been successful in reducing runoff discharged to the storm drain system conserving potable water and recharging groundwater.

Rain barrels are above ground storage vessels that capture runoff from roof downspouts during rain events and detain that runoff for later reuse for irrigating landscaped areas. The temporary storage of roof runoff reduces the runoff volume from a property and may reduce the peak runoff velocity for small, frequently occurring storms. In addition, by reducing the amount of storm water runoff that flows overland into a storm water conveyance system (storm drain inlets and drain pipes), less pollutants are transported through the conveyance system into local creeks and the ocean. The reuse of the detained water for irrigation purposes leads to the conservation of potable water and the recharge of groundwater. SD-8 fact sheet in Appendix E provides additional detail for designing Harvest and Use BMPs. Projects can incorporate SD-8 by installing rain barrels or cisterns, as applicable.

DISCUSSION:

This project will not include harvesting of storm water. The site is to compact to efficiently use rail barrels for storm capture and use as irrigation water.

MICHAEL L. SMITH, RCE 35471



ATTACHMENT A

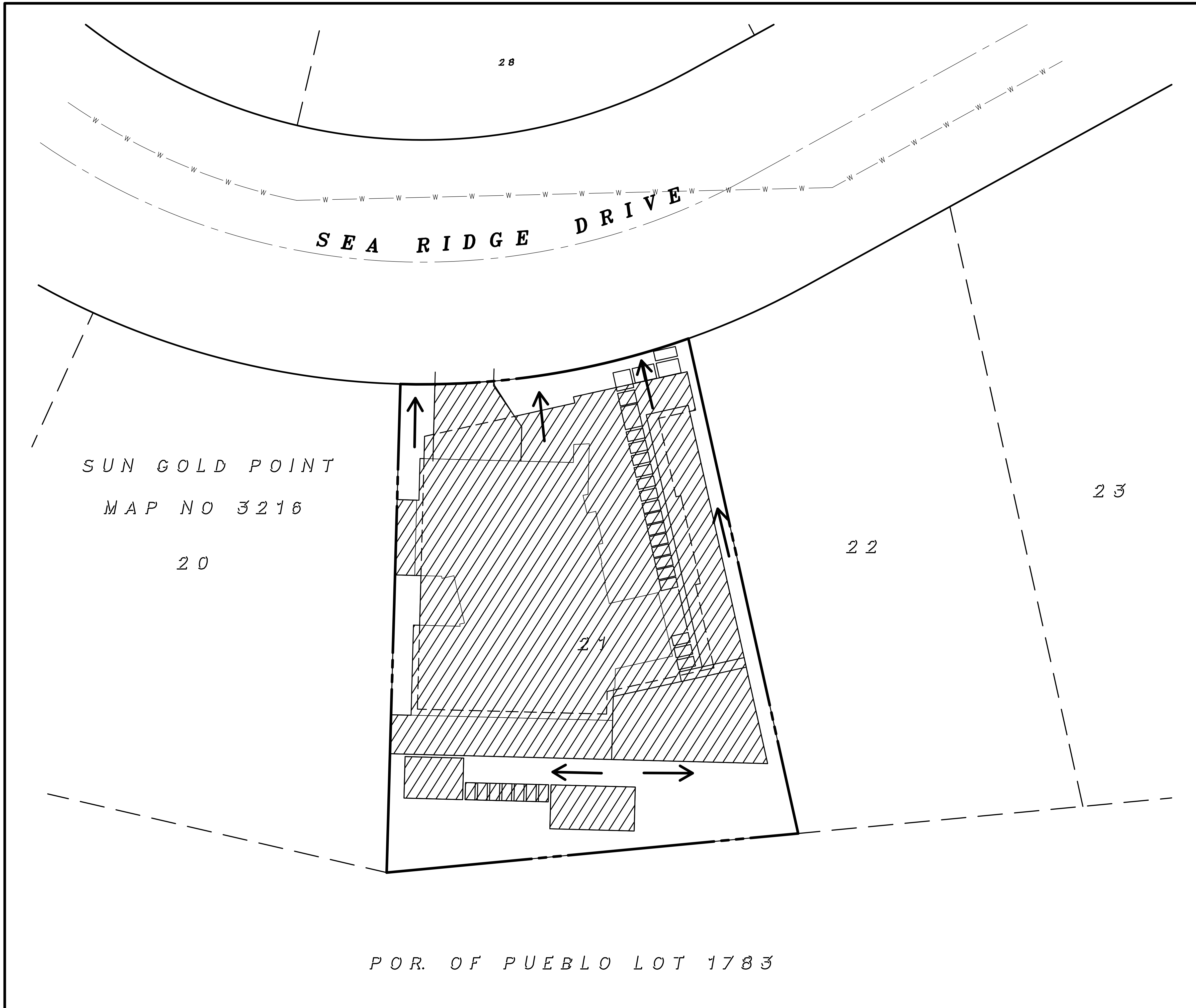
SCALE 1" = 20'

PROJECT AREA
AREA = 0.1647 AC. OR 7174 SF.

IMPERVIOUS AREA
AREA = 0.1239 AC.
PERCENTAGE OF
TOTAL AREA = 75.2

LANDSCAPED AREA
AREA = 0.0408 AC.
PERCENTAGE OF
TOTAL AREA = 24.8

EXISTING IMPERVIOUS AREA PLAN



ATTACHMENT A

SCALE 1" = 20'

SITE AREA
AREA = 0.1647 AC. OR 7174 SF.

IMPERVIOUS AREA
AREA = 0.1183 AC.
PERCENTAGE OF
TOTAL AREA = 71.8

LANDSCAPED AREA
AREA = 0.0464 AC.
PERCENTAGE OF
TOTAL AREA = 28.2

PROPOSED IMPERVIOUS AREA PLAN

GEOTECHNICAL INVESTIGATION AND
BLUFF STABILITY STUDY
311 SEA RIDGE DRIVE
LA JOLLA, CALIFORNIA

Prepared for
Mr. David M. Lessnick
Las Vegas, Nevada

Prepared by
TERRACOSTA CONSULTING GROUP, INC.
San Diego, California

Project No. 2896
September 23, 2015
Revised: January 26, 2016

Geotechnical Engineering
Coastal Engineering
Maritime Engineering

Project No. 2896
September 23, 2015
Revised: January 26, 2016

Mr. David M. Lessnick
D. Marin Development
1900 Western Avenue
Las Vegas, Nevada 89102

GEOTECHNICAL INVESTIGATION AND
BLUFF STABILITY STUDY
311 SEA RIDGE DRIVE
LA JOLLA, CALIFORNIA

Dear Mr. Lessnick:

In accordance with your request and our Proposal No. 15046 dated July 15, 2015, TerraCosta Consulting Group, Inc. (TerraCosta) has performed a geotechnical investigation and bluff stability study for the proposed construction of a single-family residence to be located at 311 Sea Ridge Drive in La Jolla, California.

The accompanying report presents the results of our field investigative work, laboratory testing, and engineering analyses of the subsurface conditions at the site, and presents our conclusions and recommendations pertaining to the geotechnical aspects of site development.

We appreciate the opportunity to work with you on this project, and trust this information meets your present needs. If you have any questions or require further information, please give us a call.

Very truly yours,
TERRACOSTA CONSULTING GROUP, INC.

Walter F. Crampton, Principal Engineer
R.C.E. 23792, R.G.E. 245

Gregory A. Spaulding, Project Geologist
C.E.G. 1863, C.H.G. 351, R.G. 5892

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(continued)

GEOTECHNICAL INVESTIGATION AND
BLUFF STABILITY STUDY
311 SEA RIDGE DRIVE
LA JOLLA, CALIFORNIA

1 INTRODUCTION AND PROJECT DESCRIPTION

The subject property is located at 311 Sea Ridge Drive, near the intersection of Sea Ridge Drive and Calumet Avenue in the La Jolla area of San Diego, California (see Vicinity Map, Figure 1). As we understand, the proposed project consists of demolition of an existing house and site improvements, and construction of a new two-story house with a basement area and third-story penthouse, and construction of a side-yard lap pool. Bluff-top retaining walls will also remain intact, and aside from landscape improvements, no improvements are proposed on the southerly (seaward) side of the property. A 3.5- to 4-foot-deep lap pool will be constructed on the easterly side of the property behind the 25-foot bluff-top setback line, parallel with the easterly property line.

The site is located atop a southerly facing coastal bluff, which descends approximately 40 feet from the top-of-bluff, down to the Pacific shoreline. The Site Plan, Figure 2, and the Generalized Geologic Cross Sections, Figures 3 and 4, show the general topographic and geologic conditions at the site. Figure 2 also indicates the approximate footprint of the planned residential structure.

1.1 Background

The subject site and surrounding area was part of the U.S. military's Bird Rock Coastal Defense and Anti-Aircraft Training Center during World War II and up until the 1950s, when residential properties began to encroach on the facility. Evidence of the old coastal defense facilities can still be seen in the bluffs today, and our review of documents indicates that the area was subdivided and redeveloped into residential lots in the mid to late 1950s.

2 PURPOSE AND SCOPE OF WORK

The purpose of our study is to provide geotechnical information to assist you and your consultants in project design, and to address City of San Diego and California Coastal Commission concerns regarding the proposed project.

For input in performing our studies and preparing this report, we have reviewed geologic literature, maps, historic aerial stereographic and oblique photographs, and other relevant reports and documents in our files. References are provided at the end of this report.

In particular, our investigation is designed to address the following geotechnical issues:

- The geologic setting of the site;
- Potential geologic hazards;
- Geotechnical characteristics of the on-site soils;
- Groundwater;
- Proposed site grading;
- Foundation design, including allowable soil bearing and earth pressure values;
- On-site and off-site surface water drainage;
- Construction-period stability of cut slopes;
- Gross stability of the coastal bluff, including the location of the 1.5 factor of safety line; and
- Predicted bluff retreat over the next 75 years.

3 FIELD INVESTIGATION AND LABORATORY TESTING

A limited geologic reconnaissance was performed on the subject site and immediately adjacent areas. Our subsurface investigation included the excavation of three 6-inch-diameter hollow-stem auger borings and one 3-inch-diameter hand-auger boring to depths ranging from 2.75 feet to 10.5 feet. The auger borings were advanced using a limited-access tripod-mounted drill rig. The locations of the auger borings are shown on the Site Plan, Figure 1. A Key to Excavation Logs is presented in Appendix A as included on Figure A-1.

Final logs of the test borings are presented as Figures A-2 and A-3. Mapping of the bluff face provided additional data to aid in characterizing the geologic site conditions.

Selected representative samples were tested in the laboratory to classify and evaluate the engineering properties of the on-site soils. Laboratory tests were performed to establish moisture/density relationships, grain size analyses, and strength characteristics. The results of our laboratory testing are presented in Appendix B.

4 GEOLOGY AND SITE CONDITIONS

4.1 Geologic Setting

The coastal plain of San Diego County is characterized by thick sequences of interbedded Eocene and Cretaceous marine siltstones, claystones, sandstones, and conglomerates upon which younger Quaternary-age deposits rest. Coastal bluff retreat, a geomorphic process that has operated for millions of years and continues today along most of San Diego's coastline, has formed steep coastal bluffs ranging up to as high as 300 feet in elevation in San Diego County.

Locally, the project site is situated at the westerly bluff-terminated edge of an approximately 1/2-mile-wide gently westerly-sloping coastal terrace, one of a sequence of well-defined wave-cut abrasion terraces created primarily by higher eustatic sea stands during Pleistocene-age interglacial episodes and, to a lesser degree, by tectonic uplift.

4.2 Site Conditions

The subject 60- to 84-foot-wide by 100- to 103-foot-deep property is bounded on the north by Sea Ridge Drive, on the east and west by adjoining residential lots, and on the south by the Pacific shoreline. From the general alignment of the top-of-bluff, the lot-grade ground surface descends to the north at an average angle of approximately 1 degree (below the horizontal), draining down to Sea Ridge Drive. Based on our review of 1953 aerial photographs, this surface was altered during the grading and construction of the Sun Gold Point residential development in the mid to late 1950s.

From the top-of-bluff, the upper coastal bluff (underlain by Quaternary terrace deposits) descends seaward at an average angle of approximately 75 degrees down to approximate elevation 32 feet (MSLD) at the top of the near-vertical cliff-forming Cabrillo Formation. As indicated on Figures 3 and 4, the lower cliffed part of the coastal bluff is underlain by the relatively erosion-resistant Cabrillo Formation.

4.3 Subsurface Conditions

Three soil and geologic units (the lower-bluff Cretaceous Cabrillo Formation, the upper-bluff late Pleistocene terrace deposits, and surficial fill soils) are present in the general site area. These soil units are described below from oldest to youngest.

> Cabrillo Formation: The lower cliff-forming Cabrillo Formation is a predominantly massive medium-grained conglomeratic sandstone. The cross-bedded cobbly conglomerate containing locally derived plutonic and metavolcanic clasts-bedding in the Cabrillo Formation is mapped as dipping 10 degrees to the east. The Cabrillo Formation is typically resistant to marine erosion, except where it has been weakened along joints and shear zones.

> Terrace Deposits: Moderately consolidated, poorly indurated, light reddish-brown, silty fine sands, characteristic of late Pleistocene-age coastal terrace deposits, are exposed in the upper sloping portion of the bluff above approximate elevation 32 feet. Soils within this generally medium dense to dense, but friable, sandy geologic unit include nearshore marine and beach sands lithologically characteristic of the (approximately 120,000 years old) Bay Point Formation.

> Fill Soils: Locally derived fill soils cap the upper 3 to 5 feet of the lot. These soils were likely placed during finish grading of the lot in the mid to late 1950s.

5 GEOLOGIC HAZARDS

5.1 Faulting and Seismicity

The site is located at 32.808° North latitude and 117.267° West longitude, in a moderately-active seismic region of Southern California that is subject to significant hazards from moderate to large earthquakes. Ground shaking from ten major active fault zones could affect the site in the event of an earthquake. The nearest of these, the northerly offshore extension of the Rose Canyon fault zone, trends north-northwest and has been mapped approximately 2.4 miles east-northeast of the site. No known active faults have been mapped, nor were any observed during our geologic reconnaissance at, or in the immediate vicinity of, the site.

5.2 Landslides

Landslides have not been mapped as being present, both on and immediately adjacent to the site. However, bluff failures are known to occur in the area. These failures have generally occurred because of heavy localized seepage caused by overirrigation or broken water pipe, or by uncontrolled runoff over the face of the bluff.

6 GROUNDWATER

Groundwater was not encountered in our test borings. However, it should be noted that perched groundwater seepage has been observed along the contact between the terrace deposits and the underlying Cabrillo Formation and various other locations in the general project site area.

7 COASTAL ENVIRONMENT

The site is located within the northern portion of the Mission Bay Littoral Cell and is characterized by a rocky sea cliff-bounded shoreline with a few small sandy pocket beaches (U.S. Army Corps of Engineers [USACE], 1988). The Mission Bay littoral cell is an area of sand movement along the coast bounded by Point La Jolla to the north and Point Loma to the south, a distance of approximately 13.5 miles. Under natural conditions, a littoral cell is supplied with sediment by rivers and streams that empty into the ocean within its limits. The sandy material brought to the coast by fluvial action is then incorporated into the beach sands and transported south (in most areas) along the coast by wave action. This longshore transport of sand is ultimately intercepted by a submarine canyon or other sink, where it is diverted offshore and lost to the nearshore environment. The Mission Bay Littoral Cell is primarily supplied with sediment by the San Diego River (USACE, 1988).

7.1 **Wave Climate**

Waves provide nearly all of the energy input that drives shoreline processes along the California coast. As illustrated in Figure 5, incoming waves along the southern California coast fall into three main categories: Longer period northern and southern hemisphere swell, and locally short-period generated seas. North hemisphere swell from the North Pacific Ocean dominate the winter wave conditions off California, while southern hemisphere swell is more important in the summer. Short-period seas are produced by storms sweeping through the area. The offshore islands, shallow banks, submarine canyons and generally complex bathymetry of southern California greatly complicate the wave climate at the coast (Figure 6).

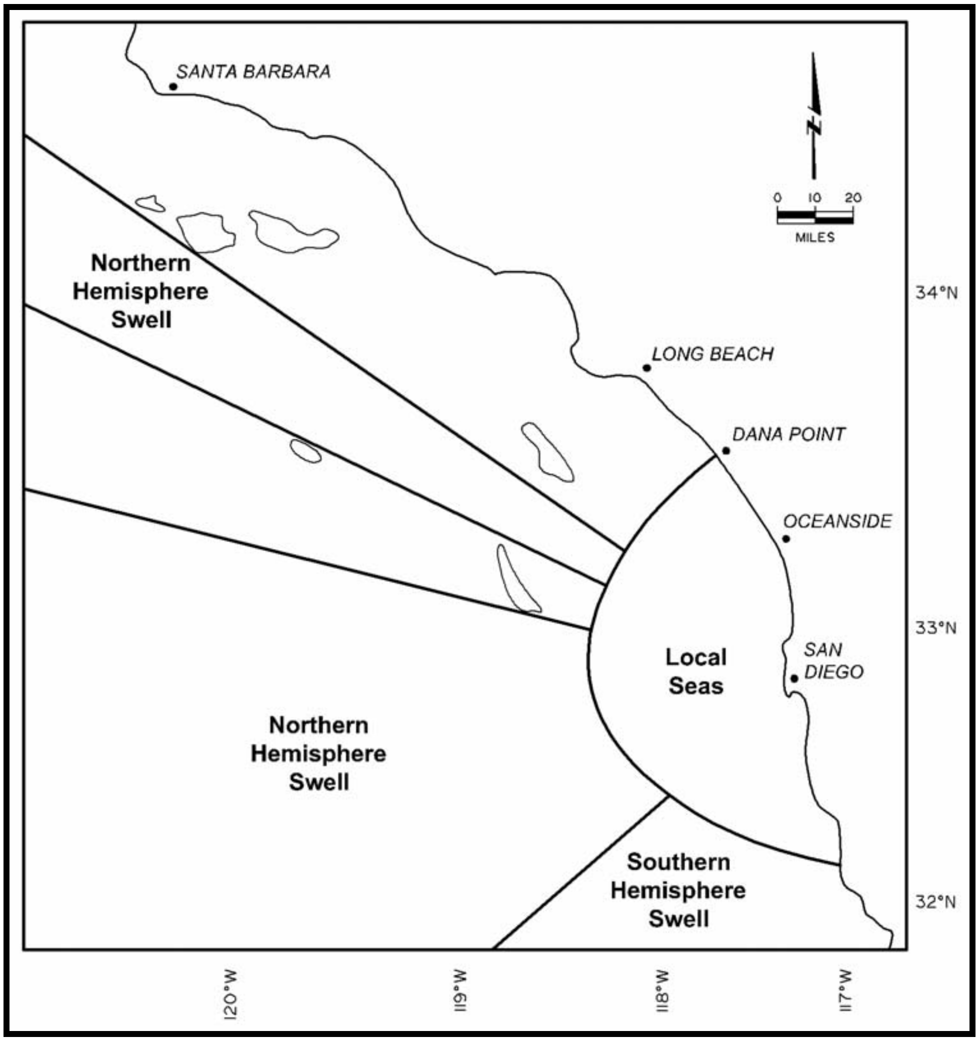

Figure 5. Map Showing Generalized Wave Exposure for Southern California.

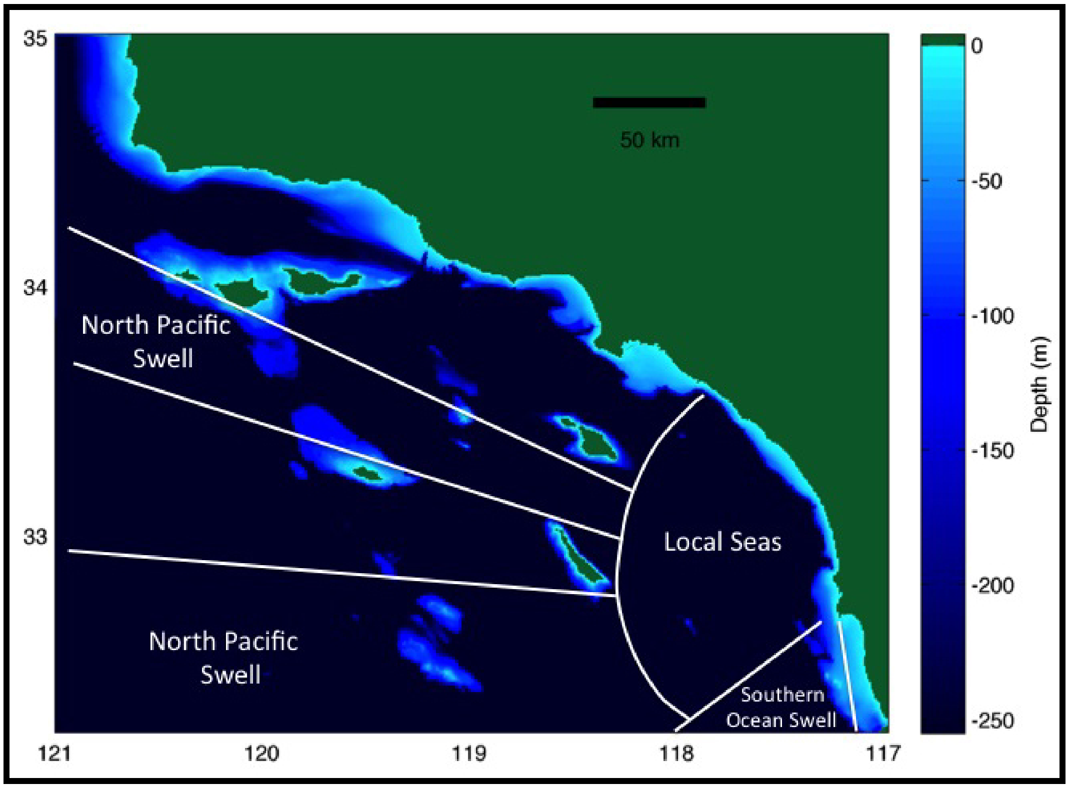

Figure 6. Map Showing Generalized Bathymetry in the Southern California Bight and Wave Exposure Windows at Oceanside.

Coastal orientation, and the islands and banks greatly influence the swell propagating toward shore by partially sheltering southern California, including La Jolla, especially from directions north of west. Figure 6 shows the approximate directions from which incoming swell is blocked by the islands. The coastline fronting the subject site faces south and is therefore also exposed to southern hemisphere swell. Because of the complicated effects of bathymetry and island shadowing, the wave height at the shoreline is sensitive to relatively small changes in the incoming direction of the deep ocean waves.

While waves along the San Diego County shoreline generally range in height from 2 to 5 feet, deep water waves off the coast have been recorded with deep water significant wave heights approaching 10 meters (33 feet).

7.2 Short-Term Sea Level Change

The effect of waves on the coast is highly dependent on the sea level during the wave episode. Large waves at low sea level cause limited erosion, since they break well offshore. When episodes of large waves combine with short-term high sea level from tides and other factors, rapid retreat may occur along vulnerable coastlines.

7.2.1 *Tides*

Tides are caused by the gravitational pull of astronomical bodies; primarily the moon, sun, and planets. Tides along the San Diego coast have a semi-diurnal inequality. On an annual average basis, the lowest tide is about 1.6 feet (MLLW datum) and the highest tide is about 7.1 feet, MLLW datum.

7.2.2 *El Niño*

Large-scale, Pacific Ocean-wide warming periods occur episodically and are related to the El Niño phenomenon. These meteorological anomalies are characterized by low atmospheric pressures and persistent onshore winds. During these events, average sea levels in southern California can rise up to 0.5 foot above normal. Tidal data indicates that six episodes (1914, 1930 through 1931, 1941, 1957 through 1959, 1982 through 1983, and 1997 through 1998 - mild El Niño-type conditions were also reported in 1988 and 1992) have occurred since 1905. Further analysis suggests that these events have an average return period of 14 years, with 0.2-foot tidal departures lasting for two to three years.

The added probability of experiencing more severe winter storms during El Niño periods increases the likelihood of coincident storm waves and higher storm surge. The record water level of 8.35 feet, MLLW, observed in San Diego Bay in January 1983, includes an estimated 0.8 foot of surge and seasonal level rise (Flick and Cayan, 1984), which set the stage for the wave-induced flooding and erosion that marked that winter season.

7.3 Sea Level Rise

Past and possible future changes in mean sea level (MSL) are of interest in design and planning for all coastal cities, as well as for any engineering activities on the coast. Global mean sea level rose at least 300 feet, and perhaps as much as 400 feet, during the past 18,000 years or so (CLIMAP, 1976). Sea level, both globally and along California, rose approximately 0.7 foot over the past century, as shown in Figure 7. Furthermore, evidence suggests that the rate of global mean sea level rise has accelerated since the mid-1800s, or even earlier (Church and White, 2006; Jevrejeva, et al., 2008), and that it has now reached a rate of about 1 foot per century over the past decade or so (Nerem, et al., 2006).

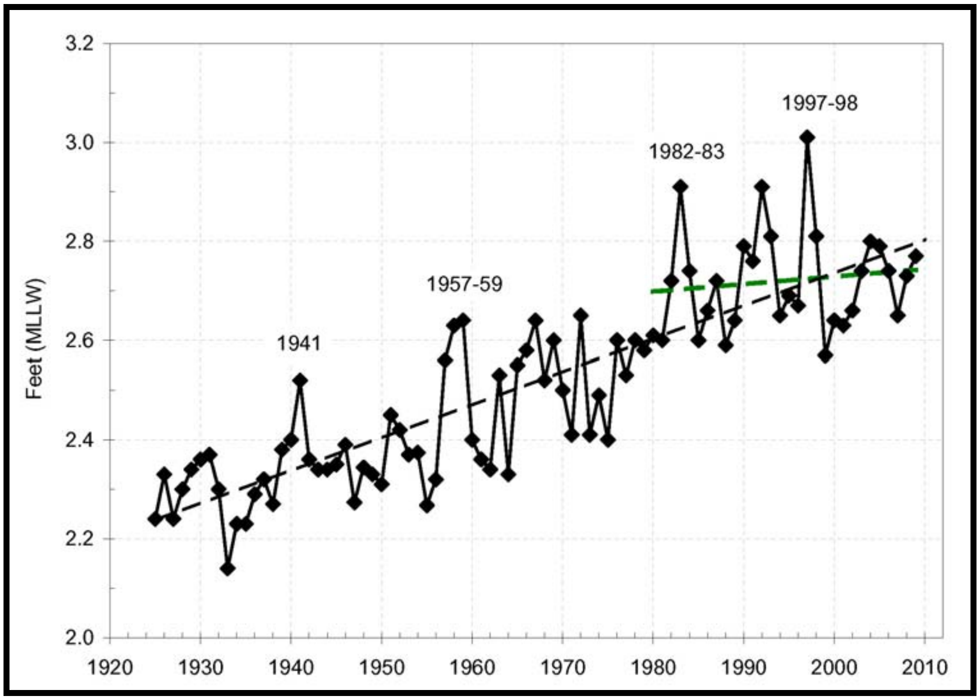

Figure 7. Annual Average Sea Level History at La Jolla, 1925-2007. Broken Line Shows Linear Trend of 0.7 Feet/Century Rise.

Figure 7 is a plot of the annual mean sea levels measured at the La Jolla tide gauge starting in 1925. The linear trend indicates the approximate 0.7 foot per century sea level rise. Also noticeable are the enhanced sea levels during the El Niño episodes of 1941, 1957-59, 1982-83, and 1997-98 (respectively labeled).

A notable feature of the sea level history at La Jolla is the leveling-off of sea level rise since about 1980 (Figure 7). The green broken line shows a much reduced trend of about 0.15 foot per century between 1980 and 2009, or about 4.5 times smaller than the overall trend of 0.67 foot per century. A similar reduction in the rate of sea level rise has been noted at San

Francisco, which has a similar overall appearance as the La Jolla record, but is a much longer record extending back to 1856.

Figure 8 shows the global distribution of the rate of sea level change for the period of 1993-2012 (University of Colorado, 2012). Note that warm colors (yellow-orange-red) show areas of sea level rise (positive rates), while cool colors (green- blue) indicate falling sea level (negative rates) over the record. Inspection of the North Pacific reveals that sea levels in the western Pacific, especially in the lower latitudes, have risen at a rate of 3-9 mm/year (equivalent to 30-90 cm per century, or about 1-3 feet per century). Conversely, sea levels in the eastern Pacific, extending from Central America north to Washington State, have fallen at a rate of 0-3 mm per year (0-30 cm per century, or 0-1 foot per century). This may explain the coastal tide gauge observations (La Jolla sea level history; Figure 7) described above.

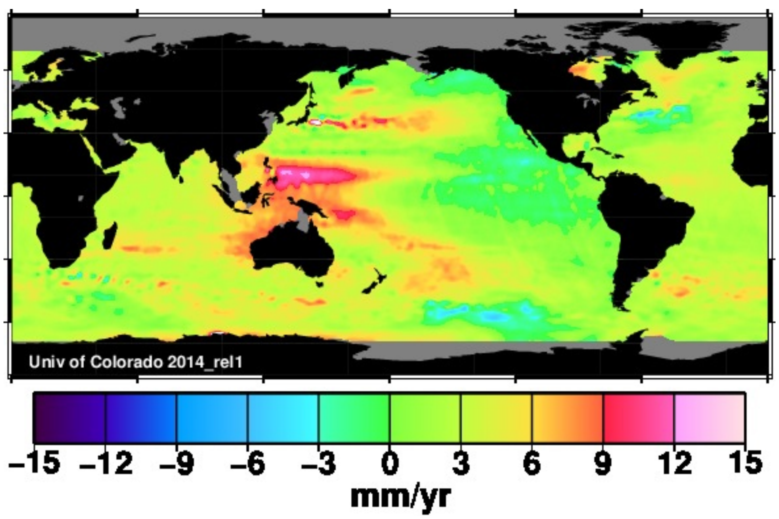

Figure 8. Global Sea Level Change Rates 1993-2012 as derived from satellite altimetry measurements, following University of Colorado (2012).

While the cause of these regional differences undoubtedly lies in the large-scale circulation of the Pacific Ocean and the overlying atmosphere, no detailed explanation is known. However, these observations could be a cause for some concern. If the conditions driving sea level up in the western Pacific and down in the eastern Pacific were to relax or even reverse, sea level along the coast of California could begin to increase at a much higher rate than what has been observed over the past several decades. Future global sea level rise scenarios could further increase the rate of sea level rise.

7.4 Water Levels

Past water elevations are based on the tide gauge data from La Jolla, which has been collected at Scripps Institution of Oceanography (SIO) Pier since 1924. These data are applicable to the San Diego region open-ocean coastline. The tidal and geodetic reference relationships at La Jolla are illustrated in Figure 9.

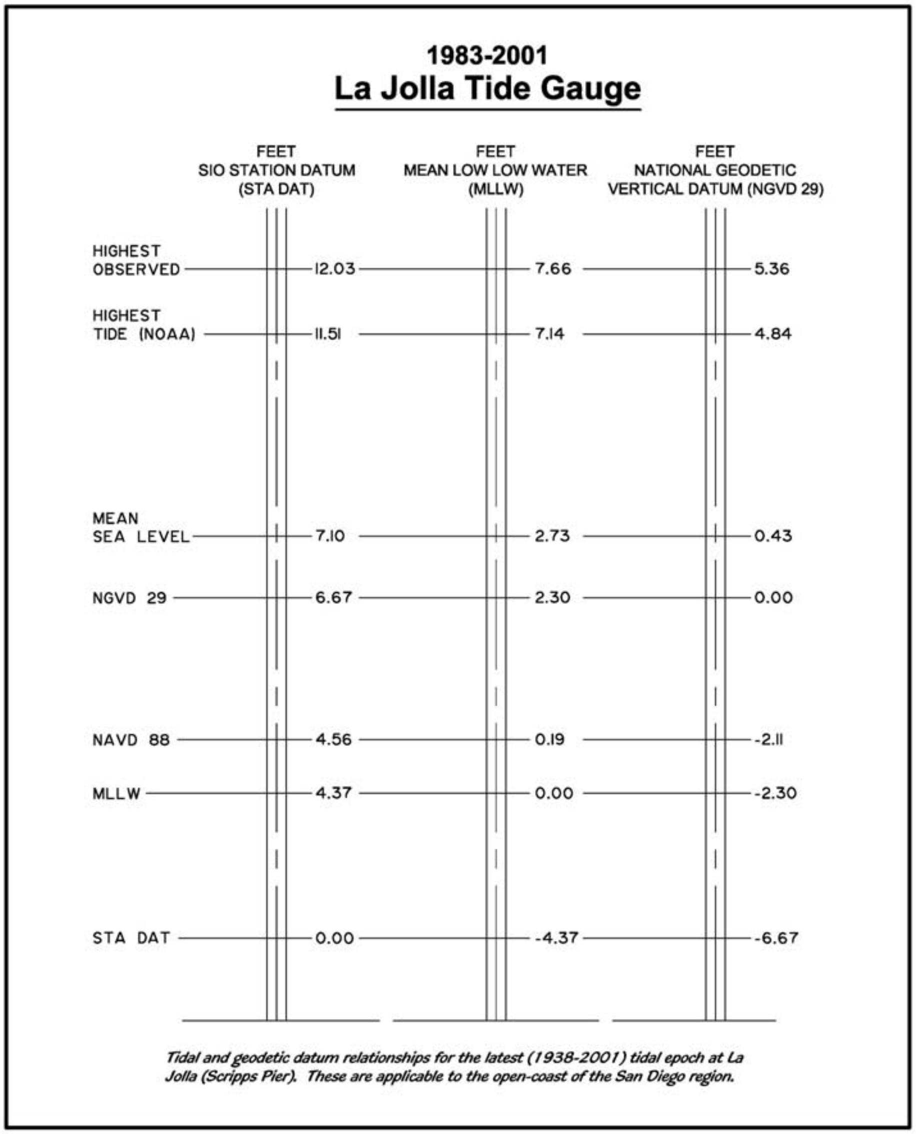

Figure 9. Sea Level Datums.

Tide gauges measure total water level outside the breaker zone, which includes contributions from the tide, as well as storm surges and other factors that raise sea level over the short and long term, including the effects of El Niño. All non-tide sea level influences measured by the tide gauges are termed "non-tide residuals, or "NTR." Importantly, tide gauges do not include the effects of waves or wave-driven runup. At the shoreline and on beaches, wave-driven runup is a crucial component of the design water elevation and must be determined by means other than tide gauge data. Alternatively, as the back beach becomes flooded during high tide and low beach sand level events, the standard runup formulations may not apply, and other factors, including local shallow-water depth-limited waves, must be considered.

When considering the effects of future sea level rise, the National Academy of Sciences (NAS, 2012) presents a possible global, west-coast, and state-wide future Mean Sea Level Rise (MSLR) for California, Oregon, and Washington (Figure 10, dots) and its range (Figure 10, bars). These are based on the IPCC (2007) mid-range Green House Gas emissions scenarios for the ocean steric (warming) expansion component added to the results of new research projecting the likely contributions of future ice-melt. The resulting projected *global* MSLR relative to 2000 ranged from 0.08-0.23 m (0.26-0.75 ft) by 2030; 0.18-0.48 m (0.59-1.6 ft) by 2050; and 0.50-1.4 m (1.6-4.6 ft) by 2100 (Figure 10, red bars). The global estimates were adjusted for vertical crustal movement (uplift north of Cape Mendocino and down-drop in the south) resulting in the orange bars, also shown in Figure 10. The State of California (2013) used these results of NAS (2012) shown as the updated MSLR guidance in Table 1.

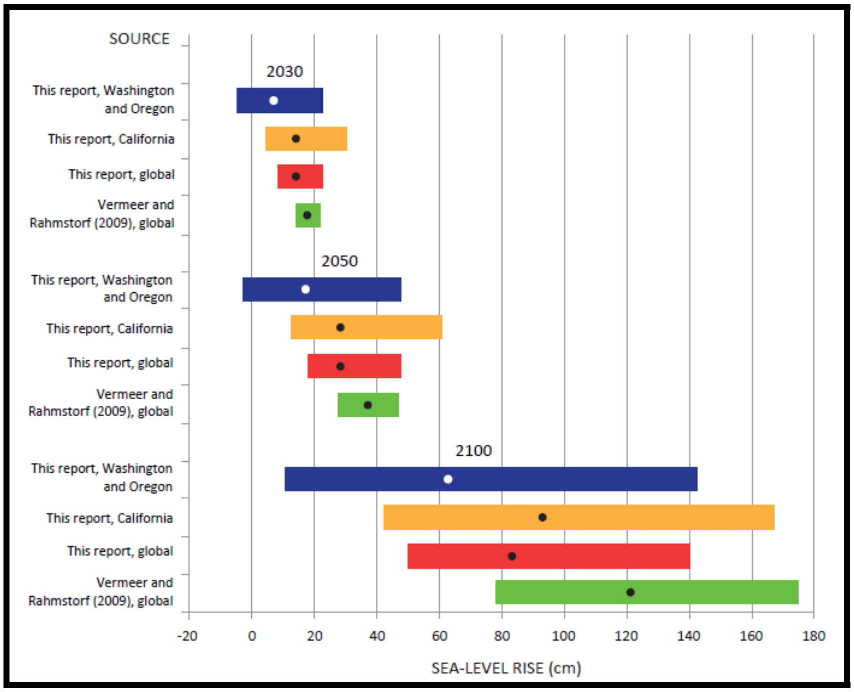

Figure 10. NAS (2012) summary of global, Washington, Oregon, and California (south of Cape Mendocino) MSLR projections for 2030, 2050, and 2100 relative to 2000.

Table 1. Updated MSLR Guidance from State of California (2013)

Time Period	North of Cape Mendocino[3]	South of Cape Mendocino
2000 - 2030	-4 to 23 cm (-0.13 to 0.75 ft)	4 to 30 cm (0.13 to 0.98 ft)
2000 – 2050	-3 to 48 cm (-0.1 to 1.57 ft)	12 to 61 cm (0.39 to 2.0 ft)
2000 – 2100	10 to 143 cm (0.3 to 4.69 ft)	42 to 167 cm (1.38 to 5.48 ft)

8 BLUFF EROSION

This section of coastline is characterized by steep coastal bluffs comprised of relatively erosion-resistant Cretaceous-age strata (Point Loma or Cabrillo Formations) at the bluff base and a less resistant upper bluff (Bay Point Formation), with a narrow cobble beach at the base of the bluff. The bluff in the project area is located in a medium to high energy wave environment subject to direct wave impact. As a result of wave-induced erosion, various attempts at coastal fortification have been previously installed in the project area, incorporating rock revetments and concrete debris from demolition of the military base, as can be seen in photographs available on the Coastal Records website (www.californiacoastline.org - Image No. 201312514).

8.1 Lower Bluff Erosion

Review of historical photographs dating back to the 1970s does not reveal a great deal of long-term lower bluff erosion in the general area of this site. Younger Tertiary-age formations to the north, Solana Beach for example, exhibit erosion rates on the order of 0.4 foot per year. The Cabrillo Formation, which is just slightly younger than the erosion-resistant Point Loma Formation, both of which pre-date the Tertiary-age formations, would be expected to have a much lower erosion rate, likely on the order of 2 to 3 inches per year.

8.2 Empirical and Analytical Techniques of Erosion Rate Assessment

The scientific community has been actively engaged in developing numerical models to assess rates of shoreline erosion. Numerical models attempt to address both the landward retreat of the sea cliff and the development of the shore platform. In this simplest expression, predictive cliff-erosion models take the following form (Sunamura, 1977):

$$dx/dt \propto \ln\left(\frac{f_w}{f_r}\right)$$

where *dx/dt* is the horizontal rate of erosion, f_w is the wave force, and f_r is the rock resistance. Similar equations have been developed to describe platform development.

Of particular interest in numerical modeling is the fact that a minimum or critical wave height capable of causing erosion exists, below which, for a given rock lithology, no erosion would occur. Additionally, the rate of erosion increases in logarithmic proportion to increase in wave force, which is substantially less than a linear increase in wave energy. Importantly, however, these numerical models describe the mechanical erosion of intact rock of assumed uniform lithology, and do not account for the accelerated erosion caused by the hydrodynamic component of wave forces that occurs in fractured rock.

When using the preceding equation, and when comparing the site conditions with San Diego's North County Tertiary cliff-forming sediments, the wave force (f_w) is likely similar for the subject site and North County San Diego. Importantly, however, the erosion resistance of the rock (f_r) is considerably stronger for the Cretaceous sediments than for the Tertiary sediments. This suggests both a more severe storm wave to initiate erosion of the sea cliff, and a corresponding reduction in marine erosion for a given design wave event from the Cretaceous sediments than from the North County Tertiary sediments. Thus, one would again conclude that, in the absence of more data, the annualized average erosion rate for the site would be on the order of 2 to 3 inches (0.17 to 0.25 foot) per year, given the more well-defined erosion rate of the Tertiary sediments of 4.8 inches (0.4 foot) per year.

9 SLOPE STABILITY

9.1 Soil Conditions

In order to assess the stability of the upper bluff, slope stability analyses were performed using the following soil strengths.

Fill:
φ = 30 degrees
c = 100 psf
γ_t = 120 pcf

Terrace (Bay Point Formation):
φ = 33 degrees
c = 300 psf
γt = 125 pcf

Cabrillo Formation:
φ = 30 degrees
c = 1000 psf
γt = 125 pcf

9.2 Slope Stability Analyses

The stability of the upper portion of the coastal bluff was evaluated using the computer software GSTABL7. GSTABL7 is a graphical program that uses limit equilibrium theory to compute the factor of safety for earth and rock slopes. The Modified Bishop Method was selected for analyses of the subject slope (see Figures 2, 3, and 4).

Slope stability analyses indicate that the existing static factor of safety with regard to slope stability is greater than 1.5, with computed factors of safety of 1.79 for Section A (Figure 3) and 1.90 for Section B (Figure 4). Under pseudo-static conditions corresponding to a horizontal seismic coefficient of 0.15 g, the slope has a computed factor of safety greater than 1.1, with computed factors of safety of 1.47 for Section A (Figure 3) and 1.56 for Section B (Figure 4). As such, from both a static and pseudo-static perspective, the slope is considered stable. Summary results of the stability analyses are included in Appendix C.

10 BLUFF-TOP SETBACK REQUIREMENTS

The City of San Diego uses three criteria for evaluating bluff-top setbacks behind which structures may be located. Depending upon the stability of the bluff, the City requires a minimum bluff-top setback of either 40 feet for unstable bluffs or 25 feet for bluffs that have been demonstrated as being stable. Given that the slope in question is stable, the City requires a minimum 25-foot bluff-top setback. In addition, the City requires consideration be given to the minimum setback that would be required to accommodate 75 years of annualized bluff retreat, which in this area we estimate to be 18.75 feet. For this site, we estimate the controlling bluff-top setback to be from the minimum 25-foot setback line.

11 GEOTECHNICAL CONCLUSIONS AND RECOMMENDATIONS

11.1 General

Our investigation did not reveal the presence of any unmitigated adverse geologic conditions on the site, such as faults, adverse bedding, or a high groundwater table, that might preclude development of the currently-proposed new construction.

11.2 Proposed Site Grading

We anticipate that the site preparation and earthwork operations for the project will include:

- Demolition of existing structures;
- Clearing and grubbing;
- Removal and recompaction of soils for the support of structural elements, such as the new house, walkways and area flatwork (patios, etc.), pavements, retaining walls; and
- Excavation for foundations and the basement, and lap pool behind the 25-foot bluff-top setback line.

We recommend that all grading and site preparation be performed under the observation of the geotechnical engineer, and in accordance with the attached specifications for engineered fill (Appendix D). In addition, we recommend that vegetation, trash, rubble, and other deleterious material be removed from the site prior to grading. All loose and porous topsoil, residual soils, slopewash, and uncontrolled fill soils not removed by the grading operations should be excavated and removed prior to placing additional fill or structural elements. We recommend that the geotechnical engineer confirm the actual depths and extent of removal of unsuitable materials in the field at the time of grading. Based on the results of our exploratory borings and laboratory testing, the deposits of unsuitable materials requiring overexcavation generally range from 1 to 6 feet in depth. As we understand, the proposed building foundations and swimming pool will be below the depths of any unsuitable overburden soils and founded on competent terrace formational soils.

Any excavations resulting from utility removals should be properly backfilled, and the backfill compacted in accordance with the specifications provided in Appendix D. Utility trenches under foundations or pavements should be backfilled with material that provides similar stiffness as adjacent areas. In these cases, cement-sand slurries may be warranted, depending on adjacent soil properties.

We recommend that all fill soils be compacted to a minimum density of 90 percent of the maximum dry density, as determined by ASTM Test Method D 1557. Moisture content should be maintained between the optimum moisture content and 3 percent above optimum.

We recommend that the geotechnical engineer review the foundation and grading plans to verify that the intent of the recommendations presented herein has been properly interpreted and incorporated into the contract documents. We further recommend that the geotechnical engineer observe the site grading, foundation excavations, construction of retaining walls, and subgrade preparation under concrete slabs and paved areas.

If construction proceeds through the rainy winter months, we recommend that adequate surface drainage be provided to drain water away from any open excavations.

11.3 Building Foundations

11.3.1 *Bearing Capacity*

For foundations having a minimum width of 12 inches, and founded a minimum of 18 inches below finished final grade, we recommend an allowable net bearing pressure of 2,000 psf. In addition, we recommend that adjacent footings not be founded above an imaginary plane extending upward at an angle of 45 degrees from the bottom outside edge of an adjacent lower footing. Additionally, we recommend that all footings be adequately reinforced as recommended by a structural engineer experienced with the design of shallow foundation systems. Footing excavations should be cleared of any loose material prior to concrete placement. Lastly, we recommend that the geotechnical engineer inspect all footing excavations.

11.3.2 *Settlement*

We estimate that footings loaded to an allowable bearing pressure of 2,000 psf will settle approximately 1/2 inch or less, with differential settlements on the order of 1/4 inch or less.

11.3.3 *Lateral Resistance*

To provide resistance for design lateral loads of footings and shear keys poured neat against vertical excavations, we recommend using an equivalent fluid pressure of 300 or 450 pcf for properly compacted granular fill or competent formational materials, respectively. These values assume a horizontal surface for the soil mass extending at least 10 feet from the face of the footing or three times the height of the surface generating the passive pressure, whichever is greater. The upper 12 inches of soil in areas not protected by floor slabs or pavements should not be included in design for passive resistance to lateral loads.

If friction is to be used to resist lateral loads, we recommend a coefficient of friction of 0.45 between soil and concrete for either compacted fill or formational soil. If it is desired to combine friction and passive resistance in design, we recommend reducing the friction coefficient by 25 percent.

11.3.4 *Concrete Slabs-on-Grade*

We recommend that concrete slabs-on-grade be designed in accordance with the CBC and the American Concrete Institute's (ACI) Committee Report No. 360. In addition, we recommend that the construction of concrete slabs-on-grade conform to the guidelines and specifications presented in ACI Committee Report No. 302.

11.3.5 *Pipes and Trenches*

Open or backfilled trenches, which are generally aligned in parallel with a footing shall not be below a plane having a downward slope of 1 unit vertical to 2 units horizontal (50% slope) from a line 9 inches above the bottom edge of the footing and not closer than 18 inches form the face of such footing.

Where pipes cross under footings, the footings shall be specially designed. Pipe sleeves shall be provided where pipe crosses through footings or footing walls, and sleeve clearances shall provide for possible footing settlement, but not less than 1 inch.

11.3.6 *Water- and Damp-Proofing Foundation Systems*

As a minimum, we recommend that the basement walls, along with all concrete slabs and foundation systems for the proposed structures be waterproofed and/or damp-proofed in accordance with Chapter 18, Section 1805, of the 2013 CBC.

11.4 Retaining Walls

For cantilevered retaining walls that are free to rotate through a horizontal movement of at least 0.002H at the top of the wall (where H is the height of the wall in feet), we recommend the following.

We recommend providing all retaining walls with a backfill drainage system adequate to prevent buildup of hydrostatic pressures.

For cantilevered retaining walls with level backfill, and which retain granular soils that comply with the material requirements of Section 300-3.5 (Structure Backfill) of the Standard Specifications for Public Works Construction (SSPWC), and that extend a minimum distance equal to 80 percent of the height of the wall, we recommend a design lateral earth pressure equivalent to a fluid pressure of 35 pcf. The on-site soils are sandy in nature and, in general, should comply with the requirements of Section 300-3.5 of the SSPWC.

For cantilevered retaining walls with a 2:1 (horizontal to vertical) backfill slope, which retain granular soils that comply with Section 300-3.5, and extend a minimum distance equal to 80 percent of the height of the wall, we recommend a design lateral earth pressure equivalent to a fluid pressure of 55 pcf.

Cantilevered retaining walls subject to vehicular loads (including the garage floor slab) should be designed to resist an equivalent fluid pressure for the active case described above, plus a surcharge load equal to an additional 2 feet of height of equivalent backfill.

We recommend that walls restrained from movement at the top, such as basement walls, be designed for the active case equivalent fluid pressure given above plus an additional uniform load of 8H psf for granular backfill materials in the backfill prism (that zone of soil extending upward and outward on a 0.8 to 1 plane from the bottom outside edge of the retaining wall footing).

Partially restrained retaining walls can be designed for a load reduction if they can be assumed to deflect. The additional uniform pressure that is added to the active condition equivalent fluid pressure should vary linearly from 8H psf uniform pressure to 0 as the calculated deflection at the top of the wall varies from 0 to 0.002H.

For strip footings supporting the proposed retaining walls, we recommend an allowable bearing pressure of 3,000 psf for footings founded a minimum of 6 inches into competent formational soils, and 2,000 psf for footings founded in compacted fill soils. In addition, all footings should be founded a minimum of 18 inches below adjacent ground surface. This recommendation also assumes that the footings will be founded on and within properly compacted fill soils, or on and within competent formational soils.

Resistance for design lateral loads of retaining wall footings should be in conformance with Section 11.3.3.

11.5 Construction Cuts and Excavations

The removal and recompaction of existing fill and formational soils will require construction cuts and excavations. We recommend that construction cuts and excavations comply with the CALOSHA and OSHA recommendations and guidelines.

For all excavations and construction cuts adjacent to, or near, existing buildings, we recommend that lateral support for the existing structures be maintained either by shoring said excavations, or that the existing buildings be underpinned. This may mean that exploratory test pits may have to be excavated in order to assess the depth and type of the existing adjacent building foundation.

The sides of all unshored excavations may be sloped no steeper than 1.5:1 (horizontal to vertical), provided that:

1. The excavation is at least 18 inches out from the face of existing footings; and

2. The excavation does not extend below a plane inclined downward at 2:1 (horizontal to vertical) from a line 9 inches above the bottom edge of the existing footing.

12 LIMITATIONS

Geotechnical engineering and the earth sciences are characterized by uncertainty. Professional judgments presented herein are based partly on our evaluation of the technical information gathered, partly on our understanding of the proposed construction, and partly on our general experience. Our engineering work and judgments rendered meet the current professional standards. We do not guarantee the performance of the project in any respect.

We have investigated only a small portion of the pertinent soil, rock, and groundwater conditions of the subject site. The opinions and conclusions made herein were based on the assumption that those rock and soil conditions do not deviate appreciably from those encountered during our field investigation. We recommend that a soil engineer from our office observe construction to assist in identifying soil conditions that may be significantly different from those encountered in our borings. Additional recommendations may be required at that time.

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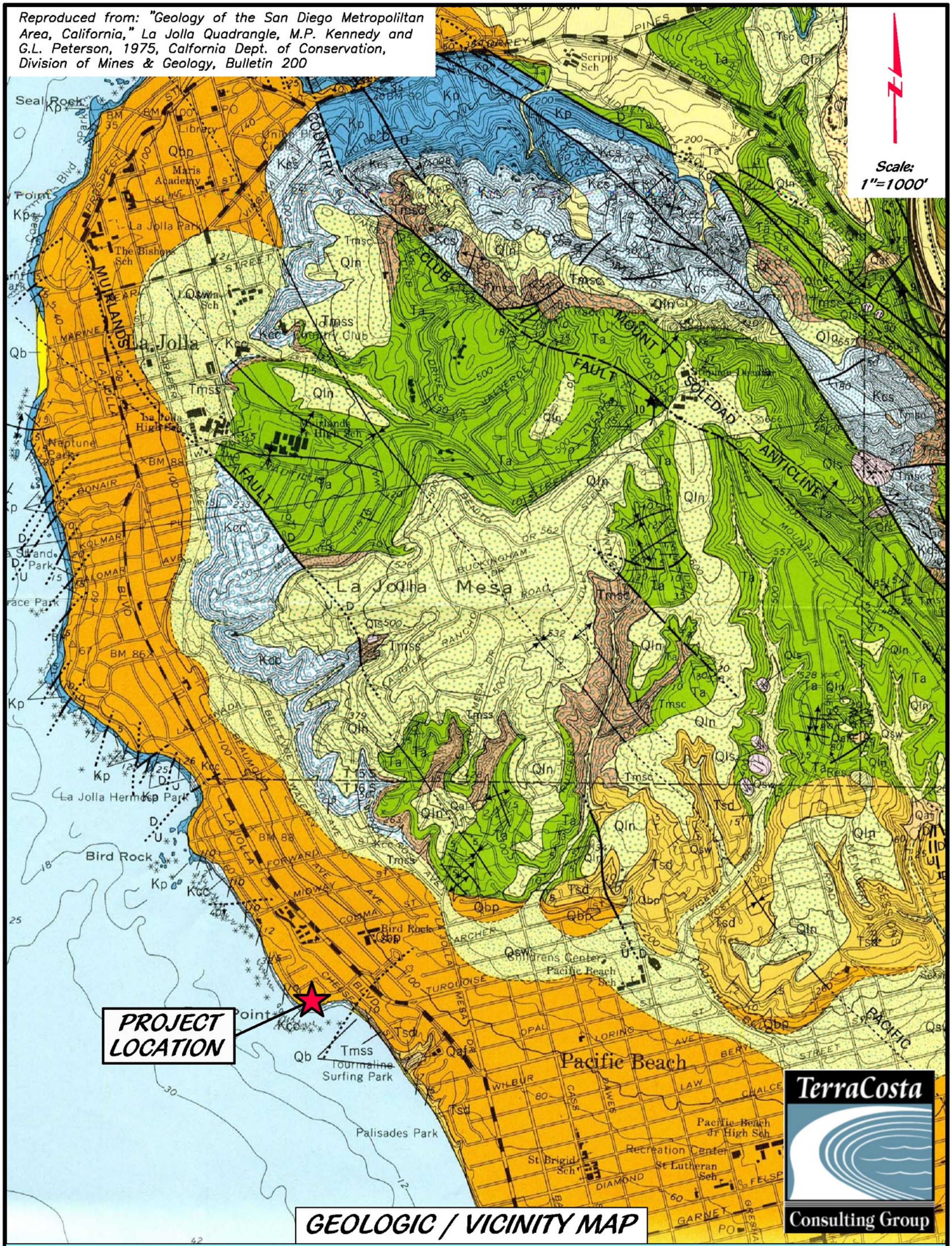
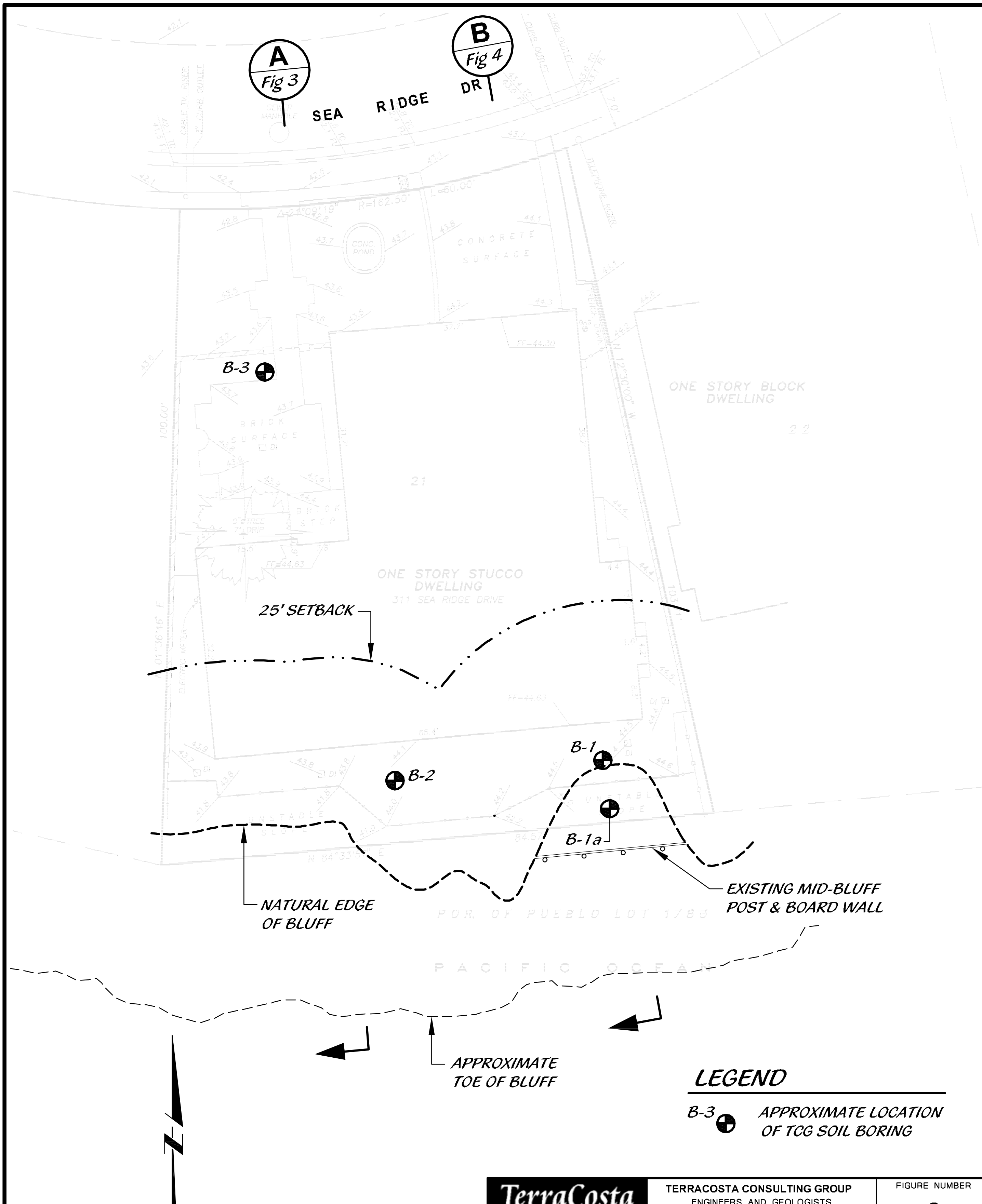


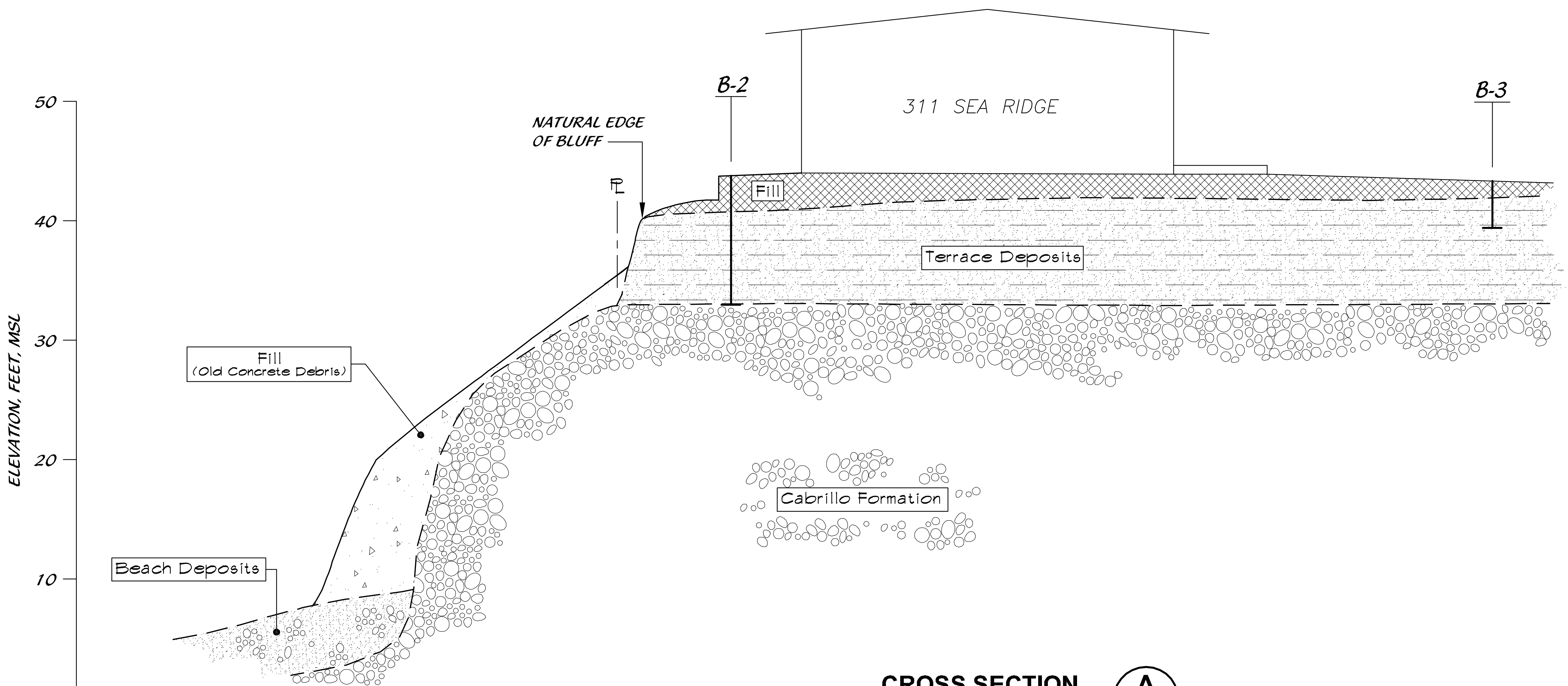
Project: 311 Sea Ridge Drive Project No. 2896 Figure No. 1



TerraCosta Consulting Group

TERRACOSTA CONSULTING GROUP ENGINEERS AND GEOLOGISTS 3890 MURPHY CANYON ROAD, SUITE 200 SAN DIEGO, CA 92123 (858) 573-6900	FIGURE NUMBER 2
PROJECT NAME 311 SEA RIDGE DRIVE	PROJECT NUMBER 2896

SITE PLAN WITH BORING LOCATIONS



CROSS SECTION A
SCALE: 1"=10' (HORIZ. & VERT.) Fig 2

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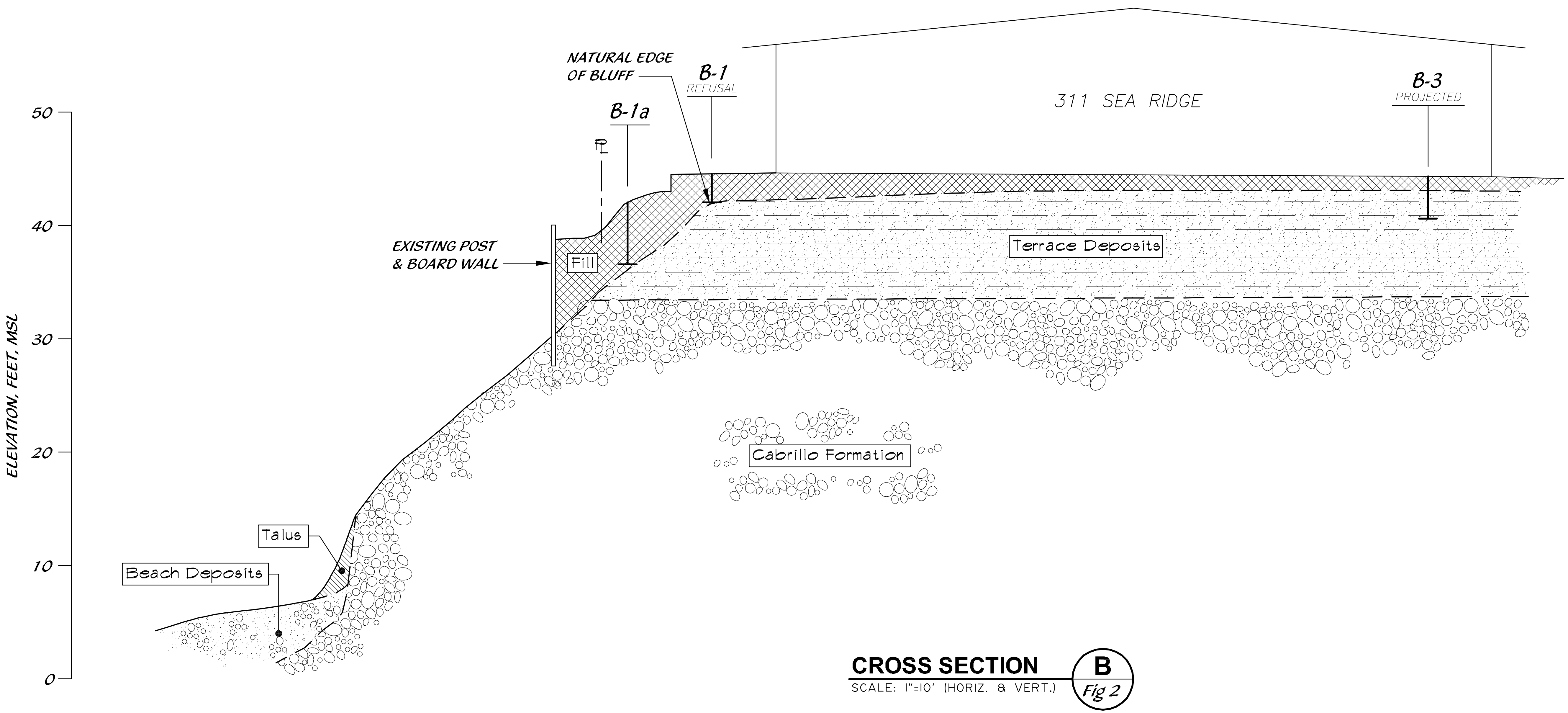
FIGURE NUMBER	3
PROJECT NAME: 311 SEA RIDGE DRIVE	PROJECT NUMBER: 2896

CROSS SECTION



CROSS SECTION B Fig 2

SCALE: 1"=10' (HORIZ. & VERT.)

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FIGURE NUMBER: 4

PROJECT NAME: 311 SEA RIDGE DRIVE

PROJECT NUMBER: 2896

CROSS SECTION

APPENDIX A

LOGS OF EXPLORATORY EXCAVATIONS

TerraCosta Consulting Group

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
311 SEA RIDGE DRIVE	2896	LEGEND

SITE LOCATION	START	FINISH	SHEET NO.
La Jolla, California	7/30/2015	7/30/2015	1 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling		G. Spaulding	

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
		40		▼ n/a

SAMPLING METHOD	NOTES

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
5									
10									
		C	1						
		S	2						
15									

KEY TO EXCAVATION LOGS

▼ WATER TABLE MEASURED AT TIME OF DRILLING

OTHER TESTS

CC	Confined Compression	ppm	parts per million of VOCs*
CL	Chloride Content	R	Resistivity
CS	Consolidation	RV	R-Value
DS	Direct Shear	SA	Sieve Analysis
EI	Expansion Index	SE	Sand Equivalent
GS	Grain Size Analysis	SF	Sulfate
LC	Laboratory Compaction	SG	Specific Gravity
pH	Hydrogen Ion	SW	Swell
PI	Plasticity Index		

PENETRATION RESISTANCE (BLOWS/ft)

Number of blows required to advance the sampler 1 foot.

California Sampler blow counts can be converted to equivalent SPT blow counts by using an end-area conversion factor of 0.67 when using a 140-pound hammer and a 30-inch drop.

SAMPLE TYPE

C ("California Sampler") - An 18-inch-long, 2-1/2-inch I.D., 3-inch O.D., thick-walled sampler. The sampler is lined with eighteen 2-3/8-inch I.D. brass rings. Relatively undisturbed, intact soil samples are retained in the brass rings.

S ("SPT") - a.k.a. Standard Penetration Test, an 18-inch-long, 2-inch O.D., 1-3/8-inch I.D. drive sampler.

NOTES ON FIELD INVESTIGATION

Borings were advanced using a limited access drill rig with a 6-inch solid-stem auger, and a 3-inch hand auger.

Standard Penetration Tests (SPT) and California Samplers were used to obtain soil samples. The SPT and California Samplers were driven into the soil at the bottom of the borings with a 140-pound hammer falling 30 inches. When the samplers were withdrawn from the boring, the samples were removed, visually classified, sealed in plastic containers, and taken to the laboratory for detailed inspection.

(CONTINUED)

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LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
311 SEA RIDGE DRIVE	2896	**LEGEND**

SITE LOCATION	START	FINISH	SHEET NO.
La Jolla, California	7/30/2015	7/30/2015	2 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling		G. Spaulding	

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
		40		▼ n/a

SAMPLING METHOD	NOTES

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
25									
30									
35									

KEY TO EXCAVATION LOGS

(CONTINUED)

NOTES ON FIELD INVESTIGATION (Continued)

Free groundwater was encountered in the borings as shown on the logs.

Classifications are based upon the Unified Soil Classification System and include color, moisture, and consistency. Field descriptions have been modified to reflect results of laboratory inspection where deemed appropriate.

TCG_METRIC_LOG(3) 2896.GPJ GDCLOGMT.GDT 9/9/15

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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-1 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
311 SEA RIDGE DRIVE	2896	**B-1**

SITE LOCATION	START	FINISH	SHEET NO.
La Jolla, California	7/30/2015	7/30/2015	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	SSA	G. Spaulding	

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
TriPod	6	2.75	44.5	▼ n/a

SAMPLING METHOD	NOTES
SPT, CAL	

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
									6" PCC
									FILL **Silty SAND (SM)**, gray, dry to damp, with trace gravel
		C	1	35					
		S	2	50/3"					
									Boring terminated at depth of 2.75 feet due to refusal on rock. *No free groundwater encountered at time of excavation.*
	40								
5									
	35								
10									
	30								
15									
	25								

TCG_METRIC_LOG(3) 2896.GPJ GDCLOGMT.GDT 9/9/15

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San Diego, California 92123

FIGURE A-2

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
311 SEA RIDGE DRIVE	2896	**B-1A**

SITE LOCATION	START	FINISH	SHEET NO.
La Jolla, California	7/30/2015	7/30/2015	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hand Auger	G. Spaulding	

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Hand Auger	3	5.5	42	▼ n/a

SAMPLING METHOD	NOTES

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0–5.5	42–36.5								FILL **Silty to Clayey Fine SAND (SM-SC)**, gray to gray-brown, dry, with trace of gravel and concrete pieces
5.5									*Boring terminated at depth of 5.5 feet due to refusal on rock.* *No free groundwater encountered at time of excavation.*

Depth scale: 5, 10, 15. Elevation scale: 40, 35, 30, 25.

TCG_METRIC_LOG(3) 2896.GPJ GDCLOGMT.GDT 9/9/15

TerraCosta Consulting Group

TerraCosta Consulting Group, Inc.
3890 Murphy Canyon Road, Suite 200
San Diego, California 92123

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.

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
311 SEA RIDGE DRIVE	2896	B-2

SITE LOCATION	START	FINISH	SHEET NO.
La Jolla, California	7/30/2015	7/30/2015	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	SSA	G. Spaulding	

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
TriPod	6	10.5	44	▼ n/a

SAMPLING METHOD	NOTES
SPT, CAL	

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
									6" PCC
		C	1	6					FILL **Silty Fine SAND (SM)**, gray, dry, with gravel and concrete pieces
		S	2	12					**SAND (SP)**, gray, dry
	40								TERRACE DEPOSITS **Silty to Fine Sandy CLAY (CL)**, medium dense, mottled red-brown / brown, dry to damp, with occasional gravel and cobble
5		C	3	48			SA PI pH R CL SF		
		S	4	26			SA PI pH R CL SF		
	35								
10		C	5	69			SA PI pH R CL SF		
									Boring terminated at depth of 10.5 feet due to refusal on rock. *No free groundwater encountered at time of excavation.*
	30								
15									
	25								

TCG_METRIC_LOG(3) 2896.GPJ GDCLOGMT.GDT 9/9/15

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
311 SEA RIDGE DRIVE	2896	**B-3**

SITE LOCATION	START	FINISH	SHEET NO.
La Jolla, California	7/30/2015	7/30/2015	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	SSA	G. Spaulding	

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
TriPod	6	3.5	43.7	⊻ n/a

SAMPLING METHOD	NOTES
SPT, CAL	

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
									TOPSOIL **Silty to Clayey Fine SAND (SM/SC)**, loose, gray-brown, damp
									TERRACE DEPOSITS **Silty to Fine Sandy CLAY (CL)**, medium dense, red-brown to brown, damp
									- Cobble
	40								*Boring terminated at depth of 3.5 feet due to refusal in Cabrillo Formation. No free groundwater encountered at time of excavation.*
5									
	35								
10									
	30								
15									
	25								

TCG_METRIC_LOG(3) 2896.GPJ GDCLOGMT.GDT 9/9/15

APPENDIX B

LABORATORY TEST RESULTS

amec foster wheeler

LABORATORY TEST RESULTS OF SOIL SAMPLES

Project Name: Terra Costa - #311 Sea Ridge (#2896)
Project No.: 5015-15-0030.04

Reviewed by: L. Collins Date: 8/13/2015
Tested by: P. Gan Date: 8/7/2015

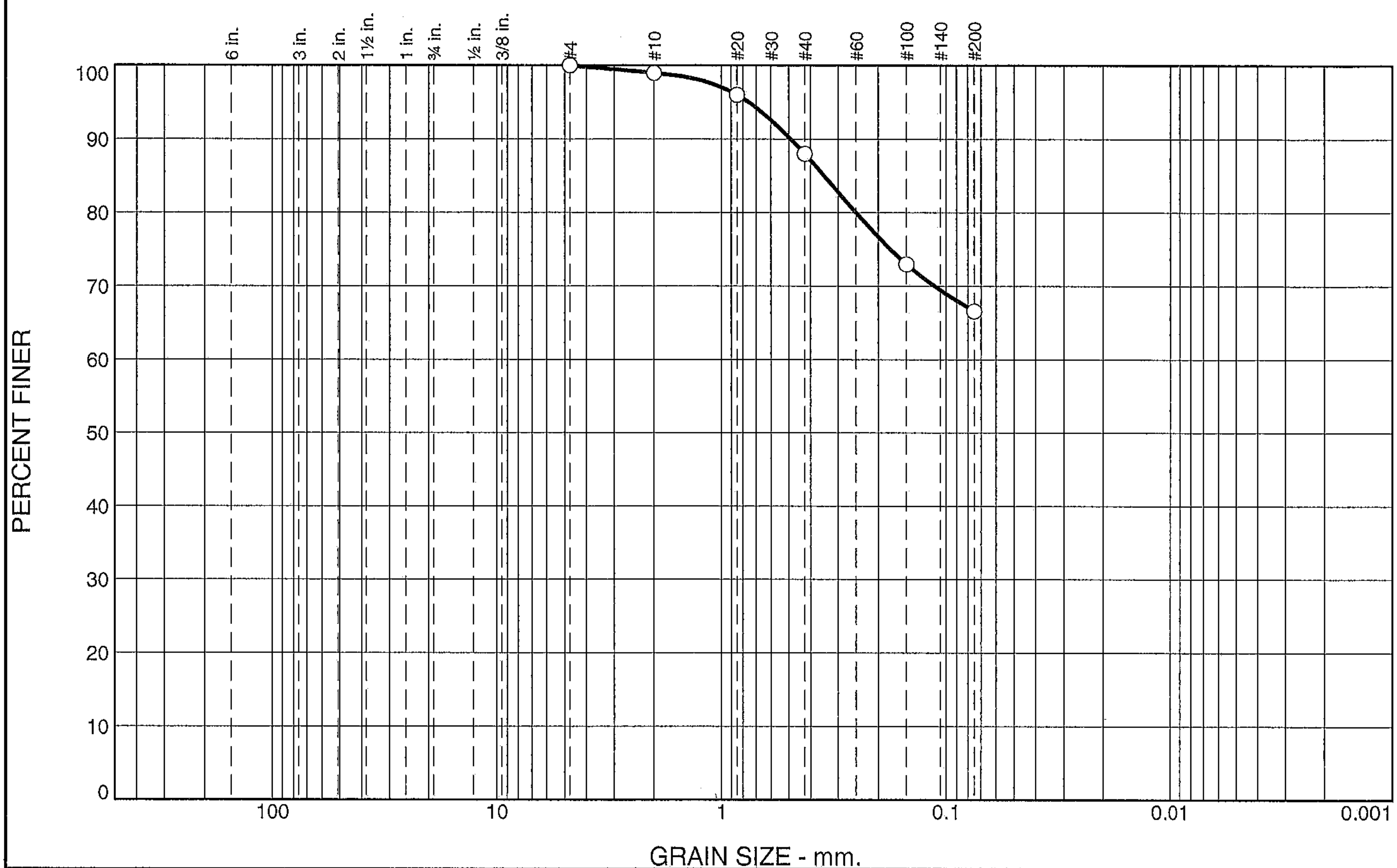
			Soil Resistivity	Chemical Analysis in mg/kg (ppm)		
			CTM 643	CTM 643	CTM 422	CTM 417
Lab No.	Boring No.	Depth (ft)	Min. Resistivity (ohm-cm)	pH	Cl	SO_4
29297	B2-3	5'	367	8.59	935	273

Notes:
NT = Not tested
CTM = CALTRANS Test Method
mg/kg = milligrams per kilogram of (parts per million) of dry soil
Chemical analysis for CTM 417 and 422 were made on 1:3 soil-to-water extract

Respectfully Submitted:
Amec Foster Wheeler Environment & Infrastructure, Inc.

David C. Wilson, P.E. #54734
Senior Principal Engineer

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.0	11.0	21.4	66.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.0		
#20	96.0		
#40	88.0		
#100	73.0		
#200	66.6		

* (no specification provided)

Material Description

Sandy Clay, CL (#29298)

Atterberg Limits

PL= 13.9 LL= 38.2 PI= 24.3

Coefficients

D_{90}= 0.4904 D_{85}= 0.3472 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(13)

Remarks

Depth: 6'

Date: 08/10/15

amec

Client: TerraCosta Consulting Group, Inc.
Project: #2896: #311 Sea Ridge
Project No: 5015150030.04 **Figure** #29298

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

8/21/2015

Client: TerraCosta Consulting Group, Inc.
Project: #2896: #311 Sea Ridge
Project Number: 5015150030.04
Depth: 6'
Material Description: Sandy Clay, CL (#29298)
Date: 08/10/15 **PL:** 13.9 **LL:** 38.2 **PI:** 24.3
USCS Classification: CL **AASHTO Classification:** A-6(13)
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
#4	100.0
#10	99.0
#20	96.0
#40	88.0
#100	73.0
#200	66.6

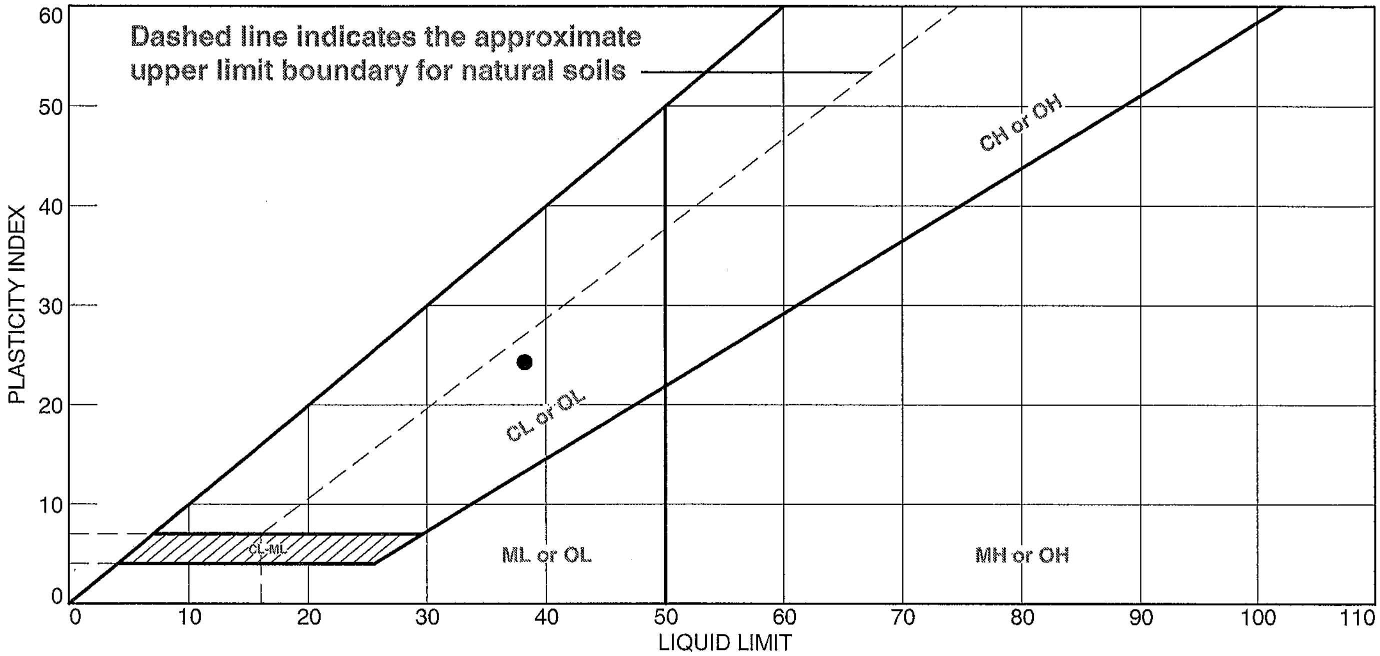
Fractional Components

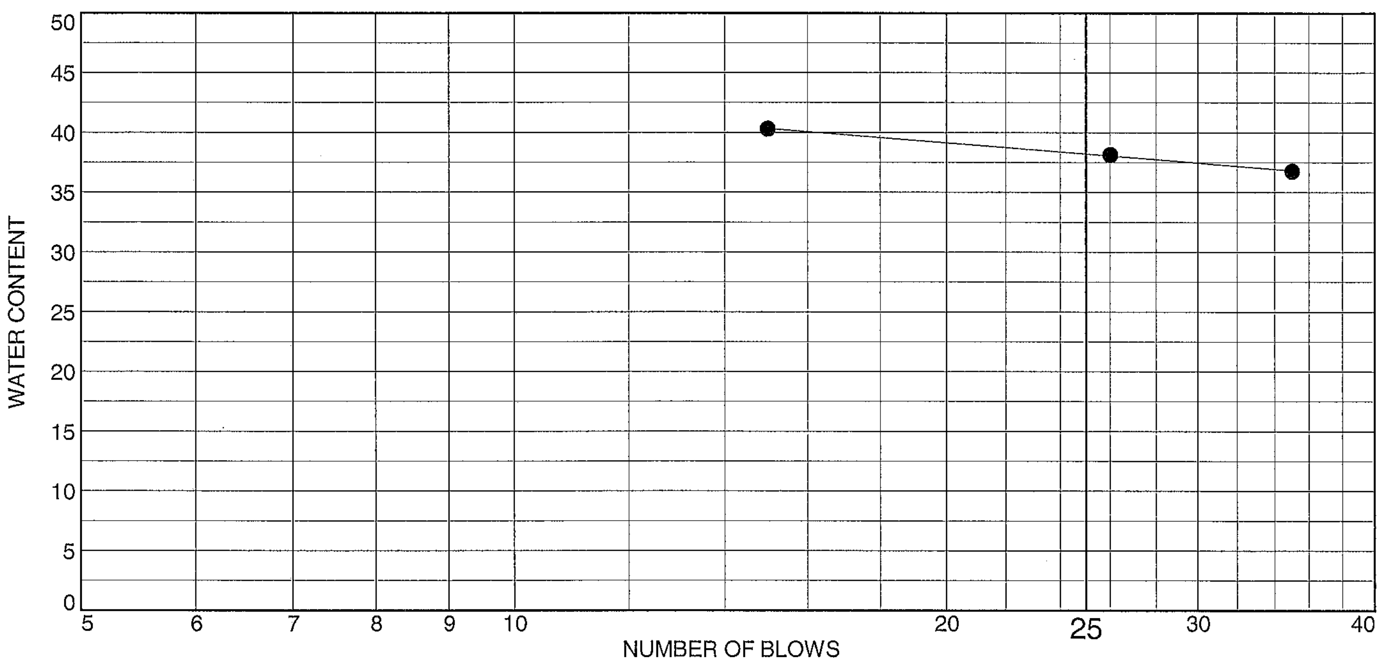
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	1.0	11.0	21.4	33.4			66.6

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
								0.2501	0.3472	0.4904	0.7552

Fineness Modulus
0.55

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy Clay, CL (#29298)	38.2	13.9	24.3	88.0	66.6	CL

Project No. 5015150030.04 **Client:** TerraCosta Consulting Group, Inc.

Project: #2896: #311 Sea Ridge

Depth: 6'

amec

Remarks:

Figure #29298

Tested By: R. Valles **Checked By:** L. Collins

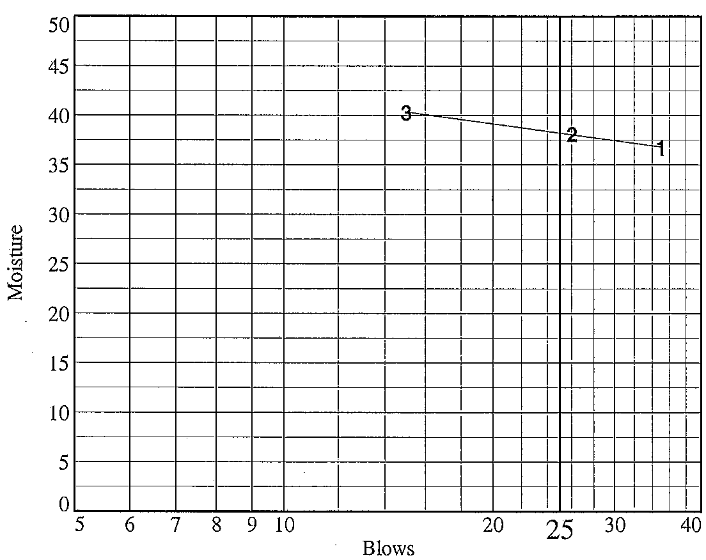
LIQUID AND PLASTIC LIMIT TEST DATA

8/21/2015

Client: TerraCosta Consulting Group, Inc.
Project: #2896: #311 Sea Ridge
Project Number: 5015150030.04
Depth: 6'
Material Description: Sandy Clay, CL (#29298)
%<#40: 88.0 **%<#200:** 66.6 **USCS:** CL **AASHTO:** A-6(13)
Tested by: R. Valles **Checked by:** L. Collins

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.51	42.63	41.66			
Dry+Tare	33.05	36.69	35.73			
Tare	20.92	21.12	21.02			
# Blows	35	26	15			
Moisture	36.8	38.2	40.3			



Liquid Limit= 38.2
Plastic Limit= 13.9
Plasticity Index= 24.3

Plastic Limit Data

Run No.	1	2	3	4
Wet+Tare	29.81	30.16		
Dry+Tare	28.76	29.04		
Tare	21.05	21.16		
Moisture	13.6	14.2		

APPENDIX C

SUMMARY SLOPE STABILITY ANALYSES

TerraCosta
Consulting Group

2896 311 SEA RIDGE DRIVE - SEC A La Jolla, California

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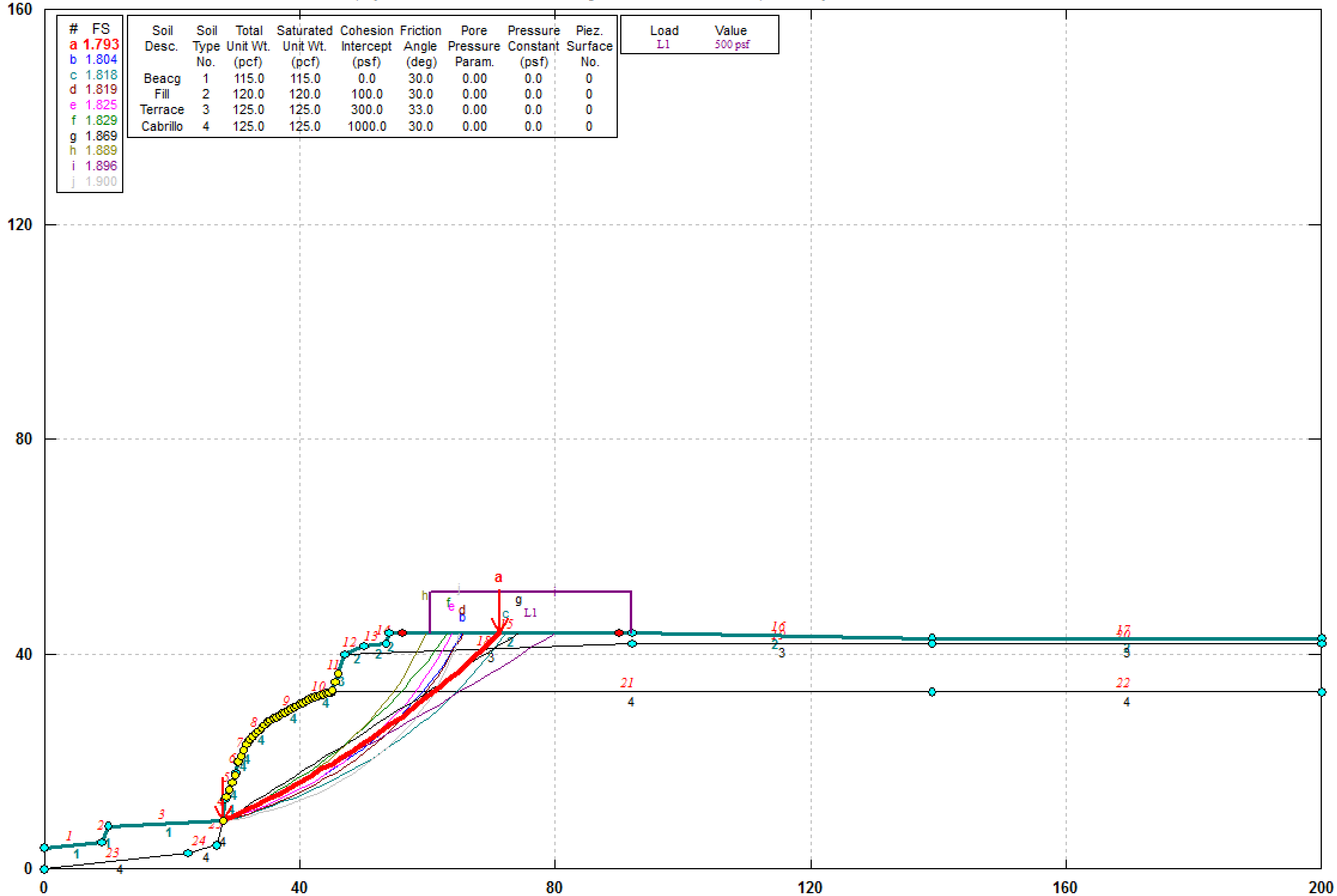

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Beacg	1	115.0	115.0	0.0	30.0	0.00	0.0	0
Fill	2	120.0	120.0	100.0	30.0	0.00	0.0	0
Terrace	3	125.0	125.0	300.0	33.0	0.00	0.0	0
Cabrillo	4	125.0	125.0	1000.0	30.0	0.00	0.0	0

GSTABL7 v.2 FSmin=1.793

Safety Factors Are Calculated By The Modified Bishop Method

2896 311 SEA RIDGE DRIVE - SEC A La Jolla, California

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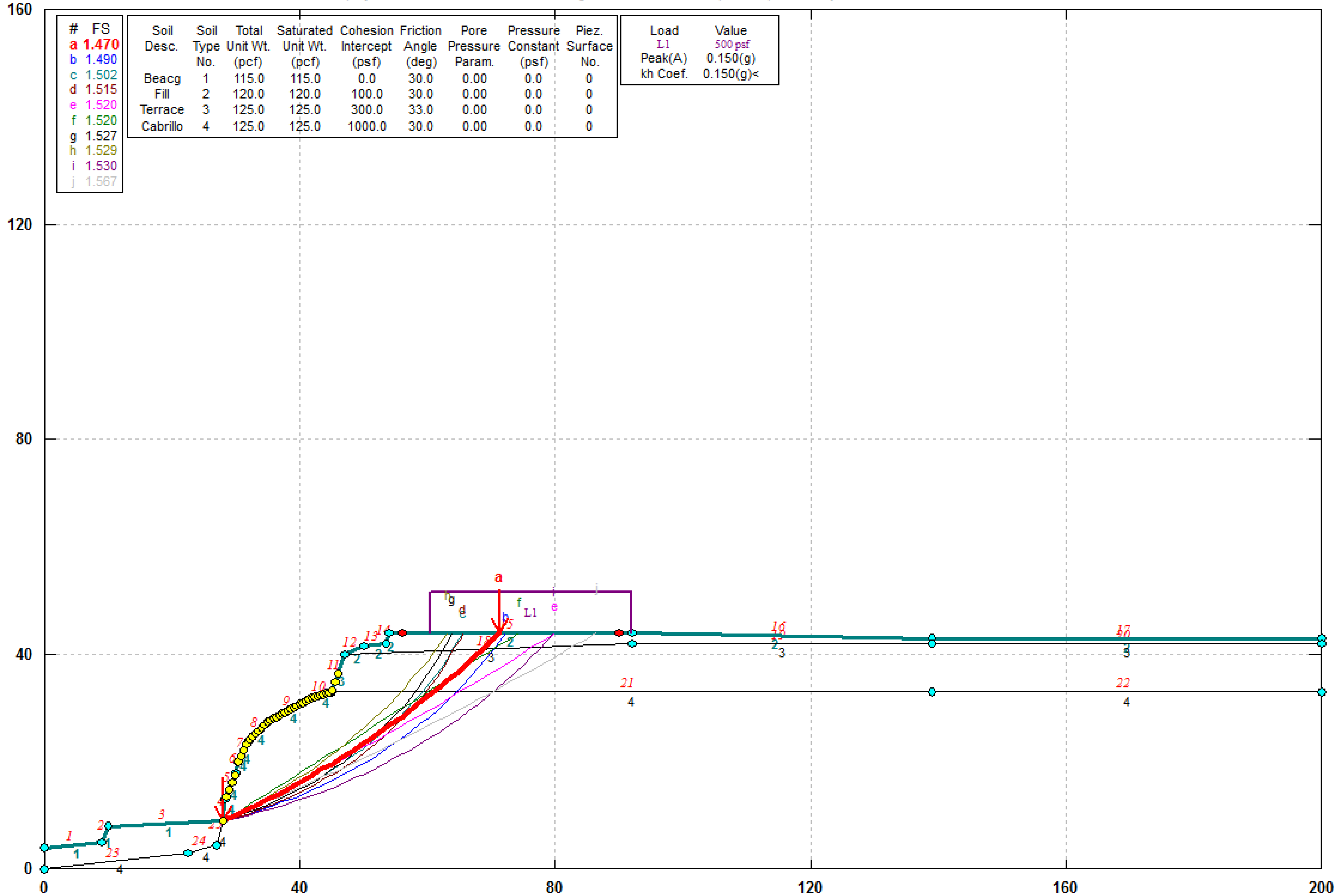

GSTABL7 v.2 FSmin=1.470

Safety Factors Are Calculated By The Modified Bishop Method

2896 311 SEA RIDGE DRIVE - SEC B La Jolla, California

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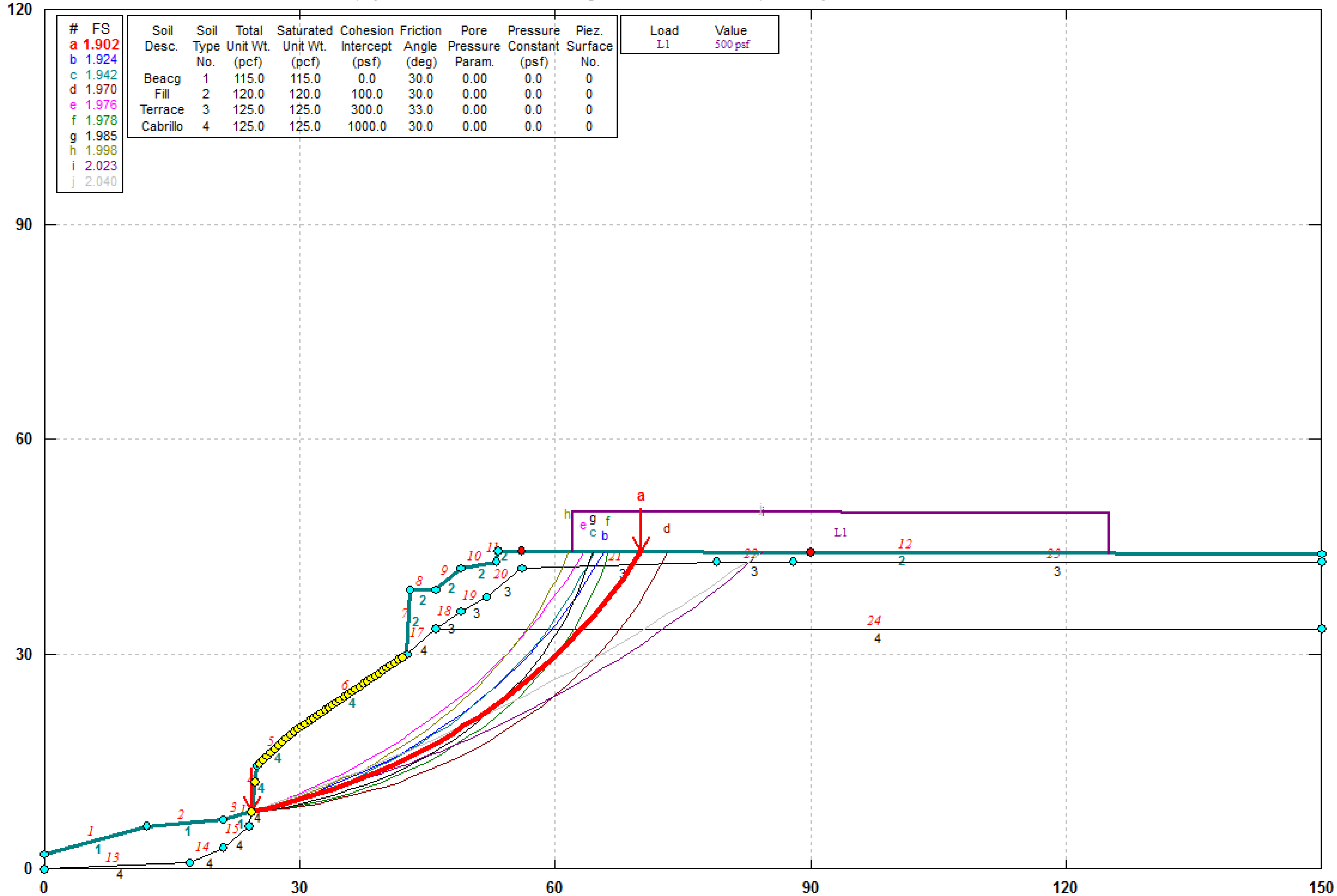

GSTABL7 v.2 FSmin=1.902

Safety Factors Are Calculated By The Modified Bishop Method

2896 311 SEA RIDGE DRIVE - SEC B La Jolla, California

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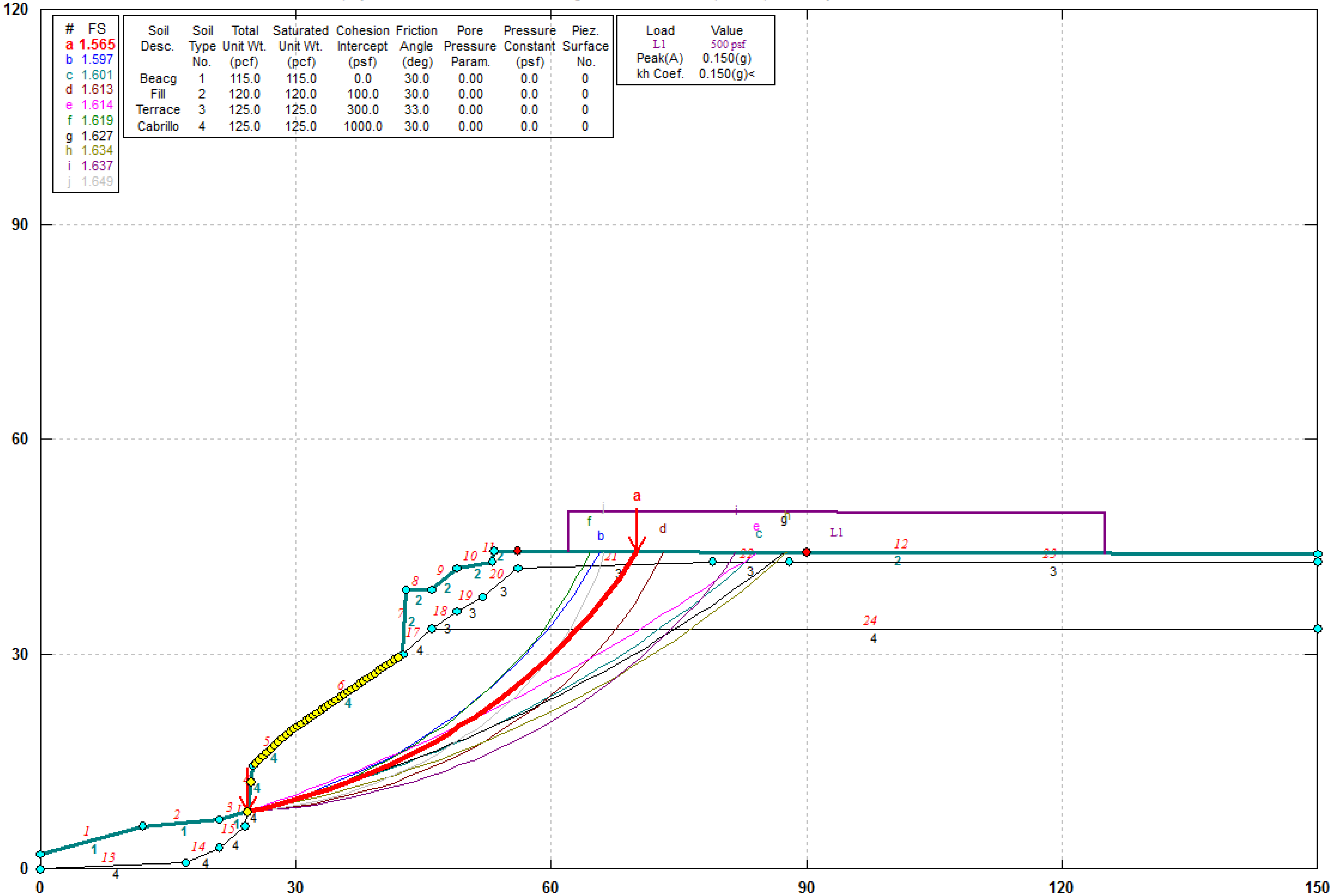


GSTABL7 v.2 FSmin=1.565

Safety Factors Are Calculated By The Modified Bishop Method

APPENDIX D

SPECIFICATIONS FOR ENGINEERED FILL

APPENDIX D
SPECIFICATIONS FOR ENGINEERED FILL

These specifications present the usual and minimum requirements for grading operations performed under observation and testing of TerraCosta Consulting Group, Inc.

No deviation from these specifications should be allowed, except where specifically superseded in the preliminary geology and soils report, or in other written communication signed by the Geotechnical Engineer or Engineering Geologist.

I. GENERAL

A. The Geotechnical Engineer and Engineering Geologist are the Owner's or Builder's representative on the project. For the purpose of these specifications, observation and testing by the Geotechnical Engineer includes that observation and testing performed by any person or persons employed by, and responsible to, the licensed Geotechnical Engineer signing the soils report.

B. The Contractor under the observation of the Geotechnical Engineer shall conduct, all clearing, site preparation, or earthwork performed on the project.

C. It is the Contractor's responsibility to prepare the ground surface to receive the fills and to place, spread, mix, water, and compact the fill in accordance with the specifications of the Geotechnical Engineer. The Contractor shall also remove all material considered unsuitable for use in the engineered fill by the Geotechnical Engineer.

D. It is also the Contractor's responsibility to have suitable and sufficient compaction equipment on the job-site to handle the amount of fill being placed. If necessary, excavation equipment will be shut down to permit completion of compaction. Sufficient watering apparatus will also be provided by the Contractor, with due consideration for the fill material, rate of placement, and time of year.

E. The Geotechnical Engineer and Engineering Geologist will issue a final report summarizing their observations, test results, and comments regarding the Contractor's conformance with these specifications.

II. SITE PREPARATION

A. In areas to be graded, all vegetation and deleterious material such as rubbish and any construction debris from previous structures shall be disposed of off site. This removal must be concluded prior to placing fill.

B. The Civil Engineer shall locate all sewage disposal systems and large structures on the site or on the grading plan to the best of his knowledge prior to preparing the ground surface.

C. Soil, alluvium, or rock materials determined by the Geotechnical Engineer as being unsuitable for placement in compacted fills shall be removed and wasted from the site. The Geotechnical Engineer is to approve any material incorporated as a part of a compacted fill.

D. After the ground surface to receive fill has been cleared, it shall be scarified, disced, or bladed by the Contractor until it is uniform and free from ruts, hollows, hummocks or other uneven features that may prevent uniform compaction.

The scarified ground surface shall then be brought to optimum moisture, mixed as required, and compacted as specified. If the scarified zone is greater than 12 inches in depth, the excess shall be removed and placed in lifts on the order of 6 to 8 inches, depending upon material type and available construction equipment.

Prior to placing fill, the ground surface to receive fill shall be inspected, tested, and approved by the Geotechnical Engineer.

E. Any abandoned building, foundations, or underground structures, such as pipelines, or others not located prior to grading, are to be removed or treated in a manner prescribed by the Geotechnical Engineer.

III. COMPACTED FILLS

A. Any material imported or excavated on the property may be utilized in the fill, provided each material has been determined to be suitable by the Geotechnical Engineer. Roots, tree branches, and other matter missed during clearing shall be removed from the fill.

B. Rock fragments less than 6 inches in diameter may be utilized in the fill provided:

1. They are not placed in concentrated pockets.

2. There is a sufficient percentage of fine-grained material to surround the rocks.

3. The distribution of the rocks is to be observed by the Geotechnical Engineer.

C. Rocks greater than 12 inches in diameter shall be taken off site.

D. Material that is spongy, subject to decay, or otherwise considered unsuitable shall not be used in the compacted fill.

E. Representative samples of materials to be utilized as compacted fill shall be analyzed in the laboratory by the Geotechnical Engineer to determine their physical properties. If any material other than that previously tested is encountered during grading, the appropriate analysis of this material shall be conducted by the Geotechnical Engineer as soon as possible.

F. Material used in the compacting process shall be evenly spread, watered or dried, processed and compacted in thin lifts to obtain a uniformly dense layer. Lift thickness shall be on the order of 6 to 8 inches. The fill shall be placed and compacted on a horizontal plane, unless otherwise approved by the Geotechnical Engineer.

G. If the moisture content or relative compaction varies from that required by the Geotechnical Engineer, the Contractor shall rework the fill until it is approved by the Geotechnical Engineer.

H. Each layer shall be compacted to 90 percent (90%) of the maximum density in compliance with the testing method specified by the controlling governmental agency. (In general, ASTM D 1557 will be used.)

IV. GRADING CONTROL

A. Inspection of the fill placement shall be provided by the Geotechnical Engineer during the progress of grading.

B. In general, density tests should be made at intervals not exceeding 2 feet of fill height. An adequate number of field density tests determined by the Geotechnical Engineer shall be made to verify that the required compaction is being achieved. The number of tests will vary depending on the soil conditions and the size of the job.

C. Density tests should also be made on the surface of the soils to receive fill as required by the Geotechnical Engineer.

D. All cleanout, processed ground to receive fill, key excavations, subdrains and rock disposal must be inspected and approved by the

Geotechnical Engineer (and often by the governing authorities) prior to placing any fill. It shall be the Contractor's responsibility to notify the Geotechnical Engineer and governing authorities when such areas are ready for inspection.

V. CONSTRUCTION CONSIDERATIONS

A. Erosion control measures, when necessary, shall be provided by the Contractor during grading prior to the completion and construction of permanent drainage controls.

B. Upon completion of grading and termination of observations by the Geotechnical Engineer, no further filling or excavating, including that necessary for footings, foundations, large tree wells, retaining walls, or other features shall be performed without the approval of the Geotechnical Engineer or Engineering Geologist.

C. Care shall be taken by the Contractor during final grading to preserve any berms, drainage terraces, interceptor swales, or other devices of a permanent nature on or adjacent to the property.

VI. ON-PAD UTILITY TRENCH BACKFILL RECOMMENDATIONS

A. SHALLOW TRENCHES: (Maximum Trench Depth of 2 Feet). Use soils approved by the Geotechnical Engineer. The soils should be compacted to 90 percent of the maximum dry density, as determined by ASTM Test Method D 1557, and tested by the Geotechnical Engineer. Compaction by flooding or jetting will be permitted only when, in the opinion of the Geotechnical Engineer, the backfill materials have a Sand Equivalent of at least 30 and the foundation materials will not soften or be damaged by the applied water.

B. DEEP TRENCHES: (Depth of Trench Greater than 2 Feet). The soils should be compacted to 90 percent of the maximum density, as determined by ASTM Test Method D 1557, and tested by the Geotechnical Engineer. The backfill placement method should consist of mechanically compacting the backfill soils throughout the trench depth.

If trench depth extends 5 feet, placement/compaction method should be reviewed by the Geotechnical Engineer. Contractor should exercise, and is responsible for, necessary and required safety precautions in all trenching operations.

C. TRENCHES UNDER VEHICLE PAVEMENTS: A minimum of 3 feet of fill should be placed over conduit, apply criteria B, above.

D. TRENCHES NEAR FOOTINGS: Approved backfill soils must be mechanically compacted to 90 percent of the maximum density, as determined by ASTM Test Method D 1557, and tested by the Geotechnical Engineer. The general backfill technique will be in accordance with the applicable criteria stated in A, above.

E. REPORTING: If the Geotechnical Engineer will be providing a written opinion as to adequacy of soil compaction and trench backfill, the entire operation should be performed under the Geotechnical Engineer's observation and testing.

TerraCosta
Consulting Group

Geotechnical Engineering
Coastal Engineering
Maritime Engineering

Project No. 2896
November 30, 2015

Mr. David M. Lessnick
D. MARIN DEVELOPMENT
1900 Western Avenue
Las Vegas, Nevada 89102

PARTIAL RESPONSE TO FIRST ROUND
CITY LDR-GEOLOGY REVIEW COMMENTS
311 SEA RIDGE DRIVE
LA JOLLA, CALIFORNIA

Dear Mr. Lessnick:

At your request and in partial response to the City of San Diego's review comments dated November 24, 2015, specifically Issue No. 6, we are responding to Mr. Jim Quinn's question, "Clarify if a man-made coastal protective device is present on the coastal bluff or coastal platform adjacent to the subject property."

Off site and to the west of the subject property below the coastal bluff, there are remnants of very old concrete, broken apart slabs intermixed with the beach cobble. Additionally, the steel frame of a large gun turret is still visible on the beach today a slight distance upcoast from the subject property. Attached are four beach-level photographs taken during our field investigation on July 30, 2015, which clearly show some concerted efforts by the local surfing community to hand-place and construct a series of chairs using the concrete slabs for seats and backs adjacent the base of the coastal bluff. Additionally, the locals have stacked concrete apparently to protect the four palm trees at the base of the coastal bluff. It is quite clear that this stacked concrete was never intended to, and does not now, provide any coastal protection. When studying the California Coastal Records Project site photographs (http://www.californiacoastline.org/), these loosely stacked concrete seats do not appear to have ever been displaced during the record of high quality photographs dating back to 1992. We also draw your attention to Coastal Records Image No. 2010040468 (http://www.californiacoastline.org/cgi-bin/captionlist.cgi?searchstr=201004068), which clearly shows the more westerly thatched palapa roof constructed by local surfers, along with the relatively extensive viewing areas constructed below and west of the subject property adjacent the two palm trees below 311 Sea Ridge Drive. We believe these features were constructed to accommodate a congregation and viewing area for the local surfing community. It is clear that none of these hand-placed and stacked concrete pieces at the base of the bluff were ever placed to retard shoreline erosion for the subject site.

As indicated in our September 2015 report, the Cabrillo Formation, which is just slightly younger than the highly erosion resistant Point Loma Formation, both of which pre-date San Diego's North County Tertiary-age formations, would be expected to have much lower erosion rates than the North County Tertiary-age formations and likely on the order of 2 to 3 inches per year. We consider the coastal bluff west of and below the subject property to be relatively stable and have estimated an annualized bluff retreat rate over 75 years to be approximately 18.75 feet (0.25 ft/yr x 75 years), supporting our recommendation for a minimum 25-foot bluff-top setback.

We appreciate the opportunity to be of service and trust this information meets your needs. If you have any questions, please give us a call.

Very truly yours,

TERRACOSTA CONSULTING GROUP, INC.

Walter F. Crampton, Principal Engineer
R.C.E. 23792, R.G.E. 245

WFC/jg
Attachments


07/30/2015


07/30/2015


07/30/2015

TerraCosta Consulting Group

Geotechnical Engineering

Coastal Engineering

Maritime Engineering

Project No. 2896
March 3, 2016

Mr. David M. Lessnick
D. MARIN DEVELOPMENT
1900 Western Avenue
Las Vegas, Nevada 89102

RESPONSE TO CITY REVIEW COMMENTS
311 SEA RIDGE DRIVE
LA JOLLA, CALIFORNIA

CITY OF SAN DIEGO PROJECT NO. 451591
REFERENCE L64A-003A LDR GEOLOGY

Dear Mr. Lessnick:

TerraCosta Consulting Group, Inc. (TerraCosta) is providing the following responses to comments by Mr. Jim Quinn of the City of San Diego Development Services Department provided in his LDR-Geology Reviewer Comments dated February 24, 2016, regarding our "Geotechnical Investigation and Bluff Stability Study, 311 Sea Ridge Drive, La Jolla, California," report dated September 23, 2015, and revised January 26, 2016. For completeness of the record, we have restated the reviewer's comment in italics, followed by our response.

Issue No. 3 (Cycle 2): Provide a site specific geologic/geotechnical map of the property and the adjacent coastal bluff that shows the distribution of fill, surficial deposits, and geologic unit(s). Show the attitude of geologic structures on the map. The geologic/geotechnical map should be on a topographic base that shows the proposed development.

We have revised Figure 2 of our report. The attached Figure 2 is a site-specific geologic/geotechnical map of the property showing the limits of the existing house and proposed improvements. The map is presented on a topographic base showing the adjacent coastal bluff, distribution of fill, surficial deposits, and geologic units.

Issue No. 4 (Cycle 2): Revise the cross sections to show the existing and proposed grades. Show the coastal bluff edge setback on the cross sections.

We have revised the cross sections in our report. The attached cross sections (Figures 3 and 4) have been developed showing the existing and proposed grades, and indicating the coastal bluff edge setback on the cross sections.

Issue No. 5 (Cycle 2): Indicate if water seepage or evidence of water seepage is present on the coastal bluff adjacent to the subject property.

Groundwater or seeps were not present in any of the borings during our investigation, nor was any free groundwater observed exiting the face of the bluff adjacent to the property or the neighboring properties at the time of our investigation. However, damp soils and phreatophytes were observed growing at the base of the bluff, indicating a continuous source of moisture supporting the plant material. Active water seepage may occur at various times of the year, depending upon local rainfall. Areas where damp/moist soils were observed are indicated on the attached revised Site Plan and Geologic Map (Figure 2).

Issue No. 7 (Cycle 2): Indicate if the proposed development will be adequately stable over the life of the proposed structure (75-years) considering the predicted 18.75-feet of bluff retreat.

Based on our review of historical aerial photographs, analysis of the bluff retreat rates, and our slope stability analysis, it is our opinion that the proposed development will remain stable over the life of the proposed structure (75 years).

Issue No. 8 (Cycle 2): The project's geotechnical consultant could note that current regional geologic mapping indicates the site is located on old paralic deposits (unit Qop7) that rest on the late Pleistocene (80 ka) Bird Rock marine terrace.

Comment noted.

Issue No. 9 (Cycle 2): The project's geotechnical consultant should address all potential geologic hazards inherent to the subject property. If significant effects are indicated, recommend mitigation measures or identify unmitigated significant effects.

A discussion of geologic hazards is presented in Section 5 of our "Geotechnical Investigation and Bluff Stability Study" revised January 26, 2016, including a discussion on faulting and seismicity, as well as landsliding. In addition, an extensive discussion on the coastal environment, including wave climate, short-term and long-term sea level rise, and tidal conditions, as well as a discussion on bluff erosion and bluff stability analysis is provided. It is our opinion that, provided the project is constructed per current state and local building codes, the site will remain stable for the life of the project. As no unmitigated significant effects on the project during its lifetime have been identified, no mitigation measures are recommended.

Issue No. 10 (Cycle 2): The project's geotechnical consultant should provide a conclusion regarding if the proposed development [will] destabilize or result in settlement of adjacent property or the right of way.

It is our opinion that provided the project is designed to current building codes and the selected building contractor uses proper means and methods during construction, the proposed development will not destabilize or result in settlement of the adjacent properties or right-of-way.

Issue No. 11 (Cycle 2): The location of the coastal bluff edge and coastal bluff edge setbacks should be shown on all exhibits including the building sections.

Figures 2, 3, and 4 (attached) have been modified to indicate the location of the coastal bluff edge and coastal bluff setbacks.

Issue No. 12 (Cycle 2): Partial Response to First Round City LDR-Geology Review Comments, 311 Sea Ridge Drive, La Jolla, California, prepared by TerraCosta Consulting Group, Inc., dated November 30,2015 (their project no. 2896).

Site Plan - Sea Ridge Drive, 311 Sea Ridge Drive, La Jolla, California 92037, prepared by Eco House Architecture, dated January 27, 2016 (their project no. 1526)

Topographic Survey, Sea Ridge Dr 311 Topo, prepared by San Diego Land Surveying & Engineering, Inc., dated July 6,2015, revised January 26,2016

The site plan and topographic survey have been updated. A revised Figure 2 is attached.

Issue No. 13: The previous review comments that have not been cleared remain applicable.

Comment noted.

Issue No. 14 (New Issue): A typographical error was noted in LDR-Geology comment number 10. The comment should read: "The project's geotechnical consultant should provide a conclusion regarding if the proposed development will destabilize or result in settlement of adjacent property or the right of way."

Comment noted.

Issue No. 15 (New Issue): Update the coastal bluff edge determination to be consistent with the site topographical survey map (revised January 26, 2016), surface geologic mapping, and subsurface data. If the location of the coastal bluff edge is revised, show the revised location of the coastal bluff edge, and 25-foot and 40-foot coastal bluff edge setback lines on the previously requested geologic/geotechnical map."

The Site Plan and Geologic Map (Figure 2) has been updated to indicate surface geologic mapping. See above response to Issue No. 3 and the attached revised Figure 2.

Issue No. 16 (New Issue): Revise the cross sections to show the existing grades as presented on the site topographical survey map (revised January 26, 2016). Show the (revised) coastal bluff edge and 25-foot and 40-foot coastal bluff edge setback lines on the cross sections."

We have revised our cross sections. See above response to Issue No. 4 and the attached revised Figures 3 and 4.

We trust these responses satisfactorily address the reviewer's comments. If you have any questions, please give us a call.

Very truly yours,
TERRACOSTA CONSULTING GROUP, INC.

Walter F. Crampton, Principal Engineer
R.C.E. 23792, R.G.E. 245

Gregory A. Spaulding, Project Geologist
C.E.G. 1863, C.H.G. 351, R.G. 5892

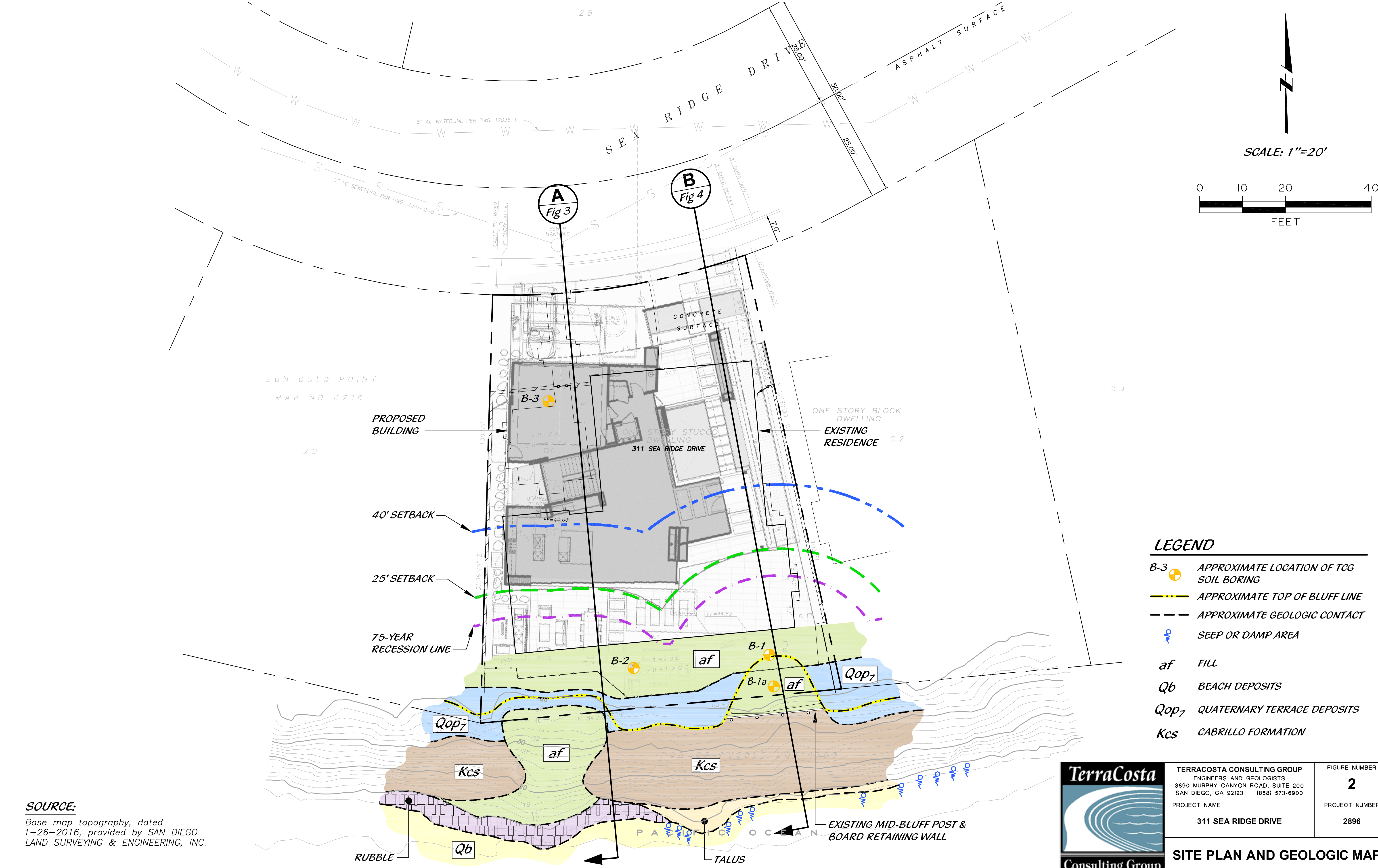
REGISTERED PROFESSIONAL ENGINEER
WALTER F. CRAMPTON
No. 245
GEOTECHNICAL
STATE OF CALIFORNIA

PROFESSIONAL GEOLOGIST
GREGORY A. SPAULDING
No. 1863
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

WFC/GAS/jg

WFC/jg
Attachments

TerraCosta
Consulting Group



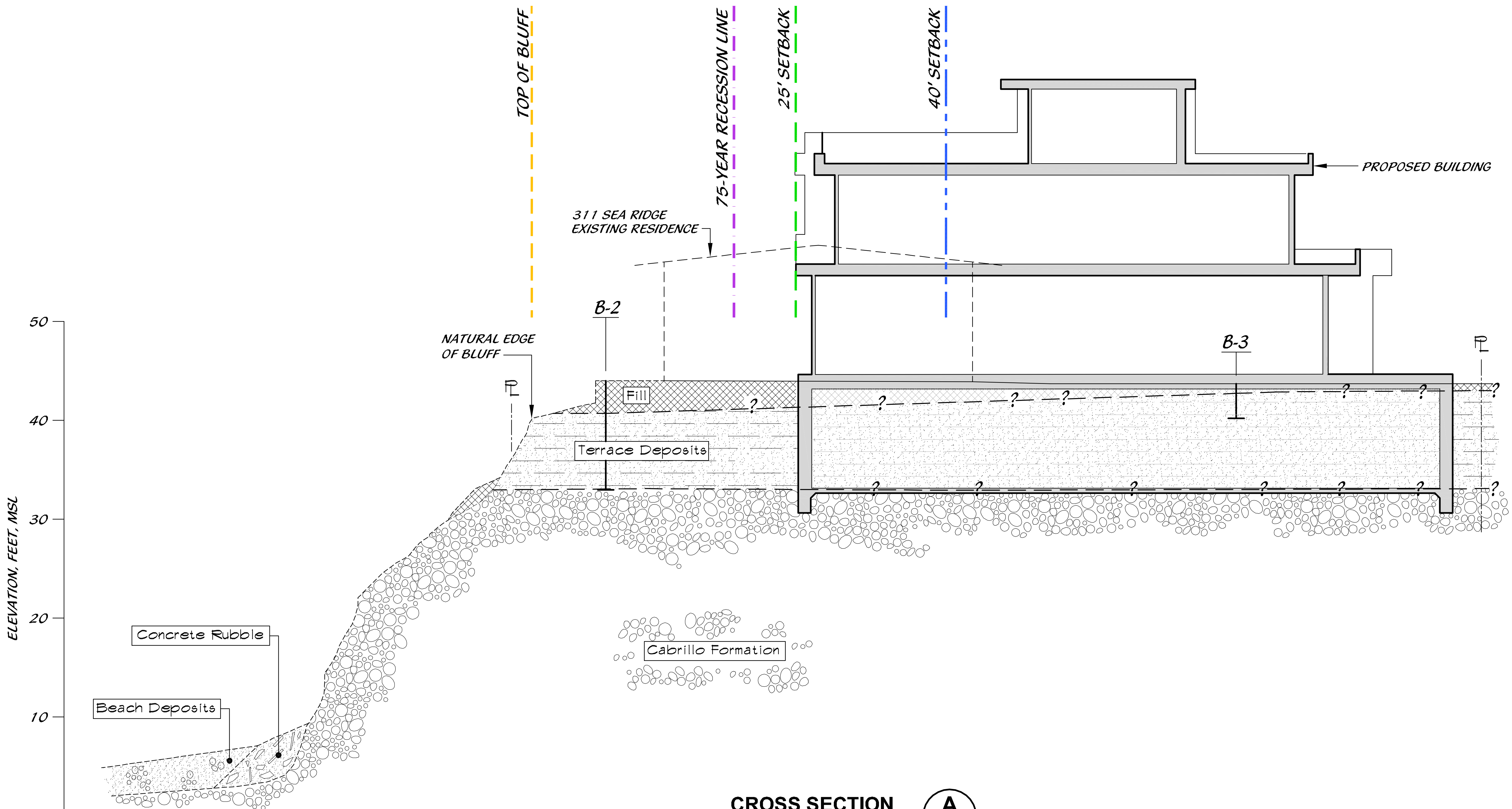
SOURCE:
Base map topography, dated 1-26-2016, provided by SAN DIEGO LAND SURVEYING & ENGINEERING, INC.

TerraCosta Consulting Group

TERRACOSTA CONSULTING GROUP
ENGINEERS AND GEOLOGISTS
3890 MURPHY CANYON ROAD, SUITE 200
SAN DIEGO, CA 92123 (858) 573-6900

FIGURE NUMBER	PROJECT NAME	PROJECT NUMBER
2	311 SEA RIDGE DRIVE	2896

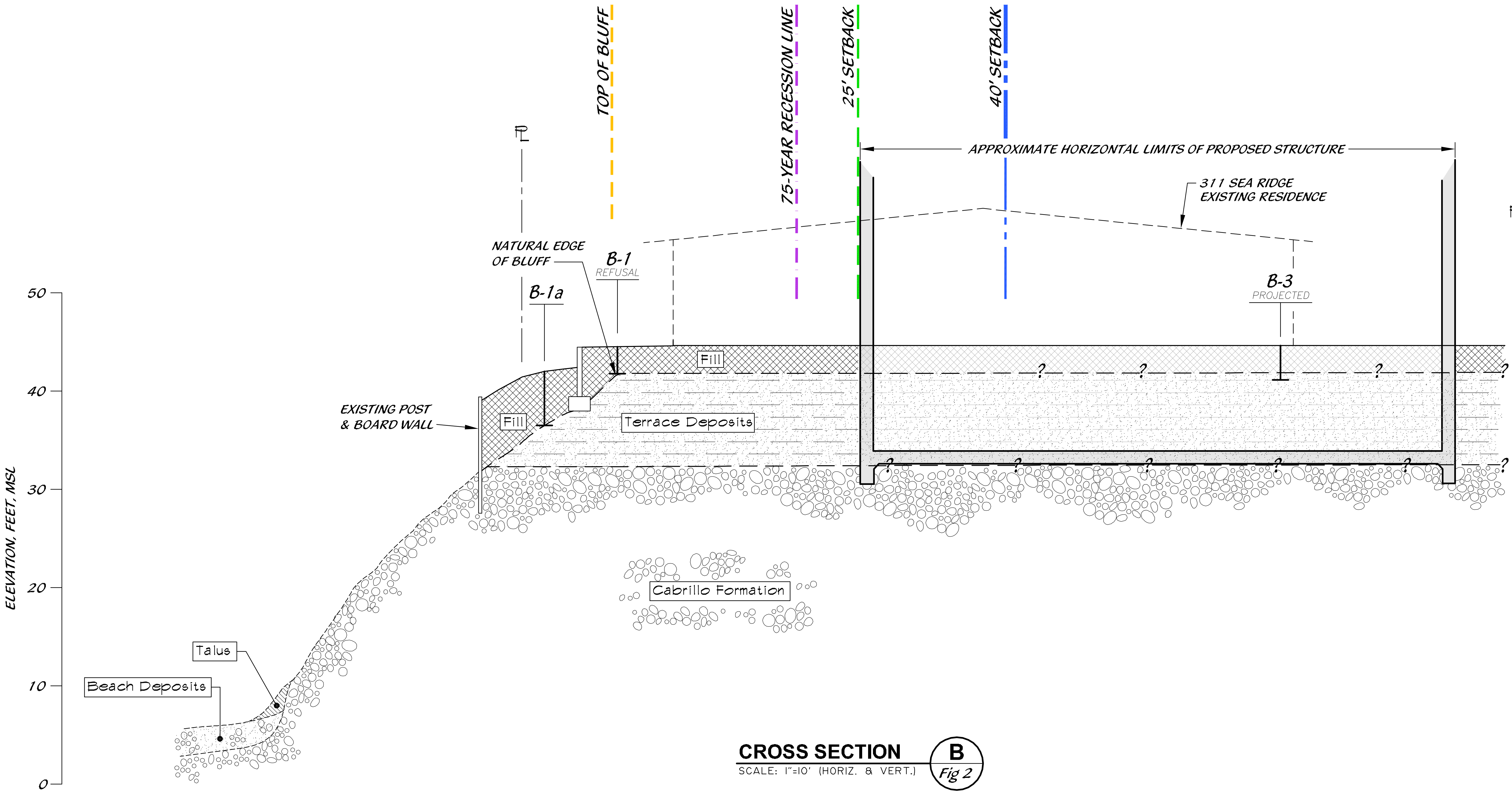
SITE PLAN AND GEOLOGIC MAP



CROSS SECTION A Fig 2

SCALE: 1"=10' (HORIZ. & VERT.)

TerraCosta Consulting Group	TERRACOSTA CONSULTING GROUP ENGINEERS AND GEOLOGISTS 3890 MURPHY CANYON ROAD, SUITE 200 SAN DIEGO, CA 92123 (858) 573-6900	FIGURE NUMBER 3
	PROJECT NAME 311 SEA RIDGE DRIVE	PROJECT NUMBER 2896
	CROSS SECTION	



CROSS SECTION B
Fig 2
SCALE: 1"=10' (HORIZ. & VERT.)

TerraCosta Consulting Group	TERRACOSTA CONSULTING GROUP ENGINEERS AND GEOLOGISTS 3890 MURPHY CANYON ROAD, SUITE 200 SAN DIEGO, CA 92123 (858) 573-6900	FIGURE NUMBER 4
	PROJECT NAME 311 SEA RIDGE DRIVE	PROJECT NUMBER 2896
	CROSS SECTION	

Geotechnical Engineering
Coastal Engineering
Maritime Engineering

Project No. 2896
May 17, 2016

Mr. David M. Lessnick
D. MARIN DEVELOPMENT
1900 Western Avenue
Las Vegas, Nevada 89102

RESPONSE TO CITY REVIEW COMMENTS
311 SEA RIDGE DRIVE
LA JOLLA, CALIFORNIA

CITY OF SAN DIEGO PROJECT NO. 451591
REFERENCE L64A-003A-2 LDR-GEOLOGY

References: "Response to City Review Comments, 311 Sea Ridge Drive, La Jolla, California," prepared by TerraCosta Consulting Group, Inc., dated March 3, 2016.

"Partial Response to First Round City LDR-Geology Review Comments, 311 Sea Ridge Drive, La Jolla, California," prepared by TerraCosta Consulting Group, Inc., dated November 30, 2015.

"Geotechnical Investigation and Bluff Stability Study, 311 Sea Ridge Drive, La Jolla, California," prepared by TerraCosta Consulting Group, Inc., revised January 26, 2016.

"Geotechnical Investigation and Bluff Stability Study, 311 Sea Ridge Drive, La Jolla, California," prepared by TerraCosta Consulting Group, Inc., dated September 23, 2015.

Topographical Survey, "311 Sea Ridge Drive," prepared by San Diego Land Surveying & Engineering, Inc., dated July 6, 2015.

Topographical Survey, "311 Sea Ridge Drive," prepared by San Diego Land Surveying & Engineering, Inc., revised May 16, 2016.

Dear Mr. Lessnick:

TerraCosta Consulting Group, Inc. (TerraCosta) is responding to the City of San Diego's review comments from Cycle 6 LDR-Geology dated March 30, 2016. For completeness of the record, we have restated the original comments in italics, followed by our response. Only those items requiring responses have been included.

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www.terracosta.com

LDR – GEOLOGY (Jim Quinn)

Issue No. 11: The location of the coastal bluff edge and coastal bluff edge setbacks should be shown on all exhibits including the building sections.

Figures 2, 3, and 4 (attached) have been modified to indicate the location of the coastal bluff edge and coastal bluff setbacks.

Issue No. 18: Based on review of the referenced topographic survey, the bluff edge appears to coincide with the 40-foot elevation contour, except in the area of B-1 where a coastal gully was filled. The project's geotechnical consultant should justify identifying the coastal bluff edge lower than the 40-foot elevation contour. The consultant could consider providing additional cross sections aligned orthogonal to the bluff edge to help illuminate the location of the bluff edge. (New Issue)

TerraCosta's original mapped location of the bluff edge was accurately measured from the existing rear yard fence line/retaining wall, as shown on Figure 2 (attached). The mapped bluff edge was determined during our regional field work on July 30, 2015, and reported in our Geotechnical Investigation and Bluff Stability Study report for the subject property dated September 23, 2015, and revised January 26, 2016. A topographic survey was subsequently prepared by San Diego Land Surveying & Engineering (SDLSE), dated July 6, 2015, revised January 26, 2016. However, we were not provided a copy of that topographic survey until February 2016. As requested in Mr. Quinn's February 24, 2016, review of comments, we modified our site plan to include the revised topographic survey provided by SDLSE, and included the distribution of fill, surficial deposits, and geologic units, along with the proposed building footprint, the 75-year recession line, and the 25-foot and 40-foot setback lines. Although we noted some inconsistencies in topography, we did not challenge the accuracy of the topographic base map when we provided our March 3, 2016, response to the City's review comments.

The geologic reviewer was indeed correct in his questioning of the coastal bluff edge dipping below the 40-foot contour. As a result, our staff, along with Mr. Robert Bateman with SDLSE, again visited the site to confirm the accuracy of our previously mapped bluff edge alignment and bluff edge topography. It was at that time that Mr. Bateman indicated that the previous topographic survey for the site provided by SDLSE was copied from the SanGIS topographic base maps provided under contract to the City of San Diego, and not actually field-surveyed or field-checked by SDLSE for accuracy. A copy of the original SanGIS topographic map used by SDLSE for the subject site is included in Appendix A for completeness of the record.

SDLSE has subsequently carefully conducted a topographic survey of the coastal bluff fronting and adjacent to 311 Sea Ridge Drive, and the new topographic base is included on our revised Figure 2. We should also note that, given the new topographic survey, we have made very minor revisions to the bluff-top alignment beyond the property boundaries where we could not conduct accurate field measurements of the location of the bluff edge. Accordingly, in addition to revising the topographic base, the attached revised Figure 2 shows a slightly different top-of-bluff line extending both easterly and westerly of the subject property. The two geologic cross sections (Figures 3 and 4) have also been revised to reflect the correct topography.

Issue No. 19: Revise the Site Plan and Geologic Map if the coastal bluff edge and setback lines require adjustment. (New Issue)

As discussed above, minor changes to the original mapped coastal bluff edge have been made to correct the inconsistencies with the previous topographic map.

Issue No. 20: Address stability of the fill material on the bluff face and impact, if any, on the proposed development. (New Issue)

As indicated in Section 4.2 – Site Conditions of our above-referenced geotechnical report, the surface was altered during the grading and construction of the Sun Gold Point residential development in the mid to late 1950s. As part of the original development, from 3 to 5 feet of locally derived fill soils were placed on the subject property to create the existing building pad. As indicated on the attached Site Plan (Figure 2) and Cross Section B (Figure 4), two relatively short retaining walls were constructed on the face and near the top of the bluff to develop the existing building pad. Specific to the reviewer's questions, the current stability of these short walls is unknown and, during the life of the proposed development, may start to yield, eventually requiring their removal. That said and discounting the unknown integrity of these relatively short slope-top walls, it is our opinion that the overall stability of the bluff is good, with existing static factors of safety ranging from about 1.8 to 1.9, with a conservative estimated cumulative bluff retreat over the next 75 years of 18.75 feet. Given the site conditions, and while admittedly the existing short bluff-top walls may eventually become compromised and require removal, it is our opinion that stability of the fill material on the bluff face will have minimal impact on the proposed development over its 75-year estimated useful life.

With regard to the fill identified on the face of the bluff at the southwesterly corner of the property, we believe that the fill is on the order of 3 to 5 feet in thickness and was dumped over the bluff face during the original clearing and grading of the Sun Gold Point development. It is our opinion that this fill likely has a factor of safety of less than 1.5. Based on our stability analyses, it is our opinion that the loss of this thin veneer of fill will have no impact on the gross stability of the bluff and will not have any impact on the proposed development.

Issue No. 21: The project's designers could consider that grading and temporary shoring will likely not be allowed within the coastal bluff edge setback zone. Therefore, consideration should be given to moving the proposed basement sufficiently landward of the coastal bluff edge setback zone to accommodate grading or shoring necessary to construct the basement. (New Issue)

As indicated in the attached Cross Sections A and B (Figures 3 and 4), the proposed basement excavations extend almost entirely into very competent terrace deposits, with the basement foundations likely embedded into the underlying Cretaceous-age and highly competent Cabrillo Formation. No temporary shoring is envisioned to extend to within the coastal bluff setback zone, and all grading and shoring will be confined behind the 25-foot bluff-top setback limits.

Issue No. 22: The project's consultants could note that a NPDES permit may be required for subsurface water discharged through basement wall drains and pumped to a storm water conveyance system. Check with LDR-Engineering Review on the requirements for discharges to the municipal storm drain system. (New Issue)

Comment noted.

We trust these responses satisfactorily address the reviewer's comments. If you have any questions, please give us a call.

Very truly yours,

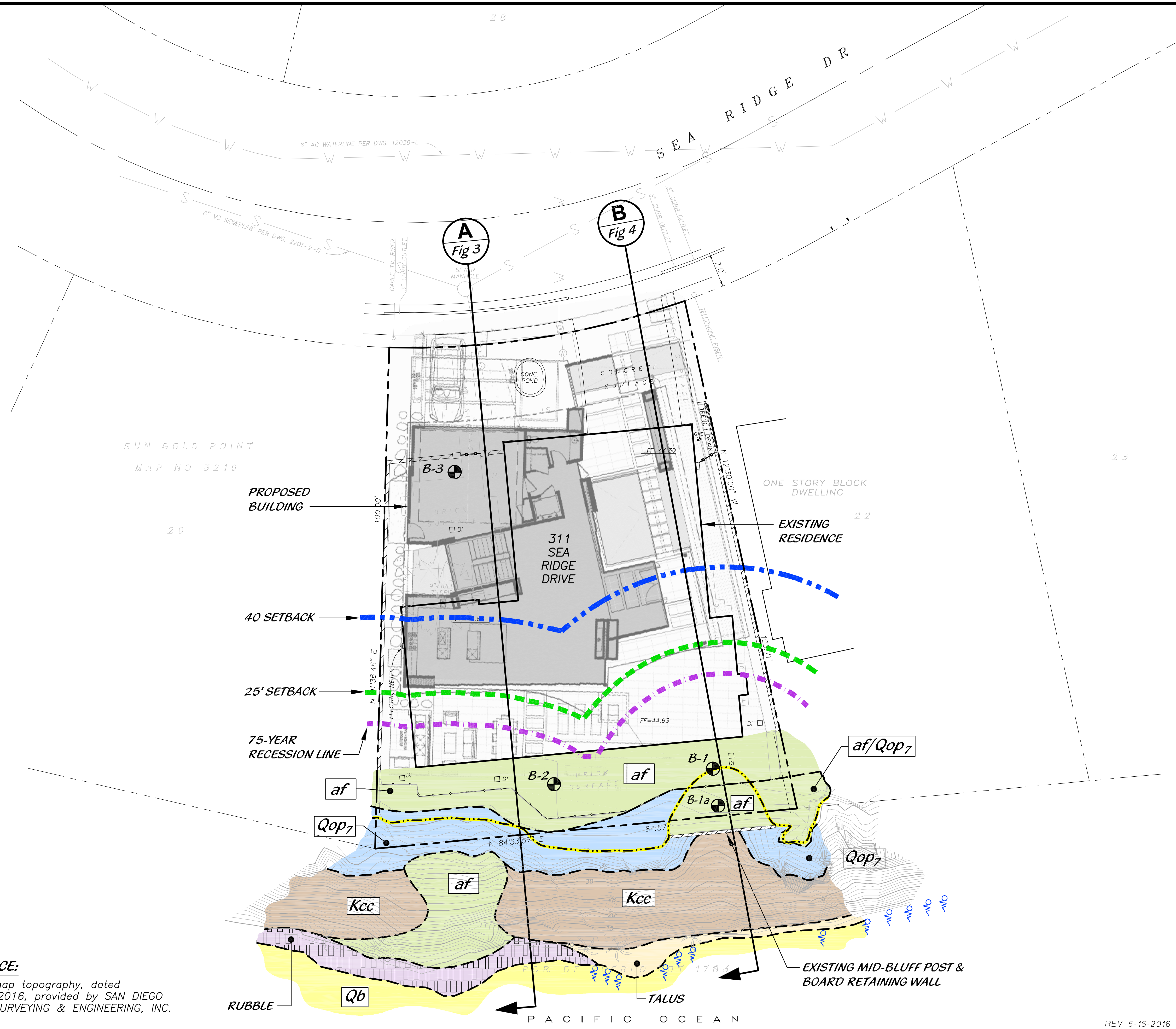
TERRACOSTA CONSULTING GROUP, INC.

Walter F. Crampton, Principal Engineer
R.C.E. 23792, R.G.E. 245

Gregory A. Spaulding, Project Geologist
C.E.G. 1863, C.H.G. 351, R.G. 5892

WFC/GAS/sr
Attachments

cc: Elizabeth J. Carmichael, ECOhouse architecture



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SCALE: 1"=20'

0 10 20 40

FEET

LEGEND

B-3	APPROXIMATE LOCATION OF TCG SOIL BORING
	APPROXIMATE TOP OF BLUFF LINE
	APPROXIMATE GEOLOGIC CONTACT
	SEEP OR DAMP AREA
af	FILL
Qb	BEACH DEPOSITS
Qop_7	QUATERNARY TERRACE DEPOSITS
Kcc	CABRILLO FORMATION (Conglomerate part)

SOURCE:

Base map topography, dated 5–16–2016, provided by SAN DIEGO LAND SURVEYING & ENGINEERING, INC.

TerraCosta Consulting Group

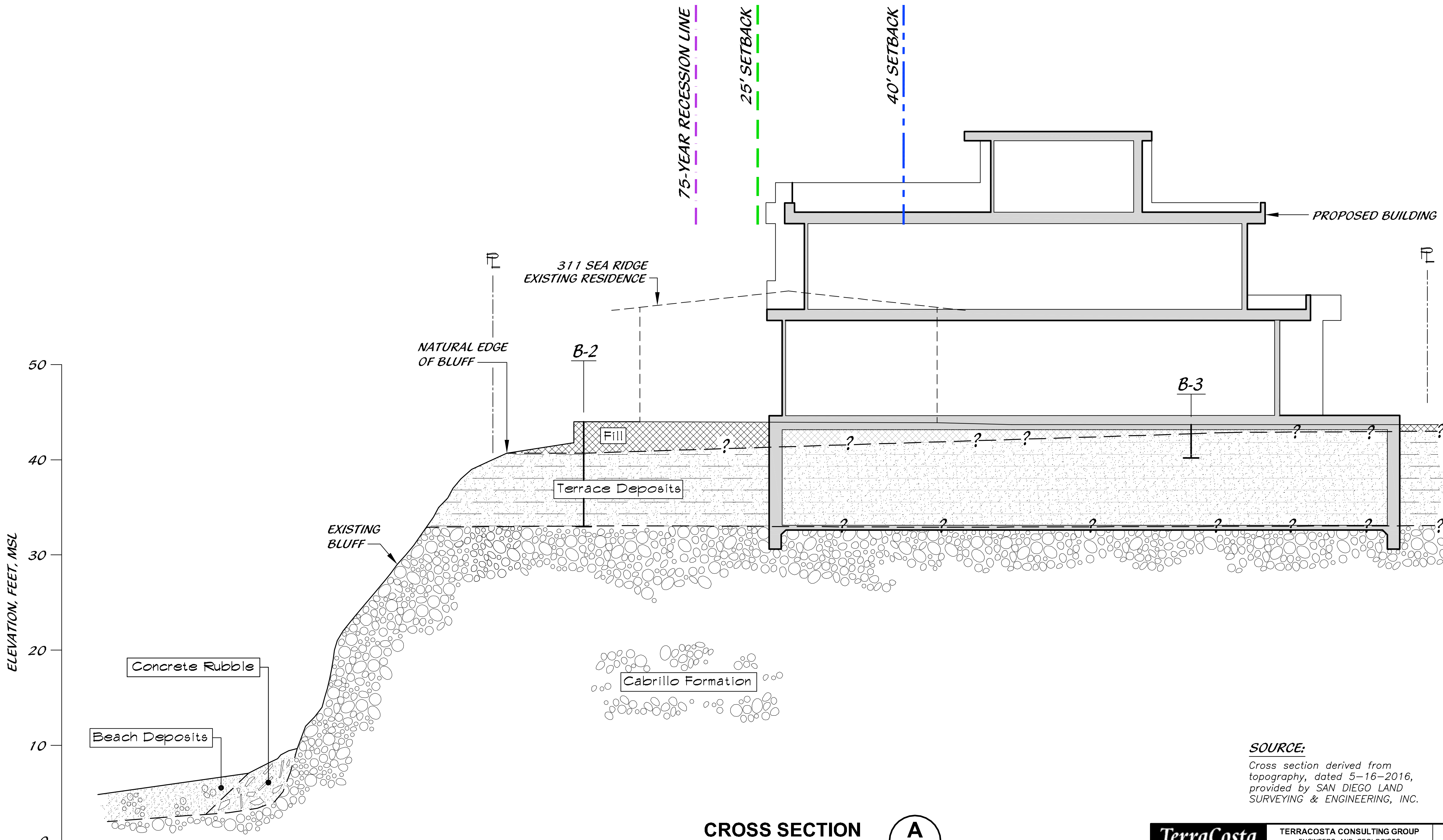
TERRACOSTA CONSULTING GROUP
ENGINEERS AND GEOLOGISTS
3890 MURPHY CANYON ROAD, SUITE 200
SAN DIEGO, CA 92123 (858) 573-6900

FIGURE NUMBER: 2

PROJECT NAME: 311 SEA RIDGE DRIVE

PROJECT NUMBER: 2896

SITE PLAN AND GEOLOGIC MAP



CROSS SECTION A Fig 2

SCALE: 1"=10' (HORIZ. & VERT.)

SOURCE:

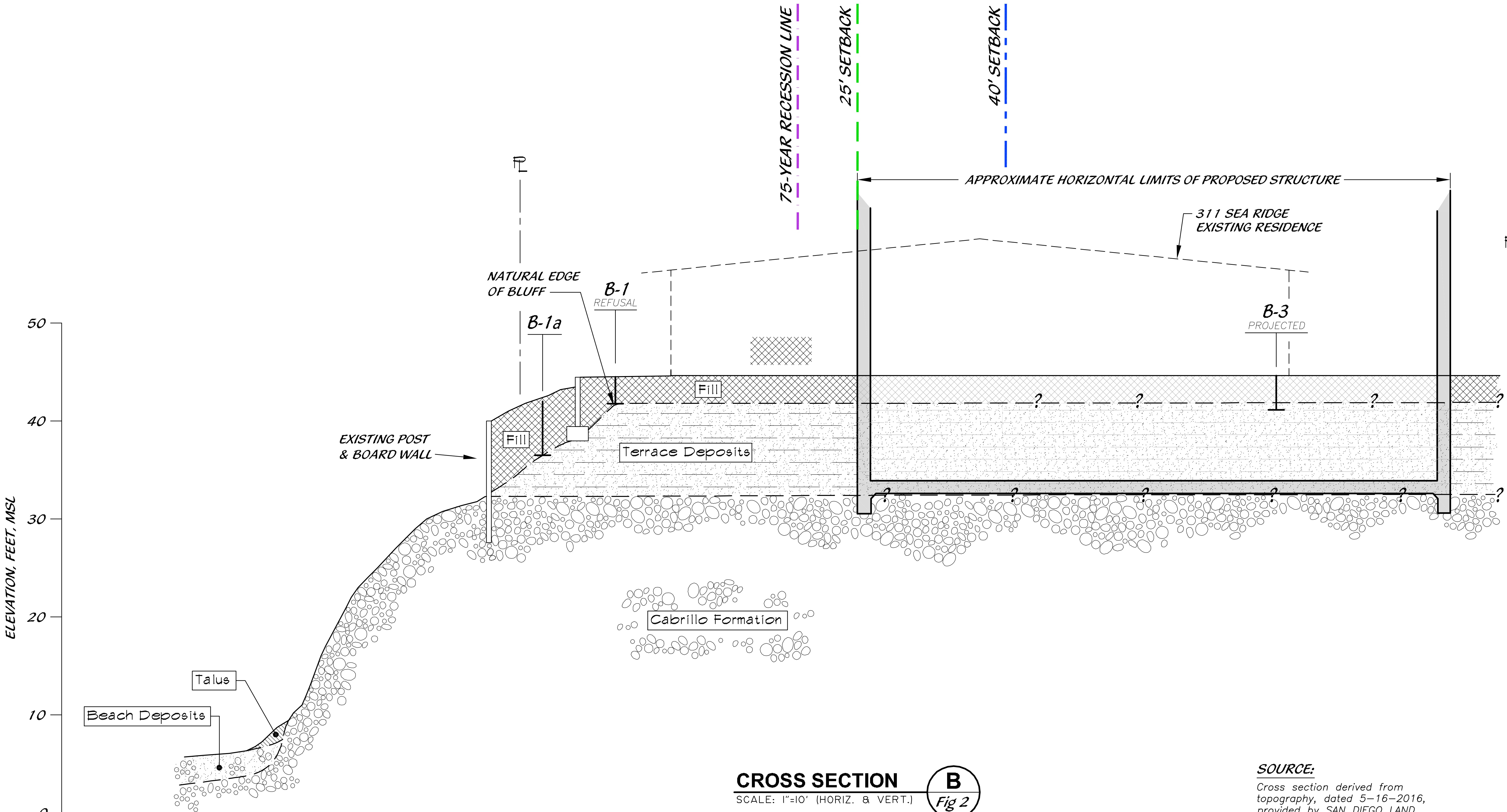
Cross section derived from topography, dated 5-16-2016, provided by SAN DIEGO LAND SURVEYING & ENGINEERING, INC.

REV 5-16-2016

TerraCosta Consulting Group

TERRACOSTA CONSULTING GROUP ENGINEERS AND GEOLOGISTS 3890 MURPHY CANYON ROAD, SUITE 200 SAN DIEGO, CA 92123 (858) 573-6900	FIGURE NUMBER	3
PROJECT NAME 311 SEA RIDGE DRIVE	PROJECT NUMBER	2896

CROSS SECTION



CROSS SECTION B Fig 2
SCALE: 1"=10' (HORIZ. & VERT.)

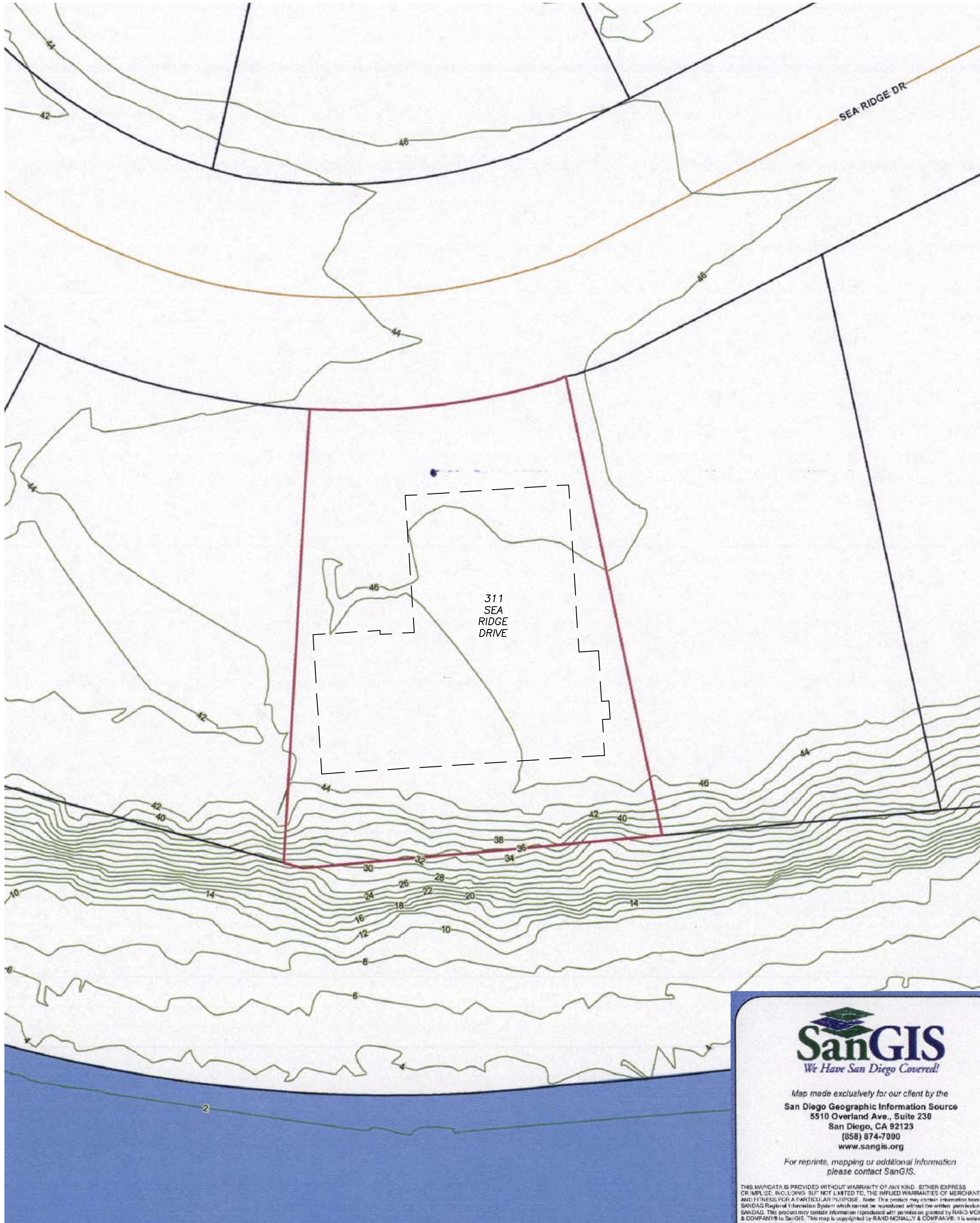
SOURCE:
Cross section derived from topography, dated 5–16–2016, provided by SAN DIEGO LAND SURVEYING & ENGINEERING, INC.

TerraCosta Consulting Group

TERRACOSTA CONSULTING GROUP ENGINEERS AND GEOLOGISTS 3890 MURPHY CANYON ROAD, SUITE 200 SAN DIEGO, CA 92123 (858) 573-6900	FIGURE NUMBER 4
PROJECT NAME 311 SEA RIDGE DRIVE	PROJECT NUMBER 2896
CROSS SECTION	

APPENDIX A

SANGIS TOPOGRAPHIC MAP



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Map made exclusively for our client by the
San Diego Geographic Information Source
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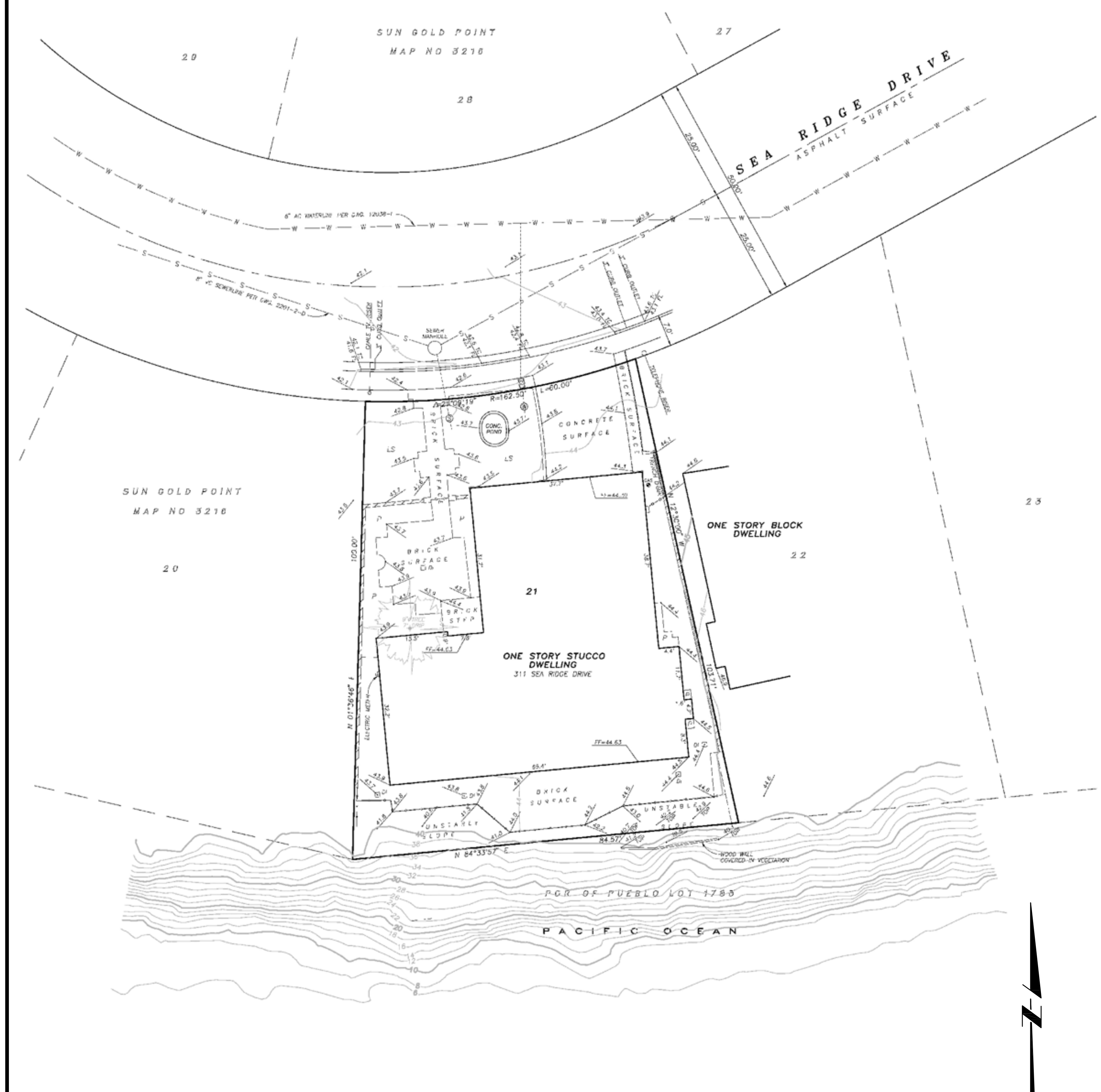
San Diego, CA 92123
(858) 874-7000
www.sangis.org

For reprints, mapping or additional information please contact SanGIS.

Plot Date: 12/07/15

NOTES:
1. SITE IMPROVEMENTS (I.E. RETAINING WALLS, ETC.) ARE NOT SHOWN ON THE SANGIS TOPOGRAPHIC MAP.
2. WE'VE ADDED HOUSE OUTLINE FOR CLARITY.



SCALE: 1"=30'

TOPOGRAPHICAL SURVEY

For the exclusive use of
D. MARIN DEVELOPMENT
1900 WESTERN AVENUE
LAS VEGAS, NEVADA 89102

San Diego Land Surveying & Engineering, Inc.
9356 Chesapeake Drive, Suite 116, San Diego, California 92123
Phone (858) 565-8362 Fax (858) 565-4354

Date: 7-08-2015	Revised: 1-20-2016	Revised
Scale: 1"=20'	Drawn by:	Sheet 1 of 1 Sheet
Drawing: Sea Ridge Dr 311 Topo	A.P.N. 415-031-07	

TerraCosta Consulting Group	TERRACOSTA CONSULTING GROUP ENGINEERS AND GEOLOGISTS 3890 MURPHY CANYON ROAD, SUITE 200 SAN DIEGO, CA 92123 (858) 573-6900	APPENDIX **A**
	PROJECT NAME **311 SEA RIDGE DRIVE**	PROJECT NUMBER **2896**
	SANGIS TOPO MAP COMPARED WITH SDLS&E TOPO MAP	