GeoSoils, Inc.

Geotechnial •Geologic • Coastal • Environmental

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April 16, 2019 W.O. S7569

The Cosmoledo Trust
c/o Laurel Fisher Price
1625 State Street, Suite 1
Santa Barbara, CA 93101

SUBJECT: Final Response to County of Santa Barbara Coastal Engineering Review, 711 San Point Road, Carpinteria, CA, Cosmoledo Trust New Residence.

Dear Cosmoledo Trust:

At your request, GeoSoils, Inc. (GSI) is pleased to provide the following final responses to the subject County of Santa Barbara (County) Coastal Engineering Review comments. In addition, this response is intended to address concerns raised by the California Coastal Commission (CCC) in their October 24, 2018 letter. GSI is assuming the role of coastal engineer for the project. We are in general agreement with the referenced site specific Sea Level Rise Assessment by Stantec.

As the coastal engineering consultant of record for the project, GSI is professionally obligated to discuss the site development requirements as dictated by the County and the CCC, and site development conditions that may likely occur over the life of the development, regardless of the regulatory requirements. That is to say the County and CCC require that the development be designed without the benefit of the existing revetments, one of which is presently unpermitted. However, it is likely that the revetments will be in place for a portion, if not all of, the life of the development. The analysis of wave overtopping with the revetments in place represents a very real site scenario and not including it in the coastal engineering analysis could potentially be professionally negligent. The purpose of the inclusion of the analysis is not to confound the project designer or reviewer but to provide relevant information to the client in order to better understand the potential for coastal hazards to impact the property and proposed development. To be perfectly clear, the recommendations with regards to the coastal engineering design conditions, such as the BFE and potential wave/bore forces, provided herein, are based upon the "no revetments" scenario. Unless specifically superceded herein, the conclusions and recommendations of the Stantec coastal hazard report remain valid and pertinent. For ease of consideration, we are providing the review comment in *italics* followed by our response. For response to Comment #1 GSI provides a recalculation of the potential flood elevation at the site.

1. The stated purpose of the report is to evaluate sea level rise, however the evaluation

includes assessment of changes in tidal ranges, still water levels that include storm surge, estimated rates of beach erosion, wave run-up and flooding in support of establishing an estimated high water level during the life of the project (75 years). The report is considered by the planning department as a coastal engineering report, intended to determine whether proposed development will be safe from coastal hazards and establish a minimum FFE for the development. The Consultant should provide design recommendations for the proposed building envelope, foundation system and mechanical equipment and utilities with respect to flooding, wave impact loads and erosion in the absence of shore protection structure. Wave forces on foundations and structures should be consistent with current County of Santa Barbara Building Code provisions, ASCE 7-05 and ASCE 24-05, and the FEMA Coastal Construction Manual. Structures located within the surf zone subject to high velocity waves should be designed to include both hydrodynamic and hydrostatic forces with a one percent chance of exceedance in any year.

EXISTING CONDITIONS

Tides are taken from the National Oceanic and Atmospheric Administration (NOAA) tidal station at Santa Barbara, see Figure 1. The historical design ocean water level will be 7.6 feet NAVD88, the "100 Year" water level. Site topography was taken from the site topographic map (attached as APPENDIX I), which shows site elevations from the beach at ~+6 feet NAVD88 through the site to Sand Point Road. The "natural" beach slope is taken from the closest BEACON beach profile monitoring range line at Padaro Lane, see Figure 2. The Design Beach Profile (DBP) for both the current condition and "natural beach" (no revetment) analysis is provided as APPENDIX II.

Table 1 - NOAA Tide Data, Santa Barbara (9411340)

	Vertical Datum			
Tidal Datum	MLLW (m)	MLLW (ft)	NAVD88 (ft)	NGVD29 (ft)
100 Year	2.35	7.71	7.57	4.93
Highest Observed	2.25	7.39	7.25	4.61
MHHW	1.65	5.40	5.26	2.62
MHW	1.42	4.64	4.50	1.86
MTL	0.86	2.81	2.67	0.03
MSL	0.85	2.79	2.65	0.01
NGVD29	0.85	2.78	2.64	0.00
MLW	0.30	0.98	0.84	-1.80
NAVD88	0.04	0.14	0.00	-2.64
MLLW	0.00	0.00	-0.14	-2.78
Lowest Observed	-0.88	-2.89	-3.03	-5.67

Figure 1.

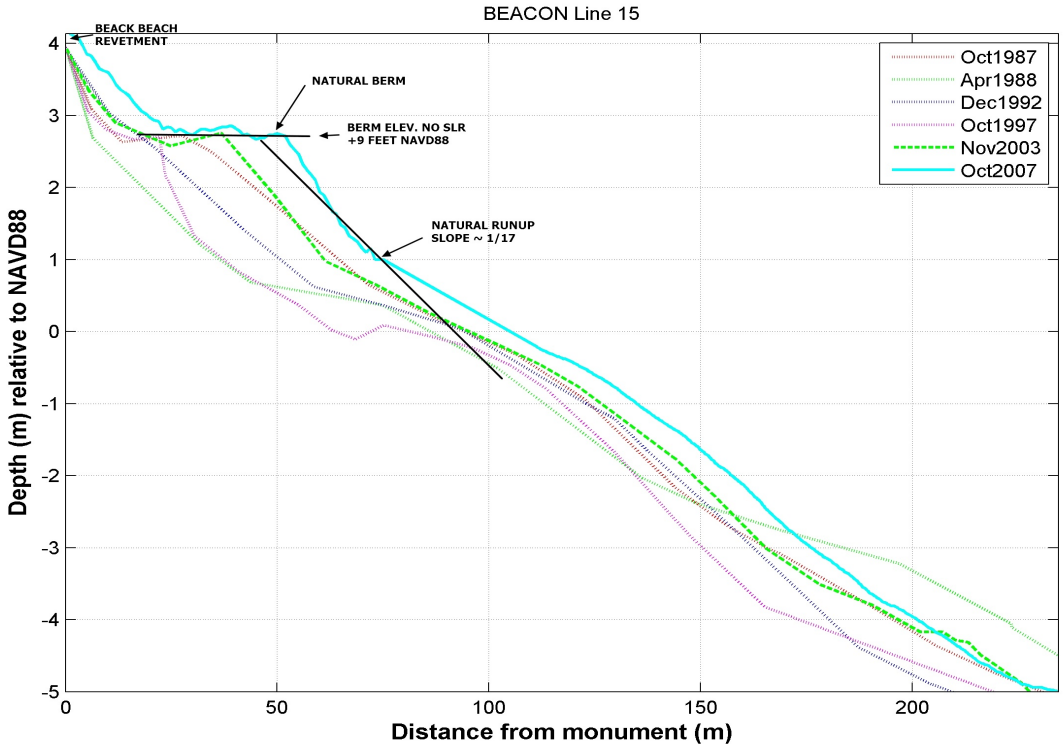


Figure 2.

FUTURE WAVE RUNUP

Sea Level Rise

The County has adopted a SLR range in their 2017 Sea Level Rise Vulnerability Assessment (see below). The County's highest SLR estimate is 60.2 inches or 5 feet. Plotting these estimate and fitting a cure shows that the SLR in 2095 is about 55 inches. The design SLR will be 4.6 feet.

Table I-1. Sea Level Rise Projections for Santa Barbara County (inches)

Time Period	Low Sea Level Rise Scenario	Medium Sea Level Rise Scenario	High Sea Level Rise Scenario
By 2030	0.04	3.5	10.2
By 2060	2.8	11.8	27.2
By 2100	10.6	30.7	60.2

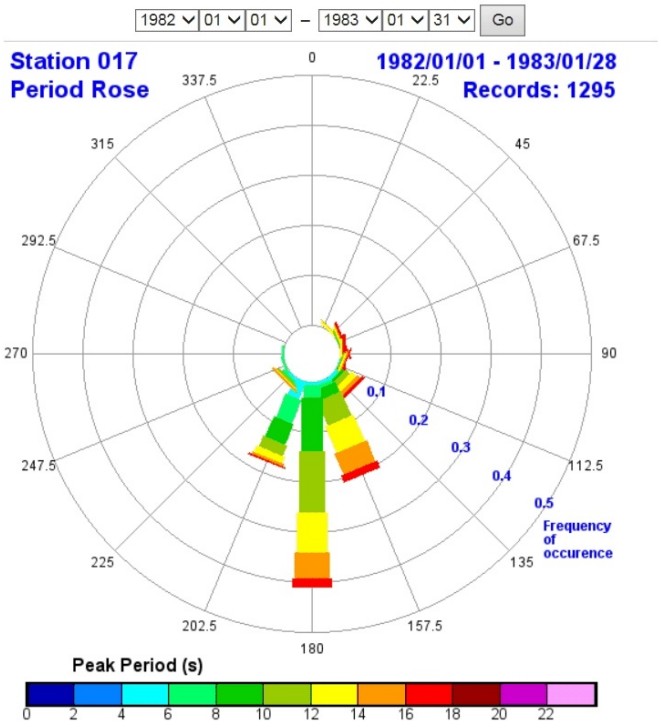
Source: Santa Barbara County Sea Level Rise and Coastal Hazards Vulnerability Assessment, July 2017.

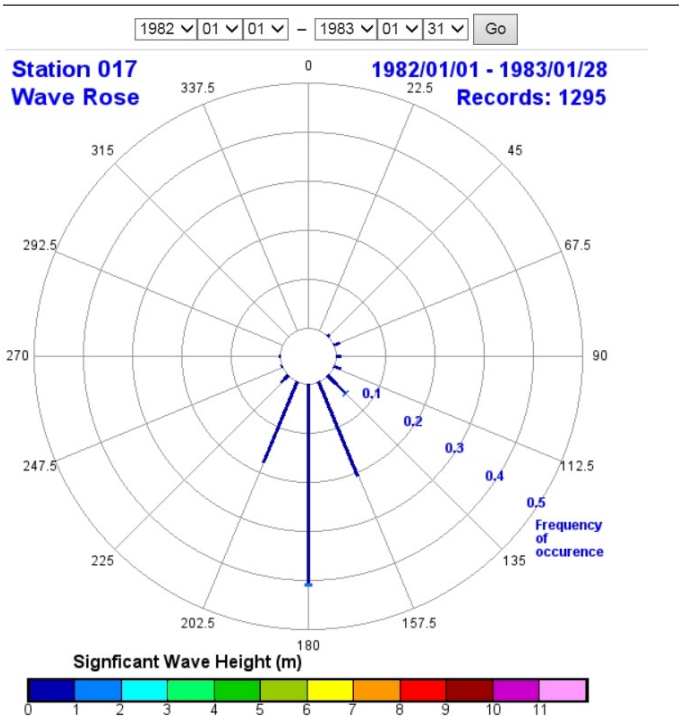
Future Overtopping Revetment In Place

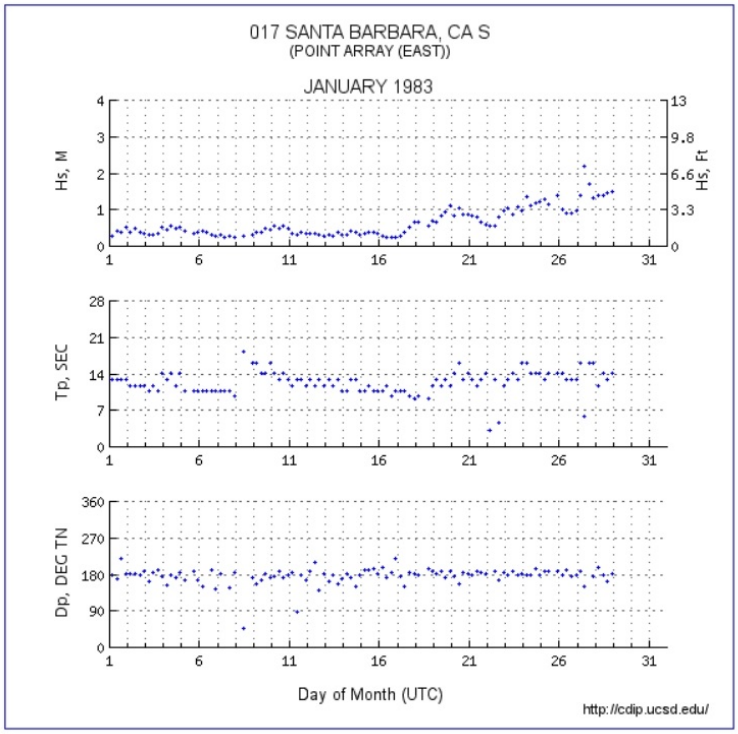
This section is not provided for regulatory determination and project design parameters but rather to describe conditions that may occur over the life of development. The site is

currently protected by a double crested shore protection structure which will be modeled as a wide crested revetment. The wave runup and overtopping calculation on the revetment will use Equation VI-5-23 from the Coastal Engineering Manual, US Army Corps of Engineers. The double crested revetment will be modeled as a single broad crested revetment. The equation coefficients will be chosen for Section (d) (See page VI-5-26 of the CEM), which is the closest analysis section to the site/revetment condition. This equation uses the significant wave height (not the highest), the mean wave period (not the highest), does not rely on the nearshore slope, and is not depth limited. The following variables from the source noted will be the input to the equation.

Structure Slope is ½ based upon revetment design plans (APPENDIX III), Top of Rocks ~+17 feet NAVD88 from project topographic map. Historical Highest Water ~+7.6 feet NAVD88 from NOAA. Mean Wave Period & Significant Wave Height taken from Santa Barbara Station CDIP during the 1982-83 storms. Future design water elevation will be 12.2 feet NAVD88. Below is the Wave Rose and Period Rose for the design wave conditions during the 1982-83 El Nino winter. In addition, a wave statistics compendium of January 1983, which had the larger wave event, is also below.




1982 01 01 – 1983 01 31 Go
Station 017
Wave Rose
1982/01/01 - 1983/01/28
Records: 1295
0
22.5
45
67.5
90
112.5
135
157.5
180
202.5
225
247.5
270
292.5
315
337.5
0,1
0,2
0,3
0,4
0,5
Frequency of occurence
Signficant Wave Height (m)
0 1 2 3 4 5 6 7 8 9 10 11


017 SANTA BARBARA, CA S
(POINT ARRAY (EAST))
JANUARY 1983
Hs, M
Hs, Ft
Tp, SEC
Dp, DEC TN
Day of Month (UTC)
http://cdip.ucsd.edu/

Based upon this data during the design winter (1982-83), the significant wave height was maximum of about 7 feet. GSI will use 8.5 feet as the design wave height to be conservative. Based upon this data the mean period is about 14 seconds. To be conservative GSI will use 15 seconds. The output for the CEM overtopping analysis is below.

			DATE	8-Mar-19
			W.O	S7569
711 Sand Point Road Revetment				
OVERTOPPING FORMULA BY BRADBURY AND ALLSOP				
EQUATION VI 5-23				
INPUT	**SYMBOL**	**VALUE**		
SIGNIFICANT WAVE HEIGHT	Hs	8.5		
MEAN WAVE PERIOD	Tom	15		
COEFFICIENT	a	0.37		
COEFFICIENT	b	2.9		
FREEBOARD	Rc	4.8		
SURFACE ROUGHNESS	ϒ	0.5		
	Som	0.00736784		
OVERTOPPING	**q**	**0.741987512**		

The calculated revetment mean overtopping rate for the design condition is 0.76 ft^3/s-ft for 4.6 feet SLR. It should be noted that the CEM says that the overtopping rate calcualted using the CEM equations could be greater by an order of magnitude or ~7 ft^3/s-ft . For the calculated overtopping rate, the height of water can be calculated using the following empirical formula provided by the USACOE (Protection Alternatives for Levees and Floodwalls in Southeast Louisiana, May 2006, equations 3.1) based upon the calculated overtopping rate Q for the SLR case.

$$q = 0.5443\sqrt{g}\,h_1^{3/2}$$

For 7 ft^3/s-ft the height of the overtopping bore is about 1.7 feet. The revetment has two crests and is very broad, which will reduce the height of the bore before is flows towards the development. The proposed structure is over 120 feet setback from the top of the revetment. The wave overtopping bore will be significantly reduced in height by the time it reaches the structure. Site elevation at the structure string line is about +12 feet NAVD88, and with an overtopping bore of less than 1 foot in height, the effective flood elevation at this location is about +13 feet NAVD88.

Future Overtopping NO Revetment In Place

Wave runup and overtopping for the proposed project is calculated using the United States

Army Corps of Engineers (USACOE) Automated Coastal Engineering System, ACES. ACES is an interactive computer based design and analysis system used in the field of coastal engineering. The methods to calculate runup and overtopping implemented herein are discussed in greater detail in Chapter 7 of the Shore Protection Manual (1984) and in Chapter 6 of the CEM. Figure 3, taken from the ACES manual, shows the runup variables.

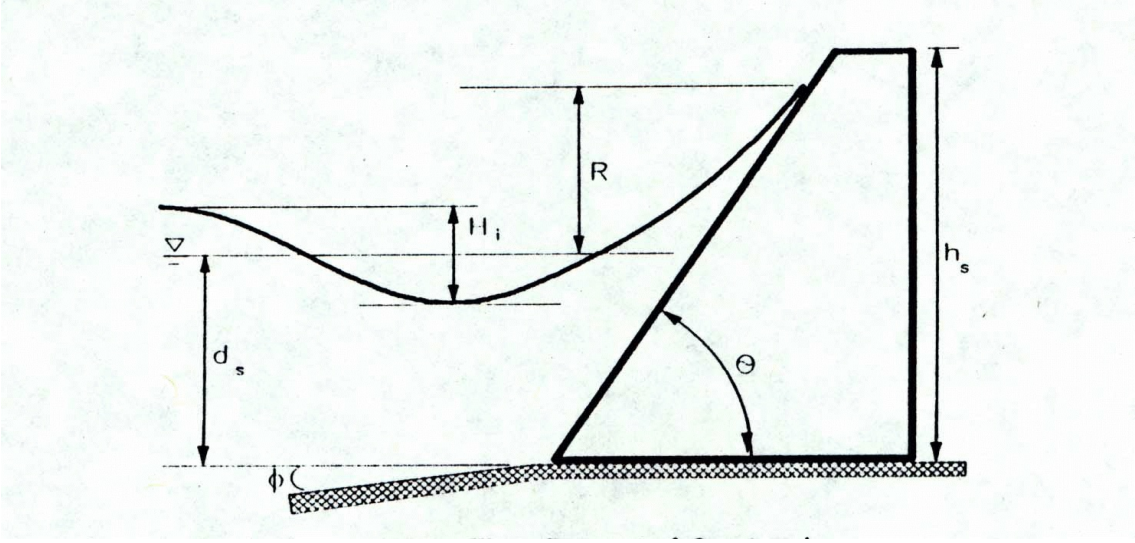


Figure 3. Wave runup terms from ACES manual.

d_s is the depth of the water at the break point on of the beach slope
H_i is the design breaking wave height
R is the height of the wave runup above the still water elevation
h_s is the height of the revetment above the toe
Θ is the ~slope of the revetment
ϕ is the nearshore slope or slope from the shoreline to beyond the breakers. This variable is only used to back calculate the deepwater wave height for comparison to wave height statistics.

The future beach slope will be the current beach slope (see Figure 2) or ~1/17. The future beach berm elevation will be the current elevation plus the approximate SLR or about +13.5 feet NAVD88. The slope and the berm elevation are determined by using the coastal engineering principal of equilibrium beach profile (Dean, 1991). The equilibrium beach profile principal is illustrated in the graphic below provided as Figure 5. The design wave will be the same design wave used in the CEM analysis, to be consistent. The water depth at the toe of the beach will be back calculated using the depth limited design wave. The calculated elevation of the toe is 12.2 NAVD88 - 8.5/0.78 = 1.3 feet NAVD88. The top of the berm at 13.5 feet NAVD88 is the 12.2 feet above the toe. The output for the ACES analysis is provided after Figure 4.

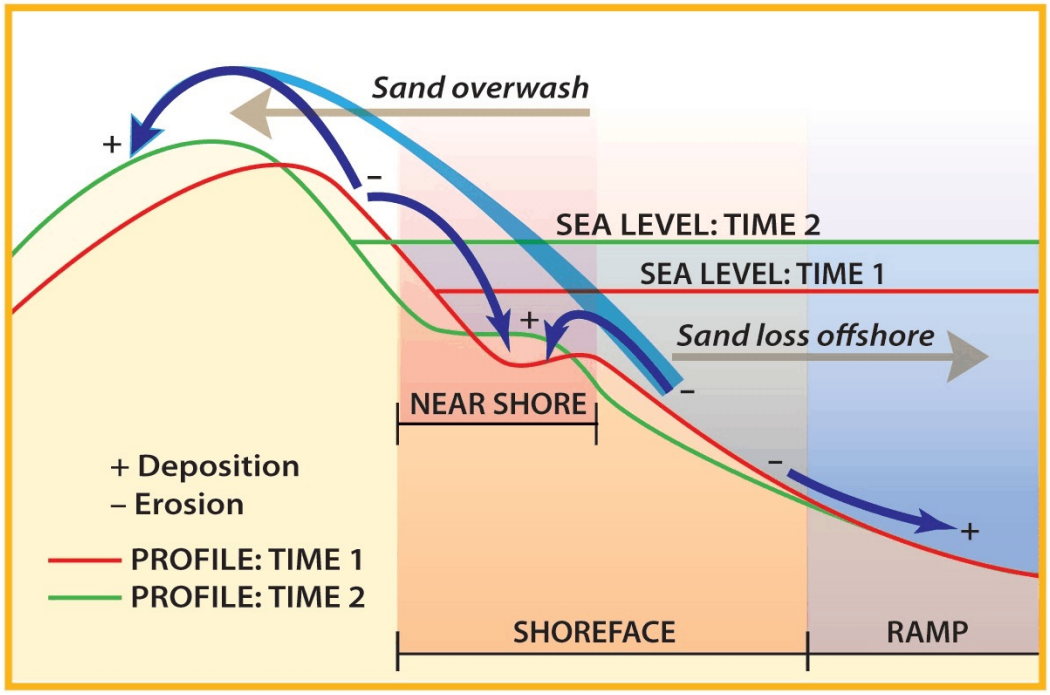


Figure 4.

ACES | Mode: Single Case | Functional Area: Wave - Structure Interaction

Application: Wave Runup and Overtopping on Impermeable Structures

Item		Unit	Value
Incident Wave Height	Hi:	ft	8.500
Wave Period	T:	sec	14.000
COTAN of Nearshore Slope	COT(ø):		125.000
Water Depth at Structure Toe	ds:	ft	10.900
COTAN of Structure Slope	COT(θ):		17.000
Structure Height Above Toe	hs:	ft	12.200
Wave Runup	R:	ft	5.444
Onshore Wind Velocity	U:	ft/sec	8.439
Deepwater Wave Height	H0:	ft	6.040
Relative Height	ds/H0:		1.805
Wave Steepness	H0/(gT^2):		0.000958
Overtopping Coefficient	α:		0.070000
Overtopping Coefficient	Qstar0:		0.070000
Overtopping Rate	Q:	ft^3/s-ft	10.474

Smooth Slope Runup and Overtopping

711 Sand Point Road

4.6 FT SLR

NO REVETMENT

The calculated natural beach overtopping rate for the design condition is 10.5 ft^3/s-ft for 4.6 feet SLR . For the calculated overtopping rate, the height of water can be calculated using the empirical formula provided by the USACOE (Protection Alternatives for Levees and Floodwalls in Southeast Louisiana, May 2006, equations 3.1) based upon the calculated overtopping rate Q for the SLR case. For 10.5 ft^3/s-ft the height of the overtopping bore is about 2.3 feet.

For the future natural beach the estimated beach retreat using erosion on average of 2 ft/yr is 150 feet. In a recent CCC staff report for a southern California (Ventura) beachfront

property (Report Th15a-3-2019), CCC staff used a shoreline retreat of 40 feet for every 1 foot of SLR. While it is GSI's professional opinion that this is a very conservative rate applied to an already eroding shoreline, if we apply it at this relatively stable beach, then for 4.6 feet of SLR the beach would retreat 184 feet. To be conservative GSI will estimate the beach retreat to be the average of these two methods or 167 feet in 75 years. This is shown on the DBP in APPENDIX II. While not a likely scenario, if the revetments are removed today, then the shoreline could retreat such that the new beach berm is at about the structure string line. The elevation of the future berm is +13.5 feet NAVD88 and when the maximum bore height of 2.3 feet is added the effective flood elevation at the structure string line is +15.8 feet NSAD88. Due to the site topography, sloping back towards Sand Point Road, and the fact that the bore height dissipates as it travels landward, this is the site maximum flood elevation over the design life of the structure.

Typically the height limit, the building/deck string line, and other setbacks (building envelope) are provided by the County or other consultants. The coastal engineer typically provides the future potential flood elevation. The county of Santa Barbara has determined that the advisory flood elevation at this site is +15.4 feet NAVD88. In addition the County has a 2 feet clearance requirement for the minimum recommended finished floor height (FF) or +17.4 feet NAVD88. With the revetment in place and maintained, including SLR of about 4.6 feet, the site is reasonably safe from wave runup and overtopping and the FF of +17.4 feet NAVD88 is adequate to protect the development from flooding. With NO revetment in place and accounting for 4.6 feet of SLR, GSI calculates a future water elevation of +15.8 feet NAVD88.

Based upon County requirement that the FF be 2 feet above the advisory BFE, the FF elevation should be at or above +15.4 feet NAVD88. Based upon GSI analysis and SLR, the future flooding elevation may be +15.8 feet NAVD88. If the County 2 feet of freeboard is required, the FF elevation minimum would be +17.8 feet feet NAVD88.

BUILDING DESIGN

The location of the project along the top of the beach exposes the proposed development to coastal hazards when high tide events coincide with extreme storm events and SLR. During these events, wave run-up extends into the seawall (rock revetments) along the ocean side of the property and then dissipates into the sand between the revetments and underlying sand berm. This condition could be worsened if the higher predicted sea level rise scenarios were to occur which would cause tide levels to increase allowing storm waves to break closer to shore which would increase erosion and result in increased run-up levels, particularly if the seawall were removed. Therefore, the proposed improvements will be designed to accommodate and withstand the extreme tidal and run-up events assuming that the seawall were removed. It should be noted that if the revetment is removed, the beach berm could be located at about the proposed residence string line at the very end of the residences design life depending on the sea level rise that occurs (See DBP APPENDIX II).

The lower level will be below the predicted flood elevations if the seawall is removed so this

space should be designed as uninhabited with break-away walls. The high SLR prediction was computed to inform the owner and allow planning for the currently anticipated, worst case scenario. Since the extreme sea level rise predictions and the removal of the seawall could cause erosion and result in tide levels that could inundate the lower level of the residence and portions of Sand Point Road towards the end of the design life of the improvements, the actual rate of sea level rise should be monitored and corrective measures (raising Sand Point Road, beach nourishment etc.) employed to protect life and the environment, if these conservative and extreme predictions occur.

According to the FEMA Coastal Construction Manuel, design within flood hazard zones should follow the guidance of Flood Resistant Design and Construction standards provided in ASCE 7-05 & 24-05. It is recommended that the structural design for this residence follow these guidelines as well as the current County of Santa Barbara Building Code provisions. The piles for the structure are to be designed to include both hydrodynamic and hydrostatic forces with a one percent chance of being exceeded in any year. According the ASCE standards this residence is classified as a Category II structure and is located in a high hazard zone. Therefore, the structure will be constructed in compliance with Section 4 of ASCE 24-05. For this Category and location, it is recommended that perpendicular, lowest supporting horizontal structural members should be one (1) foot above the BFE and parallel, lowest supporting horizontal structural members could be positioned at the BFE. According to County Flood control, the freeboard to be applied at the site is 2 feet. Applying this freeboard to the GSI BFE gives an FF elevation of 17.8 feet NAVD88 which will be the minimum elevation for mechanical equipment and living space. The lower level space is to be considered uninhabited space and shall have break-away walls designed in accordance with ASCE 24-05.

Wave Forces

Using the identified water levels and overtopping bore elevations with respect to the proposed development, it was determined that although the proposed structure is above the design water level, wave run-up will extend to the proposed residence if the rock revetment is not present. Since the existing grade along the beach in front of the residence is above the design water level, direct forces from wave transmission and breaking will not affect the structure. However, the wave run-up bore that could extend to the residence will exert a force on the structure (piles and break-away walls). The force is related to the height of the bore (Hw) at the structure. As indicated in the Coastal Engineering Manual, the force of the surge per unit horizontal width to be as follows:

$$F_{surge} \approx 4.5\rho g(Hw)^2$$

where ρ is the density of the water, Hw is the bore height, and g is gravity. Since the design wave run-up could extend to the residence if the seawall were removed, the force of the surge will be conservatively computed to the full height of the wave run-up above the eroded grade in front of the structure that could occur at the end of 75 years if SLR continues as predicted. Using a bore height of 3 feet the estimate wave bore force is about 3000 lbs per foot. These force values should be used to design the improvements along

the ocean side of the site by multiplying the force values by the width of the improvement subject to the storm surge. Since other similar conditions will likely occur depending on the final design configuration, the project coastal engineer should review proposed improvements within the surge area and identify appropriate loadings resulting from the predicted wave run-up conditions at the site.

2. The consultant states that there is an existing sea wall and revetment present seaward of the residence, however, no seawall is referenced on the plans. Please clarify if there is sea wall present, and if so, the location, dimensions and permit status of the sea wall.

There is a double crested revetment fronting the site. The site topographic map (attached as APPENDIX I) shows the revetment(s).

3. Figure 4.0 "Section Through Project Site" provides existing site elevation, eroded ground surface without the existing revetments, and projected 75 year water elevation. Please update the figure to include the design beach profile (including foreshore slope), still water level, wave heights, wave run-up elevations and limits, and the structural limits and finished floor/grade elevations between the surf zone and Sand Point Road. Figure 4.0 also includes estimated scour profiles due to beach erosion. Please extend the section seaward to show the estimated foreshore slope. The estimated depth of beach scour elevation should be supported by a discussion of likely depth of scour based on geotechnical information for the site.

This information is provided in the previous response, and the DBP is in APPENDIX II.

4. The consultant states that the required minimum FFE is 15.6 ft. NAVD88, 2 ft. above BFE of 13.6 ft. as determined by the applicable FEMA flood panel map. The proposed FFE is 17.1 ft. NAVD88 for the main floor of the house. Presumably the elevation of the uninhabitable storage and garage space is lower. Please clarify the FFE of the uninhabitable lower story. Provide the recommended minimum elevation of lowest horizontal structural member above the BFE for design. The bottom of lowest horizontal structural member shall be elevated at or above the BFE.

Please see our response to GDI comment 1.

5. The Consultant should address the potential for wave erosion of the adjacent access roadway and municipal utilities for the proposed development.

With the revetment in place and maintained wave overtopping will not impact (erode) the site and the access road/utilities. The design wave bore height of 2.3 feet (increased to 3 feet for analysis) at the eroded berm, if the revetment is gone, is about 250 feet from the road. Typically, according to the Coastal Engineering Manual, a wave bore losses about 1 foot of elevation for every 25 feet it propagates across a sand beach. It is GSI's opinion that the wave bore will dissipate in a distance of less than 150 feet. In addition, the

overtopping water is a pulse of water that is spread out across the site as it travels landward. It is NOT a continuous flow but rather a discrete volume of water. The access road and utilities will be vulnerable to flooding from the estuary as sea level rises. This vulnerability will be shared by all of the property owners. Potential adaptation strategies would include raising the road and relocating the utilities.

COASTAL COMMISSION COMMENTS

SLR

The County has adopted a SLR range in their 2017 Sea Level Rise Vulnerability Assessment. The County's highest SLR estimate is 60.2 inches or 5 feet. The discussion herein uses 4.6 feet for the year 2095. Considering the tremendous uncertainty is SLR estimates these SLR estimates are reasonable. The best available science to determine a sea level rise (SLR) range currently is the 2018 OPC SLR Guidance. This is stated in the November 2018 CCC SLR Guidance update. As a matter of fact, these SLR projection probabilities are based upon a report by Robert E. Kopp and others (see references). The design life of the structure is 75 years which we will estimate to be the year 2095. The Kopp paper has three emission scenarios (low, medium, and high), which the 2018 OPC narrowed down to just low and high (no medium emission scenario). The CCC 2018 update eliminated the low emissions option and just offered the high emissions case. However, the best available science per the 2018 CCC SLR update is the 2018 OPC SLR guidance. The following table is taken from the 2018 OPC SLR Guidance (a.k.a. the "best available science") for the closest tidal station, Santa Barbara. If you average the low emissions for the year 2090 and the low emissions for the year 2100 the average is 4.8 feet. The use of about 4.6 feet herein is justified by the best available science and in conformance with the County of Santa Barbara and the CCC SLR Guidance update.

SANTA BARBARA		*Probabilistic Projections (in feet) (based on Kopp et al. 2014)*					*H++ scenario (Sweet et al. 2017) *Single scenario*
		MEDIAN	LIKELY RANGE		1-IN-20 CHANCE	1-IN-200 CHANCE	
		50% probability sea-level rise meets or exceeds...	*66% probability sea-level rise is between...*		*5% probability sea-level rise meets or exceeds...*	*0.5% probability sea-level rise meets or exceeds...*	
				Low Risk Aversion		Medium - High Risk Aversion	Extreme Risk Aversion
High emissions	2030	0.3	0.2 -	0.4	0.5	0.7	1.0
	2040	0.5	0.3 -	0.7	0.8	1.1	1.6
	2050	0.7	0.4 -	1.0	1.2	1.8	2.5
Low emissions	2060	0.7	0.4 -	1.0	1.4	2.2	
High emissions	2060	0.9	0.6 -	1.3	1.6	2.5	3.6
Low emissions	2070	0.9	0.5 -	1.3	1.7	2.8	
High emissions	2070	1.1	0.7 -	1.7	2.1	3.3	4.9
Low emissions	2080	1.0	0.5 -	1.5	2.0	3.6	
High emissions	2080	1.4	0.9 -	2.1	2.7	4.3	6.3
Low emissions	2090	1.1	0.6 -	1.8	2.4	4.4	
High emissions	2090	1.7	1.1 -	2.6	3.3	5.3	7.9
Low emissions	2100	1.2	0.6 -	2.0	2.9	5.3	
High emissions	2100	2.1	1.2 -	3.1	4.1	6.6	9.8

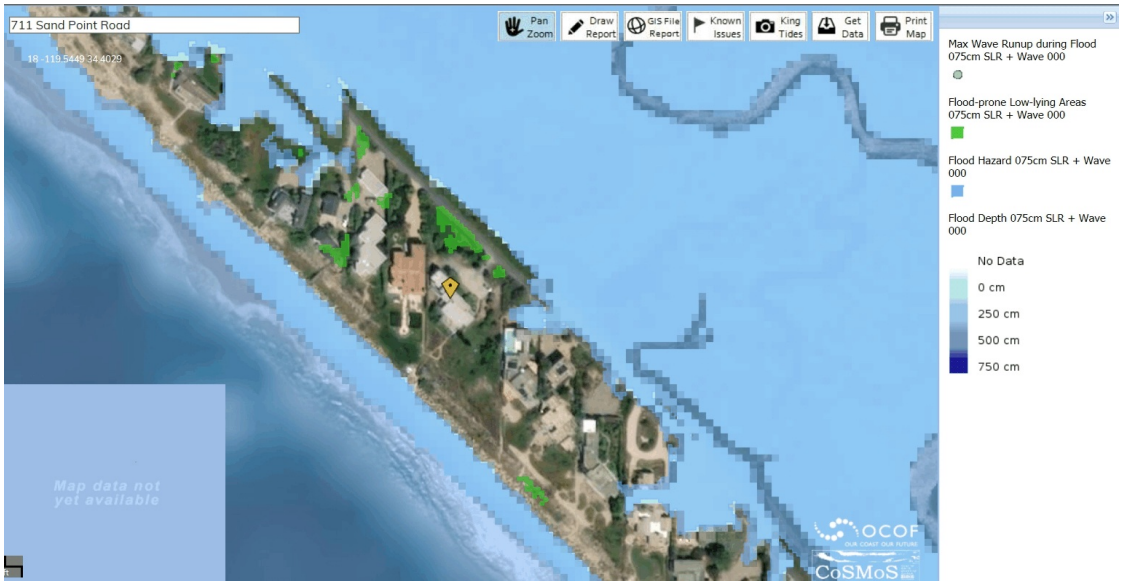
Thresholds

The CCC comments requested an analysis of thresholds for site flooding of the site. The USGS has also developed a model called the Coastal Storm Modeling System (CoSMoS) for assessment of the vulnerability of coastal areas to SLR and the 100 year storm, http://walrus.wr.usgs.gov/coastal_processes/cosmos/. Using the modeling program the vulnerability of the site to different SLR scenarios, shoreline erosion, and the100 year storm can be assessed. While GSI considers the CoSMoS analysis to be very conservative, it has been used by the CCC to assess coastal site vulnerability in project hearings. However, the following are the limitations as to the use of the CoSMoS model.

> *Inundated areas shown should not be used for navigation, regulatory, permitting, or other legal purposes. The U.S. Geological Survey provides these data "as is" for a quick reference, emergency planning tool but assumes no legal liability or responsibility resulting from the use of this information.*

The figure below is the output of the CoSMoS program for the site for the extreme design conditions. The modeling shows that the site will flood during the 100 year event with 150 centimeters (~4.9 feet) of SLR. The shoreline may retreat but just to the location of the proposed structure as shown on the DBP (APPENDIX II). This conservative analysis verifies that the Stantec, and GSI analysis and conclusions are reasonable and justified.

The threshold for flooding of the site from the estuary can be determined by using CoSMoS with no waves. The CoSMoS output below shows that the threshold for the initiation of site flooding from the estuary across the road is with about 75 cm (2.5 feet) of SLR. It also shows that the portions of the road to either side of the site will be flooded. Using the OPC SLR Santa Barbara Table above this threshold is after the year 2060.



With both revetments removed, the potential for coastal hazards to impact the development is mitigated by the proposed design. The structure elevation above potential future flooding, the pile foundation (depth and size), the FEMA approved design methods for the improvements below the flood elevation (blow out panels), all combine to mitigate the potential hazards. Provided the recommendations in the Stantec report and herein are incorporated into the design, the proposed project is reasonablely safe from coastal hazards.

The opportunity to provide professional services is appreciated, and if you have any questions please contact us.

Respectfully Submitted,

REGISTERED PROFESSIONAL ENGINEER
DAVID W. SKELLY
No. RCE 47857
Exp. 12/31/19
CIVIL
STATE OF CALIFORNIA

GeoSoils, Inc.
David W. Skelly, MS
RCE #47857

APPENDIX I	Site Topographic Map.
APPENDIX II	Design Beach Profile.
APPENDIX III	Revetment Plans.

REFERENCES

ASCE, 2006. Flood Resistant Design and Construction, ASCE/SEI 24-05.

Kopp, Robert E., Radley M. Horton Christopher M. Little Jerry X. Mitrovica Michael Oppenheimer D. J. Rasmussen Benjamin H. Strauss Claudia Tebaldi Radley M. Horton Christopher M. Little Jerry X. Mitrovica Michael Oppenheimer D. J. Rasmussen Benjamin H. Strauss Claudia Tebaldi "Probabilistic 21st and 22nd century sea-level projections at a global network of tide-gauge sites" First published: 13 June 2014

"Sea Level Rise Assessment for 711 Sand Point Road," dated February 21, 2018, by Stantec.

"Equilibrium Beach Profiles: Characteristics and Applications," date Winter 1991, by Robert Dean, Journal of Coastal Research, 7-1 pages 53-84

APPENDIX I

COSMOLEDO TRUST

711 SAND POINT ROAD, CARPINTERIA, CA 93013

T.M.MORRISON & ASSOCIATES

1910 OUTPOST DRIVE,LOS ANGELES, CA 90068

TEL: 323.512.7700 FAX: 323.378.5289

LOT SIZE: 6.30 ACRES/274,428.00 SQ. FT.

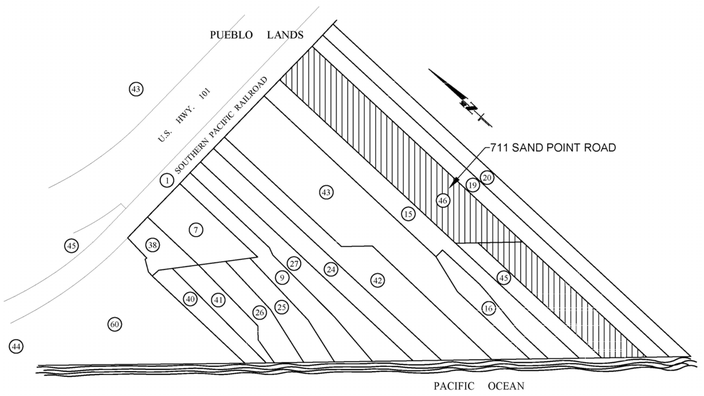
GROSS AREA: 40,408.00 SQ. FT.
APN: 005-460-046
EXISTING RESIDENCE: 2,634.00 SQ. FT.
DEMOLISHED RESIDENCE: 2,634.00 SQ. FT.
PROPOSED RESIDENCE: 7,023.20 SQ. FT.
MAX ALLOWED FAR PER HOA: 40,408X25%=10,102 SQ. FT.
PROPOSED RESIDENCE FAR PER HOA: 17.6 %
PROPOSED GARAGE/STORAGE: 2,190.4 SQ. FT.
TYPE V, RESIDENTIAL
ZONE : 10-R-1
AVERAGE HEIGHT: ± 22'
DATE: FEBRUARY 20, 2018

ESTIMATED GRADING QUANTITIES

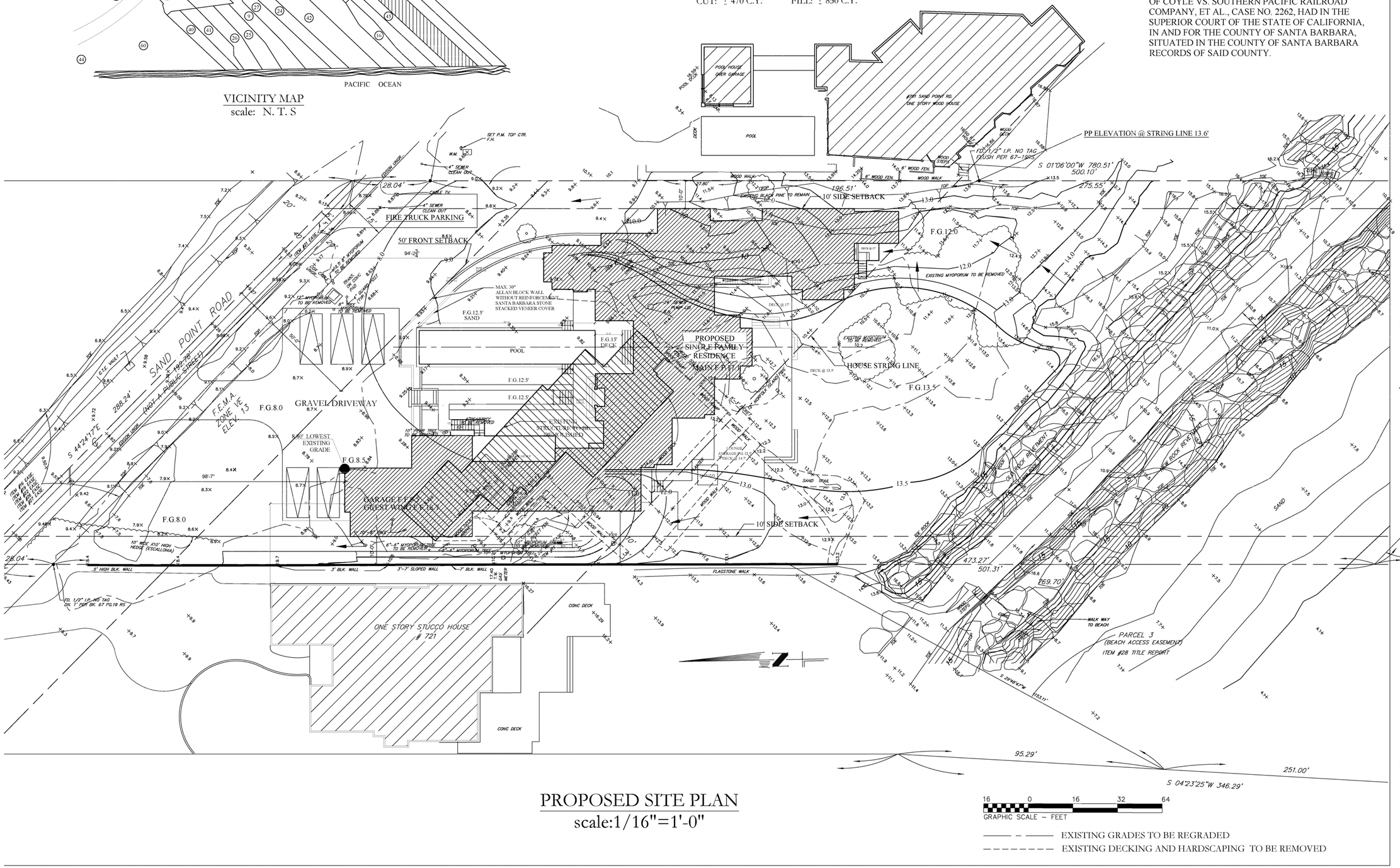
CUT: ± 470 C.Y. FILL: ± 850 C.Y.

LEGAL DESCRIPTION

IN THE COUNTY OF SANTA BARBARA, STATE OF CALIFORNIA BEING A PORTION OF LOT 2, ACCORDING TO THE PARTITION MAP IN THE CASE OF COYLE VS. SOUTHERN PACIFIC RAILROAD COMPANY, ET AL., CASE NO. 2262, HAD IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA, IN AND FOR THE COUNTY OF SANTA BARBARA, SITUATED IN THE COUNTY OF SANTA BARBARA RECORDS OF SAID COUNTY.



VICINITY MAP
scale: N. T. S



PROPOSED SITE PLAN

scale:1/16"=1'-0"

16 0 16 32 64
GRAPHIC SCALE – FEET

——— – ——— EXISTING GRADES TO BE REGRADED
– – – – – – – – EXISTING DECKING AND HARDSCAPING TO BE REMOVED

T.M. MORRISON & ASSOCIATES

1910 OUTPOST DRIVE,
LOS ANGELES, CA 90068

TEL: 323.512.7700
FAX: 323.378.5289

CONSULTANTS

PROJECT NAME

711 SAND POINT ROAD,
CARPINTERIA,
CA 93013

REVISIONS:

SHEET TITLE

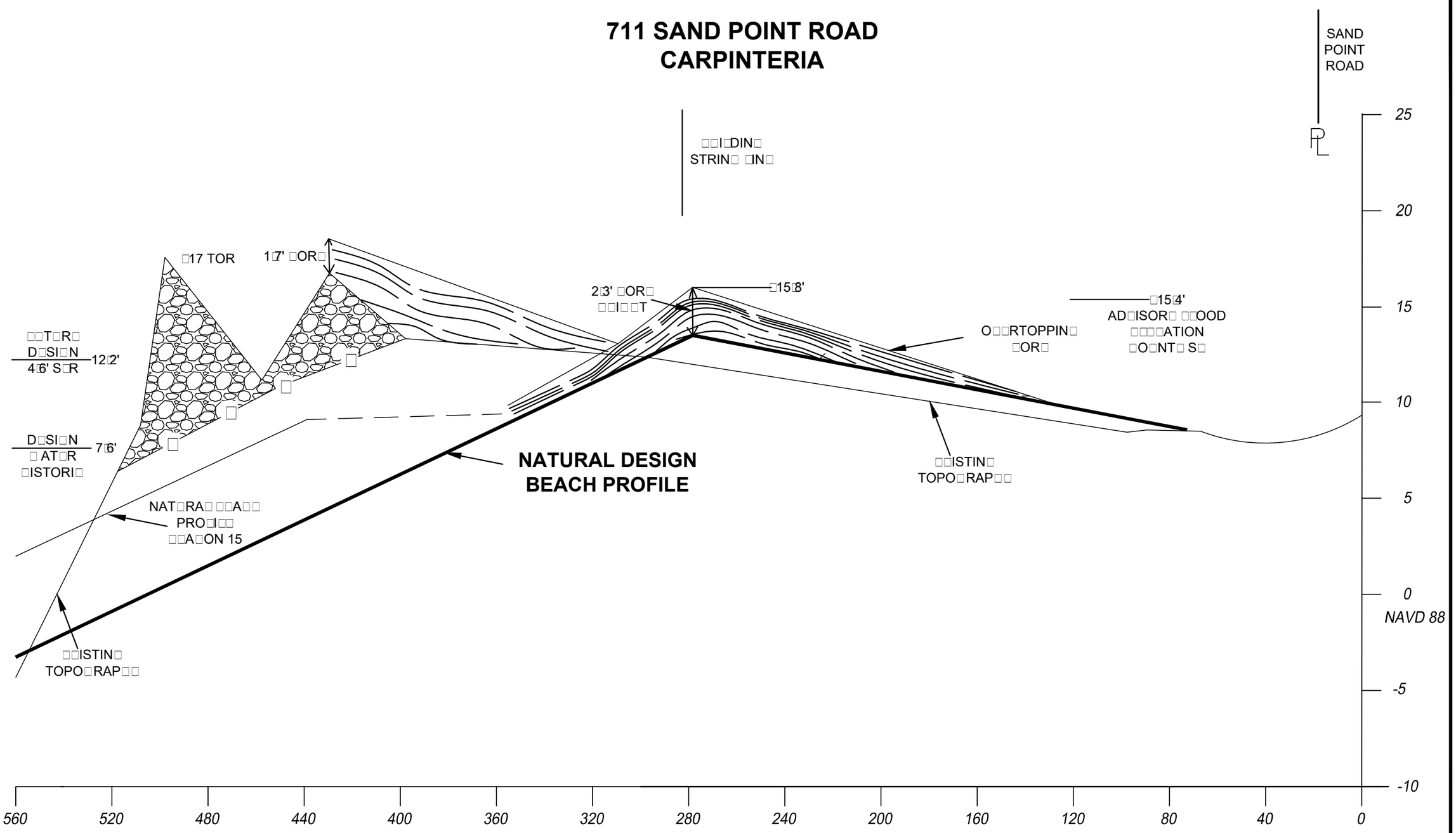
PROJECT INFORMATION, PROPOSED SITE PLAN, VICINITY MAP

SCALE: AS NOTED
DATE: 02.19.2018
PROJECT NUMBER:

A-0

APPENDIX II

711 SAND POINT ROAD
CARPINTERIA



REVISIONS	BY

DRA□TIN□ □□□

PROFESSIONAL ENGINEER ★ REGISTERED ★ STATE OF CALIFORNIA
DAVID W. SKELLY
No. C 47857
EXP. 12/31/19
CIVIL

GeoSoils, Inc.
Geotechnical • Geologic • Coastal • Environmental
5741 Palmer Way, Carlsbad, CA 92010
760-438-3155

TITLE:
711 SAND POINT ROAD
DESIGN BEACH PROFILE

W.O. S7569

CLIENT: THE COSMOLEDO TRUST
711 SAND POINT ROAD
CARPINTERIA, CA – 93013

CHECKED

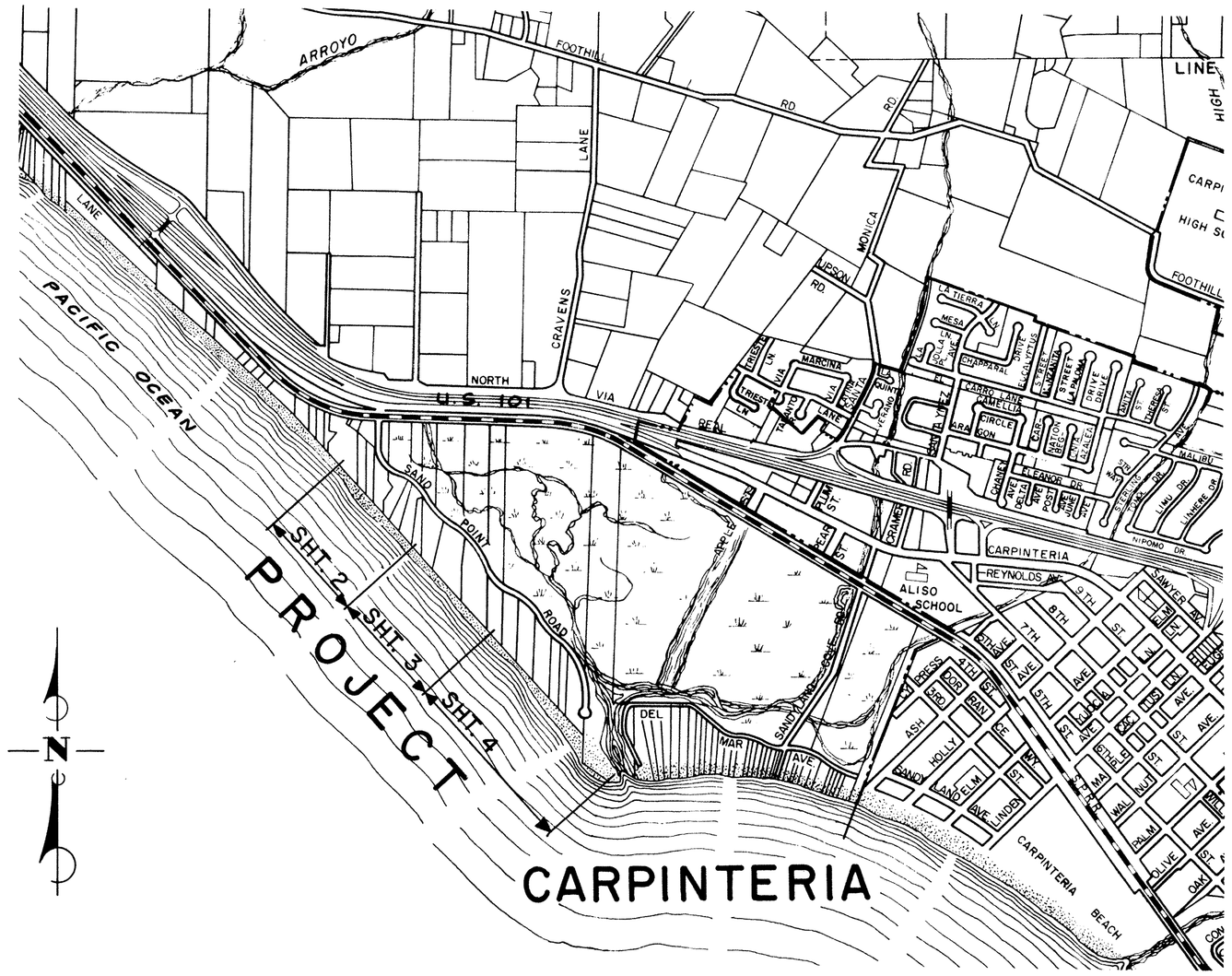
DATE
03/13/19

SCALE

JOB NO.

SHEET
S1
OF 1 SHEETS

APPENDIX III



LOCATION MAP

SCALE : 1" = 1000'

Distance: 1000.39 ft

0 1000 2000 3000 4000

SANDYLAND SEAWALL ASSOCIATION

COUNTY OF SANTA BARBARA, CALIFORNIA

PROJECT NO. F88009 & F88010

CONSTRUCTION PLANS FOR SEAWALL IMPROVEMENTS

NOTES

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THIS PLAN AND THE PROJECT SPECIFICATIONS. THE CONTRACTOR SHALL PROVIDE ALL LABOR, EQUIPMENT AND MATERIALS TO CONSTRUCT THE IMPROVEMENTS INCLUDING ALL IMPORTED EARTH AND ROCK MATERIAL.

2. THE CONTRACTOR SHALL CONTACT THE FOLLOWING AGENCIES TWO WEEKS IN ADVANCE OF ANY WORK AND HE SHALL COORDINATE HIS WORK WITH AND ABIDE BY THE DIRECTION OF SUCH AGENCIES.

3. THE LOCATION OF PROPERTY LINES AT STA. 0+00 & STA. 32+47.83 WERE CALCULATED FROM FIELD SURVEY & RECORD DATA. OTHER PROPERTY LINES ARE BASED ON COUNTY TAX ACCESSOR'S MAPS & ARE APPROXIMATE ONLY.

COUNTY OF SANTA BARBARA ..... (805) 966-1611
PUBLIC WORKS DEPARTMENT

UTILITY LOCATING SERVICE ..... (800) 422-4133

INDEX TO DRAWINGS

LOCAL BENCH MARK

PUNCH MARK CROSS TOP OF S.E. BOLT OF R.R. SIGNAL AT SAND POINT RD.
EL. 8.77

INITIAL BENCH MARK

CALIFORNIA STATE LANDS COMMISSION,
SAND POINT RM2 EL. 7.03
U.S.C. & G.S. DATUM, MEAN SEA LEVEL
ADJUSTMENT OF 1929

PREPARED BY:

Penfield & Smith
ENGINEERS INC.

111 E. VICTORIA STREET, SANTA BARBARA, CALIF. 93101 (805) 963-9532

URS/JOHN A. BLUME & ASSOCIATES, ENGINEERS
130 JESSIE ST. (AT NEW MONTGOMERY) SAN FRANCISCO, CA 94105

W.O. 6665 (21-20)

DRAWN BY C.E.P.
DESIGNED BY R.N.S.
ARCHITECT
ENGINEER
APPROVAL
RECOMMENDED BY
DATE 6/24/83

Penfield & Smith
ENGINEERS & PLANNERS
111 EAST VICTORIA STREET
POST OFFICE BOX 98 • SANTA BARBARA, CA. 93102
TEL. (805) 963-9532
Frank M. Graham RCE 32187 6-22-83

APPROVED
BOARD OF SUPERVISORS — DATE
DIRECTOR OF PUBLIC WORKS — DATE

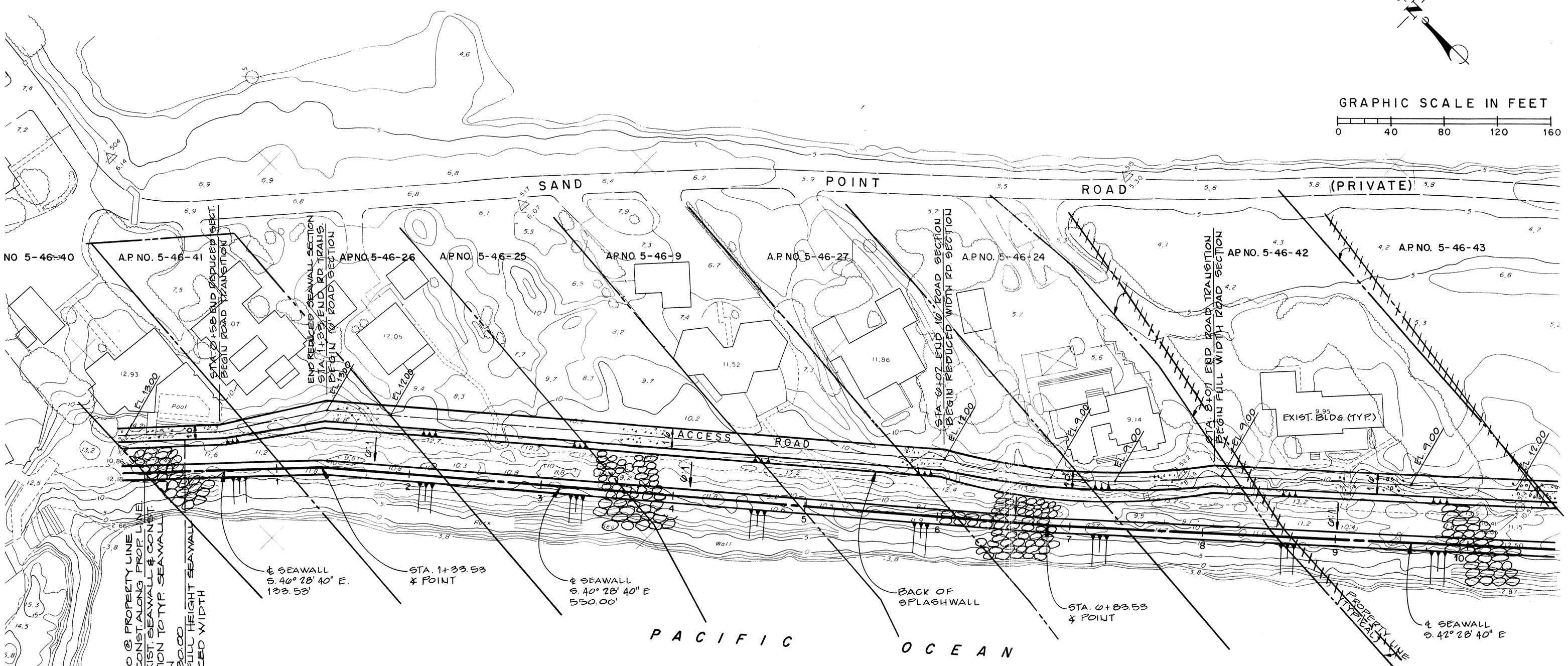
COUNTY OF SANTA BARBARA • DEPARTMENT OF PUBLIC WORKS • ENGINEERING AND CONSTRUCTION DIVISION
123 EAST ANAPAMU STREET SANTA BARBARA, CA 93101 (805) 963-7115

LOCATION SANTA BARBARA COUNTY, CA.
PROJECT SEAWALL IMPROVEMENTS

DESCRIPTION GENERAL INFORMATION

F88009

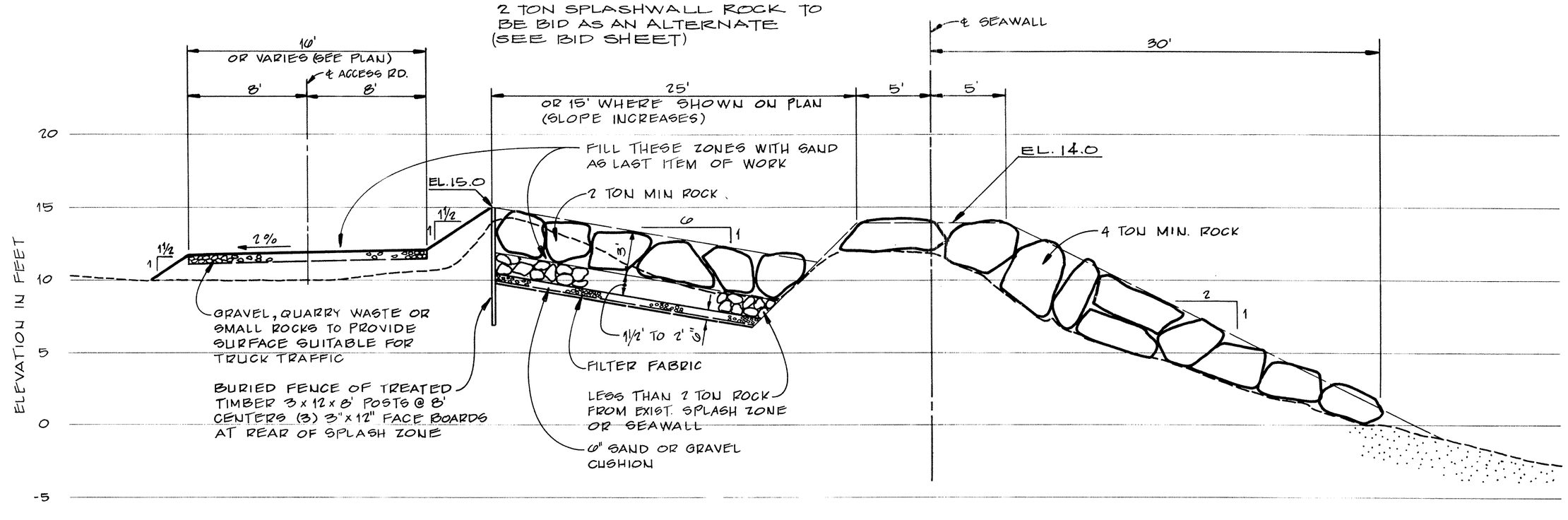
SHEET No. 1 OF 4 SHEETS



SEE SHEET 3

N O T E:

2 TON SPLASHWALL ROCK TO BE BID AS AN ALTERNATE (SEE BID SHEET)



TYPICAL SEAWALL SECTION
SCALE: 1"=5'

was compiled from photography dated 3-25-83

PACIFIC WESTERN AERIAL SURVEYS
ROBERT C. PRESTAF - PHOTOGRAMMETRIC SURVEYOR
628 Olive Street, Santa Barbara, CA 93102
870 E. Santa Clara, Ventura, CA 93001
15235

W. O. 6665 (21-20)

COUNTY OF SANTA BARBARA • DEPARTMENT OF PUBLIC WORKS • ENGINEERING AND CONSTRUCTION DIVISION
120 EAST ANAPAMU STREET, SANTA BARBARA, CA. 93101 (805) 963-7115

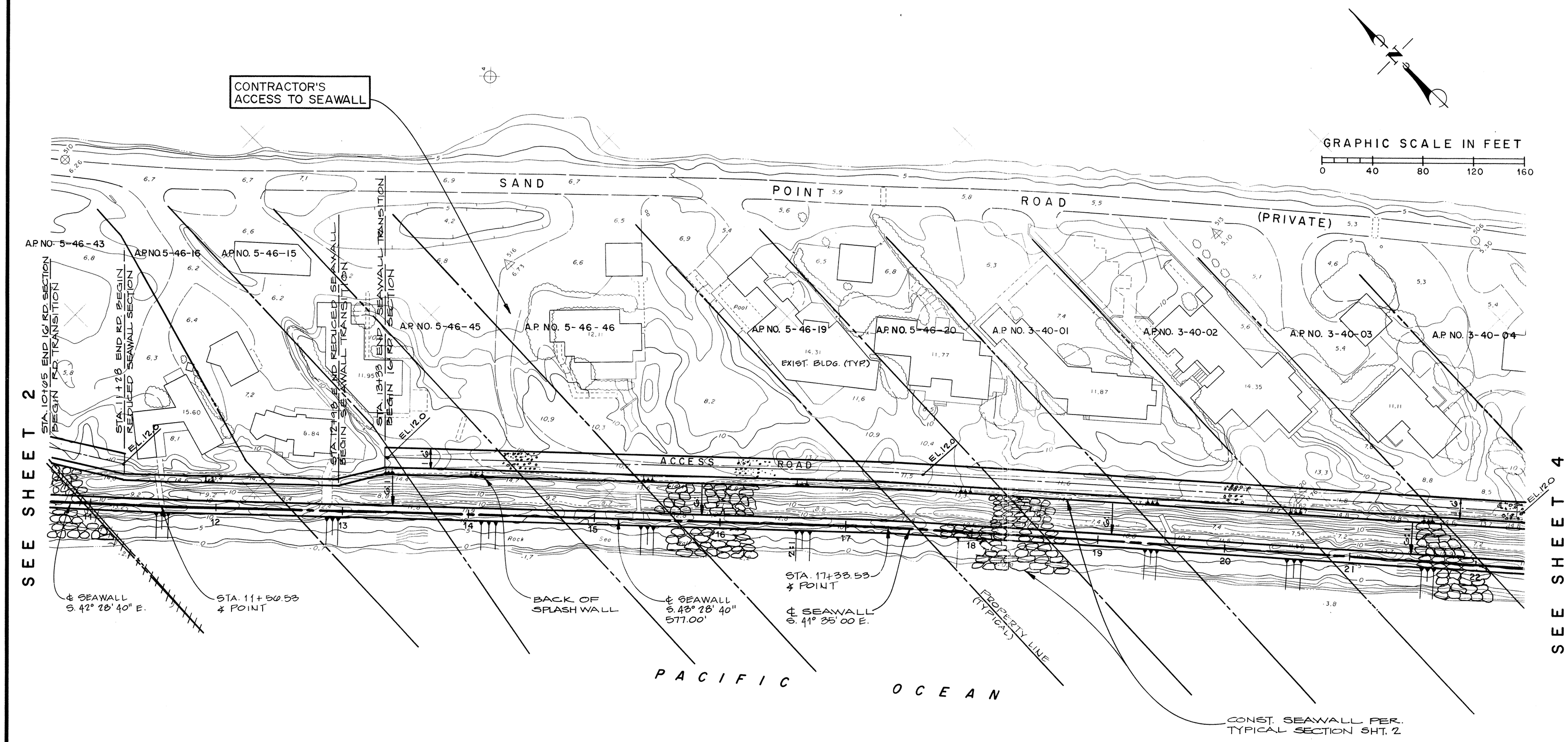
DRAWN BY C.E.P.
DESIGNED BY R.N.S.
ARCHITECT
ENGINEER
APPROVAL
RECOMMENDED BY
DATE 6/24/83

Penfield & Smith
ENGINEERS & SURVEYORS
111 EAST VICTORIA STREET
POST OFFICE BOX 98 • SANTA BARBARA, CA. 93102
TEL. (805) 963-9532
Ronald N. Strogen R.C.E. 32,182 6-24-83

APPROVED
BOARD OF SUPERVISORS DATE
DIRECTOR OF PUBLIC WORKS DATE

LOCATION SANTA BARBARA COUNTY, CA.
PROJECT SEAWALL IMPROVEMENTS
F88 009
DESCRIPTION FROM STA. 0+00 TO 10+65

SHEET No. 2 OF 4 SHEETS



This map was compiled from photography dated 3-25-83

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ROBERT C. PRIESTAF - PHOTOGRAMMETRIC SURVEYOR
628 Olive Street, Santa Barbara, CA 93102
870 E. Santa Clara, Ventura, CA 93001

15235

W. O. 6665 (21-20)

COUNTY OF SANTA BARBARA • DEPARTMENT OF PUBLIC WORKS • ENGINEERING AND CONSTRUCTION DIVISION

123 EAST ANAPAMU STREET
SANTA BARBARA, CA 93101 (805) 963-7115

DRAWN BY C.E.P. DATE 6/24/83
DESIGNED BY R.N.S.
ARCHITECT
ENGINEER
APPROVAL RECOMMENDED BY

Penfield & Smith
ENGINEERS INC.
111 EAST VICTORIA STREET
POST OFFICE BOX 638 • SANTA BARBARA, CA. 93102
TEL (805) 963-9532
Ronald R. Lodge R.C.E. 21187 6-24-83

APPROVED
BOARD OF SUPERVISORS DATE
DIRECTOR OF PUBLIC WORKS DATE

LOCATION SANTA BARBARA COUNTY, CA.
PROJECT SEAWALL IMPROVEMENTS

F88009
FRR010

DESCRIPTION FROM STA. 10+65 TO 22+40

SHEET No. 3
OF 4 SHEETS

SEE SHEET 3

SAND POINT ROAD (PRIVATE)

GRAPHIC SCALE IN FEET
0 40 80 120 160

A.P. NO. 3-40-4
A.P. NO. 3-40-5
A.P. NO. 3-40-6
A.P. NO. 3-40-14
A.P. NO. 3-40-15
A.P. NO. 3-40-16
A.P. NO. 3-40-9
A.P. NO. 3-40-10

STA. 25+85.4 PT. OF BEGIN REDUCED SEAWALL SECTION
STA. 26+57 END ACCESS RD
STA. 27+20 BEGIN ACCESS RD
STA. 28+12 BEGIN 4 PT. RAD END REDUCED SEAWALL SECTION

CONTRACTOR'S ACCESS TO SEAWALL

ACCESS ROAD

℄ STA. 32+47.83

EL. 12.0

CONST. SEAWALL PER TYPICAL SECTION SHT. 2

BACK OF SPLASHWALL

S 41° 35' 00" E

℄ SEAWALL STA. 27+55.53 4 PT.

PROPERTY LINE (TYPICAL)

S 39° 45' 40" E

S 40° 35' 16" E

℄ SEAWALL STA. 31+83.53 4 PT

PACIFIC OCEAN

℄ STA. 32+47.83

A.P. NO. 3-40-10

S 40° 35' 16" E

℄ SEAWALL STA. 33+89.53 4 PT.

S 39° 43' 00" E

BACK OF SPLASHWALL

CONST. SEAWALL PER TYPICAL SECTION SHT. 2

STA. 31+94.68 END CONST.
STA. 31+78.68 P.C.C.

STA. 31+43.72 P.C.C.

Δ = 22° 15' 07"
R = 90.00'
L = 34.95'

Δ = 100° 39' 43"
R = 35.00'
L = 61.49'

Δ = 32° 31' 10"
R = 40.00'
L = 22.70'

CONTINUATION

STA. 36+91.53 P.C.C.

STA. 36+82.23 P.C.C.

This map was compiled from photography dated 3-25-83

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628 Olive Street, Santa Barbara, CA 93102
870 E. Santa Clara, Ventura, CA 93001
15235

W.O. 6665 (21-20)

COUNTY OF SANTA BARBARA • DEPARTMENT OF PUBLIC WORKS • ENGINEERING AND CONSTRUCTION DIVISION
123 EAST ANAPAMU STREET SANTA BARBARA, CA 93101 (805) 963-7111

DRAWN BY C.E.P.
DESIGNED BY R.N.S.
ARCHITECT
ENGINEER
APPROVAL RECOMMENDED BY
DATE 6/24/83

Penfield & Smith
ENGINEERS INC
111 EAST VICTORIA STREET
POST OFFICE BOX 98 • SANTA BARBARA, CA. 93102
TEL. (805)963-9532
Ronald R. Sandgren R.C.E. 32187 6-27-83

APPROVED
BOARD OF SUPERVISORS DATE
DIRECTOR OF PUBLIC WORKS DATE

LOCATION SANTA BARBARA COUNTY, CA.
PROJECT SEAWALL IMPROVEMENTS

DESCRIPTION FROM STA. 22+40 TO 33+45

F 88009
F 88010

SHEET No. 4 OF 4 SHEETS