

CALIFORNIA COASTAL COMMISSION

CENTRAL COAST DISTRICT OFFICE
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W18a

3-17-0335 (PACIFIC GROVE SEAWALL REPAIRS)

JULY 12, 2017

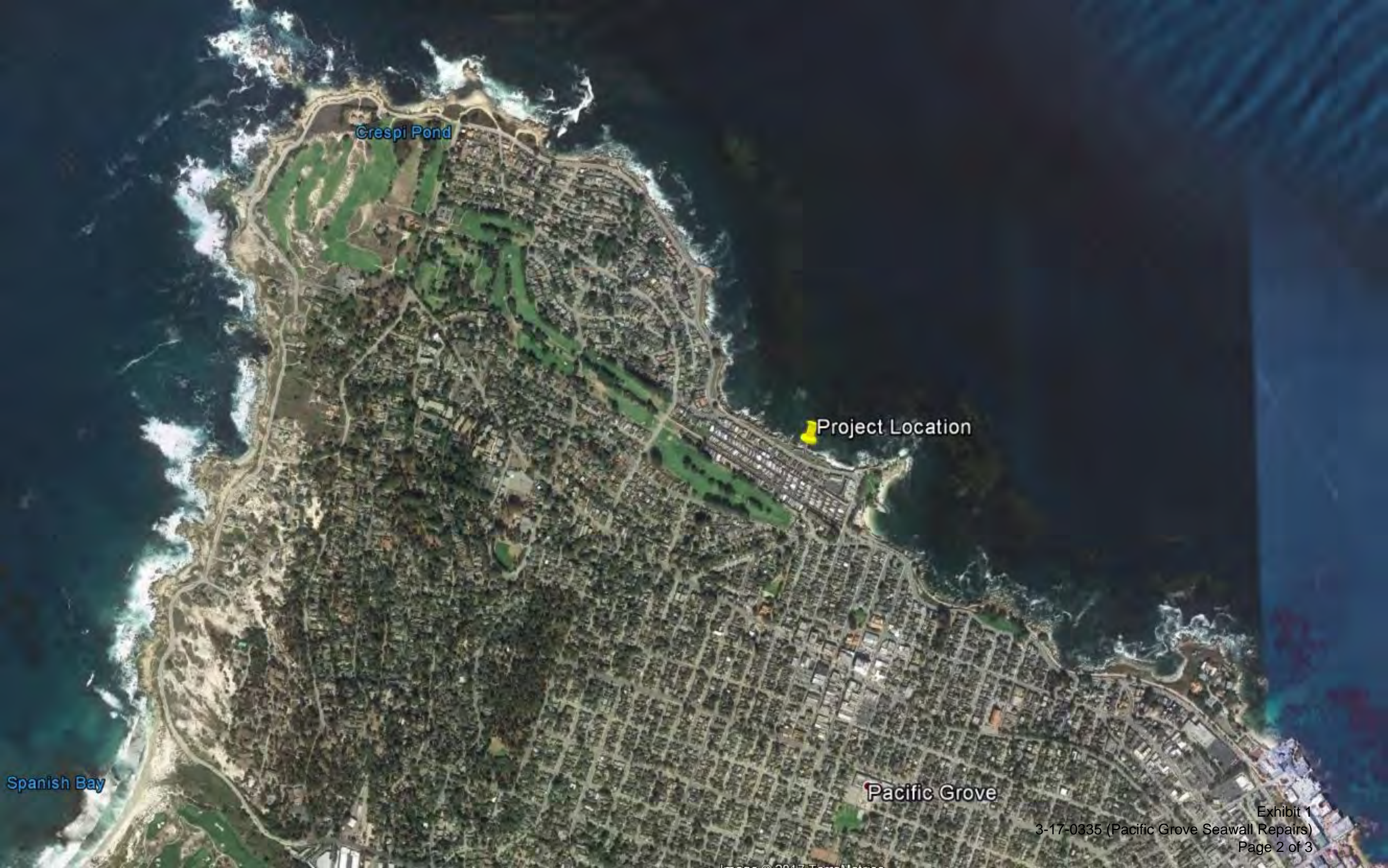
EXHIBITS

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Item 6 - Vicinity Map





Crespi Pond

Project Location

Spanish Bay

Pacific Grove



Project Location











PHOTOGRAPH OF DAMAGED OVERLOOK



SITE LOCATION MAP

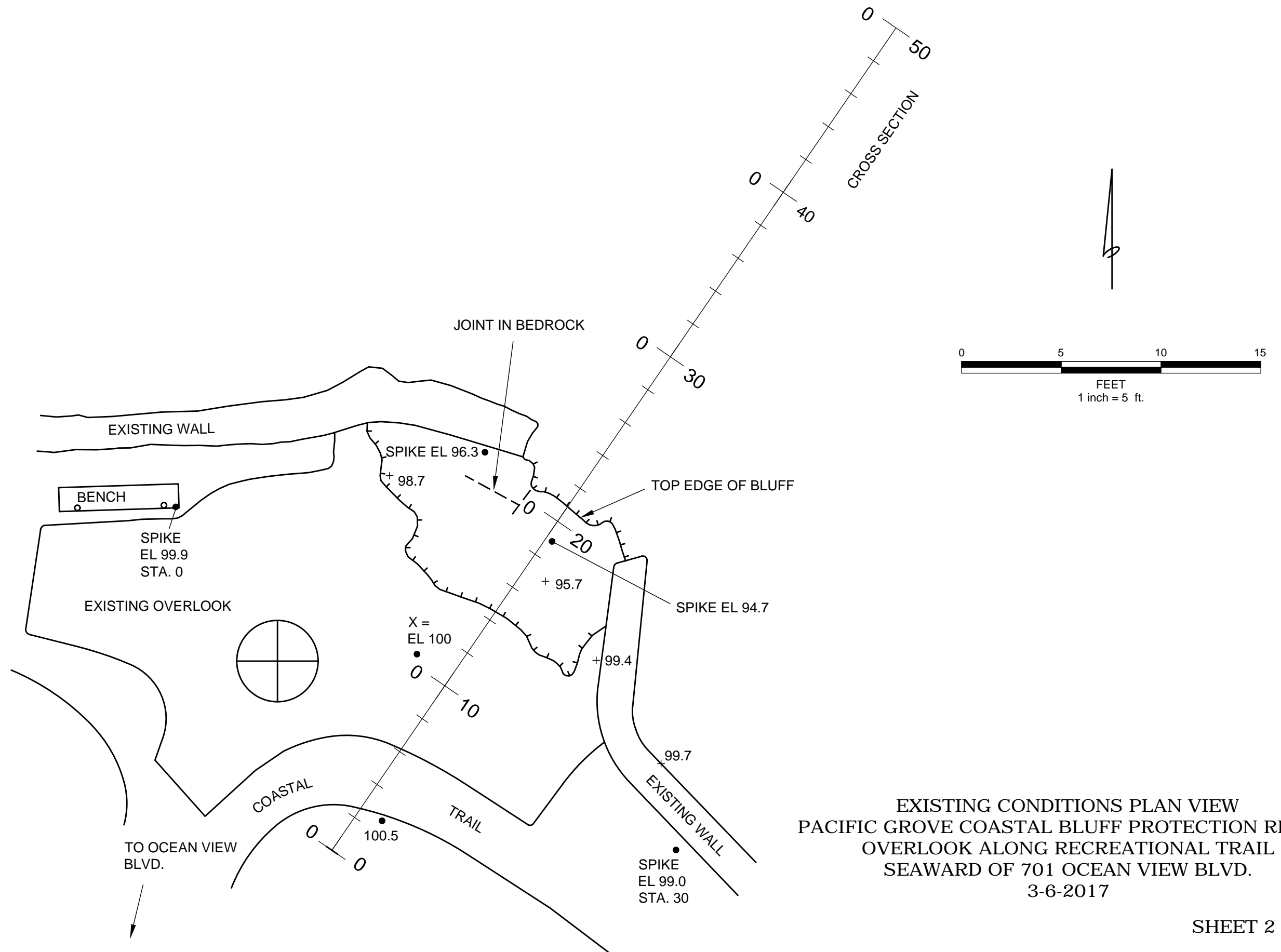
Plan Preparers:
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Prepared for:
 CITY OF PACIFIC GROVE
 Public Works Department
 Attn: Daniel Gho, P.E.
 2100 Sunset Drive
 Pacific Grove, CA 93950
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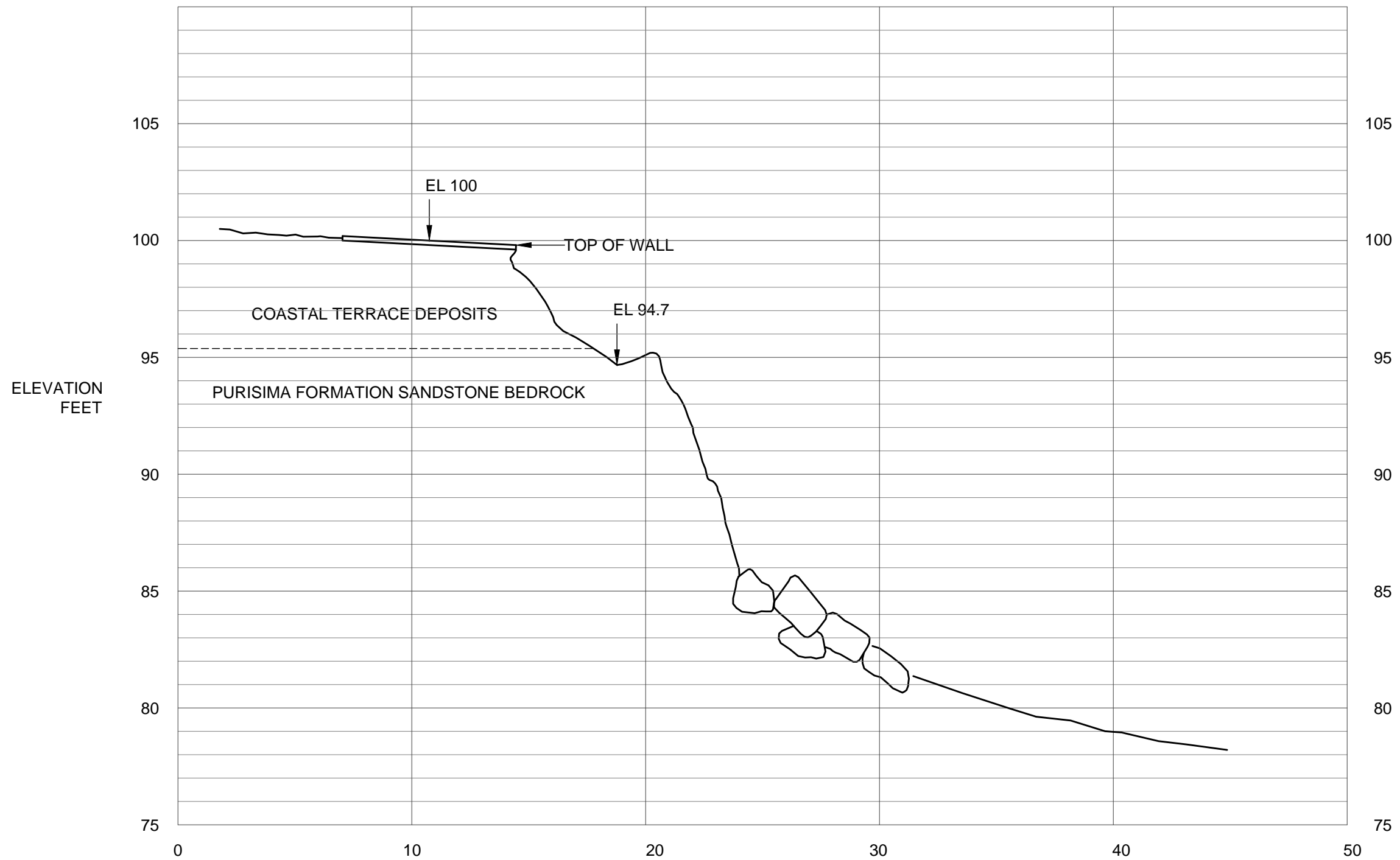
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TITLE SHEET
 PACIFIC GROVE COASTAL BLUFF PROTECTION REPAIR
 OVERLOOK ALONG RECREATIONAL TRAIL
 SEAWARD OF 701 OCEAN VIEW BLVD.
 3-6-2017



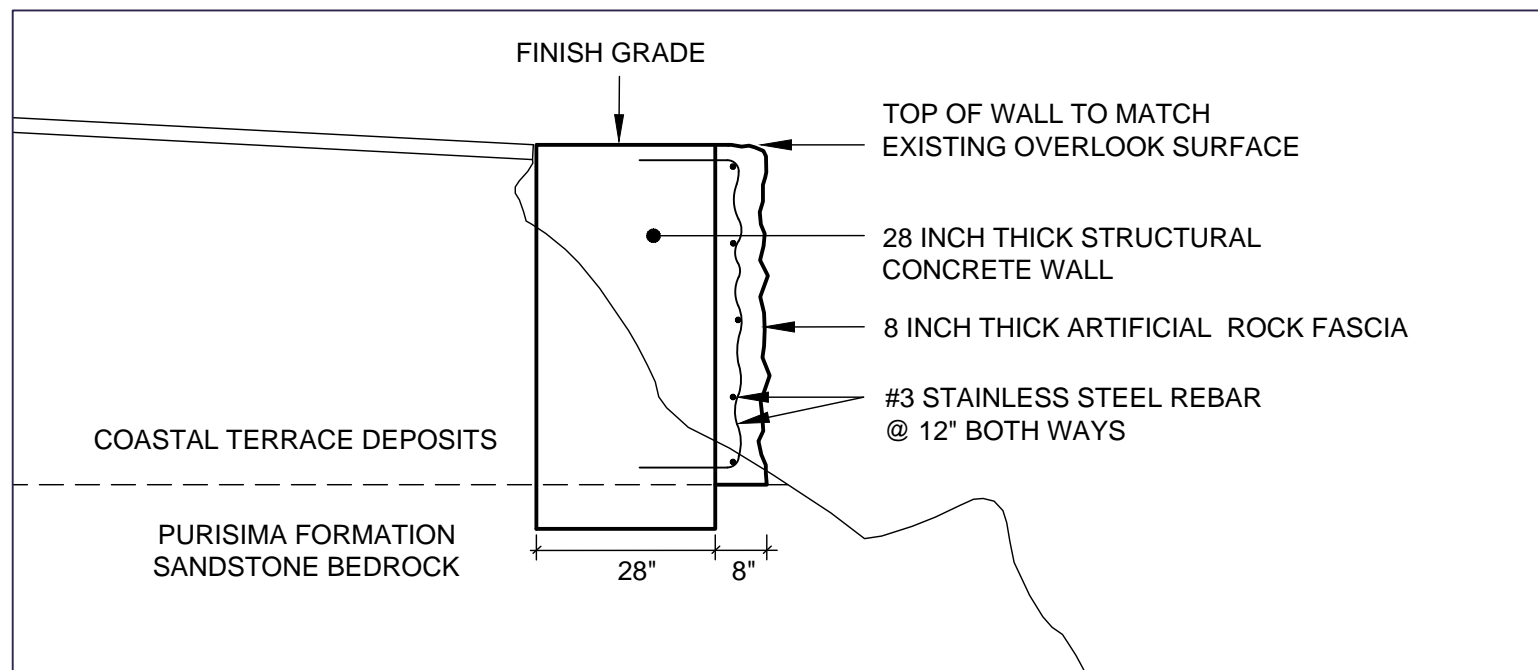
EXISTING CONDITIONS PLAN VIEW
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SHEET 2 of 5

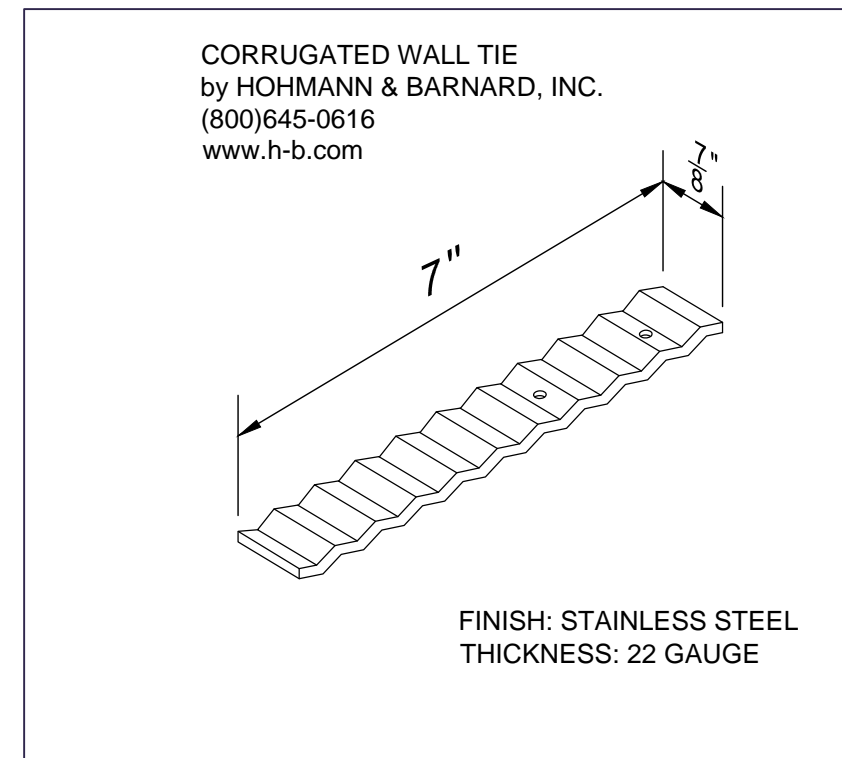


EXISTING CONDITIONS CROSS SECTION
 PACIFIC GROVE COASTAL BLUFF PROTECTION REPAIR
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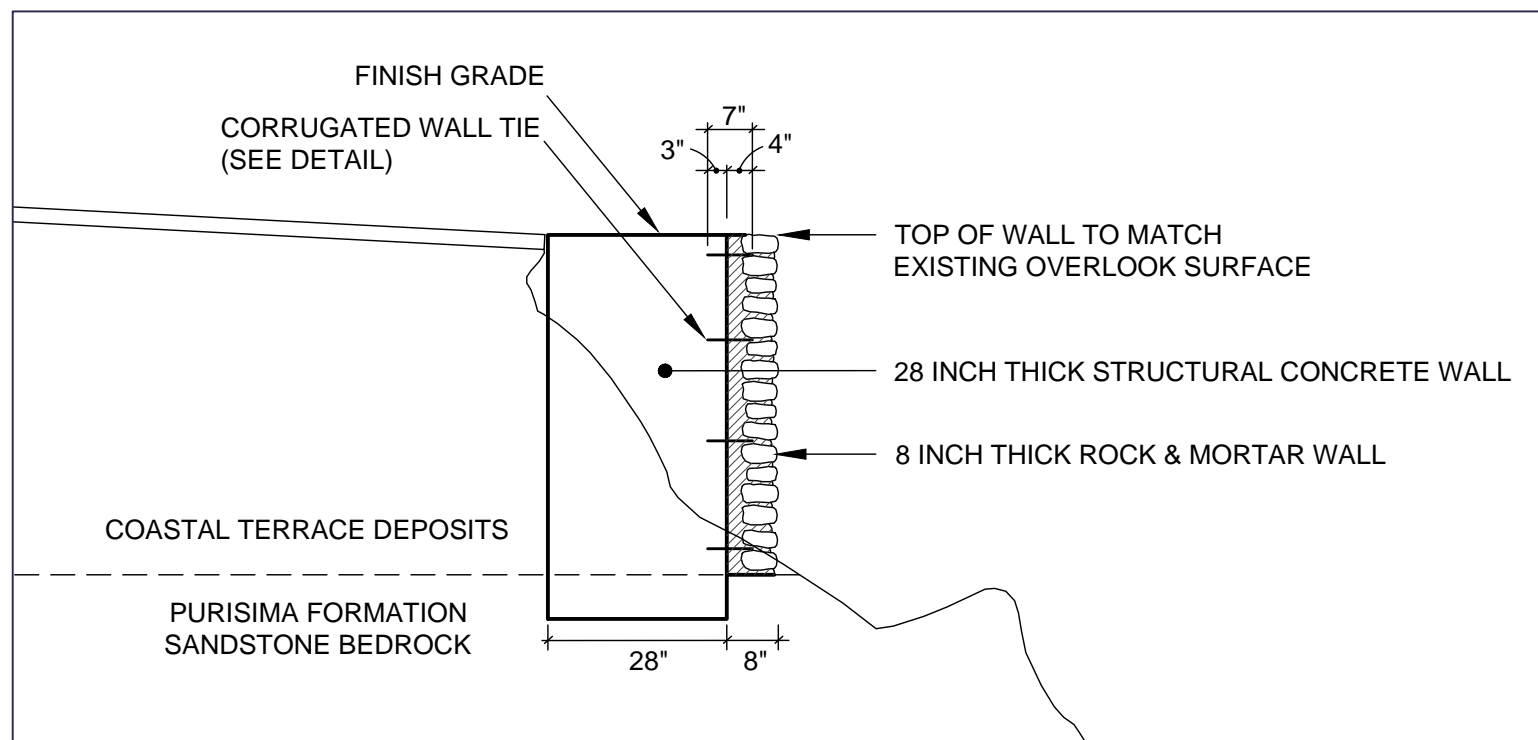
SHEET 3 of 5



**PROPOSED COASTAL OVERLOOK PROTECTION REPAIR
UTILIZING ARTIFICIAL ROCK SURFACE FASCIA**



CORRUGATED WALL TIE DETAIL



**PROPOSED COASTAL OVERLOOK PROTECTION REPAIR
UTILIZING ROCK & MORTAR SURFACE FASCIA**

**PROPOSED STRUCTURAL DETAILS
PACIFIC GROVE COASTAL BLUFF PROTECTION REPAIR
OVERLOOK ALONG RECREATIONAL TRAIL
SEAWARD OF 701 OCEAN VIEW BLVD.
3-6-2017**

SHEET 5 of 5

Project No M11222
23 March 2017

CITY OF PACIFIC GROVE
Public Works Department
Attn: Daniel Gho, P. E.
2100 Sunset Drive
Pacific Grove, CA 93950

Reference: Pacific Grove Coastal Bluff Protection Repair
Coastal Overlook Along Recreational Trail
Seaward of 701 Ocean View Boulevard
Pacific Grove, CA

Subject: Emergency Coastal Bluff Protection

Dear Mr. Gho:

At your request we have prepared this letter and the accompanying plans to assist with coastal bluff protection for an area at the edge of an overlook along the Pacific Grove Recreational Trail, near 701 Ocean View Boulevard. Mark Foxx (C. E. G.) has visited the site, and Haro Kasunich and Associates Inc. has worked at numerous other locations along Pacific Grove Recreational Trail for the City of Pacific Grove.

Our work included the following tasks:

- 1) Administration and file review
- 2) Two site visits
- 3) Preparation of a geologic sketch map
- 4) Preparation of a geologic profile
- 5) Drafting of field data and preparation of plans for a concrete gravity wall with rock and mortar stone facing or alternatively, artificial rock fascia.
- 6) Preparation of a focused geotechnical letter report addressing the proposed project.

A photograph of the problem area is shown below:



Photograph 1: Area of Damage to Coastal Trail Overlook

The existing rock and mortar wall at the bluff edge of this popular ocean overlook collapsed and fell into the ocean during strong wave impact on January 21, 2017. That day offshore significant wave heights exceeded 34 feet (10.4 meters) and damage to improvements occurred in many areas of the coastline.

Our site inspection revealed that the segment of wall that failed lost foundation support when the bedrock below the wall cracked along pre-existing natural jointed surfaces within the rock. A large piece of granite bedrock slid downslope along with the wall segment and is now at rest on the beach below the overlook. The portions of this wall that consist of concrete or mortar should be removed from the beach during repair of the wall.



Photograph 2: Coastal Trail Overlook Wall Segment on Beach

Examination of the face of the coastal bluff at the downcoast end of the failure revealed that an additional area of precarious existing wall is cracked, is undermined and is at risk of failure in the near future.



Photograph 3: Showing Failed Area of Existing Coastal Protection and Precarious Wall Segment at Top of Bluff



**Photograph 4: Showing Cracked Bedrock Below Wall
And Recent Bedrock Failure Area That Damaged Wall**



Photograph 5: Showing Bedrock Jointing and Fracturing

Bedrock has Moved Along Inclined Joint Plane Surface



**Photograph 6: Showing Precarious Portion of Wall
in Relation to Stable Part of Wall at Downcoast Area of Overlook
Bedrock in Left Half of Photo is Unstable**

The purpose of our study was to analyze the site conditions and develop plans for emergency repair of the existing coastal protection for the public access trail overlook pictured above. We recommend construction of a gravity type retaining structure surfaced to resemble the adjacent rock and mortar retaining wall; this will minimize visual impacts associated with bluff protection. The repaired area of the wall will be subject to wave overtopping and wave impact forces. The wall repair will be located a short distance landward of the location of the wall segment that failed in order to minimize wall height and take advantage of better foundation conditions.

The proposed segment of repaired wall is 31 feet long and 5 feet in height. Some demolition of the existing wall will be required to repair the wall. We are on standby to survey the alignment of the new segment of the wall and observe the foundation conditions where the repaired wall segment will be located. This observation is necessary to verify that the wall segment is located landward of the joint in the bedrock that forms the boundary of the unstable bedrock block discussed above. Portions of the unstable bedrock will need to be removed. At the downcoast end of the repaired wall segment the new wall segment will need

to be attached to the existing rock and mortar work that extends to a lower elevation (visible in right half of Photograph 6 above). Use of a rock breaking demolition agent (like Ecobust or Dexpan) will be required to break the rock in a controlled manner. Approximately 25 cubic yards of soil removal and demolition will be required. Portions of the soils can be used as backfill for the repaired wall segment. Compaction of those soils should be done with good workmanship. The top surface of the repaired wall should be shaped to achieve positive drainage. Any repaired area of the surface of the overlook should be surface top match the existing overlook. Our intent is to have the top of the repaired wall overlook surfaced to prevent pedestrians from standing on it, so that it forms a safety zone between the overlook area and the drop-off to the beach. These details need to be discussed with the selected contractor prior to commencement of construction to insure they are implemented.

Attachment A includes calculations for the proposed coastal bluff protection repair that demonstrate the repaired wall segment will be stable in regards to sliding and overturning.


Attachment B includes our Pacific Grove Coastal Bluff Protection Repair Plans, for Overlook Along Recreational Trail, Seaward Of 701 Ocean View Blvd. (5 Sheets dated 3-6-2017)



Respectfully submitted,

HARO, KASUNICH & ASSOCIATES, INC.

Moses Cuprill
C. E. 78904


Mark Foxx
C. E. G. 1493

JK/MF/dk

Enclosure: Fee Schedule

Copies: 1 to Addressee by email
1 to file

Attachment A: Pacific Grove Coastal Bluff Protection Repair Calculations

Attachment B: Pacific Grove Coastal Bluff Protection Repair Plans, for Overlook Along Recreational Trail, Seaward Of 701 Ocean View Blvd. (5 Sheets dated 3-6-2017)

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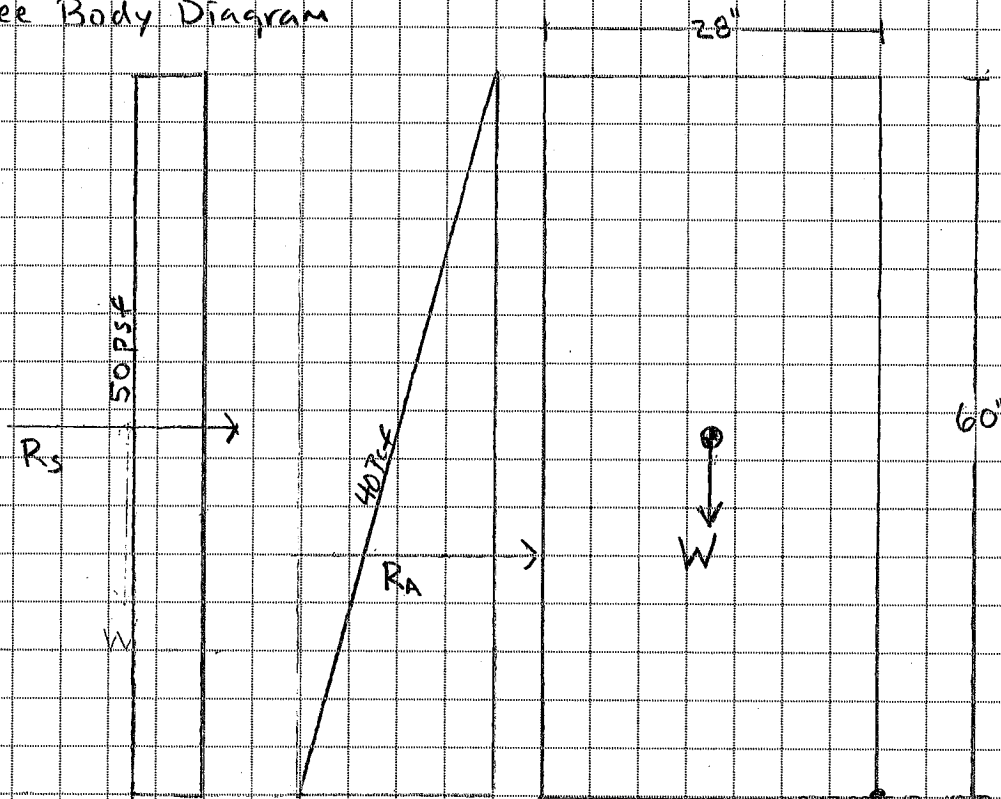
Attachment A

Pacific Grove Coastal Bluff Protection Repair Calculations

Proposed Coastal Overlook Protection Repair

ASSUMPTIONS

1. Wall is bearing on Purisima Sandstone Formation Bedrock
2. Wall is supporting Coastal Terrace Deposits
3. Active earth Pressure of 40 PCF acting against wall
4. Friction coefficient between concrete and bedrock equal to 0.6
5. Seismic surcharge equal to 10 ft psf/ft
6. Unit weight of concrete equal to 150 pcf
7. Ultimate bearing capacity equal to 24,000 psf
8. Free Body Diagram



Overturning Calculation

$$\text{Area} = 60 \text{ in} \times 28 \text{ in} = 1680 \text{ in}^2 \times \frac{1.44 \text{ ft}^2}{144 \text{ in}^2} = 11.67 \text{ ft}^2$$

$$\text{Area} \times \gamma_{\text{conc}} = W = (11.67 \text{ ft}^2) \times (150 \text{ pcf}) = 1,750 \text{ lb/ft} \downarrow @ 1.17' \text{ from Toe}$$

$$\text{Active Resultant } R_a = \frac{1}{2} (40 \text{ pcf}) (5 \text{ ft})^2 = 500 \text{ lb/ft} \rightarrow @ 1.67' \text{ above base}$$

$$\text{Seismic Surcharge } R_s = (10 \text{ pcf/ft}) (5 \text{ ft})^2 = 250 \text{ lb/ft} \rightarrow @ 2.5' \text{ above base}$$

$\Sigma M_{\text{overturning}}$

$$M_o = (500 \times 1.67) + (250)(2.5) = 1,460 \frac{\text{lb-ft}}{\text{ft}} \text{ seismic}$$

$\Sigma M_{\text{resisting}}$

$$M_R = (1,750)(1.17) = 2,047 \frac{\text{lb-ft}}{\text{ft}}$$

$$F.S. = \frac{M_R}{M_o} = \frac{2,047}{1,460} = 1.40 > 1.10 \checkmark$$

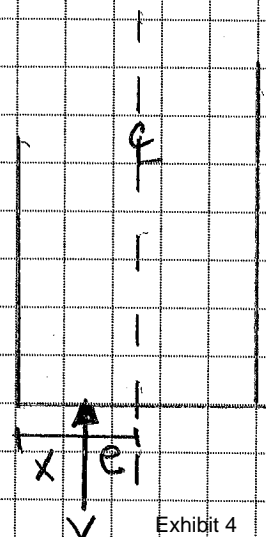
$$M_o = (500)(1.67) = 835 \frac{\text{lb-ft}}{\text{ft}} \text{ static}$$

$$F.S. = \frac{2,047}{835} = 2.45 > 1.50 \checkmark$$

Toe Eccentricity

$$e = \frac{1}{2} B - x = \frac{1}{2} (2.33 \text{ ft}) - 0.34 = 0.83 \text{ ft}$$

$$x = \frac{M_R - M_o}{F_v} = \frac{2,047 - 1,460}{1,750} = 0.34 \text{ ft}$$



Sliding at Base of Wall

$$S = K \tan \delta + W \tan \delta$$

$$S = W \tan (31) = 0.6 W = 0.6 (1750) = 1050 \text{ lbs}$$

$$R_a = 500 \text{ lb/ft}$$

$$R_s = 250 \text{ lb/ft}$$

$$F.S._{\text{static}} = \frac{S}{R_a} = \frac{1050}{500} = 2.1 > 1.50 \checkmark$$

$$F.S._{\text{seismic}} = \frac{S}{R_a + R_s} = \frac{1050}{750} = 1.4 > 1.10 \checkmark$$

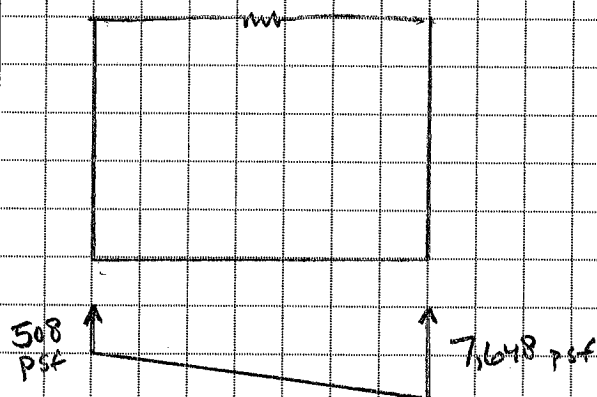
Bearing Capacity

$$q_{\max} = V/A + Mc/i = V/A + V_e/s = V/B (1 + 6e/B)$$

$$q_{\min} = V/A - Mc/i = V/A - V_e/s = V/B (1 - 6e/B)$$

$$q_{\max} = (1750)(2.33)(1 + (6)(0.34)/2.33) = 7,648 \text{ psf}$$

$$q_{\min} = (1750)(2.33)(1 - (6)(0.34)/2.33) = 508 \text{ psf}$$



$$F.S. = \frac{q_{ult}}{q_{\max}} = \frac{24,000 \text{ psf}}{7,648 \text{ psf}} = 3.14 \checkmark > 3.0$$