Exhibit D

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April 20, 2012
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Attn. Mr. George Salvaggio

Re: Geologic and Geotechnical Evaluation
Otter House – 30650 Aurora Del Mar
Carmel Highlands, California

Introduction

This letter summarizes the results of our geologic and geotechnical evaluation of the "Otter House" property at 30650 Aurora Del Mar in Carmel Highlands, California. A site location map is presented on Figure 1. Our services are provided in accordance with our Change Order #1 to our Agreement for Professional Engineering Services, dated September 8, 2011. The purpose of our services is to provide a Geological Report as required by the Monterey County Resource Management Agency (MCRMA) for procurement of a Coastal Development Permit (CDP). This letter is for the exclusive use of WRA Environmental Consultants and the project design team.

The scope of our services includes review of project history, review of available historic aerial imagery and other data and information, evaluation of relevant geologic hazards, evaluation of the design life and maintenance requirements of completed improvements, and seismic evaluation of completed gabion walls. Additionally, our scope includes evaluation of potential alterations to retaining structures in consideration of potential streambed modifications and evaluation of possible project alternatives, including "no project" (i.e. removal of completed improvements and restoration of the site to pre-existing conditions).

Project History

We understand erosion caused undermining of the "Otter House" residence foundation system and retaining walls at 30650 Aurora Del Mar and prompted issuance of an Emergency Permit (PLN100094) from the Monterey County Planning Department. Photos of the site conditions prior to the emergency work are shown on Figure 2. The permit authorized construction of an approximately 135-foot long retaining wall to mitigate failure of the creekbank slope along the southern side of the residence and undermining of the residence foundation. Conditional terms of the Emergency Permit included submittal of an application for a follow-up Coastal Development Permit (CDP). Additionally, restoration may be required for any work that was not specifically authorized by the Emergency Permit.

Based on evaluation of site conditions by Grice Engineering and Geology, a Hilfiker gabion wall was selected and constructed to restore stability to the northern arroyo bank. Drainage improvements, including grouted rock weirs and 2 new high-capacity subsurface drainage culverts were constructed within the creek channel. Drainage facilities from the neighboring residence to the south, the Chinn property at 30680 Aurora Del Mar, were also connected to the subsurface culverts. A keyway was excavated and several feet of compacted fill were placed in the arroyo to mitigate erosion of the southern arroyo bank. Currently, MCRMA is requiring submittal of a geologic report, among other items, in order to review the CDP application.

Review of Reference Documents

We have reviewed a Geotechnical Engineering Investigation report prepared by Haro, Kasunich and Associates[1] that summarized an investigatory subsurface exploration, laboratory testing, and a brief assessment of site seismicity. The report also provided geotechnical recommendations and design criteria for a soil-nail and shotcrete type retaining wall to support the arroyo's northern bank.

We also reviewed a report of geotechnical observation and testing during construction of the improvements prepared by Grice Engineering and Geology[2]. The report includes several letters outlining emergency corrective actions taken during the summer of 2010 to mitigate instability of both northern and southern arroyo banks (adjacent to Otter House and Chinn residences, respectively), including placement of two large culverts and several feet of fill in the arroyo. The report also includes field compaction test results and several pages of hand-drawn plans and details for the work.

Finally, we reviewed historic black-and-white vertical aerial photography provided by Photoscience, Inc., of Emeryville, California and color oblique aerial photography compiled by the California Coastal Records Project. Black-and-white vertical aerial photography covered the time period between 1967 and 1992, and color oblique aerial photography spans the time period from 1972 to 2010.

Regional Topography and Geology

The site is located in the Coast Ranges geomorphic province of California. Regional topography within the Coast Ranges province is characterized by northwest-southeast trending mountain ridges and intervening valleys that were formed by compressive forces at a convergent boundary between the North American and the Pacific Plates during Mesozoic time. Continued deformation and erosion during late Tertiary and Quaternary time (the last several million years) formed the prominent coastal ridges and the inland depression that is now the San Francisco Bay. More recent seismic activity within the Coast Ranges province is concentrated around the San Andreas Fault Zone, a complex ground of generally north- to northwest-trending faults which is the defining structural feature of the province.

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[1] Haro, Kasunich and Associates, Inc., "Geotechnical Engineering Investigation for Proposed Arroyo Retaining Wall, Existing Raiser Residence, 30650 Aurora Del Mar, Otter Cove – Carmel Highlands, Monterey County, California", Project No. M9905, dated September 9, 2010.

[2] Grice Engineering and Geology, Inc., "Final Engineering Report & Construction Documents, 04/15/2010 to 07/27/2010 for 30560 Aurora Del Mar, Otter Cove, Carmel Highlands, California, APN 243-341-001", dated August 2010.

Regional geologic mapping by the California Division of Mines and Geology (CDMG)[3] indicates that the site is underlain by Pleistocene-age marine terrace deposits. Marine terraces are formed when wave-cut terraces are tectonically uplifted, resulting in a broad, planar surface that dips gently seaward. Terrace deposits commonly consist of poorly - to moderately-sorted, generally weakly-indurated alluvial silts, clays, and sands, often with a basal gravel or cobble horizon.

More recent regional geologic mapping by USGS[4] indicates that the project site is underlain by Cretaceous-age granitic rocks of the Salinian Complex (Map unit gd). USGS mapping also indicates that at the project site, exposed Salinian basement rocks are overlain by localized deposits of older alluvium (map unit Qoa), which consists of poorly-sorted soil and rock debris washed down from the adjacent mountains to the east.

Based on our site inspection and review of aerial photography and reference reports provided for this project, the Otter House is underlain by approximately 15 to 25 feet of poorly-indurated silty sand terrace deposits, with hard, resistant granitic rocks exposed in the lower reaches of the arroyo channel and the lower portion of the coastal bluff. A regional geologic map is presented on Figure 3.

Geologic Hazards Evaluation

We have evaluated a variety of potential geologic hazards as required by MCMRA and the Big Sur Coastal Implementation Plan (CIP). The primary geotechnical and geologic hazards to be considered at the site are strong seismic ground shaking, lurching of arroyo banks, and erosion of arroyo banks and the slope on the upper portion of the coastal bluff. Other geologic hazards are not considered significant at this site. Specific hazards we evaluated are discussed in more detail below:

Fault Surface Rupture

Under the Alquist-Priolo Earthquake Fault Zoning Act[5] (APEFZ), the California Division of Mines and Geology (CDMG, now known as the California Geological Survey) produced 1:24,000 scale maps showing known active and potentially active faults and defining zones within which special fault studies are required. As shown on Figure 4, the closest active faults are the San Gregorio-Palo Colorado Fault Zone, located 1.1-miles (1.8 km) to the west, and the Monterey Bay-Tularcitos Fault Zone, located 7.9-miles (12.7 km) to the east. The site is not located within an Alquist-Priolo Special Studies Zone. Therefore, the potential for fault surface rupture at the site is low.

Evaluation: *No significant impact.*
Mitigation: *No mitigation measures are required.*

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[3] Jennings, C.W. and Strand, R.G. (1958) "Geologic Map of California: Santa Cruz Sheet", California Division of Mines and Geology, Scale 1:250000.

[4] Dibblee, T.W. (1974) "Geologic Maps of the Monterey, Salinas, Gonzales, Point Sur, Jamesburg, Soledad and Junipero Serra 15' Quadrangles, Monterey County, California", U.S. Geological Survey, Open-File Report OF-74-1021, scale 1:62500.

[5] The Alquist Priolo Earthquake Fault Zoning Act prohibits placing most structures for human occupancy across traces of active faults. Maps of these fault zones are issued by the CDMG.

Seismic Shaking

The site will likely experience seismic ground shaking from future earthquakes in the San Francisco Bay and Central Coast regions. Earthquakes along several active faults in the region, as shown on Figure 4, could cause moderate to strong ground shaking at the site.

Deterministic Seismic Hazard Analysis – Deterministic Seismic Hazard Analysis (DSHA) predicts the intensity of earthquake ground motions by analyzing the characteristics of nearby faults, distance to the faults and rupture zones, earthquake magnitudes, earthquake durations, and site-specific geologic conditions. Empirical relations (Abrahamson and Silva, Boore and Atkinson, Campbell and Borzognia, Chiou and Youngs, Idriss (2008)) for the bedrock subsurface conditions were utilized to provide approximate estimates of median peak site accelerations. A summary of the principal active faults affecting the site, their closest distance, moment magnitude of characteristic earthquake and probable peak ground accelerations (PGA), which an earthquake on the fault could generate at the site are shown in Table A.

TABLE A
DETERMINISTIC PEAK GROUND ACCELERATION
30650 Aurora Del Mar
Carmel Highlands, California

Fault	Moment Magnitude[1]	Distance (km)[2]	PGA (g)[3,4]
San Gregorio-Palo Colorado	7.5	1.8	0.49
Monterey Bay-Tularcitos	7.3	12.7	0.23
Rinconada-Hosgri	7.5	26.9	0.15
San Andreas	7.8	54.2	0.10

(1) USGS (2008)

(2) Blake (2001)

(3) USGS (2008), Abrahamson and Silva (2008), Blake (2001), Boore and Atkinson (2008), Campbell and Borzognia (2008), Chiou and Youngs (2008), Idriss (2008)

(4) Values determined using Vs_{30} = 760 m/s (2,500 ft./sec.) for Site Class B per 2010 California Building Code (CBC).

Probabilistic Seismic Hazard Analysis – Probabilistic Seismic Hazard Analysis (PSHA) analyzes all possible earthquake scenarios while incorporating the probability of each individual event to occur. The probability is determined in the form of the recurrence interval, which is the average time for a specific earthquake acceleration to be exceeded. The design earthquake is not solely dependent on the fault with the closest distance to the site and/or the largest magnitude, but rather the probability of given seismic events occurring on both known and unknown faults. For residential development, the design earthquake is typically taken to be that earthquake with a 10% chance of exceedance in 50 years (475 year statistical return period). We used the USGS Earthquake Ground Motion Parameters Java Program (Version 5.1.0) to calculate the probabilistic seismic ground acceleration as shown below in Table B.

TABLE B
PROBABILISTIC SEISMIC HAZARD ANALYSES
30650 Aurora Del Mar
Carmel Highlands, California

	Probabilistic Seismic Hazard Analysis Statistical Return Period	PGA
10% in 50 years	475 years	0.34 g

Reference: USGS Earthquake Ground Motion Parameters Java Program, Version 5.1.0, revised February 11, 2011

The potential for strong seismic shaking at the project site is high. Due to its immediate proximity, the San Gregorio Fault presents the highest potential for sever ground shaking. The most significant adverse impact associated with strong seismic shaking is potential damage to structures and improvements.

Evaluation: *Less than significant with mitigation.*
Mitigation: *At a minimum, structures should be designed in accordance with the 2010 California Building Code. Mitigation recommendations are discussed in further detail in the Conclusions and Recommendations section of this report.*

Liquefaction Potential
Liquefaction refers to the sudden, temporary loss of soil shear strength during strong ground shaking. Liquefaction-related phenomena include liquefaction-induced settlement, flow failure, and lateral spreading. These phenomena can occur where there are saturated, loose, granular deposits.

Boring logs issued by Haro, Kasunich and Associates with their Geotechnical Engineering Investigation indicate that the site is underlain by 14 to 24 feet of marine terrace deposits and channel deposits, generally consisting of medium-dense to dense silty sand with lesser gravels and some large cobbles within the channel deposits. These dense soils are generally not prone to liquefaction. Therefore, the risk of liquefaction at the site is low.

Evaluation: *Less than significant.*
Mitigation: *No mitigation measures are required.*

Seismically-Induced Ground Settlement
Seismic ground shaking can induce settlement of unsaturated, loose, granular soils. Settlement occurs as the loose soil particles rearrange into a denser configuration when subjected to seismic ground shaking. Varying degrees of settlement can occur throughout such a deposit and could result in differential settlement of structures founded on such deposits. Haro, Kasunich and Associates found that the upper 6 feet of pre-existing wooden retaining wall backfill consisted of loose silty sand. Therefore, the risk of localized seismically-

induced ground settlement is moderate.

Evaluation: *Less than significant with mitigation.*
Mitigation: *The loose fill materials were removed during construction of the Hilfiker wall and replaced with properly-compacted fill. Mitigation recommendations are discussed in further detail in the Conclusions and Recommendations section of this report.*

Lateral Spreading, Lurching and Ground Cracking
Lurching and associated ground cracking can occur during strong ground shaking. The ground cracking generally occurs along the tops of slopes where stiff soils are underlain by soft deposits or along steep slopes or channel banks. The existing Otter House has minimal setback from the top of the adjacent arroyo bank; therefore, the risk of damage due to lurching or ground cracking is moderate to high.

Evaluation: *Less than significant with mitigation.*
Mitigation: *The Hilfiker wall system should provide protection against lurching of arroyo banks provided that good foundation and toe support is maintained (ie – engineered arroyo fill is not removed). Mitigation recommendations are discussed in further detail in the Conclusions and Recommendations section of this report.*

Erosion
Sandy soils on moderate slopes or clayey soils on steep slopes are susceptible to erosion when exposed to concentrated surface water flow. The potential for erosion is increased when established vegetation is disturbed or removed.

The project site is located on a moderately-sloping, west-facing hillside, adjacent to a deeply-incised arroyo. The arroyo emanates from the steep ridge east of the site, at an elevation of approximately +1,200-feet, and discharges into the Pacific Ocean just northwest of the residence. At the Otter House site, the arroyo banks are incised up to approximately 25-feet deep. As evidenced by the deep incision of the arroyo banks, the relatively steep stream gradient and poorly-indurated marine terrace deposits at the site create a highly erosive condition at the site. The original emergency permit for the project was issued in order to allow for mitigation of excessive erosion and resulting arroyo bank instability near the southern perimeter of the Otter House. Additionally, we observed evidence of surficial raveling and erosion of the upper slope of the coastal bluff on the west side of the Otter House during our review of aerial photography. Therefore, the risk of damage to improvements at the site due to erosion is high.

Evaluation: *Less than significant with mitigation.*
Mitigation: *The Hilfiker walls, in conjunction with the subsurface high-capacity drainage culverts, should provide protection against significant erosion of the northern arroyo bank. The HIlfiker walls also provide protection against erosion of the upper slope of the adjacent coastal bluff. The existing erosion-control mats and grouted rock wiers placed atop the engineered fill will reduce the erosive potential of overland flow when culverts are at full capacity or in the event they are not functional. Mitigation recommendations are discussed in further detail in*

the Conclusions and Recommendations section of this report.

Seiche and Tsunami

Seiche and tsunamis are short duration, earthquake-generated water waves in large enclosed bodies of water and the open ocean, respectively. The extent and severity of a seiche would be dependent upon ground motions and fault offset from nearby active faults. The Otter House is located atop a bluff at an elevation of approximately 40-feet above sea level, and is not mapped as being within a tsunami inundation zone[6]. Therefore, the risk of damage due to tsunami is low.

Evaluation: *No significant impact.*
Mitigation: *No mitigation measures are required.*

Flooding

The adverse impact from flooding is water damage to structures and furnishings. Based on our review of available FEMA Flood Insurance Rate Maps[7] (FIRMs), the project site straddles the boundary between Flood Zone Z (defined as Coastal Flood Zone with Velocity Hazard (Wave Action) and Flood Zone X (Areas determined to be outside the 0.2% annual chance floodplain). The Otter House is located entirely within Flood Zone X; therefore, the risk of damage due to large-scale flooding is low.

Evaluation: *No significant Impact.*
Mitigation: *No mitigation measures are required.*

Settlement/Subsidence

Significant settlement can occur when new loads are placed at sites that due to consolidation of soft compressible clays (i.e. Bay mud) or compression of loose soils. Based on the results of the subsurface exploration performed by Haro, Kasunich and Associates, soft clayey soils do not exist at the site. Therefore, the risk of settlement at the project site is low.

Evaluation: *No significant impact.*
Mitigation: *No mitigation measures are required.*

Expansive Soil

Expansive soil occurs when clay particles interact with water causing volume changes in the clay soil. The clay soil may swell when saturated and shrink when dried. This phenomenon generally decreases in magnitude with increasing confinement pressure at depth. These volume changes may damage lightly loaded foundations, flatwork, and pavement. Expansive soil also causes soil creep on sloping ground. Boring logs published by Haro, Kasunich and Associates do not indicate the presence of clayey soils at the site, and therefore the risk of

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[6] California Emergency Management Agency, California Geological Survey, and University of Southern California (2009), "Tsunami Inundation Map for Emergency Planning, State of California – County of Monterey, Soberanes Point Quadrangle, Map Scale 1:24,000.

[7] Federal Emergency Management Agency, "Flood Insurance Rate Maps (FIRMS), Monterey County, California and Incorporated Areas, Panel 480 of 2050, Map Number 06053C0480G, effective April 2, 2009.

damage due to expansive soils is low.

Evaluation: *No significant impact.*
Mitigation: *No mitigation measures are required.*

Slope Instability/Landsliding
Weak soils and bedrock on moderate to steep slopes can move downslope due to gravity or in response to a seismic event. Slope instability may also be initiated by removal of supporting toe material by erosion or scour. Without the existing project improvements or other mitigation, the arroyo banks have a high risk of instability. The Otter House is sited on a moderate slope at the top of a steep coastal bluff. During our review of historic oblique aerial photography, we observed indications of shallow sloughing and raveling of the marine terrace deposits in the upper portion of the bluff below the residence.

Evaluation: *Less than significant with mitigation.*
Mitigation: *The Hilfiker wall on the western and southern sides of the house should provide protection against instability of the upper portion of the bluff and the northern arroyo bank. The steeper, lower portion is underlain by hard granitic rocks and appears stable. Mitigation recommendations are discussed in further detail in the Conclusions and Recommendations section of this report.*

Cliff Retreat and Erosion
Coastal cliff retreat, and shoreline retreat in general, is most common where the underlying geologic materials are highly susceptible to erosion and scour, and where erosion by concentrated flow at the top of the cliff occurs in conjunction with scour by wave action and ocean currents at the base of the cliff. Cliff and shoreline retreat may be exacerbated or accelerated by rising sea levels, and may be retarded by simultaneous accretion, deposition, and/or tectonic uplift.

The Otter House is sited near the top of a coastal bluff, approximately 40-feet above the Pacific Ocean. The bluff is at the head of a sheltered cove (Otter Cove) and adjacent to the mouth of a deeply-incised arroyo which drains the high ridge east of the site. Very hard, resistant, coarsely crystalline granitic bedrock of the Salinian Complex is exposed in the lower portion of the bluff, with the upper bedrock surface approximately 25-feet above mean sea level. Marine terrace deposits, composed of poorly-indurated silty sand alluvium and a possible basal cobble layer, unconformably overlie the granitic rocks and form a slope inclined between 1:1 (horizontal:vertical) and 2:1. While the terrace deposits are susceptible to erosion and instability from concentrated water flow, as discussed above and evidenced by the extreme downcutting in the arroyo channel, the granitic rock is relatively resistant to erosion either by channel flow or wave action.

Based on our review of available published literature, no studies regarding cliff retreat have been conducted at the project site proper. However, several studies of cliff and shoreline retreat in the greater Big Sur Coast and Monterey Bay Regions have been conducted. Studies and reports we reviewed are discussed below:

USGS SCIENTIFIC INVESTIGATIONS MAP 2853 (2004) - In cooperation with the California Department of Transportation, USGS conducted a study of coastal cliff retreat rates over a 52-year time period from 1942 to 1994 along nine discontinuous study sections on the Big Sur coast[8]. The study utilized digital photogrammetry to generate three-dimensional stereo models based on historic (1942) and recent (1994) vertical aerial photographs. The stereo models were then input into a GIS system to generate a shore-parallel baseline from which orthogonal transects to the coast were constructed on 15-meter intervals. Differences in the cliff edge between 1942 and 1994, as determined from cliff edge features in the photographs and measured along those transects, were then reduced to average annual cliff retreat rate.

Study section 1 was the northernmost study section, extending from milepost 63.0 to milepost 65.7 along California State Highway 1. The northern terminus of the study section, at milepost 65.7, is located approximately 2 miles south of the project site. Geologic conditions within the study section are similar to those which exist at the Otter House site in that the cliff faces expose the same granitic basement rocks as exist at the project site. The study concludes that Study Section 1 has an average annual cliff retreat rate of 12 +/- 7 cm/yr.

USGS OPEN-FILE REPORT 2007-1133 (2007) – Part 4 of the USGS National Assessment of Shoreline Change Project[9] addresses long-term cliff retreat rates along the California Coast. Cliff retreat rates were interpreted based on the spatial difference between historic cliff edge locations, as determined from NOAA Topographic Sheets and other maps, and current cliff edges as surveyed using LiDAR technology. Historic cliff edge locations were taken from sources published between 1920 and 1930, while LiDAR imaging was performed in 1998 and 2002. Therefore, long-term cliff retreat rates are based on differences in cliff edge locations observed over a period of time spanning approximately 70-years.

The report concludes that the average statewide cliff retreat rate is approximately 0.3 +/- 0.2 meters per year, with an average of approximately 17.7-meters of total cliff retreat over the 70-year time span. For the Big Sur study region, which extends from Point Pinos in the north to just south of Cape San Martin, the average retreat rate is reported as 0.3-meters per year, while the average total retreat over the 70-year span is reported as 17.2-meters. It should be noted that average rates are likely affected by outliers in the data. For instance, the highest retreat rate in the Big Sur region was observed near Pfeiffer Beach, where nearly 150-meters of total retreat was reported, for an average annual rate of over 2-meters per year. At this location, the underlying geology consists of Melange matrix of the Franciscan Complex, which is composed of pervasively sheared shale bedrock that is easily eroded. Therefore, average regional rates may be severely skewed where the majority of the regional bedrock geology is at odds with those locations where unique geologic features lend themselves to higher rates of retreat.

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[8] Hapke, C.J. and Green, K.R. (2004), "Maps Showing Coastal Cliff Retreat Rates Along the Big Sur Coast, Monterey and San Luis Obispo Counties, California", United States Geological Survey Scientific Investigations Map 2853.

[9] Hapke, C.J.,Reid, D., Green, K.R., and Borrelli, M. (2007), "National Assessment of Shoreline Change: Part 4: A GIS Compilation of Vector cliff edges and associated change data for the cliffed shorelines of the California Coast", Open-File Report 2007-1112, U.S. Geological Survey, Coastal and Marine Geology Program, U.S. Geological Survey, Pacific Science Center, Santa Cruz.

We were able to review composite vector shorelines[10,11] produced by the study in ArcGIS Explorer Desktop. Vector shoreline data for coastal cliff areas included composite historic shorelines for the time period between 1929 and 1935 (generated from maps and other paper sources) and composite modern shorelines for the time period between 1998 and 2002 (surveyed by LiDAR in conjunction with NASA). While we did note some spatial discrepancy between the satellite basemap imagery and the overlain GIS data, we measured an average of approximately 5 meters of cliff retreat over the 70-year period, or an average annual rate of 0.07-meters per year.

Finally, we reviewed historic aerial photography provided by Photoscience, Inc. of Emeryville, California and the California Coastal Records Project. Aerial photography spanned the time period between 1967 and 2010 and included both black-and-white vertical photography and color oblique-angle photography. Based on our review, there does not appear to be any significant change in cliff geometry or topography at the project site.

Based on our review of available cliff retreat data, mapping, and aerial photography, we judge that cliff retreat rates at the project site are likely lower than average for the Big Sur region due to the sheltered nature of Otter Cove and the bluff on which the residence is sited, as well as the relatively resistant granitic rock exposed at the base of the bluff. The potential for cliff retreat due to wave action and scour is low. However, the Otter House has minimal setback from the top of the bluff, and additional erosion of the overlying marine terrace deposits exposed on the slope in the upper portion of the bluff could jeopardize the stability of the residence. Therefore, the risk of damage due to cliff retreat and erosion is low to moderate.

Evaluation: *Less than significant with mitigation.*
Mitigation: *The Hilfiker wall should provide protection against erosion and, ultimately, retreat of the upper bluff edge. The lower portion of the bluff exposes hard granitic rock, which is relatively resistant to erosion and is well-protected from intense wave action by the sea stacks on the seaward side of Otter Cove. Mitigation recommendations are discussed in more detail in the Conclusions and Recommendations section of this report.*

Hilfiker Gabion Retaining Wall Evaluation

We performed stability analyses of the existing Hilfiker gabion wall on the south (arroyo) side of the Otter House under both static and seismic conditions. Our analyses indicate that, for existing conditions, factors of safety under static conditions are above 1.5 and the HIlfiker wall is stable. Factors of safety under seismic conditions (utilizing a PGA of 0.4g in accordance with our probabilistic seismic hazard analysis discussed in the preceding section) are lower, indicating marginal stability.

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[10] Hapke, C.J. and Reid, D. (2007) cencal1929_1935.shp - Vectorized Cliff Edge of Central California Derived from 1929-1935 Source Data: Open-File Report 2007-1112, U.S. Geological Survey, Coastal and Marine Geology Program, U.S. Geological Survey, Pacific Science Center, Santa Cruz, California.

[11] Hapke, C.J., Reid, D., and Green K.R. (2007) cencal1998_2002.shp - Vectorized Cliff Edge of Central California Derived from 1998/2002 Lidar Source Data: Open-File Report 2007-1112, U.S. Geological Survey, Coastal and Marine Geology Program, U.S. Geological Survey, Pacific Science Center, Santa Cruz, California.

We performed further analyses assuming removal of 3 feet of engineered fill in the arroyo channel. Factors of safety under these hypothetical conditions are reduced to less than 1.0 for both static and seismic conditions, respectively. Removal of the engineered arroyo fill would result in exposure of the base of the wall and increased potential for undermining by channel scour and bank erosion, in addition to the significantly reduced stability. The results of our stability analyses are presented in Appendix A.

Based on the results of our stability analyses, the Hilfiker wall is stable under both static and seismic conditions, but is not stable when the engineered fill is removed. If engineered fill is removed, restoration of wall stability would require construction of a new, 3-foot-high reinforced concrete wall at the base of the existing Hilfiker wall. The new concrete wall would require deep foundations, such as drilled, cast-in-place concrete piers. Additional soil nails near the top of the Hilfiker wall would also be required. We estimate 10-kip capacity soil nails on approximate 6-foot centers would be needed in order to raise factors of safety to above 1.1 for seismic conditions.

We judge that, as exists, the Hilfiker wall should have a design life of at least 30 years, provided that the wire baskets installed are galvanized or otherwise corrosion-protected, and that the wall was constructed in accordance with commonly-accepted engineering and construction practice, as indicated by the construction report prepared by Grice Engineering and Geology.

<u>Project Alternatives</u>

We have evaluated alternative wall configurations, in consideration of potential alterations to the arroyo channel. Removal of the engineered fill and culverts within the arroyo drainage would undermine the Hilfiker wall foundation and result in loss of stability to the northern arroyo bank as discussed above. Removal of the engineered fill may also result in undermining of the southern bank, adjacent to the Chinn property, based on construction documentation by Grice Engineering and Geology, and therefore two new retaining walls may be needed if fill is removed.

If the engineered fill and drainage culverts are removed, deep foundations would be required for any alternative wall(s) in order to mitigate the potential for scour and erosion to undermine a shallow foundation system when culverts are removed and channel flow is uncontrolled. Deep foundations could consist of drilled, cast-in-place concrete piers or driven piles. Based on our experience with similar projects, we judge that drilled piers would be difficult and costly due to permitting issues with the California Department of Fish and Game and the very hard underlying granitic bedrock. Similarly, driven piles would be difficult to install due to the extreme resistance and hardness of the granitic bedrock into which they must be embedded. Any deep foundation construction would require access to the creek channel area and would result in excavation or drilling spoils and possible excess concrete deposition in the channel during construction.

In summary, alternatives to the completed improvements would be difficult and costly to construct, would result in a less-natural appearance, and would likely further damage the environment and riparian habitat at the site.

In accordance with MCMRA's request, we have also considered "no project" as an alternative to the completed improvements (assuming "no project" is defined as complete restoration to pre-construction conditions). Based on our understanding of the condition of the arroyo banks, particularly the northern bank, at the time the emergency permit was issued, we judge that "no project" would result in ongoing scour, erosion, and undermining of the northern arroyo bank, and eventual damage to the Otter House foundation, and possibly to existing structures and facilities on the Chinn property.

Conclusions and Recommendations

Based on our knowledge of the project, the primary pre-construction geotechnical concerns were safely diverting high-velocity surface water away from residence foundations and protecting badly eroded banks on both north and south sides of the arroyo. It is our professional opinion that, in consideration of those priorities, the completed improvements comprise appropriate and adequate mitigation from a geotechnical and geologic engineering perspective.

We conclude that the completed improvements should have a design life of at least 30 years provided they are maintained appropriately. We recommend that periodic inspections be performed to ensure that back-of-wall drainage is functional and that there are no blockages of subdrains or outlets. The wall should be inspected for damage or corrosion to the wire baskets. A trash rack (possibly constructed of natural rock) should be installed above the culvert inlet in the creek channel if necessary to keep debris out of the culverts, and the culverts regularly inspected and cleaned to maintain functionality.

In order to create a more natural appearance, we recommend that disturbed portions of the arroyo channel and banks be planted with native species in accordance with local regulations and guidelines, and that low-velocity overland flow be restored to the channel by construction of a diversion system which allows low-velocity surface flow in the arroyo channel and high-velocity, high-volume flow through the drainage culverts.

If the engineered fill in the arroyo is removed, we recommend that the Hilfiker wall be stabilized by construction of a new, deep-founded reinforced concrete retaining wall at the base of the Hilfiker wall, in conjunction with installation of new soil nails as discussed above. If complete removal of the fill and Hilfiker wall is required, any replacement wall similarly should incorporate deep foundations to mitigate potential instability.

Supplemental Services

If desired, we can perform supplemental geological or engineering analysis to respond to comments or concerns by the various authorities involved. We can also provide geo-civil services for design of alternative retaining walls or drainage facilities.

We trust that this letter presents the information you require at this time. Should you or others have any questions or concerns regarding this geotechnical and geologic evaluation or the opinions, conclusions, and recommendations presented herein, please do not hesitate to contact us.

April 20, 2012

Very truly yours,
MILLER PACIFIC ENGINEERING GROUP

REVIEWED BY:

REGISTERED PROFESSIONAL ENGINEER
SCOTT A. STEPHENS
2398
Exp. 6/30/13
GEOTECHNICAL
STATE OF CALIFORNIA

Mike Jewett
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Scott A. Stephens
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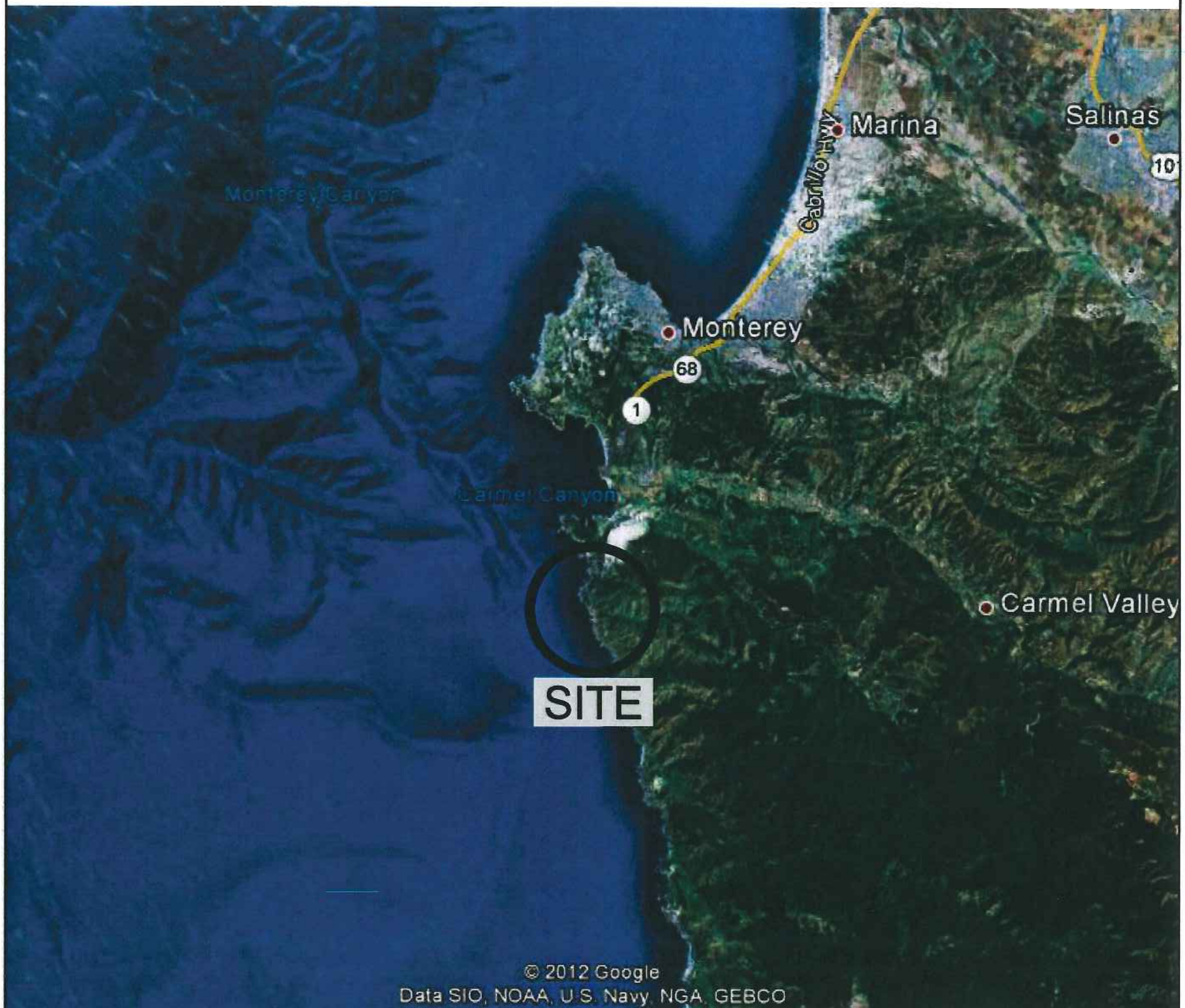
(Expires 6/30/13)

Attachments: Figures 1 through 4;
Appendix A



SITE: LATITUDE, 36.478°
LONGITUDE, -121.937°

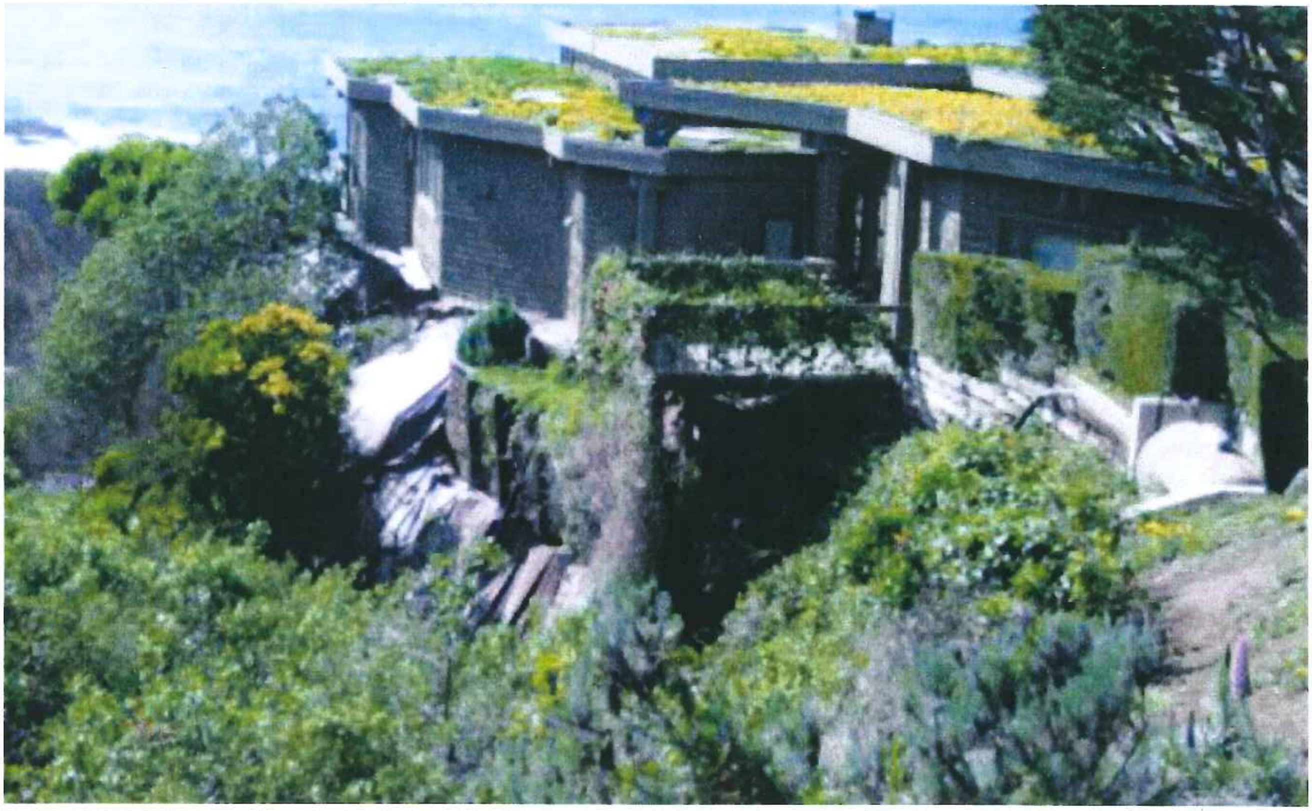
SITE LOCATION

NORTH

REFERENCE: Google Earth, 2012

Miller Pacific ENGINEERING GROUP	504 Redwood Blvd. Suite 220 Novato, CA 94947 T 415 / 382-3444 F 415 / 382-3450 www.millerpac.com	SITE LOCATION MAP Otter House 30650 Aurora Del Mar Carmel Highlands, California Project No. 1039.04 Date: 2/22/2012	Drawn MFJ Checked	1 FIGURE

FILE: 1039.04SLM.dwg



Miller Pacific
ENGINEERING GROUP

FILE: 1039.04Aerials.dwg

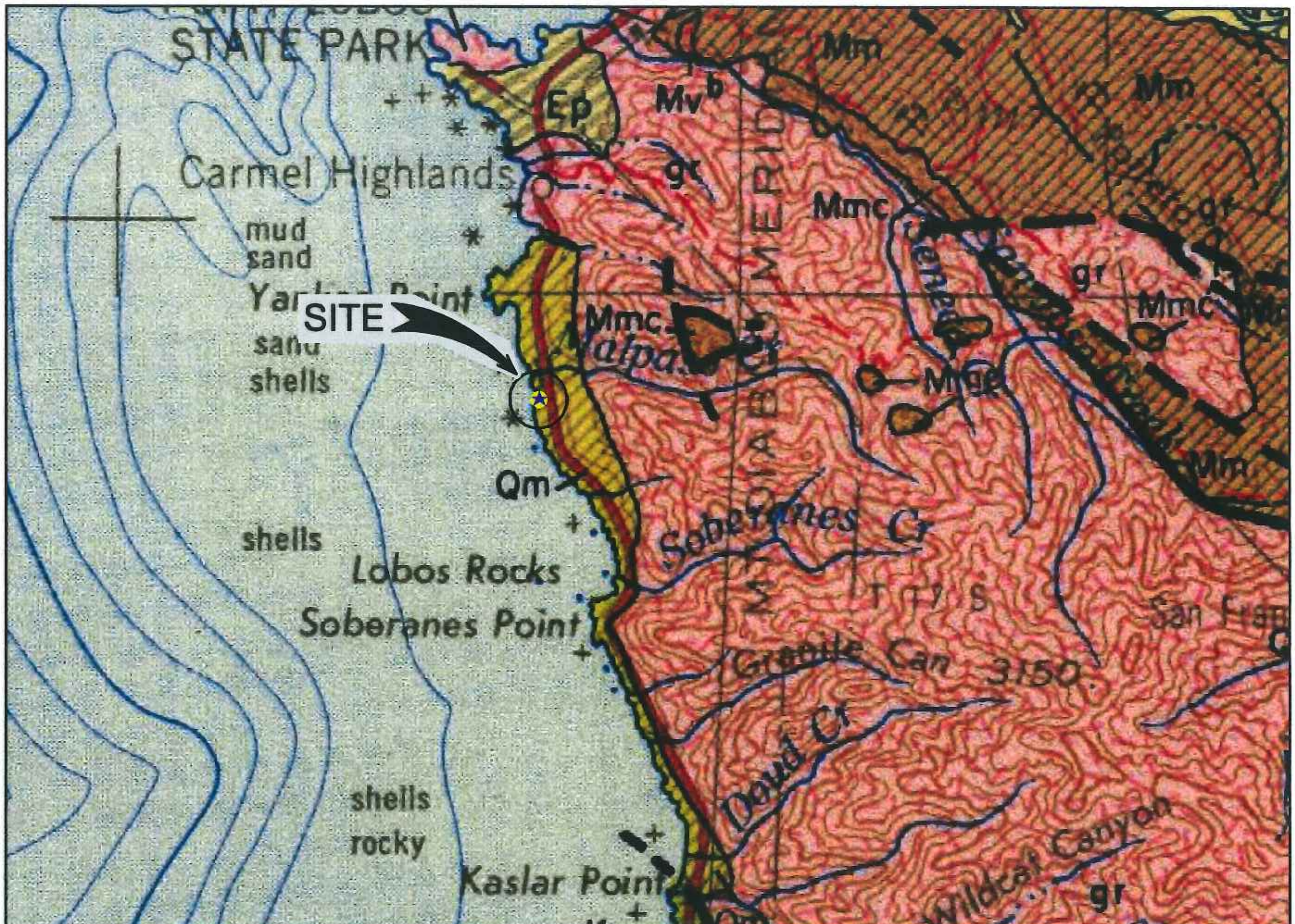
504 Redwood Blvd.
Suite 220
Novato, CA 94947
T 415 / 382-3444
F 415 / 382-3450
www.millerpac.com

SITE PHOTOGRAPHS

Otter House
30650 Aurora Del Mar
Carmel Highlands, California
Project No. 1039.04 Date: 02/28/2011

Drawn MFJ
Checked

2
FIGURE



REFERENCE: Jennings, C.W. and Strand, R.G. (1958) "Geologic Map of California: Santa Cruz Sheet", California Division of Mines and Geology, Map Scale 1:250000.

GEOLOGIC MAP

(NO SCALE)

NORTH

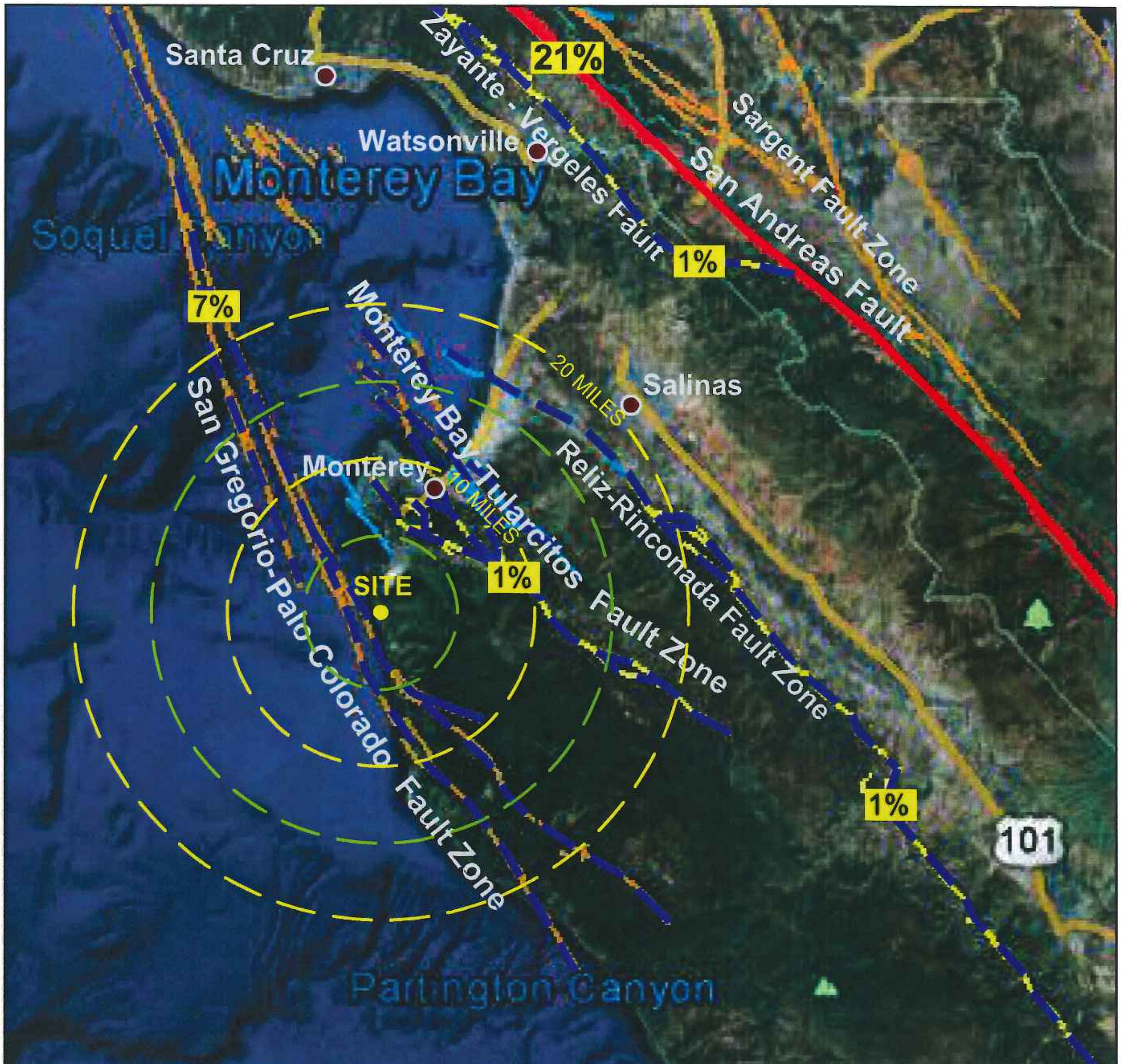
Explanation

Qm — MARINE AND MARINE TERRACE DEPOSITS (PLEISTOCENE)
Uplifted allvuial deposits composed of poorly- to moderately-sorted and slightly indurated silt, clay, and sand with lesser gravels. Unconformably overlies Mesozoic granitic rocks.

gr — GRANITIC ROCKS (MESOZOIC)
Chiefly grandiorite and quartz monzonite, composed of coarsely crystalline quartz, orthoclase, plagioclase, amphibole, and biotite.

Miller Pacific ENGINEERING GROUP	504 Redwood Blvd. Suite 220 Novato, CA 94947 T 415 / 382-3444 F 415 / 382-3450 www.millerpac.com	REGIONAL GEOLOGIC MAP Otter House 30650 Aurora Del Mar Carmel Highlands, California Project No. 1039.04 Date: 2/22/2012	Drawn MFJ Checked	3 FIGURE

FILE: 1039.04GM.dwg



LEGEND

SITE: LATITUDE, 38.0000°
LONGITUDE, -122.0000°

NORTH

FAULT	TYPE	CBC DESCRIPTION
(red solid line)	"A"	CAPABLE OF LARGE MAGNITUDE EARTHQUAKES AND HIGH RATE OF SEISMIC ACTIVITY
(blue dashed line)	"B"	CAPABLE OF LARGE MAGNITUDE EARTHQUAKES OR HIGH RATE OF SEISMIC ACTIVITY

21% PROBABILITY OF M≥6.7 BETWEEN 2008-2038 FOR FAULTS SHOWN. OVERALL PROBABILITY OF 93% IN NORTHERN CALIFORNIA OF ONE OR MORE M≥6.7 EARTHQUAKES FROM 2008-2038.

REFERENCES:

1) ACTIVE FAULT MAP MODIFIED FROM SUMMARY OF EARTHQUAKE PROBABILITIES IN THE S.F. BAY REGION, 2008-2038, THE 2007 WORKING GROUP ON CALIFORNIA EARTHQUAKE PROBABILITIES, 2008.

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FILE: 1039.04 FM.dwg

ACTIVE FAULT MAP

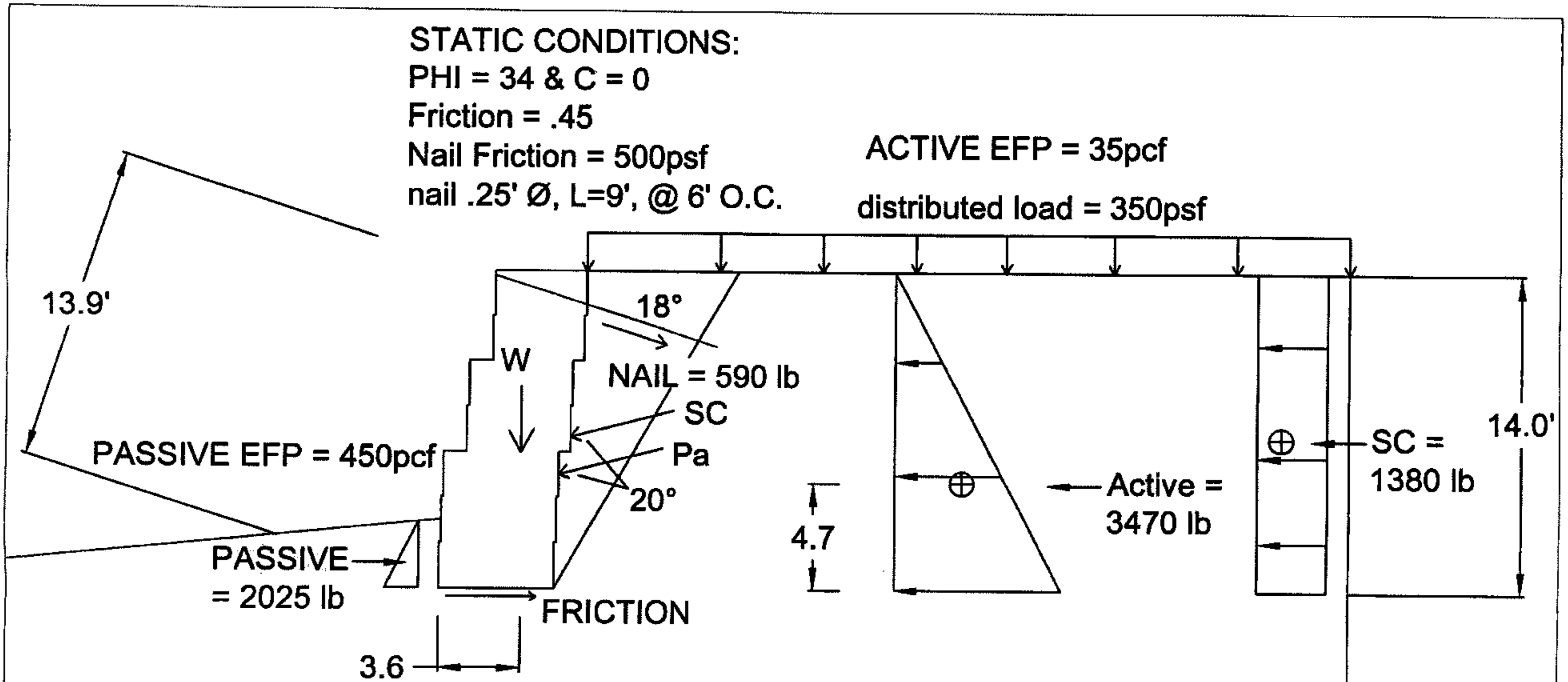
Otter House
30650 Aurora Del Mar
Carmel Highlands, California

Project No. 1039.04 Date: 2-24-2012

Drawn MFJ
Checked

4
FIGURE

APPENDIX A
RETAINING WALL STABILITY ANALYSES



SLIDING

RESISTING

NAIL + PASSIVE + FRICTION

=590 cos(18) + 2,025 + .45 * [7,920 + 3470 sin(20) + 1380 sin(20)] = 6,900

DRIVING

ACTIVE + SURCHARGE

=3,470 * cos(20) + 1,380 * cos(20) = 4,560

FACTOR OF SAFETY

6,900 / 4,560 = 1.51

OVERTURN

RESISTING

NAIL + WALL + PASSIVE + ACTIVE + SURCHARGE

=590*13.9 + 7,920*3.6 + 2,025 * 1 + 3470 * sin(20) * 5 + 1380 * sin(20) * 5 = 47,000

DRIVING

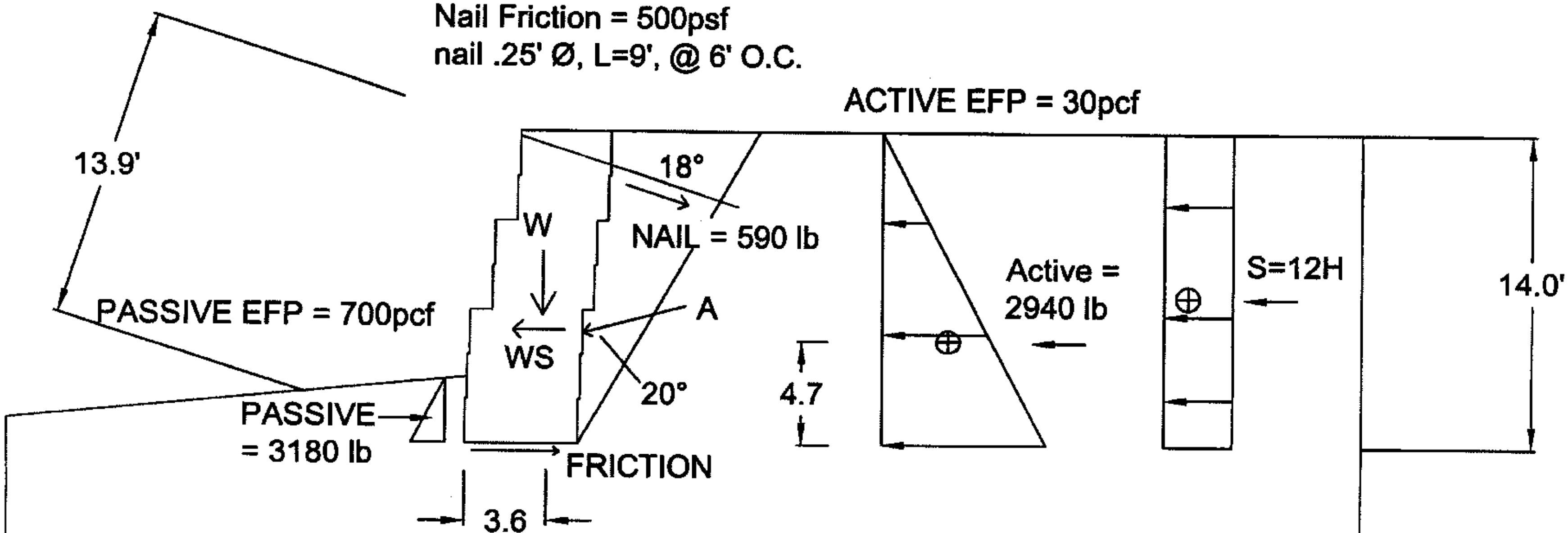
ACTIVE + SURCHARGE

=3,470 * cos(20) *4.7 + 1,380 * cos(20) *7 = 24,400

FACTOR OF SAFETY

47,000 / 24,400 = 1.93

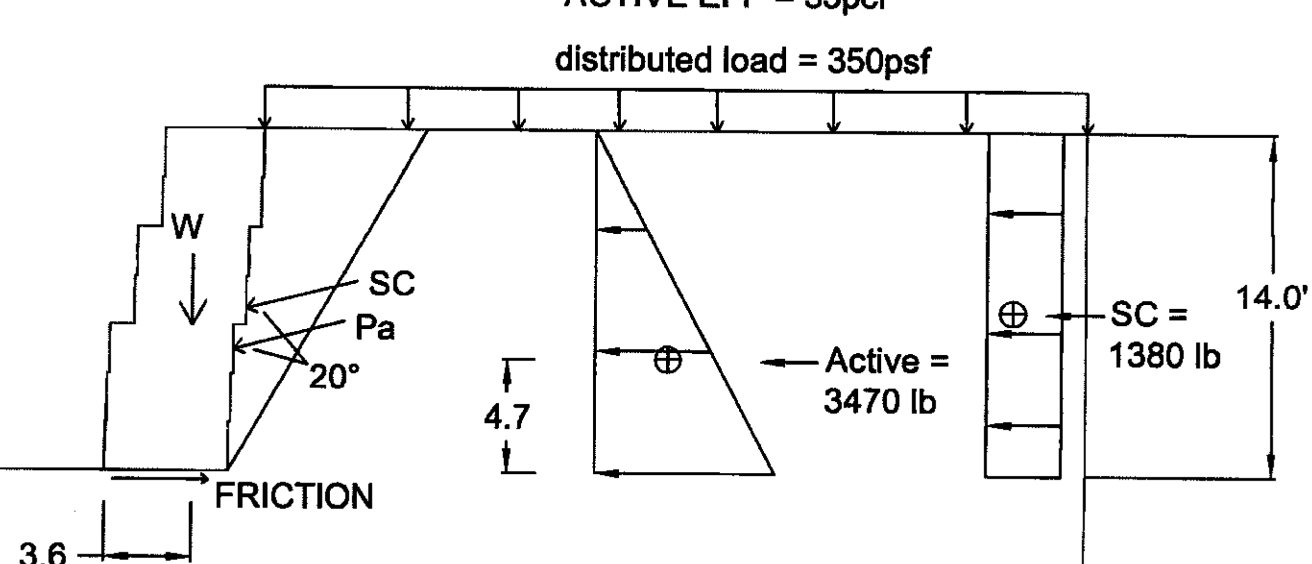
SEISMIC CONDITIONS:
PHI = 32 & C = 250 & g = 0.4
Friction = .45
Nail Friction = 500psf
nail .25' Ø, L=9', @ 6' O.C.



SLIDING
RESISTING
NAIL + PASSIVE + FRICTION + ACTIVE
=590 cos(18) + 3,180 + 7,920*.45 + 2940 * sin(20) * .45 = 7,760
DRIVING
ACTIVE + SEISMIC
=2940 * cos(20) + 2350 = 5,110
FACTOR OF SAFETY
7,760 / 5,110 = 1.52

OVERTURN
RESISTING
NAIL + PASSIVE + WALL + ACTIVE
=590*13.9 + 3180 * 1 + 7920 * 3.6 + 2940 sin(20) * 5 = 42,800
DRIVING
ACTIVE + SEISMIC + WALL SEISMIC
=2940 * cos(20) * 4.7 + 2350 * 7 + 7920 * .4 * 7 = 51,800
FACTOR OF SAFETY
42,800 / 51,800 = 0.83

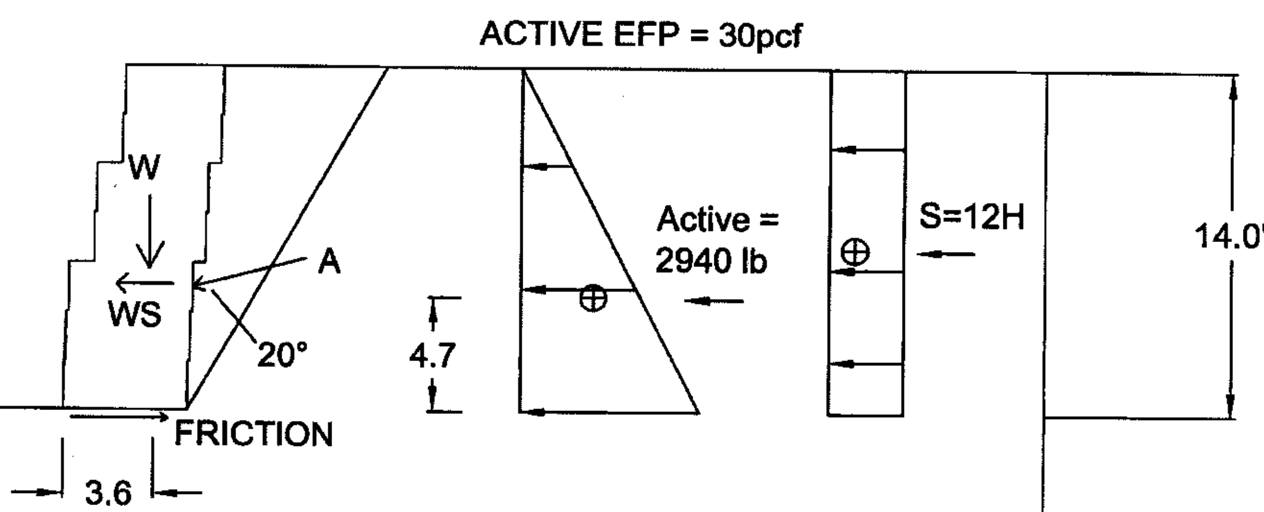
STATIC CONDITIONS:
PHI = 34 & C = 0
Friction = .45



SLIDING
- RESISTING
  - FRICTION [WALL + ACTIVE + SURCHARGE]
  - =.45 * [7,920 + 3470 sin(20) + 1380 sin(20)] = 4,310
- DRIVING
  - ACTIVE + SURCHARGE
  - =3,470 * cos(20) + 1,380 * cos(20) = 4,560
- FACTOR OF SAFETY
  - 4,310 / 4,560 = .96

OVERTURN
- RESISTING
  - WALL + ACTIVE + SURCHARGE
  - =7,920*3.6 + 3470 * sin(20) * 5 + 1380 * sin(20) * 5 = 36,800
- DRIVING
  - ACTIVE + SURCHARGE
  - =3,470 * cos(20) *4.7 + 1,380 * cos(20) *7 = 24,400
- FACTOR OF SAFETY
  - 36,800 / 24,400 = 1.51

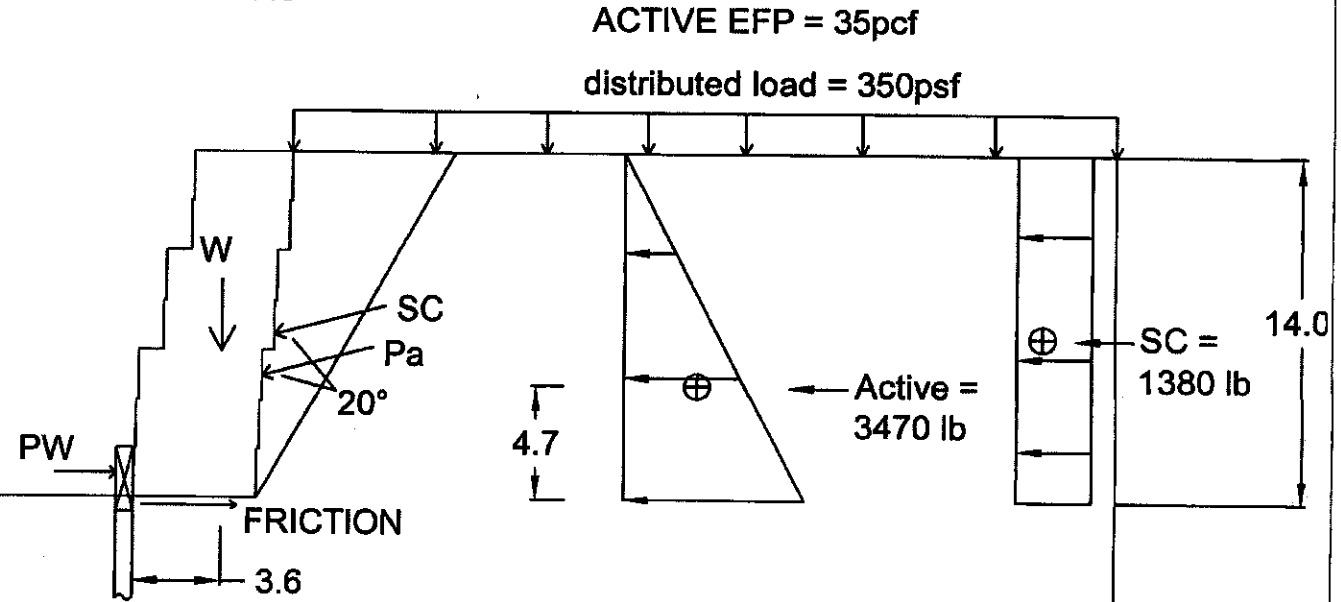
SEISMIC CONDITIONS:
PHI = 32 & C = 250 & g = 0.4
Friction = .45



SLIDING
- RESISTING
  - FRICTION + ACTIVE
  - =7,920*.45 + 2940 * sin(20) * .45 =4,020
- DRIVING
  - ACTIVE + SEISMIC
  - =2940 * cos(20) + 2350 = 5,110
- FACTOR OF SAFETY
  - 4,020 / 5,110 = .79

OVERTURN
- RESISTING
  - WALL + ACTIVE
  - =7920 * 3.6 + 2940 sin(20) * 5 = 33,540
- DRIVING
  - ACTIVE + SEISMIC + WALL SEISMIC
  - =2940 * cos(20) * 4.7 + 2350 * 7 + 7920 * .4 * 7 = 51,800
- FACTOR OF SAFETY
  - 33,540 / 51,800 = .65

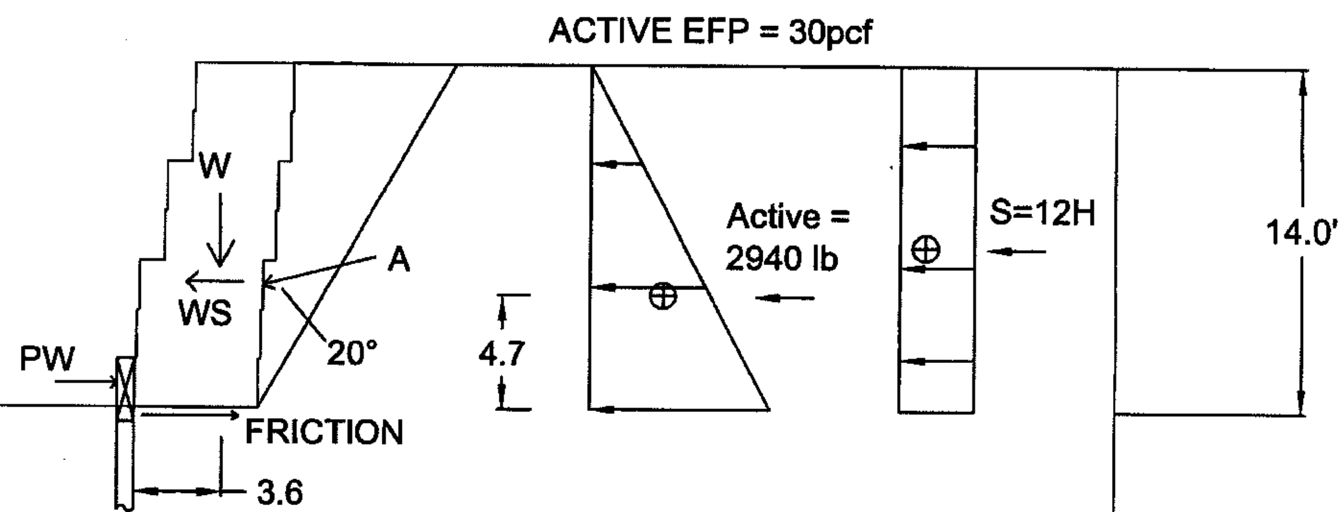
STATIC CONDITIONS:
PHI = 34 & C = 0
Friction = .45



SLIDING TO ACHIEVE FS = 1.5
NEED RESISTING = 6,840
NEED PIER WALL TO RESIST = 2530 lb per foot
RESISTING
FRICTION [WALL + ACTIVE + SURCHARGE] + PIER WALL
=.45 * [7,920 + 3470 sin(20) + 1380 sin(20)] + 2,530= 6,840
DRIVING
ACTIVE + SURCHARGE
=3,470 * cos(20) + 1,380 * cos(20) = 4,560
FACTOR OF SAFETY
6,840 / 4,560 = 1.50

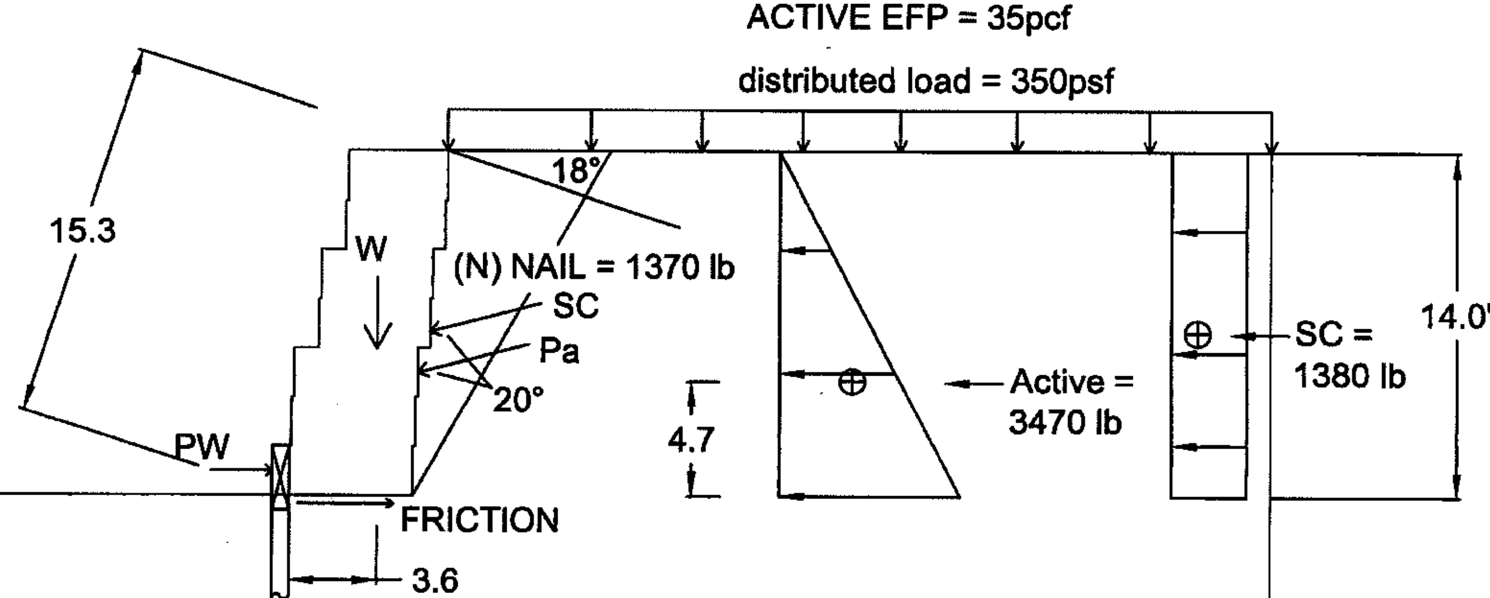
OVERTURN
RESISTING
WALL + ACTIVE + SURCHARGE + PIER WALL
=7,920*3.6 + 3470 * sin(20) * 5 + 1380 * sin(20) * 5 + 2,530 * 1= 39,330
DRIVING
ACTIVE + SURCHARGE
=3,470 * cos(20) *4.7 + 1,380 * cos(20) *7 = 24,400
FACTOR OF SAFETY
39,330 / 24,400 = 1.61

SEISMIC CONDITIONS:
PHI = 32 & C = 250 & g = 0.4
Friction = .45



SLIDING
RESISTING
FRICTION + ACTIVE + PIER WALL
=7,920*.45 + 2940 * sin(20) * .45 + 2530 = 6,550
DRIVING
ACTIVE + SEISMIC
=2940 * cos(20) + 2350 = 5,110
FACTOR OF SAFETY
6,550 / 5,110 = 1.28
OVERTURN
RESISTING
WALL + ACTIVE + PIER WALL
=7920 * 3.6 + 2940 sin(20) * 5 + 2530 * 1= 36,070
DRIVING
ACTIVE + SEISMIC + WALL SEISMIC
=2940 * cos(20) * 4.7 + 2350 * 7 + 7920 * .4 * 7 = 51,800
FACTOR OF SAFETY
36,070 / 51,800 = .70

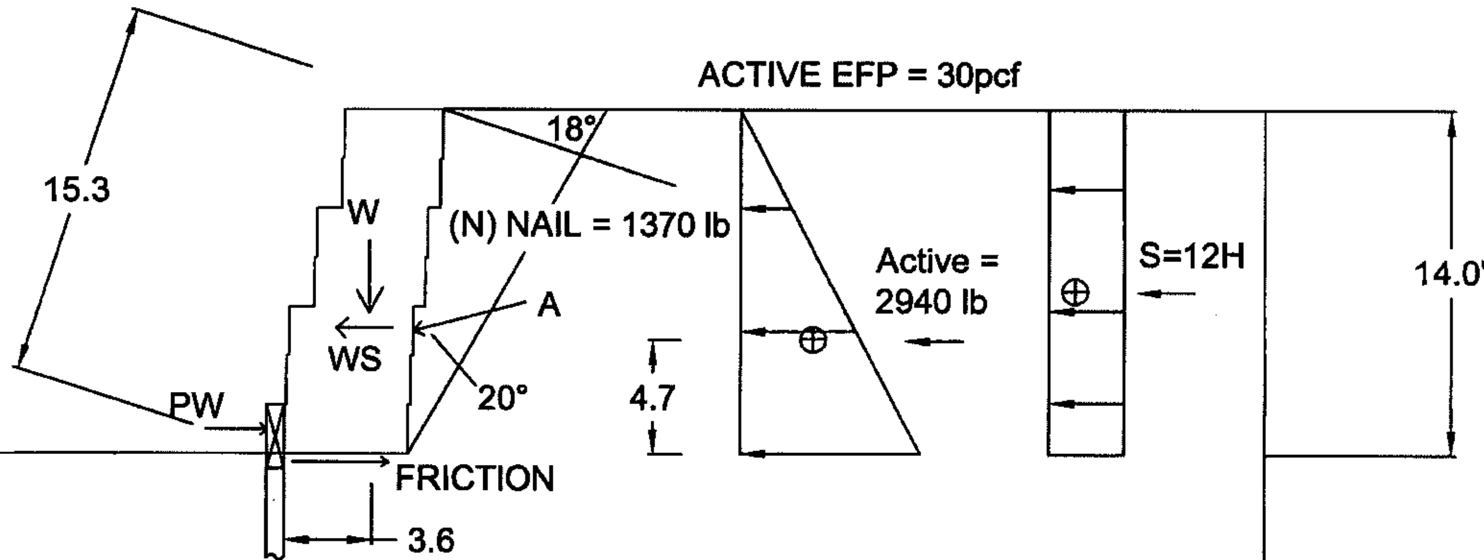
STATIC CONDITIONS:
PHI = 34 & C = 0
Friction = .45



SLIDING TO ACHIEVE FS = 1.5
NEED RESISTING = 6,840
NEED PIER WALL TO RESIST = 2530 lb per foot
RESISTING
FRICTION [WALL + ACTIVE + SURCHARGE] + PIER WALL + SOIL NAIL
=.45 * [7,920 + 3470 sin(20) + 1380 sin(20)] + 2,530 + 1370 cos(18) = 8,140
DRIVING
ACTIVE + SURCHARGE
=3,470 * cos(20) + 1,380 * cos(20) = 4,560
FACTOR OF SAFETY
8,140 / 4,560 = 1.78

OVERTURN
RESISTING
WALL + ACTIVE + SURCHARGE + PIER WALL + SOIL NAIL
=7,920*3.6 + 3470 * sin(20) * 5 + 1380 * sin(20) * 5 + 2,530 * 1 + 15.3' * 1370= 60,240
DRIVING
ACTIVE + SURCHARGE
=3,470 * cos(20) *4.7 + 1,380 * cos(20) *7 = 24,400
FACTOR OF SAFETY
60,240 / 24,400 = 2.47

SEISMIC CONDITIONS:
PHI = 32 & C = 250 & g = 0.4
Friction = .45



SLIDING
- RESISTING
  - FRICTION + ACTIVE + PIER WALL + SOIL NAIL
  - =7,920*.45 + 2940 * sin(20) * .45 + 2530 + 1370 * cos(18) = 7,850
- DRIVING
  - ACTIVE + SEISMIC
  - =2940 * cos(20) + 2350 = 5,110
- FACTOR OF SAFETY
  - 7,850 / 5,110 = 1.54

OVERTURN TO ACHIEVE FS = 1.1
- NEED SOIL NAIL TO RESIST = 20,910 ft-lb per foot of wall
  - 15.3' x 1370 lb = 20,910 ft-lb
- RESISTING
  - WALL + ACTIVE + PIER WALL + SOIL NAIL
  - =7920 * 3.6 + 2940 sin(20) * 5 + 2530 * 1 + 20,910 = 56,980
- DRIVING
  - ACTIVE + SEISMIC + WALL SEISMIC
  - =2940 * cos(20) * 4.7 + 2350 * 7 + 7920 * .4 * 7 = 51,800
- FACTOR OF SAFETY
  - 56,980 / 51,800 = 1.1

LIB130223

Memorandum

To: Delinda Robinson **From:** George Salvaggio
Cc: Michael Watson

Date: November 14, 2012
Subject: Raiser Property, PLN100396, Coastal Development Permit

Purpose of the Memorandum

The purpose of the memorandum is to provide you with a summary of the results and conclusions of the geologic and geotechnical evaluation that was performed for this property. The report contains a risk assessment of the site and describes how these are mitigated by the Hilficker wall that was installed. The report also evaluates the potential adverse effects if the high-flow diversion culverts or fill was removed from the channel. The report evaluates the stability and design life span of the Hilficker wall system. And evaluates alternatives such as alternative wall systems, removal of the culvert and fill from the channel, and a no project alternative.

Conclusions

The following is an outline of the conclusions that can be drawn from this report as it pertains to request for a Coastal Development Permit

- Hilficker wall system is a stable long term solution to the stabilizing the residence and adjacent southern bluff.
- The Hilficker wall system will protect the residence from the retreat of the upper portion of the adjacent western coastal bluff.
- The high-flow diversion culverts, engineered fill, and grouted rock-cascade are necessary to stabilize the highly erosive channel given the instability of the underlying soils at the site.
- Alternative wall designs would require a deep founded reinforced retaining located within the northern bank of the channel in order to stabilize the channel and protect the foundation of the house. This wall would increase impacts to the channel and be prohibitively expensive.
- Restoring the channel to the existing conditions would create an unstable, unsafe condition for the house and potentially the adjacent residence to the south.
- The proposed modifications to the high-flow diversion culvert (i.e. modify the inlet to convey low-lows to the surface) would create surface flows within the channel and provide the hydrologic basis for the successful restoration of the riparian vegetation within the channel.

Risk Assessment of the As-built Conditions

- Erosion of Sandy Soils – Otter House is underlain by approximately 15 to 25 feet of poorly-indurated silty sand terrace deposits. The risk of damage to improvements at the site due to erosion within the adjacent stream channel is high due to the presence of sandy soils. The Hilfiker walls, in conjunction with the high-capacity drainage culvert, and grouted rock spillway should provide protection against erosion.

- Receding Coastal Bluff – The Hilfticker walls also provide protection against erosion of the upper slope of the adjacent coastal bluff.
- Slope Instability/Landsliding – The risk of slope instability or Landsliding is moderate. This is mitigated by the Hilfiker wall system on the western and southern sides of the house.
- Cliff Retreat and Erosion – Retreat of the coastal bluff was estimated to be approximately 5 meters over a 70 year period. This risk is mitigated by the protection afforded by the Hilfticker wall system on the western and southern sides of the house.
- Fault Surface Rupture - Potential for fault surface rupture at the site is low because the site is not located within an Alquist-Priolo Special Studies Zone.
- Seismic Shaking – Potential for strong seismic shaking at the project site is high. Mitigation included the construction of the Hilfticker wall system.
- Liquefaction Potential – The risk of liquefaction at the site is low.
- Seismic-Induced Ground Settlement – The risk of localized seismically-induced ground settlement is moderate. Mitigation included removal of loose fill materials during the construction of the Hillfticker wall and replacement with properly compacted fill.
- Lateral Spreading, Lurching and Ground Cracking – Risk of damage due to lurching or ground cracking is moderate to high. Mitigation handled through stability of Hillfticker wall system provided the foundation of the wall is protected.
- Seiche and Tsunami - Risk of damage due to tsunami is low.
- Flooding – The risk of damage due to large-scale flooding is low.
- Settlement/Subsidence – Risk of settlement at the project site is low.
- Expansive Soils – Risk of damage due to expansive soils is low.

Evaluation of the Hilfticker Gabion Retaining Wall

- Static Stability – The analysis concludes that the Hilfticker system is stable under static conditions with a safety factor of 1.5.
- Seismic Stability – The analysis concludes that the Hilfticker system is stable.
- Remove of Fill from Channel – The analysis concluded that removal of fill would undermine the stability of the Hilfticker system in both static and seismic conditions.
- Estimate Life Span – Estimate design life of 30 years.

Evaluation of Alternatives

- Retain Hilfticker Wall System and Remove Engineered Fill and Culverts - Removal of the engineered fill and culverts within the stream channel would undermine the Hilfticker wall foundation and result in loss of stability of the northern stream bank. In addition, removal of the engineered fill may also result in destabilizing of the southern bank, adjacent to the Chinn property.
- Alternative Wall Designs - If the engineered fill and culverts were removed then deep foundations would be required for any type of alternative wall. Options include drilled, cast-in-place or driven piles. Alternatives to completed improvements would be difficult and costly to construct and result in a less-natural appearance and would likely further damage the environment and riparian habitat at the site.

- No Project Alternative – no project would result in ongoing scour, erosion, and undermining of the northern steam bank and eventual damage to the Otter House foundation and possibly the existing structures and facilities on the Chinn property.

Conclusions and Recommendations

- Diversion of high-velocity surface water away from the residence foundation provides significant mitigation from the hazards presented by highly erosive soils and the erosion that was experienced.
- Complete improvement should have a design life span of 30 years.
- Recommend revegetation of the channel with riparian species.
- Removal of the engineered fill would require the installation of a new deep-founded reinforced concrete retaining wall at the base of the Hilficker Wall, which would be prohibitively expensive and further damage the adjacent channel.

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