Staff Report to the Zoning Administrator

Application Number: 141017

Applicant: Stephanie Barnes-Castro
Owner: Lowe
APN: 028-304-55
Address: 2864 South Palisades Avenue, Santa Cruz

Agenda Date: January 20, 2017
Agenda Item #:
Time: After 9:00 a.m.

Project Description: Proposal to demolish an existing 2,352 square foot residential structure containing a single-family dwelling and a studio apartment/ADU, with a 252 square foot attached garage and to construct a replacement 2,384 square foot single-family dwelling with a 225 square foot attached garage and 256 square foot attached carport, construct a 5 foot high stucco wall and gate in the front, in the R-1-5-PP zone district. This requires a Coastal Development Permit and an Over-Height Fence Permit. This application also includes a Combined Soils/Geologic Report Review.

Location: Property located on the south side of South Palisades Avenue (2864 South Palisades Avenue) at about 150 feet southeast of the intersection with East Cliff Drive.

Supervisorial District: First District (District Supervisor: John Leopold)

Permits Required: Coastal Development Permit
Over-Height Fence Permit

Technical Reviews: Combined Soils Report and Geologic Report Review (REV141017)

Staff Recommendation:

- Confirm that the proposal is categorically exempt from further Environmental Review under the California Environmental Quality Act under classes 1, 2, 3 and 4.
- Approval of Application 141017, based on the attached findings and conditions.

Exhibits

A.	Categorical Exemption (CEQA determination)	G.	Geotechnical Report/Wave Run-Up Analysis/update prepared by Rock Solid Engineering Inc. dated October 14, 2013 and June 17, 2014
B.	Findings	H.	Alternatives Analyses Reports prepared by Easton Geology and Rock Solid Engineering Inc., dated July 7 and 1, 2016 (respectively)
C.	Conditions	I.	Comments & Correspondence (if received)
D.	Project plans		
E.	Assessor's, Location, Zoning and General Plan Maps		
F.	Geologic Report/updates prepared by Easton Geology, dated October 10, 2013 and June 11and 12, 2014		

Parcel Information

Parcel Size:	5,300 square feet (gross), 4,770 square feet (net)
Existing Land Use - Parcel:	single-Family Dwelling and Studio Apartment/Accessory Dwelling Unit (ADU)
Existing Land Use - Surrounding:	Residential neighborhood
Project Access:	South Palisades Avenue
Planning Area:	Live Oak
Land Use Designation:	R-UM (Urban Medium Residential)
Zone District:	R-1-5-PP (Single-Family Residential, 5,000 square feet - Pleasure Point Combining District)
Coastal Zone:	X Inside __ Outside
Appealable to Calif. Coastal Comm.	X Yes __ No

Environmental Information

Geologic Hazards:	Located on a Coastal Bluff, Geologic Report Reviewed and accepted
Soils:	Soils report reviewed and accepted
Fire Hazard:	Not a mapped constraint
Slopes:	The developable portion of the parcel is not sloped
Env. Sen. Habitat:	Not mapped/no physical evidence on site
Grading:	No grading proposed
Tree Removal:	No trees proposed to be removed
Scenic:	Not a mapped resource/visible from public beach and the coastal overlook at Rockview Drive
Drainage:	Preliminary drainage plan approved by the Stormwater Division.
Archeology:	Not mapped/no physical evidence on site

Services Information

Urban/Rural Services Line:	X Inside __ Outside
Water Supply:	Santa Cruz City Water District
Sewage Disposal:	Santa Cruz County Sanitation District
Fire District:	Central Fire Protection District
Drainage District:	Zone 5.

History

The original one-story dwelling and studio apartment/ADU were constructed on the parcel in 1942. In 1965 a rear deck was constructed under Building Permit #A-8543. In 1972 Use Permit and Variance 4143-U was approved for a 918 square foot second story addition and for remodeling the original nonconforming dwelling and studio apartment/ADU. Building Permit #27241 was then issued for construction, resulting in the existing two-story dwelling with a studio apartment/ADU and deck. A staircase to the beach that was erected in 1964 under Building Permit #A-96 has since been removed.

In September 1983 the California Coastal Commission approved Coastal Development Permit 3-83-166 for the repair of an existing seawall that protects the parcel, which dates back to 1953, and for installation of a new seawall comprised of approximately 960 tons of rip rap and an extension of an existing retaining wall. Subsequently Grading Permit #1872 was issued by the County of Santa Cruz in August 1983 for the replacement of rip rap for the subject parcel and adjacent parcel 028-304-54 (2862 South Palisades Avenue).

Project Setting

The property is located on South Palisades Avenue, a narrow road that was originally laid out as an alleyway to serve the rear of parcels located to the south and west that fronted onto the former East Cliff Drive and also to the north and east, fronting onto Chesterfield Drive. However, coastal erosion processes along this stretch of coastline has meant that the right-of-way for East Cliff Drive has long been abandoned so that South Palisades is now the only means of access to those parcels, including the subject parcel, that are now located on the coastal bluff.

Although newer homes, including the homes on adjacent parcels, have been designed to meet current setback requirements, many of the homes along the street, including the dwelling on the subject parcel, or their detached garages, have been developed so that there is no, or only a minimal, setback to the edge of the South Palisades "alley" right-of-way. Therefore, the street feels narrow and constricted, especially when vehicles park along the roadway. In addition, because there are very few front yard areas abutting South Palisades Avenue there is only very limited landscaping to break up and soften the built environment. The styles and types of housing along the street are very eclectic with newer structures interspersed with the original older dwellings and with a wide range of architectural styles. The structures along the street include single story cottages or accessory dwellings, attached and detached garages, two story homes and also an apartment building that is constructed over an open carport.

Coastal Bluff /Geologic Hazards

The subject parcel borders the Monterey Bay and is located along a coastal bluff that that consists of a lower and an upper terrace. The lower terrace consists of an elevated bedrock platform and the upper terrace is comprised of loosely consolidated deposits that are more easily eroded. The property is currently protected from wave action by coastal protection structures, some of which date back to 1953. These include a rip rap revetment, which protects the bedrock terrace, and a concrete wall, concrete sack wall (on adjacent APN 028-304-54) and a small additional area of rip rap which help retain the terrace deposits comprising the upper bluff. Modifications to the seawall system were constructed in 1983 (Coastal Permit 3-83-166) and included fortifying the revetment and extending the concrete wall. The existing seawall system at the site extends onto both the adjacent up-coast and down-coast properties and is in an acceptable condition overall.

Because of the location of the subject parcel, immediately adjacent to a coastal bluff, the County Geologist required that the applicant submit a Geologic Report to determine the 100 year geologic setback for the site. As a result, a Geologic Report prepared by Easton Geology was submitted for review. In addition, a Geotechnical Report prepared by Rock Solid Engineering, Inc., was submitted which includes a Wave Run-Up Analysis. These reports have been reviewed

and accepted by the County Geologist. Subsequent Alternatives Analyses were also prepared to provide additional analysis, from both a geologic and geotechnical standpoint, to determine whether alternative coastal protection measures other than those recommended in the original reports, or removal of the existing coastal protection structure, would be feasible.

The Geologic Report is based upon the assumption that the existing coastal protection structures at the property, which are currently in good condition, will be retained and maintained. The proposed replacement dwelling has therefore been designed with a minimum 25 foot setback from the top of the coastal bluff in accordance with the recommendations of the Geologic Report. As set out in County Code section 16.10.070(H)(1)(c) the determination of the minimum geologic setback is based upon existing site conditions at the time of application submittal, which therefore allows consideration of the existing approved protection structures (County Code sets out only that no *proposed* protection structures may be taken into consideration). Accordingly, a minimum setback of 25 feet from the existing top of bluff/seawall, which is the minimum setback required by County Code section 16.10.070(H)(1)(b), was recommended for the proposed replacement dwelling based upon retention of the existing seawall and rip rap revetment.

Coastal Development Permit 3-83-166 issued by the California Coastal Commission in 1983, states that *"The safety of improved structures on this parcel is dependent, in part, on the construction and maintenance of an engineered seawall approved by the County and Coastal Permit process."* However, although the conditions of approval of Coastal Development Permit 3-83-166 require that the rip rap revetment be subject to ongoing maintenance, including the retrieval of fugitive boulders displaced due to wave action, the conditions of approval of that Permit state that maintenance of the seawall itself requires the approval of an Amendment.

At the request of the Planning Director, both Easton Geology and Rock Solid Engineering both prepared an Alternatives Analysis to review the feasibility of a range of possible options for protection of the site that included: removing the existing coastal protection structures; modifying the existing structures to increase coastal access (by removing or decreasing the extent of the rip rap revetment in accordance with the provisions of Coastal Development Permit 3-83-166), or retaining the existing structures, either with or without ongoing maintenance. For each alternative the 100 year stability of the bluff-top was considered and also how that alternative would affect the proposed development and the adjacent properties.

In conclusion, both Easton Geology and Rock Solid Engineering considered that removal or modification of the existing protection structures would likely render the subject parcel unbuildable and also negatively impact and compromise the safety of adjacent bluff-top properties. The same result could be expected, although over a longer time period, if the existing protection structures are not maintained. The Alternatives Analysis therefore concluded that ongoing maintenance of the coastal protection structures associated with the subject parcel is necessary, not just to protect the subject property but also to protect the adjacent parcels both up- and down-coast. It was further concluded, in addition to the safety of the improvements on adjacent parcels, that beach access and public safety in the area would be improved by periodic maintenance of the seawall system and that these benefits would be jeopardized if the existing structures were not retained and maintained in good condition.

Based upon the Alternatives Analyses, which have been accepted by the County Geologist, beneficial maintenance of the existing rip rap revetment to appropriately retrieve and replace any dislodged rocks that have migrated onto the beach are on the revetment has been recommended. Therefore, as a condition of approval of this permit, the applicant's coastal engineering/ geotechnical engineer and engineering geologist will be required to identify any rock that has dislodged from the revetment since the construction of the existing shoreline protection structure, and provide the County with a report that identifies the dislodged rock and specifies the procedure for recovering and restacking the rock in an appropriate manner with the least disturbance to the beach and shoreline. Any excess rock will be exported to an approved location. This report, which will include a Recovery Plan that identifies the rock recovery, phasing and construction Best Management Practices, is required to be reviewed and accepted by County of Santa Cruz and the resulting grading permit for the work must be issued either prior to or concurrent with the Building Permit for the proposed replacement home.

This maintenance of the rip rap revetment to maintain the original engineered design will provide ongoing protection to the seawall and will also allow for increased coastal access along the shoreline by the retrieval and re-stacking of fugitive boulders that have migrated seawards due to wave action. Further, subsequent to the initial recovery effort the applicant is further required, as a condition of approval, to have the rip rap revetment routinely inspected (at least once every 5 years) by the coastal engineering/geotechnical engineer and/or engineering geologist. Ongoing maintenance and rock retrieval as identified in the reports of these inspections is then required to be carried out in accordance with the conditions of both the original 1983 Permit and this Permit concerning rock recovery.

The proposed replacement single family home may be used for only as long as the approved development remains safe for occupancy and use. If coastal hazards result in an unsafe site or unsafe structure, the property owner would be required as a condition of approval of this Permit, to agree to either abate the property or address the dangerous conditions. This includes that any future shoreline protection/armoring structure, that exceeds previously authorized maintenance of the existing structures, will only be considered for approval if proposed as part of a comprehensive and unified Urbanized Area Beach and Bluff Management Strategy, such as a unified project design that is implemented through a Geologic Hazard Abatement District (GHAD) to address coastal bluff properties and coastal resources that exist in this urbanized area. Such strategy may allow for phased implementation with sub-areas. The Strategy would be required to address potential loss of beach areas, potential opportunities to improve public access to the coast, protection of visual resources, and protection of public infrastructure in response to sea level rise.

The project site is currently located outside of any mapped flood hazard zones. However, because of the proximity of the parcel to the coastal bluff, a quantitative Wave Run-Up Analysis was prepared by Rock Solid Engineering to estimate the potential for waves to overtop the existing shoreline protection. Based upon the approved Wave Run-Up Analysis, the proposed dwelling has been designed based upon a Base Flood Elevation of 30.3 feet (referenced to NAVD 88 datum). On September 28, 2015 the Federal Emergency Management Administration (FEMA) released a Preliminary Flood Insurance Rate Map (FIRM) that could potentially impact the required elevation of the replacement dwelling to some degree. Although the proposed residence as currently designated continues to be located outside the mapped VE

Zone on the Preliminary FIRM, the mapping is subject to change prior to issuance of the effective FIRM. Therefore it is required, as a condition of approval of this permit, that if the effective FIRM shows the proposed dwelling as within a designated VE-Zone at the time of building permit issuance, the proposed replacement dwelling must be revised so as to be in full compliance. Revisions to the proposed dwelling that increase the height to greater than 28 feet or significantly revise the overall design would require the approval of an Amendment to this Permit.

Zoning & General Plan Consistency

The subject property is a parcel with a net developable area of approximately 4,770 square feet that is located in the R-1-5-PP (Single-family residential, 5,000 square feet- Pleasure Point Combining District) zone district, a designation that allows residential uses. The proposed single-family dwelling is a principal permitted use within the zone district and the zoning is consistent with the site's R-UM (Urban Medium Residential) General Plan Designation.

The Pleasure Point Community Design Combining District is an overlay or combining district that provides site and development standards that are in addition to those imposed by the site's R-1-5 zoning. These include increased setback requirements at the second floor to reduce the visual and shading impacts of new and expanded houses on neighboring parcels and homes, and additional restrictions on garage doors and driveways to reduce the impact of automobile-oriented features on residential building facades.

The proposed dwelling has been designed to meet the all of the setbacks, lot coverage, floor area ratio and height standards of the R-1-5 zone district and also conforms to all of the additional regulations of the Pleasure Point Combining District. A summary of the required and proposed site and development standards that are relevant to this project is summarized in the table below:

	Required Standard	**Proposed**
Front Yard	15 feet Min.	20 feet
Side Yards (lot < 60 feet wide)	5 feet (both sides)	5 feet (both sides)
Second Floor Side Yard (PP)	10 feet Min. (both sides)	10 feet (both sides)
Rear Yard	15 Min. feet	21 feet
Lot Coverage	40% Max.	40%
Floor Area Ratio (FAR)	50% Max.	49.9%
Height	28 feet Max.	26 feet
Height within 10 foot side yard	15 feet Max.	12 feet 6 inches (15 feet to top of deck rail)
Width of garage doors	50% of façade facing street	22.6% of façade facing street (48% garage door/carport entry combined)

As set out in County Code section 13.10.552, the proposed four bedroom single family dwelling requires three parking spaces. The proposed dwelling includes a total of four off-street parking spaces, one within an enclosed garage, one within an open unenclosed carport and two spaces on a paved driveway area within the front yard and therefore will be in compliance with current regulations for the provision of off-street parking.

This application also seeks approval for a 5 foot high masonry/stucco wall within the required front yard adjacent to South Palisades Avenue. As set out in County Code Section 13.10.525, the height of a wall or fence that is located within any required front yard or within a 10 foot sight distance triangle adjacent to a driveway is limited to a maximum of three feet in height without approval of an Over-Height Permit. To be consistent with the existing wall at 2868 South Palisades Avenue, approved in June 2007 by Coastal Development Permit 06-0581, the proposed wall on the subject parcel is required as a condition of approval of this permit to be relocated to be a minimum of 18 inches from the edge of the right-of-way. This will allow for the addition of planting along the base of the wall to break up the visual mass of the wall in views from the street and to add visual interest and color to the streetscape. The proposed design has been reviewed by the Department of Public Works, Road Engineering Division, who have determined that the wall will not unduly affect the line of sight along the street. Further, as conditioned, the wall will be consistent in scale, design and location with other walls and fences along South Palisades Avenue. It will also have a reduced impact on the street as compared to the one and two story walls of the existing dwelling that are located two feet from the edge of the right-of-way.

Local Coastal Program Consistency

The proposed single-family dwelling is in conformance with the County's certified Local Coastal Program, in that the structure is sited on an existing residential parcel and has been designed in accordance with the site and development standards of the zone district, which are designed to ensure that new structures are visually compatible, in scale with, and integrated with the character of the surrounding neighborhood. Developed parcels in the area contain both single-family and multi-family dwellings, including one, two and even three story homes, and sizes and architectural styles vary widely as do exterior materials and colors. "Eclectic" describes the character of the neighborhood as well as the Pleasure Point area in general. Further, many of the homes also have walls, fences or tall hedges that exceed 3 feet in height located close to the right-of-way for South Palisades Avenue. The design submitted is consistent within the existing range of styles, particularly with other newer homes on the area.

The site of the proposed project lies between the sea and the first public road and therefore, as set out in County Code section 13.20.110(F), the project may berequired to include the provision of increased public access to the shoreline. Currently public access points exist both up-coast and down-coast of the site. About 250 feet down-coast on Rockview Avenue there is an overlook area that provides surfing access and limited beach access, but access from this point to the shoreline seaward of the project area is difficult given the rocky intertidal and shelf areas that lie between. About 700 feet up-coast there is reliable beach access at Moran Lake/26th Avenue beach, but the beach immediately adjacent to the project site can only reached from this direction during very low tides. This is due, at least in part, to the rip rap revetment that runs behind the subject property and that extends westwards to protect the adjacent homes, particularly the adjacent house at 2862 South Palisades Avenue. The proposed project does not interfere with any existing public access.

To provide increased public access to the beach adjacent to the subject parcel, displaced rip rap is required to be reclaimed and re-stacked, in accordance with the conditions of approval of this Permit and as allowed under the provisions of Coastal Development Permit 3-83-166. Also, the

required ongoing monitoring and maintenance of the rip-rap will ensure the greatest possible level of public access to the beach areas adjacent to the project site in the foreseeable future.

It is, however, anticipated that the coastal protection structures in this area may eventually need to be replaced as part of a comprehensive and unified Urbanized Area Beach and Bluff Management Strategy, implemented through a Geologic Hazard Abatement District (GHAD). By acceptance of this permit, the property owners have agreed to not object to the formation of a GHAD, and any future new or replacement coastal protection structures would be required to address potential loss of beach areas, potential opportunities to improve public access to the coast, protection of visual resources, and protection of public infrastructure in response to sea level rise.

Currently there are no views of the ocean across the parcel due to the location of the existing structure that is set close to South Palisades Avenue, with fences on either side that obstruct ocean views. Therefore the proposed dwelling will not change or reduce any public views of the ocean from South Palisades Avenue.

The proposed development is consistent with the visual resource protection policies of the Local Coastal Program in that the rear of the proposed dwelling will be built on an existing developed street in the urbanized area of Santa Cruz County. Whereas the existing nonconforming dwelling and studio apartment/ADU has been developed to within two feet of the edge of the right-of-way, the proposed dwelling will be in-line with other dwellings located both to the east and northwest of the subject parcel along South Palisades and will therefore have a reduced impact in views from the street as compared to the current conditions. Further, the proposed dwelling does not extend seaward of the line of the rear of the existing dwelling on the parcel so that the replacement house will not be visually prominent in views along the coast from either Rockview Drive or from the Moran Lake beach to the northwest. From the Moran Lake/26th Avenue beach the rear of the dwelling will be in line with all of the other homes that back onto the beach, including an approved two-story home that, once constructed, will be the last house in line due to its location at the point where the street turns and angles away from the beach viewpoint. The proposed replacement home on the subject property will not be visible from the public viewpoint or from the public pedestrian walkway at the end of Rockview Drive. Therefore the proposed replacement dwelling will not significantly alter the scenic nature of the beach.

Design Review

Although the proposed dwelling is not located in a mapped scenic area, and therefore not technically subject to the County Design Review Ordinance, the project incorporates site and architectural design features to ensure the compatibility of the proposed home. This has been achieved by the inclusion of increased side setbacks to the second floor and varied wall and roof planes, particularly at elevations visible from South Palisades Avenue. The dwelling also incorporates a palette of natural colors and materials, including a natural colored stone trim, sage colored horizontal wood siding and sandstone colored stucco at the dwelling and the proposed front yard wall. These, together with new landscape plantings, will reduce the visual impact of the proposed development on surrounding land uses and the natural landscape.

Environmental Review

As proposed, the project qualifies for an exemption under the California Environmental Quality Act (CEQA). Demolition of the existing duplex is consistent with the CEQA Guidelines in Section 1 - Existing Facilities (15301). The construction of a replacement single-family dwelling is consistent with both Section 2, Replacement or Reconstruction (15302) and Section 3, New Construction or Conversion of Small Structures (15303). This is because the proposed dwelling will replace an existing residential structure (single-family dwelling with a studio apartment/ADU) and will be constructed within an area that is zoned for residential uses. Further the proposed dwelling and 5 foot high front yard wall will conform to all of the required site and development standards for the zone district with the approval of an Over-Height Fence Permit for a stucco wall that exceeds 3 feet in height within the required front yard. The recommendations of the Geology and Geological Reports have been incorporated into the project in order to ensure impacts related to the coastal bluff location will be less than significant.

Conclusion

As proposed and conditioned, the project is consistent with all applicable codes and policies of the Zoning Ordinance and General Plan/LCP. Please see Exhibit "B" ("Findings") for a complete listing of findings and evidence related to the above discussion.

Staff Recommendation

- Confirm that the proposal is categorically exempt from further Environmental Review under the California Environmental Quality Act under classes 1, 2, 3 and 4.
- **APPROVAL** of Application Number **141017**, based on the attached findings and conditions.

Supplementary reports and information referred to in this report are on file and available for viewing at the Santa Cruz County Planning Department, and are hereby made a part of the administrative record for the proposed project.

The County Code and General Plan, as well as hearing agendas and additional information are available online at: www.co.santa-cruz.ca.us

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CALIFORNIA ENVIRONMENTAL QUALITY ACT
NOTICE OF EXEMPTION

The Santa Cruz County Planning Department has reviewed the project described below and has determined that it is exempt from the provisions of CEQA as specified in Sections 15061 - 15332 of CEQA for the reason(s) which have been specified in this document.

Application Number: 141017
Assessor Parcel Number: 028-304-55
Project Location: 2864 South Palisades Avenue, Santa Cruz

Project Description: Demolish an existing duplex with an attached garage, and construct a replacement dwelling with an attached garage and carport. Maintain an existing permitted coastal protection structure.

Person or Agency Proposing Project: Stephanie Barnes-Castro

Contact Phone Number: (831) 239 0603

A. _____ The proposed activity is not a project under CEQA Guidelines Section 15378.
B. _____ The proposed activity is not subject to CEQA as specified under CEQA Guidelines Section 15060 (c).
C. _____ **Ministerial Project** involving only the use of fixed standards or objective measurements without personal judgment.
D. _____ **Statutory Exemption** other than a Ministerial Project (CEQA Guidelines Section 15260 to 15285).
E. __X__ **Categorical Exemption**

Specify type: Class 1 - Existing Facilities (Section 15301)
Class 2 - Replacement or Reconstruction (Section 15302)
Class 3 - New Construction or Conversion of Small Structures (Section 15303)
Class 4 - Minor Alterations to Land (Section 15304)

F. Reasons why the project is exempt:

Demolition of a duplex in an urbanized area and construction of a replacement single family dwelling in a residential zone district, new gardening or landscaping and maintenance/reconstruction of an existing permitted coastal protection structure.

In addition, none of the conditions described in Section 15300.2 apply to this project.

_____ Date:_____
Lezanne Jeffs, Project Planner

EXHIBIT A

Coastal Development Permit Findings

1. That the project is a use allowed in one of the basic zone districts, other than the Special Use (SU) district, listed in section 13.10.170(d) as consistent with the General Plan and Local Coastal Program LUP designation.

This finding can be made, in that the property is zoned R-1-5-PP (Single-family residential, 5,000 square feet – Pleasure Point Combining District), a designation which allows residential uses. The proposed single-family dwelling is a principal permitted use within the zone district and the zoning is consistent with the site's (R-UM) Urban Medium Residential designation.

2. That the project does not conflict with any existing easement or development restrictions such as public access, utility, or open space easements.

This finding can be made in that no such easements or restrictions are known to encumber the project site. The proposed project is located entirely outside the right-of-way for South Palisades Avenue and therefore will not interfere with street access to other parcels in the area.

3. That the project is consistent with the design criteria and special use standards and conditions of this chapter pursuant to section 13.20.130 et seq.

This finding can be made in that the proposed single-family dwelling and stucco wall in the front yard would be consistent with the surrounding neighborhood in terms of architectural style, and the dwelling will incorporate site and architectural design features such as increased side setbacks to the second floor and varied wall and roof planes, particularly at the elevations visible from South Palisades Avenue. The dwelling also incorporates a palette of natural colors and materials, a natural colored stone trim, sage colored horizontal wood siding, and sandstone colored stucco at the dwelling. The proposed front yard wall, together with new landscape plantings, will reduce the visual impact of the proposed development on surrounding land uses and the natural landscape as compared to current site conditions.

The site is surrounded by lots developed to an urban density and the proposed replacement dwelling has been designed in accordance with all site and development standards of the zone district, which have been adopted to ensure that new structures are visually compatible, in scale with and integrated with the character of the surrounding neighborhood. Developed parcels in the area contain both single-family and multi-family dwellings and the size and architectural styles vary widely. The design submitted is consistent with the existing range of styles, particularly other newer homes. The neighborhood contains many two-story homes and the surrounding structures exhibit many different architectural styles as well as exterior materials and colors. Further, the homes in the area include a variety of roof styles, including both pitched and flat roofs.

Currently there are no views of the ocean across the parcel due to the location of the existing structure that is set close to the road and has fences on either side that obstruct ocean views. Therefore the proposed dwelling will not significantly change or reduce any public views of the ocean from South Palisades Avenue.

The proposed development is consistent with the visual resource protection policies of the Local Coastal Program in that the proposed dwelling will be built on an existing developed street in the urbanized area of Santa Cruz County. Whereas the existing nonconforming dwelling and studio apartment/ADU was developed to within two feet of the edge of the right-of-way, the proposed dwelling will be in-line with other dwellings located both to the east and northwest of the subject parcel along South Palisades and will therefore have a reduced impact in views from the street. Further, the proposed dwelling does not extend seaward of the line of the rear of the existing dwelling on the parcel so that the replacement house will not be visually prominent in views along the coast from either Rockview Drive or from the Moran Lake beach to the northwest. From the Moran Lake/26th Avenue beach the dwelling will be in line with all of the other homes that back onto the beach, including an approved two-story home that, once constructed, will be the last house in line due to its location at the point where the street turns and angles away from the beach viewpoint. The proposed replacement home on the subject property will not be visible from the public viewpoint or from the public pedestrian walkway at the end of Rockview Drive. Therefore the proposed replacement dwelling will not significantly alter the scenic nature of the beach.

4. **That the project conforms with the public access, recreation, and visitor-serving policies, standards and maps of the General Plan and Local Coastal Program land use plan, specifically Chapter 2: figure 2.5 and Chapter 7, and, as to any development between the nearest public road and the sea or the shoreline of any body of water located within the coastal zone, such development is in conformity with the public access and public recreation policies of Chapter 3 of the Coastal Act commencing with section 30200.**

This finding can be made in that, although the project site is located between the shoreline and the first public road, the proposed project will not interfere with any existing public access to the beach, ocean, or other nearby body of water. There is currently no public access to the beach that crosses the site and therefore the proposed project will not block any pathway to the ocean or beach. The proposed project does not qualify as a "replacement after disaster structure", as set out in County Code section 13.20. Therefore the proposed replacement single-family dwelling has been evaluated for the opportunity to provide or increase public access to the shoreline wherever feasible. A public access and overlook area with a picnic table, surfing access and limited beach access, is located about 250 feet down-coast of the project site on Rockview Avenue. Access to the shoreline lying seaward of the project area from this point is very difficult, given natural the rocky intertidal and shelf areas that lie between Rockview Avenue and the project site. The nearest reliable beach access is located up-coast at Moran Lake/26th Avenue beach and at times the beach located seaward of the project site can reached from this direction. However, this access is only possible during very low tides due, at least in part to the rip rap revetment that runs behind the subject property and that extends westwards to protect the adjacent homes, particularly the house at 2862 South Palisades Avenue.

To provide increased public access to the beach adjacent to the subject parcel, displaced rip rap is required to be reclaimed and re-stacked, subject to the conditions of approval of this Permit and as allowed under the provisions of Coastal Development Permit 3-83-166. Also, ongoing monitoring and maintenance of the rip-rap has been required to ensure the greatest possible level of access to the beach areas adjacent to the project site in the foreseeable future.

Further, in the event of future damage to existing coastal protection structures or other changed circumstances, the existing coastal protection structures in this area may be required to be replaced as part of a comprehensive and unified Urbanized Area Beach and Bluff Management Strategy, implemented through a Geologic Hazard Abatement District (GHAD). By acceptance of this permit, the property owners have agreed to not object to formation of a GHAD, and any future new or replacement coastal protection structure would be required to address potential loss of beach areas, potential opportunities to improve public access to the coast, protection of visual resources, and protection of public infrastructure in response to sea level rise.

The project site is not identified as a priority acquisition site in the County Local Coastal Program.

5. That the proposed development is in conformity with the certified local coastal program.

This finding can be made, in that the structure is sited and designed to be visually compatible, in scale, and integrated with the character of the surrounding neighborhood. Additionally, residential uses are allowed uses in the R-1-5-PP (Single-family residential, 5,000 square feet – Pleasure Point Combining District) zone district, as well as the General Plan and Local Coastal Program land use designation. Developed parcels in the area contain single family dwellings. Size and architectural styles vary widely in the area, and the design submitted is consistent within the existing range of styles.

Development Permit and Over-Height Fence Permit Findings

1. That the proposed location of the project and the conditions under which it would be operated or maintained will not be detrimental to the health, safety, or welfare of persons residing or working in the neighborhood or the general public, and will not result in inefficient or wasteful use of energy, and will not be materially injurious to properties or improvements in the vicinity.

This finding can be made, in that the project is located in an area designated for residential uses and the site is not encumbered by physical constraints to development. Construction will comply with prevailing building technology, the California Building Code, and the County Building ordinance to ensure safety and the conservation of energy and resources. Further, the design of the proposed dwelling is based upon Geological and Geotechnical Reports and also a Wave Run-Up Analysis, each prepared by a licensed professional, to ensure that the proposed structure has been specifically designed for the coastal bluff location on which it is situated.

The proposed single-family dwelling will not deprive adjacent properties or the neighborhood of light, air, or open space, in that the proposed replacement dwelling will be in conformance with the general intent and purposes of the Pleasure Point Community Design Combining District. This combining zone provides site and development standards in addition to the setback requirements of the R-1-5 zone district, that are designed to further reduce the visual and shading impacts of new and expanded houses on neighboring parcels. Therefore the proposed dwelling will not deprive neighboring parcels of these amenities.

The location of the proposed 5 foot high stucco wall in the front yard will not be detrimental to health, safety or public welfare of persons living or working in the neighborhood, or the general public in that the wall is entirely outside of the access right-of-way for South Palisades Avenue and further, will be set back a minimum of 18 inches from the edge of the right-of-way. Currently the much higher one and two story walls of the existing dwelling are developed to within 2 feet of the edge of the right-of-way, with enclosed garages that open up directly to the street. Therefore the impact of the proposed wall and vehicle gate will be significantly less than the existing structure and the wall therefore will not adversly affect the existing line of sight for travellers along South Palisades Avenue.

2. That the proposed location of the project and the conditions under which it would be operated or maintained will be consistent with all pertinent County ordinances and the purpose of the zone district in which the site is located.

The proposed location of the single-family dwelling, with a 5 foot high stucco wall and gate located 18 inches from the edge of the right-of-way for South Palisades Avenue, and the conditions under which it would be operated or maintained, will be consistent with all pertinent County ordinances and the purpose of the R-1-5-PP (Single-family residential, 5,000 square feet – Pleasure Point Combining District) zone district. The primary use of the property will be one single-family dwelling that replaces an existing single-family dwelling with an attached studio apartment/ADU that meets all current site standards for the zone district. The proposed wall and associated landscaping, with the approval of an Over-Height Fence Permit to allow for an increase in the allowed height of the wall within the required front yard from 3 feet to 5 feet, will provide privacy from South Palisades Avenue and will not intensify the conditions that exist at

the site. The wall is therefore allowable with an Over-height Fence Permit under the exceptions to the residential development standards for walls and fences as set out in County Code Section 13.10.525. Further, the project includes the provision of four off-street parking spaces where only two are currently available.

This finding can therefore be made.

3. That the proposed use is consistent with all elements of the County General Plan and with any specific plan which has been adopted for the area.

This finding can be made, in that the proposed residential use is consistent with the use and density requirements specified for the Urban Medium Residential (R-UM) land use designation in the County General Plan.

The proposed single-family dwelling and 5 foot stucco wall in the front yard will not adversely impact the light, solar opportunities, air, and/or open space available to other structures or properties in the area. With the approval of an Over-height Fence Permit to allow an increased height of the wall from 3 feet to 5 feet, the proposed project meets all current site and development standards for the zone district as specified in Policy 8.1.3 (Residential Site and Development Standards Ordinance), in that the proposed replacement single-family dwelling will meet current setbacks for the zone district and neither the house nor the wall will adversely shade adjacent properties.

The proposed replacement home will be properly proportioned to the parcel size and the character of the neighborhood as specified in General Plan Policy 8.6.1 (Maintaining a Relationship Between Structure and Parcel Sizes), in that the proposed single-family dwelling will comply with the site standards for the R-1-5-PP zone district (including setbacks, lot coverage, floor area ratio, height, and number of stories) and will result in a structure consistent with a design that could be approved on any similarly sized lot in the vicinity. The proposed stucco wall and gate is consistent with the location, scale, and design of privacy walls located on other parcels along South Palisades Avenue.

A specific plan has not been adopted for this portion of the County.

4. That the proposed use will not overload utilities and will not generate more than the acceptable level of traffic on the streets in the vicinity.

This finding can be made, in that the proposed single-family dwelling is to be constructed on an existing developed lot and will replace an existing single-family dwelling with an attached studio apartment/ADU. The structure will be built to current building standards that ensure efficient use of energy and therefore the proposed dwelling will not overload utilities. Further, the expected level of traffic generated by the proposed project is expected to be less than was generated by the previous development which consists of both a home and an accessory dwelling unit (ADU) and therefore the new home will not adversely impact existing roads or intersections in the surrounding area. Further, four off-street parking spaces will be provided for the proposed dwelling, two more spaces than currently available for the existing home and ADU, and this increased on-site parking will help alleviate problems caused by parked vehicles within the narrow right-of-way for South Palisades Avenue.

5. That the proposed project will complement and harmonize with the existing and proposed land uses in the vicinity and will be compatible with the physical design aspects, land use intensities, and dwelling unit densities of the neighborhood.

This finding can be made, in that the proposed structure is located in an eclectic neighborhood with a great variety of housing types. The site is surrounded by lots developed to an urban density and the proposed replacement dwelling has been designed in accordance with all site and development standards of the zone district, which have been adopted to ensure that new structures are visually compatible, in scale with and integrated with the character of the surrounding neighborhood. Developed parcels in the area contain both single-family and multi-family dwellings and sizes and architectural styles vary widely. The design submitted is consistent within the existing range of styles, particularly other newer homes. The neighborhood contains many two-story homes and the surrounding structures exhibit many different architectural styles as well as exterior materials and colors. Further, the homes in the area include a variety of roof styles, including both pitched and flat roofs. The proposed stucco wall and gate and associated landscaping will complement and harmonize with the existing and proposed land uses in the vicinity and will be consistent with other walls and fences in the neighborhood. The proposed replacement dwelling and front yard stucco wall will be of a similar size and mass to other home developments in the neighborhood and will be sited, designed and landscaped to be visually compatible and integrated with the character of the surrounding homes and with the natural environment.

6. The proposed development project is consistent with the Design Standards and Guidelines (sections 13.11.070 through 13.11.076), and any other applicable requirements of this chapter.

This finding can be made, in that the proposed single-family dwelling, stucco wall and gate will be of an appropriate scale and type of design that will enhance the aesthetic qualities of the surrounding properties and will not reduce or visually impact available open space in the surrounding area. The proposed project will incorporate site and architectural design features such as increased side setbacks to the second floor and varied wall and roof planes, particularly at the elevations visible from South Palisades Avenue. The dwelling also incorporates a palette of natural colors and materials, a natural colored stone trim, sage colored horizontal wood siding and sandstone colored stucco at the dwelling and the proposed front yard wall, which together with new landscape plantings will reduce the visual impact of the proposed development on surrounding land uses and the natural landscape. The rear of the proposed dwelling will be in-line with other dwellings located both to the east and northwest of the subject parcel along South Palisades Avenue and therefore will not be visually prominent or out of place in views along the coast from either the public viewpoint at the end of Rockview Drive or from the Moran Lake/26th Avenue beach to the northwest.

Conditions of Approval

Exhibit D: 12 sheets, 7 sheets prepared by Stephanie Barnes-Castro, Architect, 5 dated 11/10/16, 1 dated 7/11/16 and 1 undated (neighborhood photos), and 5 sheets prepared by Luke R. Beautz, C.E., L.S., dated 7/5/16.

I. This permit authorizes the demolition of an existing 2,352 square foot residential structure consisting of a single-family dwelling and a studio/accessory dwelling unit with a 252 square foot attached garage, and construction of a 2,384 square foot single-family dwelling with a 225 square foot attached garage and 256 square foot attached carport, and construction of a 5 foot high stucco wall and gate in the front yard. A condition of approval of this permit, addresses implementation of previously authorized maintenance and repair of the existing rip rap revetment that protects this parcel and adjacent properties (CDP 3-83-166). This approval does not confer legal status on any existing structure(s) or existing use(s) on this parcel or associated with the subject property that are not specifically authorized by this permit. Prior to exercising any rights granted by this permit including, without limitation, any construction or site disturbance, the applicant/owner shall:

A. Sign, date, and return to the Planning Department one copy of the approval to indicate acceptance and agreement with the conditions thereof.

B. Obtain a Demolition Permit from the Santa Cruz County Building Official.

C. Obtain a Building Permit from the Santa Cruz County Building Official.

1. Any outstanding balance due to the Planning Department must be paid prior to making a Building Permit application. Applications for Building Permits will not be accepted or processed while there is an outstanding balance due.

D. Obtain a Grading Permit from the Santa Cruz County Building Official.

E. Submit proof that these conditions have been recorded in the official records of the County of Santa Cruz (Office of the County Recorder) within 30 days from the effective date of this permit.

II. Prior to issuance of a Demolition Permit the applicant/owner shall:

A. Obtain a Permit from the County Sanitation District for the abandonment of the existing sewer lateral.

III. Prior to issuance of a Building Permit the applicant/owner shall:

A. Submit final architectural plans for review and approval by the Planning Department. The final plans shall be in substantial compliance with the plans marked Exhibit "D" on file with the Planning Department. Any changes from the approved Exhibit "D" for this development permit on the plans submitted for the Building Permit must be clearly called out and labeled by standard architectural

EXHIBIT C

methods to indicate such changes. Any changes that are not properly called out and labeled will not be authorized by any Building Permit that is issued for the proposed development. The final plans shall include the following additional information:

1. A copy of the text of these conditions of approval incorporated into the full size sheets of the architectural plan set.

2. One elevation shall indicate materials and colors as they were approved by this Discretionary Application.

    i. Please provide three (3) copies of a "Colors and Materials" sheet mounted on an 8.5" X 11" sheet of card or paper (not foam core board).

3. Grading, drainage, and erosion control plans.

4. If the effective FIRM results in a requirement that the dwelling is to be increased in height as compared to the structure depicted on Exhibit D, the following additional requirement shall be met:

    i. The building plans must include a surveyed roof plan based upon the surveyed contour map of the ground surface, superimposed and extended to allow height measurement of all features, to show that no portion of the structure will exceed the maximum height allowed by the zone district. Spot elevations shall be provided at points on the structure that have the greatest difference between ground surface and the highest portion of the structure above.

    ii. Maximum height is 28 feet, and within the 10 foot second story side setback the maximum height is 15 feet.

5. A revised site plan to show that the stucco wall and gate located within the required 20 foot front yard has been relocated a minimum of 18 inches from the edge of the right-of-way for South Palisades Avenue, to allow for the provision of a minimum 18 inch wide planting area adjacent to the street.

6. A detailed Landscape Plan to show all proposed landscaping/planting within yard areas on the parcel, including the planting area outside the front wall. All planting shall be non-invasive, drought tolerant or native species, and within 5 feet of the bluff edge shall include plants that may trail over the edge of the bluff. Proposed landscaping should require the use of only drip or micro spray irrigation systems.

B. Meet all requirements of the Environmental Planning section of the Planning Department as follows:

EXHIBIT C

1. Provide plan review letters from the soils engineer and project geologist that reference the final plans.

2. Building permit plans shall accurately reflect the location of the effective FEMA-designated VE-Zone at the time of building permit issuance.

   Note: Although the proposed residence as currently designated is located outside the mapped VE Zone on the Preliminary FIRM, the mapping is subject to change prior to issuance of the effective FIRM. If the proposed development is out of compliance with the effective FIRM at the time of building permit issuance, Environmental Planning shall not approve the building permit application, even if it is consistent with an approved discretionary permit for the project.

3. All plan sheets submitted for the building application shall reflect the base flood elevation of 30.3 feet (referenced to NAVD 88 datum).

4. The lowest horizontal member of the lowest floor shall be located at or above an elevation of 31.3 feet (referenced to NAVD 88 datum).

5. Plans submitted for the building application shall be designed in conformance with all recommendations provided in the soils and geology reports, and shall reference the reports.

6. Plans submitted for the building application shall conform to ASCE 24.

7. Plans submitted for the building application shall include a civil-engineered stormwater pollution control plan that meets the requirements set forth in the County's Construction Site Stormwater Pollution Control BMP Manual. The Manual may be found on the County of Santa Cruz, Planning Department website at www.sccoplanning.com by navigation to Environmental/Erosion and Stormwater Pollution Control/Construction Site Stormwater BMP Manual.

8. Plans submitted for the building application shall include a drainage plan that complies with the requirements set forth in 2016 California Building Code (CBC) Section 1804.3 and the recommendations of the soils engineer.

   a. The drainage system shall be designed to ensure that no drainage will flow over the coastal bluff. The drainage system (including water from landscaping and irrigation) shall not contribute to coastal bluff erosion. Furthermore, all drainage system components shall be maintained in good working order for the life of the project.

9. All decks, stairs, etc. within the 25'/100-year coastal bluff setback are required to be structurally detached from the new home and not require a building permit.

EXHIBIT C

10. A "Notice of Geologic and Coastal Hazards, Acceptance of Risk, and Liability Release" shall be recorded on the parcel with the format and content of that document to be reviewed and accepted by the County of Santa Cruz prior to recordation. The Notice will provide for property owner (and all successors and assigns) agreement to an acknowledgement of coastal and geologic hazards, an acceptance of and assumption of risk, a waiver of liability against the County, and an indemnification of the County; the final language of such provisions will be consistent with the following:

    a. Coastal Hazards. That the site is subject to coastal hazards including but not limited to episodic and long-term shoreline retreat and coastal erosion, high seas, ocean waves, storms, tsunami, tidal scour, coastal flooding, liquefaction and the interaction of same;

    b. Flood Insurance. If the structure is built so that it does not comply with the effective BFE data as shown on the final Flood Insurance Rate Map (FIRM), that the structure may be subject to a higher flood insurance rating, likely resulting in higher-risk annual flood insurance premium if the property owner purchases flood insurance (voluntarily, or as required by mortgage lenders).

    c. Assume and Accept Risks. To assume and accept the risks to the Applicant and the properties that are the subject of this CDP of injury and damage from such coastal and geologic hazards in connection with the permitted development;

    d. Waive Liability. To unconditionally waive any claim of damage or liability against the County, its officers, agents, and employees for injury or damage from such coastal and geologic hazards;

    e. Indemnification. To indemnify and hold harmless the County, its officers, agents, and employees with respect to the County's approval of the development against any and all liability, claims, demands, damages, costs (including costs and fees incurred in defense of such claims), expenses, and amounts paid in settlement arising from any injury or damage due to such coastal and geologic hazards; and

    f. Property Owner Responsible. That any adverse effects to property caused by the permitted development shall be fully the responsibility of the property owner.

11. Submit the following additional information:

    a. Two copies of the soils report/wave run-up analysis and any updates;

b. Two copies of the geology report and any updates;

c. A plan review form, based on final revised plans, signed and stamped by the soils engineer;

d. A plan review form, based on final revised plans, signed and stamped by the project geologist;

e. A copy of the recorded Notice of Geologic and Coastal Hazards, Acceptance of Risk, and Liability Release; and

f. A completed V-Zone Certificate.

C. In accordance with the provisions of Coastal Development Permit for the seawall and rip rap revetment (Permit# 3-83-166, issued by the California Coastal Commission September 15, 1983), meet the following additional requirements of the County Geologist:

1. Prepare a report, including a Recovery Plan for the maintenance and repair of the existing approved rip rap revetment.

a. The coastal engineering/geotechnical engineer and engineering geologist shall identify any rock that has dislodged from the revetment since the construction of the existing shoreline protection structure, and provide the County with a report that identifies the dislodged rock and specifies the procedure for recovering and restacking the rock in an appropriate manner. The extent of rock to be restacked will be guided by principles of protecting the homesite and adjacent properties consistent with the original objective of the rock revetment, and that the least amount of rock should be restacked while still meeting appropriate engineering and building standards.

b. The report shall address the disposition of any rock that is not needed, in order to meet a performance standard that clears the beach of migrated rock with the only rock remaining being that necessary for the repaired shoreline protection structure.

c. The report must include a procedure for rock replacement that provides for the least disturbance of the beach and shoreline.

d. The report shall include a Recovery Plan prepared by the coastal engineer/geotechnical engineer that identifies the rock recovery, phasing and construction Best Management Practices.

e. The report and Recovery Plan shall be submitted to the County of Santa Cruz Planning Department with appropriate fees for report review and for the application for a grading permit to carry out the Recovery Plan.

EXHIBIT C

f. The report and Recovery Plan must be reviewed and accepted and the grading permit must be issued either prior to or concurrent with the Building Permit for the home.

g. The Recovery Plan must be prepared in accordance with Section 7.79 of the Santa Cruz County Code.

h. Any rock that is ultimately taken off the beach but not restacked and relocated to repair and maintain the revetment, shall be taken and/or used in an appropriate location, with permits as may be needed.

2. Best Management Practices for the maintenance and repair of the revetment must address potential impacts to sensitive species and environmental resources that may occur during the rock recovery as follows:

a. The applicant shall retain the services of a qualified biologist or environmental resources specialist with appropriate qualifications acceptable to the Planning Director to conduct sensitive species surveys prior to any maintenance activities.

b. The results of the survey shall be submitted to the County of Santa Cruz Planning Department in a written report for review and acceptance. Any areas of avoidance or special concern shall be shown on a copy of the approved rock recovery, phasing and construction Best Management Practices plan.

3. Best Management Practices for construction during maintenance and repair activities must include but are not limited to:

a. No machinery or mechanized equipment shall be allowed at any time within the active surf zone, except for that necessary to remove any errant rocks from the beach seaward of the revetment.

b. All maintenance materials and equipment shall be removed in their entirety from the beach area by sunset each day that work occurs.

c. Any and all debris resulting from maintenance activities shall be appropriately removed from the project site within 24 hours.

d. Equipment shall not be cleaned on the beach or in the adjacent beach parking areas.

e. Any unsafe debris or other materials that may become exposed on the revetment or the beach in the area of the revetment shall be removed and exported to an appropriate offsite disposal area in order to protect public health and safety and coastal resources.

D. Meet all requirements of and pay Zone 5 drainage fees to the County Department of Public Works, Stormwater Management. Drainage fees will be assessed on the net increase in impervious area.

1. Provide a cross section construction detail for the proposed paver blocks to facilitate proper construction by the contractor.

2. Record a maintenance agreement for the proposed water quality treatment units. Please contact the County of Santa Cruz Recorder's office for appropriate recording procedure. The maintenance agreement form can be picked up from the Public Works office or can be found online at: http://www.dpw.co.santa-cruz.ca.us/Storm_Water/FigureSWM25A.pdf

3. For fee calculations please provide tabulation of new impervious and semi-impervious (gravel, base rock, paver blocks, pervious pavement) areas resulting from the proposed project. Make clear on the plans by shading or hatching the limits of both the existing and new impervious areas. To receive credit for the existing impervious surfaces to be removed please provide documentation such as assessor's records, survey records, aerial photos or other official records that will help establish and determine the dates they were built.

   Note: A drainage fee will be assessed on the net increase in impervious area. The fees are currently $1.14 per square foot, and are subject to increase based on the fee amount applicable at the time of permit issuance. Reduced fees (50%) are assessed for semi-pervious surfacing (such as gravel, base rock, paver blocks, porous pavement, etc.) to offset costs and encourage more extensive use of these materials.

4. Upon approval of the project, a drainage "Hold" will be placed on the permit and will be cleared once the construction is complete and the stormwater management improvements are constructed per the approved plans: In order to clear the Hold, one of these options has to be exercised:

   a. The civil engineer must inspect the drainage improvements on the parcel and provide public works with a letter confirming that the work was completed per the plans. The civil engineer's letter shall be specific as to what got inspected whether invert elevations, pipe sizing, the size of the mitigation features and all the relevant design features. Notes of "general conformance to plans" are not sufficient.

   b. As-built plans stamped by the civil engineer may be submitted in lieu of the letter. The as-built stamp shall be placed on each sheet of the plans where stormwater management improvements were shown.

c. The civil engineer may review as-built plans completed by the contractor and provide the county with an approval letter of those plans, in lieu of the above two options. The contractor installing the drainage improvements will provide the civil engineer as-built drawings of the drainage system, including construction materials, invert elevations, pipe sizing and any modifications to the horizontal or vertical alignment of the system. The as-built drawings, for each sheet showing drainage improvements and/or their construction details, must be identified with the stamp (or label affixed to the plan) stating the contractor's name, address, license and phone number. The civil engineer will review the as-built plans for conformance with the design drawings. Upon satisfaction of the civil engineer that the as-built plans meet the design intent and are adequate in detail, the civil engineer shall submit the as-built plans and a review letter, stamped by the civil engineer to the County Public Works Department for review to process the clearance of the drainage Hold, if the submittal is satisfactory.

E. Meet all plan submittal requirements of the County Sanitation District as follows:

1. Revise the note on sheet C2 to read as follows:

"A sewer lateral abandonment permit shall be obtained from the Santa Cruz County Sanitation District, and the lateral shall be abandoned per figure SS-15 of the Santa Cruz County Design Criteria. Prior to demolition work, the contractor shall locate and cap the existing sewer lateral and then call for a sewer lateral abandonment inspection. If a new lateral is necessary it shall be installed per figure SS-12 of the Santa Cruz County Design Criteria."

F. Meet all requirements and pay any applicable plan check fee of the Central Fire Protection District.

G. Submit proof that a full set of building permit plans has been submitted directly to the Santa Cruz Water Engineering Division for further review to determine water permit fees and water/fire service requirements for this proposed project. The project shall be designed to incorporate water efficient plumbing fixtures and appliances as well as a water efficient landscaping.

H. Provide information from the Assessor's Office to confirm the number of existing bedrooms on the parcel in the existing dwelling and studio/accessory dwelling unit. If the proposed replacement dwelling will result in an increase in the number of bedrooms, then the owner will be required to pay the current fees for Parks and Child Care mitigation. Currently, these fees are, respectively, $1,000 and $109 per bedroom.

I. Provide required off-street parking for 4 cars. Parking spaces must be 8.5 feet wide by 18 feet long and must be located entirely outside vehicular rights-of way. Parking must be clearly designated on the plot plan.

J. Submit a written statement signed by an authorized representative of the school district in which the project is located confirming payment in full of all applicable developer fees and other requirements lawfully imposed by the school district.

IV. All construction shall be performed according to the approved plans for the Building Permit. Prior to final building inspection, the applicant/owner must meet the following conditions:

A. All site improvements shown on the final approved Building Permit plans for the replacement dwelling shall be installed.

B. All inspections required by the building permit shall be completed to the satisfaction of the County Building Official.

C. Prior to building permit final, the applicant shall submit:

a. A completed Elevation Certificate, based on finished construction;

b. Final inspection forms from the geotechnical engineer, engineering geologist, and civil engineer; and

c. A completed Final V-Zone Certificate.

D. All construction shall be completed in compliance with all recommendations provided in the soils and geology reports.

E. The project shall comply with the requirements set forth in the technical report acceptance letter prepared by Joe Hanna, County Geologist, dated 12/9/2015. However, the required "Declaration of Geologic Hazards" has been superseded by the "Notice of Geologic and Coastal Hazards, Acceptance of Risk, and Liability Release" referenced in III. B. 10, above. This document will be provided at the time of building permit application review.

F. Development within the 25'/100-year coastal bluff geologic setback is prohibited.

G. All repairs and maintenance of the rip rap revetment shall be performed according to the approved report and Recovery Plan and Best Management Practices. Prior to final building inspection of the replacement dwelling, the applicant/owner must meet the following conditions:

1. Within three years of issuance of the building permit for the home, and under direction of the coastal engineering/geotechnical engineer, permittee shall recover dislodged revetment rock and shall restack an appropriate amount in compliance with the original revetment permit and the grading

permit which implements the Recovery Plan, and shall take off-site any rock that is excess to the repair and maintenance objective.

A HOLD will be placed on the final permit sign-off for the home until the Recovery Plan is implemented and accepted by the County. Subject to approval of the Planning Director, the three-year period may be extended, and the homeowners may occupy the home prior to removal of the HOLD, upon a determination(s) that good faith efforts are being made to recover and restack the rock, but seasonal conditions or other constraints preclude completion of the work within the three-year timeframe and/or by the time the home is ready for occupancy.

2. Prior to the commencement of the rock recovery, a preconstruction meeting must be held that includes the owner's representatives, the geotechnical engineer, engineering geologist, the Contractor , the qualified biologist or environmental resources specialist, the County Project Planner, and County Civil Engineer. The meeting must discuss all phases of the project, and the contractor shall present a public safety plan that identifies, in writing and on the Recovery Plan, the measures necessary to protect the public and avoid sensitive species.

3. The coastal engineering/geotechnical engineer and/or engineering geologist, or a QSP/QSD employed by the same, must be present during the entire rock recovery operation. The recovery effort shall be documented on the Recovery Plan. At the completion of the work a final letter from the coastal engineering/geotechnical engineer and engineering geologist must be submitted to the County. The letter shall be accompanied by a copy of Recovery Plan that documents that the rock recovery has been completed in compliance with the Recovery Plan.

H. Pursuant to Sections 16.40.040 and 16.42.080 of the County Code, if at any time during site preparation, excavation, or other ground disturbance associated with this development, any artifact or other evidence of an historic archaeological resource or a Native American cultural site is discovered, the responsible persons shall immediately cease and desist from all further site excavation and notify the Sheriff-Coroner if the discovery contains human remains, or the Planning Director if the discovery contains no human remains. The procedures established in Sections 16.40.040 and 16.42.080 shall be observed.

V. Coastal Hazards Response Alternatives. By acceptance of this permit, the applicant/ property owner(s) acknowledges and agrees, on behalf of itself and all successors and assigns, that:

A. The approved single family home replacement project will be constructed and may be used consistent with the terms and conditions of this permit for only as long as the approved development remains safe for occupancy and use. If coastal hazards result in an unsafe site or unsafe structure, the property owner agrees to abate or address dangerous conditions in accordance with County regulations

EXHIBIT C

and/or Orders of the Chief Building Official and these Conditions of Project Approval. If all or any portion of improvements are deemed uninhabitable, the property owner agrees to remove the improvements and restore the affected area, unless an alternative response involving a shoreline protection structure is proposed by the property owner and approved by the County of Santa Cruz, and also by the California Coastal Commission if the project location is within the Coastal Commission's primary jurisdiction. Alternative responses to coastal hazards may include (1) pursuit of an Emergency Coastal Development Permit consistent with County Code regulations in Chapter 13.20 (Coastal Zone Regulations) and Chapter 16.10 (Geologic Hazards); and/or (2) pursuit of an Urbanized Area Beach and Bluff Management Strategy pursuant to Condition IV.C below.

B. Requirement for Geotechnical and Coastal Hazards Reports: 10-foot Trigger. In the event that in the future the blufftop edge recedes to within 10 feet of the single family dwelling, the property owner shall undertake the following activities to determine whether selection and pursuit of a Coastal Hazards Response Alternative is required:

1. Notify the Santa Cruz County Geologist, and

2. Retain a licensed geologist or civil engineer with experience in coastal processes and hazard response to prepare a geotechnical investigation and Coastal Hazards Report that addresses whether all or any portions of the residence and related development are threatened by coastal hazards, and that identifies actions that should be taken to ensure safe use and occupancy, which may include removal or relocation of all or portions of the threatened development and improvements, or other alternate response(s).

3. Agree to undertake activities to pursue an appropriate Coastal Hazards Response consistent with these Conditions of Approval and in accordance with adopted and applicable County of Santa Cruz and California Coastal Commission regulations. The geotechnical investigation and Coastal Hazards Report shall be submitted to the Executive Director of the California Coastal Commission, and to the Planning Director, Chief Building Official and County Geologist of Santa Cruz County. If the residence or any portion of the residence is proposed to be removed, the Applicant shall submit a Removal and Restoration Plan (see Condition IV.D below).

C. Urbanized Area Beach and Bluff Management Strategy Alternative.

1. The property owner agrees and acknowledges that the existing coastal shoreline protection/armoring structures may be maintained in accordance with conditions of approval of Permits authorizing the structures.

EXHIBIT C

2. The property owner and /or any future heirs or assigns further acknowledge and agree that any future shoreline protection/armoring structure (including but not limited to seawalls, revetments, retaining walls, tie backs, caissons, piers, groins, etc.), that exceeds previously authorized maintenance of the existing structures, will only be considered for approval if proposed as part of a comprehensive and unified Urbanized Area Beach and Bluff Management Strategy, such as a unified project design that is implemented through a Geologic Hazard Abatement District (GHAD) to address South Palisades Avenue (or related unit thereof) coastal bluff properties and coastal resources that exist in this urbanized area. Such strategy may allow for phased implementation within sub-areas. The Strategy would be required to address potential loss of beach areas, potential opportunities to improve public access to the coast, protection of visual resources, and protection of public infrastructure in response to sea level rise.

3. The property owner and / or any future heirs or assigns, by accepting this permit, agree not to protest the formation of any Geologic Hazard Abatement District (GHAD) that is proposed, either by the County or other private entity, to address South Palisades Avenue (or related unit thereof) coastal bluff properties and coastal resources that exist in this urbanized area.

D. Removal and Restoration. If an appropriate government agency so orders, or as a result of the above-referenced geotechnical investigation and Coastal Hazards Report, it is determined that any portion of the approved development will be proposed for removal due to coastal hazards, the Applicant shall, prior to removal, submit two copies of a Removal and Restoration Plan to the County of Santa Cruz Planning Director for review and approval. No removal activities shall commence until the Removal and Restoration Plan and all other required plans and permits are approved. If the Director determines that an amendment to this permit or separate grading and coastal development permits are legally required in order to authorize the activities, the Applicant shall as soon as immediately feasible submit the required application, including all necessary supporting information to ensure it is complete. The Removal and Restoration Plan shall clearly describe the manner in which such development is to be removed and the affected area restored so as to best protect coastal resources, and shall be implemented immediately upon Director approval, or County approval of the permit application, if necessary.

VI. Operational Conditions

A. In the event that future County inspections of the subject property disclose noncompliance with any Conditions of this approval or any violation of the County Code, the owner shall pay to the County the full cost of such County inspections, including any follow-up inspections and/or necessary enforcement actions, up to and including permit revocation.

EXHIBIT C

B. All development as defined in County Code section 16.10.040, including that which is cantilevered, is prohibited within the 25'/100-year coastal bluff setback.

C. Once constructed , no changes to the dwelling as approved by this permit (such as enclosing open areas under building projections) or any revised landscaping within 50 feet of the top of the coastal bluff, shall be allowed without first obtaining an Amendment to this Coastal Development Permit in accordance with the provisions of Chapter 18.10 of the County Code.

D. Subsequent to the initial recovery effort the applicant shall have the rip rap revetment routinely inspected (at least once every 5 years) by the coastal engineering/geotechnical engineer and/or engineering geologist and shall comply with the conditions of this permit concerning revetment rock recovery *mutatis mutandis*. A copy of a report for each inspection shall be submitted to the County Planning Department and the California Coastal Commission to confirm the inspection.

VII. As a condition of this development approval, the holder of this development approval ("Development Approval Holder"), is required to defend, indemnify, and hold harmless the COUNTY, its officers, employees, and agents, from and against any claim (including attorneys' fees), against the COUNTY, it officers, employees, and agents to attack, set aside, void, or annul this development approval of the COUNTY or any subsequent amendment of this development approval which is requested by the Development Approval Holder.

A. COUNTY shall promptly notify the Development Approval Holder of any claim, action, or proceeding against which the COUNTY seeks to be defended, indemnified, or held harmless. COUNTY shall cooperate fully in such defense. If COUNTY fails to notify the Development Approval Holder within sixty (60) days of any such claim, action, or proceeding, or fails to cooperate fully in the defense thereof, the Development Approval Holder shall not thereafter be responsible to defend, indemnify, or hold harmless the COUNTY if such failure to notify or cooperate was significantly prejudicial to the Development Approval Holder.

B. Nothing contained herein shall prohibit the COUNTY from participating in the defense of any claim, action, or proceeding if both of the following occur:

1. COUNTY bears its own attorney's fees and costs; and

2. COUNTY defends the action in good faith.

C. Settlement. The Development Approval Holder shall not be required to pay or perform any settlement unless such Development Approval Holder has approved the settlement. When representing the County, the Development Approval Holder shall not enter into any stipulation or settlement modifying or affecting the interpretation or validity of any of the terms or conditions of the development approval without the prior written consent of the County.

EXHIBIT C

D. Successors Bound. "Development Approval Holder" shall include the applicant and the successor'(s) in interest, transferee(s), and assign(s) of the applicant.

Minor variations to this permit which do not affect the overall concept or density may be approved by the Planning Director at the request of the applicant or staff in accordance with Chapter 18.10 of the County Code.

Please note: This permit expires three years from the effective date listed below unless a building permit (or permits) is obtained for the primary structure described in the development permit (does not include demolition, temporary power pole or other site preparation permits, or accessory structures unless these are the primary subject of the development permit). Failure to exercise the building permit and to complete all of the construction under the building permit, resulting in the expiration of the building permit, will void the development permit, unless there are special circumstances as determined by the Planning Director.

Approval Date: _____

Effective Date: _____

Expiration Date: _____

Wanda Williams Deputy Zoning Administrator	Lezanne Jeffs Project Planner

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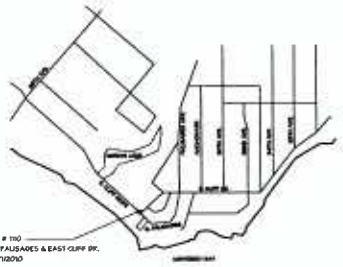
Appeals: Any property owner, or other person aggrieved, or any other person whose interests are adversely affected by any act or determination of the Zoning Administrator, may appeal the act or determination to the Planning Commission in accordance with chapter 18.10 of the Santa Cruz County Code.

EXHIBIT C



NORTH

VICINITY MAP

PROJECT CONTACTS

OWNER:	JULIE & ALAN LOWE 2181 LAS TRAMPAS ROAD ALAMO, CA 94507 (925)820-1151
ARCHITECT:	STEPHANIE BARNES- CASTRO 849 ALMAR AVENUE, #C212 SANTA CRUZ, CA 95060 (831) 426-8050 sbc@sbcarch.com
GEOTECHNICAL ENGINEER:	ROCK SOLID ENGINEERING 900 MAIN STREET, SUITE A WATSONVILLE, CA 95076 (831) 724-5860 rocksolid@cruzio.com
GEOLOGIST:	EASTON GEOLOGY P.O. BOX 3633 SANTA CRUZ, CA 95063 (831)247-4387 geologist.easton@gmail.com
CIVIL ENGINEER:	LUKE BEAUTZ, C.E., L.S. (831)475-8686 beautz@sbcglobal.net

SHEET INDEX

PROJECT DATA

APN:	028-304-55
SITE ADDRESS:	2564 S. PALISADES AVENUE SANTA CRUZ, CA 95062
ZONE:	R-1-6 PP
OCCUPANCY:	R-3/U
TYPE OF CONSTRUCTION:	VB, SPRINKLERED
PROJECT DESCRIPTION:	NEW 4 BEDROOM, 4 BATH 2 STORY SINGLE FAMILY RESIDENCE. DEMOLISH (E) 3 BEDRM, 2 BATH SINGLE FAMILY HOME W/ ATTACHED 1 ROOM, 1 BATH STUDIO.

SQUARE FOOTAGES:

TOTAL PARCEL AREA:	5,300 SQ. FT.
(E) RESIDENCE TO BE REMOVED:	2,952 SQ. FT. (DOWNSTAIRS) 252 SQ. FT. (GARAGE)

PROPOSED SQUARE FOOTAGE:

MAXIMUM ALLOWABLE LOT COVERAGE:
5,300 SQ. FT. (TOTAL PARCEL AREA) MINUS 530 SQ. FT. (RIGHT-OF-WAY)= 4,770 SQ. FT. X 40%= 1,908 SQ. FT.

PROPOSED LOT COVERAGE:
PROPOSED LOWER LEVEL FOOTPRINT (INCLUDING GARAGE, CARPORT, COVERED SIDE YARD PATIO & OUTDOOR COVERED SHOWER): 1,603 SQ. FT.

MAXIMUM ALLOWABLE F.A.R.:
4,770 SQ. FT. X .5= **2,385 SQ. FT.**

PROPOSED F.A.R.:
PROPOSED LOWER LEVEL: 1,365 SQ. FT.
PROPOSED UPPER LEVEL: 1,018 SQ. FT.
TOTAL: 2,384 SQ. FT.

IMPERVIOUS AREA:
REFER TO IMPERVIOUS AREA CALCULATIONS ON SHEET C1 BY LUKE BEAUTZ, S.E.

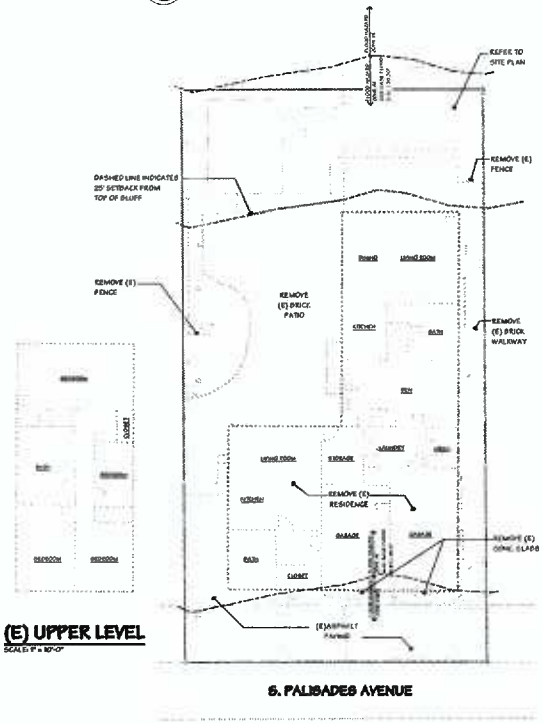
PRELIMINARY PLANT LIST

NOTE:
ALL TREES ARE TO BE 15 GALLON UNLESS NOTED OTHERWISE. ALL SHRUBS ARE TO BE 5 GALLON UNLESS NOTED OTHERWISE. AUTOMATICALLY TIMED IRRIGATION SYSTEM CONSISTING OF DRIP AND POP COMPONENTS WILL BE USED.

Acacia vestita	
Agave	Blue Flame, Attenuata, Willdemaniana
Angiocanthos 'Big Red'	Kangaroo Paw
Beschorneria yuccoides	
Bougainvillea 'spectabilis'	
Carex tumicicola	Berkeley Sedge
Dianella tasmanica variegata	Flax Lily
Distictis buccinatoria	Red trumpet vine
Euphorbia myrtinoides	
Furcrea roezlii	
Helictotrichon sempervirens	Blue Oat Grass
Lonicera 'Brecte'	
Melianthus major	Honey Bush
Origanum 'Kent Beauty'	Ornamental Oregano
Phormium	New Zealand Flax
Strelitzia nicolai	Giant Bird of Paradise
Succulents	Aeonium, Aloe, Echeveria, Sedum
Thamnochortus insignis	Thatching Reed

FIRE PROTECTION NOTES

1. THESE PLANS SHALL COMPLY WITH CALIFORNIA BUILDING AND FIRE CODES (CURRENT EDITION) AND DISTRICT AMENDMENTS.
2. OCCUPANCY CLASSIFICATION: R-3/U
   BUILDING CONSTRUCTION TYPE: TYPE VB
   FIRE RATING: SPRINKLERED
3. A 30 FOOT CLEARANCE SHALL BE MAINTAINED TO FLAMMABLE VEGETATION AROUND ALL STRUCTURES. SINGLE SPECIMENS OF TREES, ORNAMENTAL SHRUBBERY, OR SIMILAR PLANTS USED AS GROUND COVER, PROVIDED THEY DO NOT FORM A MEANS OF RAPIDLY TRANSMITTING FIRE FROM NATIVE GROWTH TO ANY STRUCTURES, ARE EXEMPT.
4. THE ROOF COVERING SHALL NOT BE LESS THAN CLASS 'B' RATED ROOF.
5. 4 INCH HIGH ADDRESS NUMBERS OF CONTRASTING COLOR WITH BACKGROUND SHALL BE PROVIDED.
6. THE JOB COPIES OF THE BUILDING PLANS AND PERMITS MUST BE ON SITE DURING INSPECTIONS.
7. THE BUILDING SHALL BE PROTECTED BY AN APPROVED AUTOMATIC FIRE SPRINKLER SYSTEM COMPLYING WITH THE CURRENTLY ADOPTED EDITION OF NFPA 13D IN CHAPTER 35 OF THE CALIFORNIA BUILDING CODE.
8. THE DESIGNER/INSTALLER SHALL SUBMIT THREE SETS OF PLANS AND CALCULATIONS FOR THE UNDERGROUND AND OVERHEAD RESIDENTIAL AUTOMATIC FIRE SPRINKLER SYSTEM TO THIS AGENCY FOR APPROVAL.

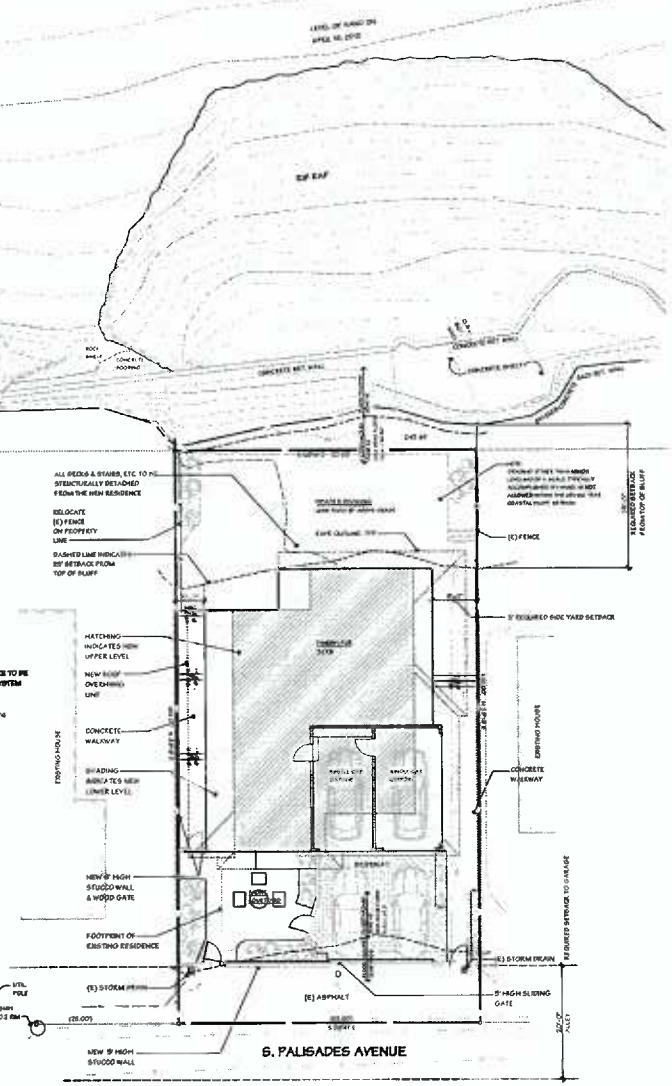


(E) UPPER LEVEL

SCALE: 1" = 10'-0"

(E) SITE PLAN/ (E) LOWER FLOOR PLAN

SCALE: 1" = 10'-0"



PROPOSED SITE PLAN/ LANDSCAPE PLAN

SCALE: 1" = 10'-0"

GENERAL LANDSCAPING NOTE:
ANY PROPOSE LANDSCAPING SHOULD REQUIRE THE USE OF ONLY DRIP OR MICRO SPRAY IRRIGATION SYSTEMS IN ADDITION TO THE USE OF ONLY DROUGHT TOLERANT, NON-INVASIVE PLANTS.
IN ADDITION, THE PROJECT SHOULD INCORPORATE WATER EFFICIENT PLUMBING FIXTURES AND APPLIANCES.

EXHIBIT D

849 Almar Ave, Ste. C212
Santa Cruz, CA 95060
Ph: (831) 426-8050
Fax: (831) 426-8055
Email: sbc@sbcarch.com

STEPHANIE BARNES-CASTRO
ARCHITECT

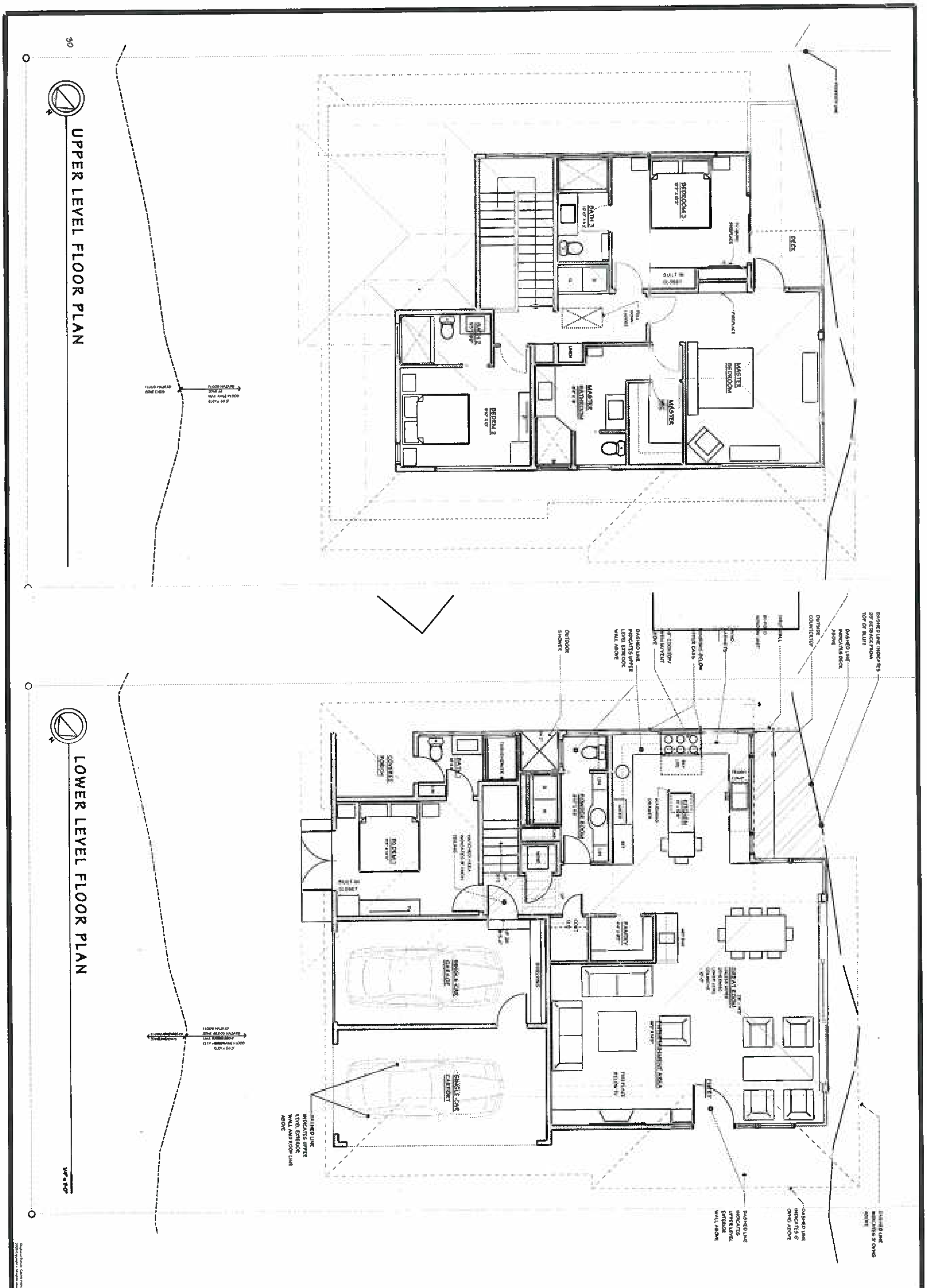
SITE PLAN & PROJECT DATA

31

LOWE RESIDENCE
2564 S Palisades Ave
Santa Cruz, CA 95062
APN# 028-304-55

SUBMITTAL DATE
INITIAL SUBMITTAL DATE: 3/15/14
1 DATE 6/20/14 RESPONSE
2 DATE 8/7/14 RESPONSE
3 DATE 11/10/14 RESPONSE

SHEET **A1**



SHEET	SUBMITTAL DATE
A2	

LOWE RESIDENCE
2864 S Palisades Ave
Santa Cruz, CA 95062
APN# #028-304-55

LOWER LEVEL
& UPPER LEVEL
FLOOR PLANS

S T E P H A N I E
B A R N E S - C A S T R O
A R C H I T E C T

EXHIBIT D

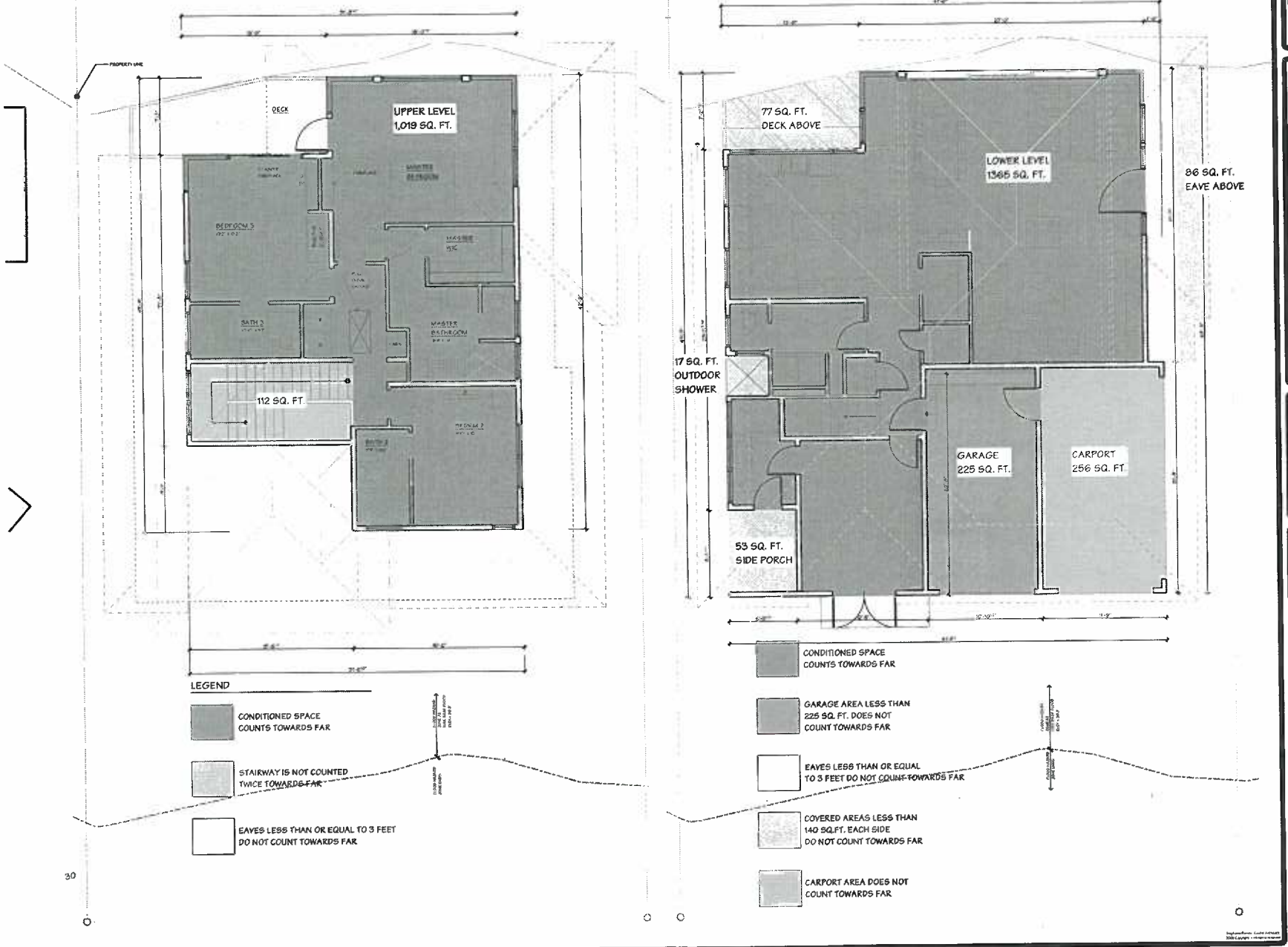


EXHIBIT D

33

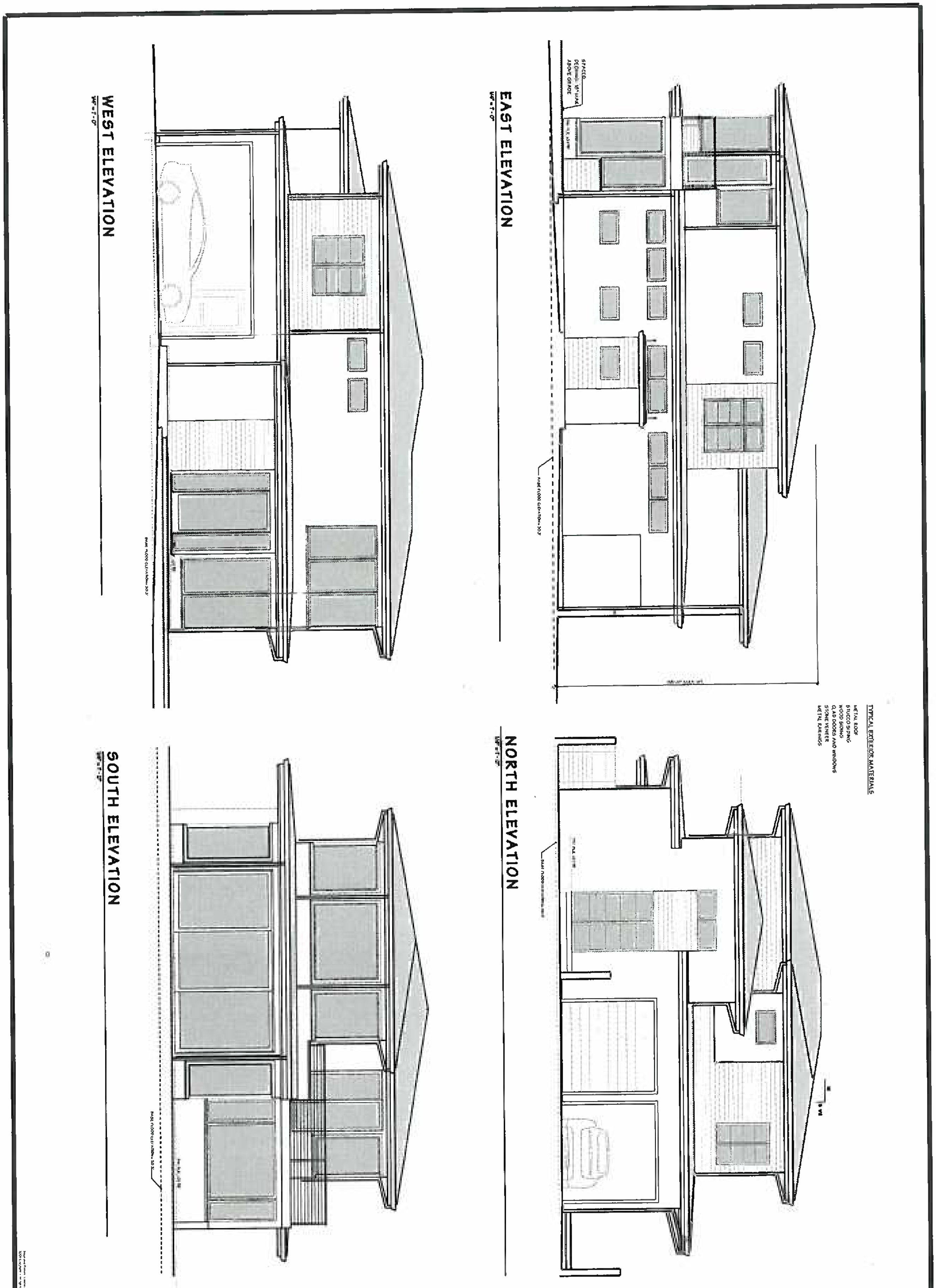
STEPHANIE BARNES-CASTRO ARCHITECT

LOWE RESIDENCE
2664 B Palisades Ave
Santa Cruz, CA 95062
APN# 028-304-06

SUBMITTAL DATE
10/07 REVISION
6/5/14 REVISION
4/7/16 REVISION
7/19/16 REVISION

SHEET A2A

30



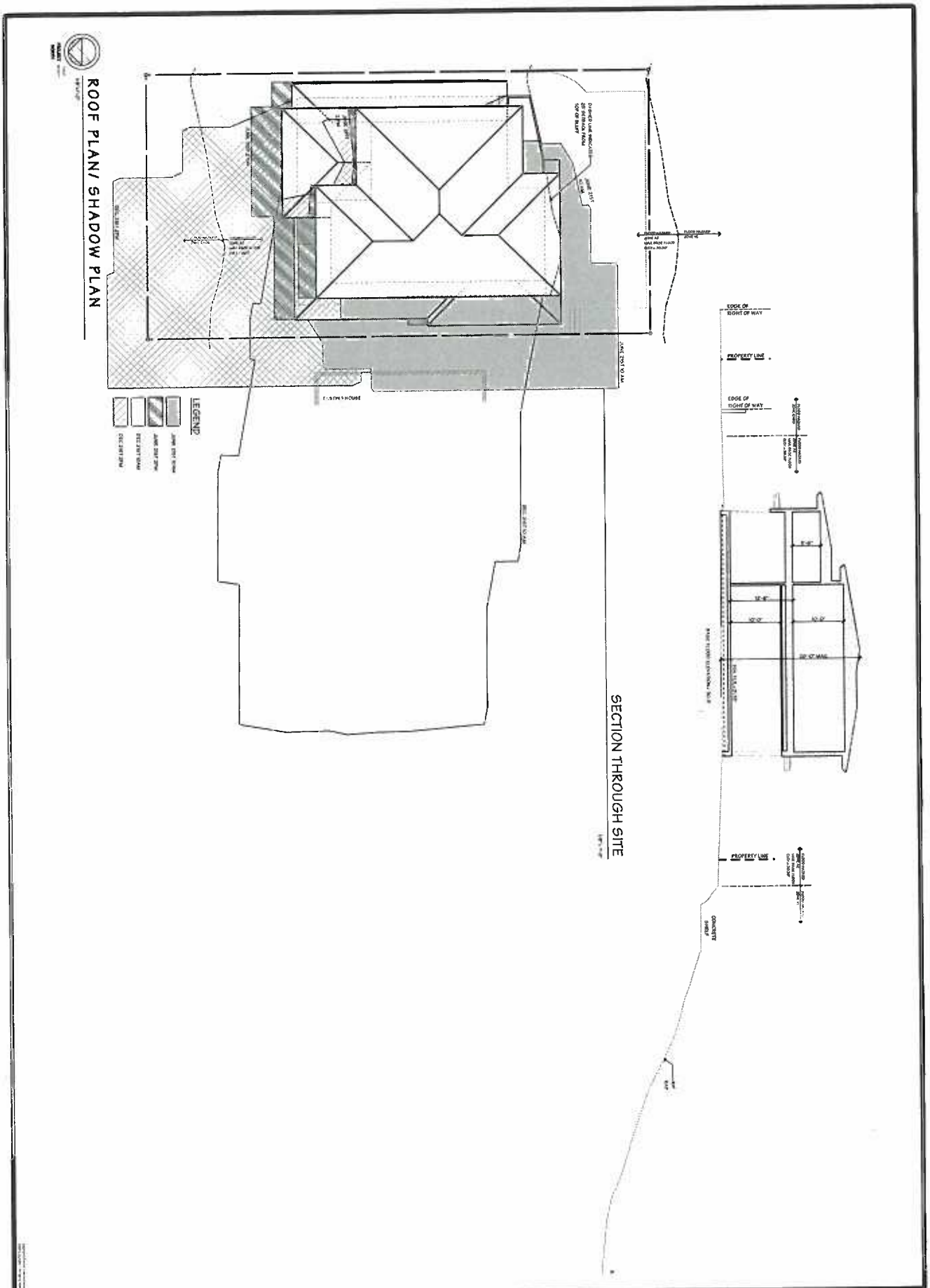
SHEET A3

LOWE RESIDENCE
2864 S Palisades Ave
Santa Cruz, CA 95062
APN# #028-304-55

EXTERIOR ELEVATIONS

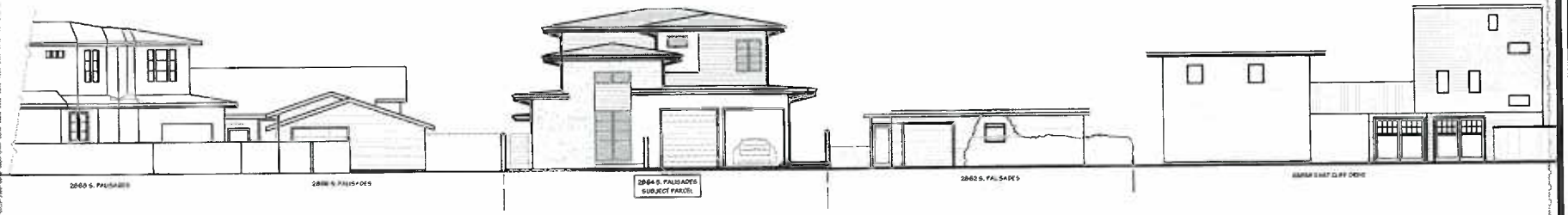
STEPHANIE BARNES-CASTRO
ARCHITECT

EXHIBIT D



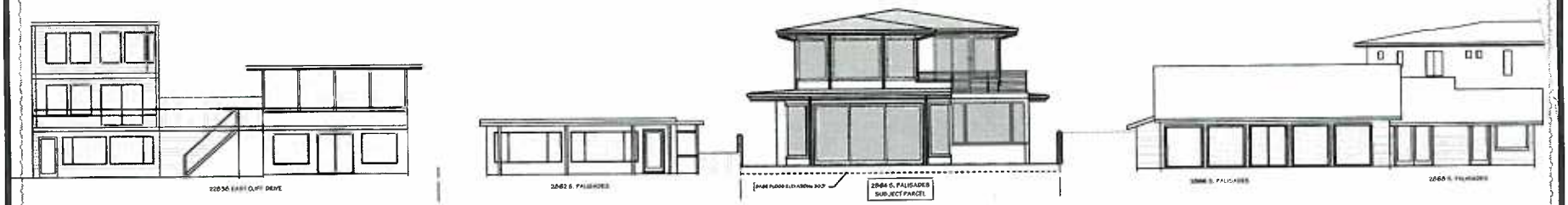
SHEET A4	LOWE RESIDENCE 2564 S Palisades Ave Santa Cruz, CA 95062 APN# #028-304-55	SITE SECTION ROOF PLAN SHADOW PLAN	STEPHANIE BARNES-CASTRO ARCHITECT

EXHIBIT D



STREETSCAPE FROM S. PALISADES AVENUE

3/8" = 1'-0"



ELEVATION FROM BEACH

3/8" = 1'-0"

STEPHANIE BARNES-CASTRO ARCHITECT

STREETSCAPE & BEACH ELEVATION

36

LOWE RESIDENCE
2864 S Palisades Ave
Santa Cruz, CA 95062
APN# #026-304-55

SUBMITTAL DATE
2/8/19

1	DATE	DESCRIPTION
2	6/5/19	PLAN CHECK
3	7/7/19	REVISION
4	1-1-20	REVISION

SHEET
A5

EXHIBIT D

3 ROCKVIEW

1 ROCKVIEW

2870 S. PALISADES

2868 S. PALISADES

2866 S. PALISADES

2864 S. PALISADES
SUBJECT PARCEL

2862 S. PALISADES

22838 EAST CLIFF

22834 EAST CLIFF

22830 EAST CLIFF

22826 EAST CLIFF

NEIGHBORHOOD PHOTOS- SAME SIDE OF STREET

2800 CHESTERIELD

2861 S. PALISADES

2865 S. PALISADES

2866 CHESTERFIELD

2868 CHESTERFIELD

2870 CHESTERFIELD

2872 CHESTERFIELD

2874 CHESTERFIELD

2876 CHESTERFIELD

2878 CHESTERFIELD

NEIGHBORHOOD PHOTOS- OPPOSITE SIDE OF STREET

STEPHANIE BARNES-CASTRO
ARCHITECT

NEIGHBORHOOD PHOTOS
37

LOWE RESIDENCE
2864 S Palisades Ave
Santa Cruz, CA 96062
APN# #028-304-56

SUBMITTAL DATE
DATE REVISION

SHEET A6 OF SHEETS

GENERAL NOTES

1. All construction shall comply with applicable requirements in the current edition of the Santa Cruz County Design Criteria.
2. No changes in the approved plans shall be made without prior approval by the Santa Cruz County Planning Department.
3. The Director of Planning, or his authorized representative, shall have the authority to stop work if the work is not being done in accordance with the approved Improvement Plans.
4. The contractor shall notify the Santa Cruz County Planning Department (454-2580 or 454-2077) at least 24 hours prior to the start of construction.
5. All drainage inlets are to be precast concrete Christy boxes, model as indicated on plan, or equivalent.
6. All storm drain material to be SDR 35 PVC.
7. The top 12" of subgrade under all surfaces subjected to vehicular traffic shall be overexcavated and recompacted in accordance with the recommendations of the project geotechnical report.
8. All construction shall be in accordance with the recommendations of the Geotechnical Investigation prepared for the site by Rock Solid Engineering Inc., Project No. 13009, dated October 14, 2013.
9. All construction shall be in accordance with the recommendations of the Geologic Investigation prepared for the site by Easton Geology, Project No. C13006.

ABBREVIATIONS

AB	AGGREGATE BASE	FS	FINISHED SURFACE
AC	ASPHALT CONCRETE	INV	INVERT
AGG	AGGREGATE	LF	LINEAR FEET
BOT	BOTTOM	R	RADIUS
CL	CENTERLINE	RC	RELATIVE COMPACTION
DS	DOWN SPOUT	S	SLOPE
(E)	EXISTING	SD	STORM DRAIN
EG	EXISTING GROUND	TSW	TOP OF STEMWALL
FF	FINISHED FLOOR	TG	TOP OF GRATE
FG	FINISHED GRADE	TSF	TOP OF SUB FLOOR
FL	FLOWLINE	TW	TOP OF WALL

EARTHWORK ESTIMATE

OVEREXCAVATION AND RECOMPACTION OF TOP 12" BELOW GARAGE SLAB AND PAVEMENT AREAS SUBJECTED TO VEHICULAR TRAFFIC
TOTAL AREA OF OVEREXCAVATION AND RECOMPACTION = 1,380 S.F.
VOLUME = (1,380 S.F. x 1' DEPTH)/27 = 51 CUBIC YARDS

BUILDING SITE (INCLUDES EXCAVATION FOR ALL FLATWORK STRUCTURAL SECTIONS)
CUT = 35 CUBIC YARDS
FILL = 20 CUBIC YARDS

PROJECT TOTAL
16 CUBIC YARDS OF EXPORT

EXCESS CUT MATERIAL SHALL BE TAKEN TO THE COUNTY LANDFILL OR ANOTHER APPROVED DISPOSAL SITE.

EROSION CONTROL NOTES

1. Stockpile disturbed topsoil and redistribute around the finished site as seed base.
2. Disturb only those areas under construction. Do not leave soil unprotected during heavy rain.
3. Re-seed all disturbed areas with permanent landscaping or seed mix as follows:
   - Blando Brome: 1/2 # per 1000 S.F.
   - Rose Clover: 1/3 # per 1000 S.F.
   - Annual Ryegrass: 1/4 # per 1000 S.F.
4. Fertilize seedlings with 16-20-0 ammonium phosphate w/ sulphur.
5. Between October 15 and April 15, exposed soil shall be protected at all times. During construction such protection may consist of mulching and/or planting of native vegetation of adequate density. Before completion of the project, any exposed soil on disturbed slopes shall be permanently protected from erosion.

DRAINAGE ANALYSIS

PRE-DEVELOPMENT CONDITIONS
EXISTING IMPERVIOUS AREA TO BE REMOVED AS SHOWN ON SHEET C2 = 3,630 S.F.

POST-DEVELOPMENT CONDITIONS
IMPERVIOUS AREA OF NEW HOUSE, CONCRETE WALKS, AND CONCRETE ENTRIES = 2,440 S.F.

SEMI PERVIOUS AREA OF NEW PAVER BLOCK DRIVEWAY AND COURTYARD AREAS = 760 S.F.

EQUIVALENT NEW IMPERVIOUS AREA = 2,440 + (760/2) = 2,820 S.F.

THE PROPOSED DEVELOPMENT RESULTS IN A NET DECREASE IN EQUIVALENT IMPERVIOUS AREA OF 810 S.F.

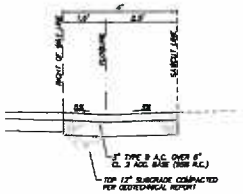
STORM WATER QUALITY MITIGATION
IN ORDER TO PROVIDE AN IMPROVED CONDITION IN TERMS OF THE QUALITY OF STORM WATER RUNOFF LEAVING THE SITE, THE PROJECT HAS INCORPORATED TWO WATER QUALITY TREATMENT UNITS. ALL RUNOFF FROM IMPERVIOUS AREAS WILL BE FILTERED THROUGH THESE UNITS PRIOR TO LEAVING THE SITE.

UPSLOPE AND ADJACENT DRAINAGE PATTERN
UPSLOPE RUNOFF FROM THE EXISTING ROADWAY FRONTING THE SITE WILL BE COLLECTED BY AN ASPHALT SWALE IN FRONT OF THE SITE AND DIRECTED INTO THE ON SITE STORM DRAIN SYSTEM. THE SITE DOES NOT RECEIVE ANY RUNOFF FROM THE PARCELS TO THE EAST AND WEST.

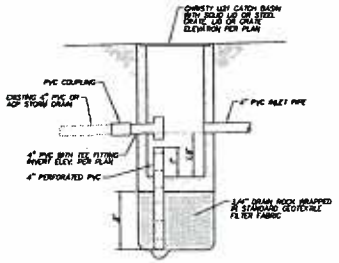
DOWNSTREAM ASSESSMENT
AFTER LEAVING THE WATER QUALITY TREATMENT UNITS, RUNOFF WILL BE DISCHARGED USING THE EXISTING STORM DRAIN OUTLETS SHOWN ON SHEET C2, BECAUSE THERE IS NO INCREASE IN IMPERVIOUS AREA AND THE EXISTING OUTLETS WILL BE USED TO DISCHARGE THE RUNOFF, THE PROJECT WILL CAUSE NO CHANGES TO THE EXISTING DRAINAGE PATTERN.

MAINTENANCE PROCEDURES FOR DRAINAGE SYSTEM
1. INSPECT ALL INLET/JUNCTION BOXES ANNUALLY PRIOR TO THE RAINY SEASON. REMOVE ANY ACCUMULATED SILT/DEBRIS.
2. PRIOR TO THE RAINY SEASON CLEAN ALL SILT AND DEBRIS FROM THE WATER QUALITY TREATMENT UNITS.

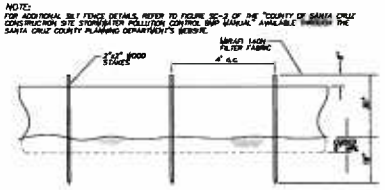
NOTE:
UPON COMPLETION OF WORK, THE CIVIL ENGINEER WILL HAVE TO INSPECT THE DRAINAGE IMPROVEMENTS AND PROVIDE THE PUBLIC WORKS DEPARTMENT WITH A LETTER CONFIRMING THAT THE WORK COMPLETED WAS IN ACCORDANCE WITH THE APPROVED PLANS. THE LETTER SHALL BE SPECIFIC AS TO WHAT WAS INSPECTED IN TERMS OF PIPE SIZES, ELEVATIONS, ETC.



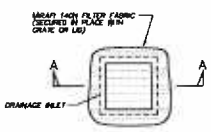
DETAIL C1-A
ASPHALT CONCRETE SWALE
N.T.S.



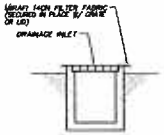
DETAIL C1-B
STORM WATER QUALITY TREATMENT UNIT
N.T.S.



DETAIL C1-C
TYPICAL SILT FENCE
N.T.S.

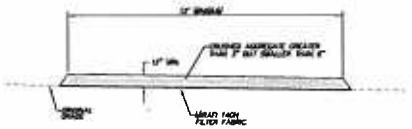


PLAN



SECTION A-A

DETAIL C1-D
DROP INLET SEDIMENT BARRIER
N.T.S.



DETAIL C1-E
ROCKED CONSTRUCTION ENTRANCE
N.T.S.

NOTES, EARTHWORK ESTIMATE, DETAILS, & DRAINAGE ANALYSIS

EXHIBIT D

38

6/6/14 - REVISED PER COUNTY PLAN CHECK COMMENTS.
7/6/16 - REVISED PER COUNTY PLAN CHECK COMMENTS.

C1

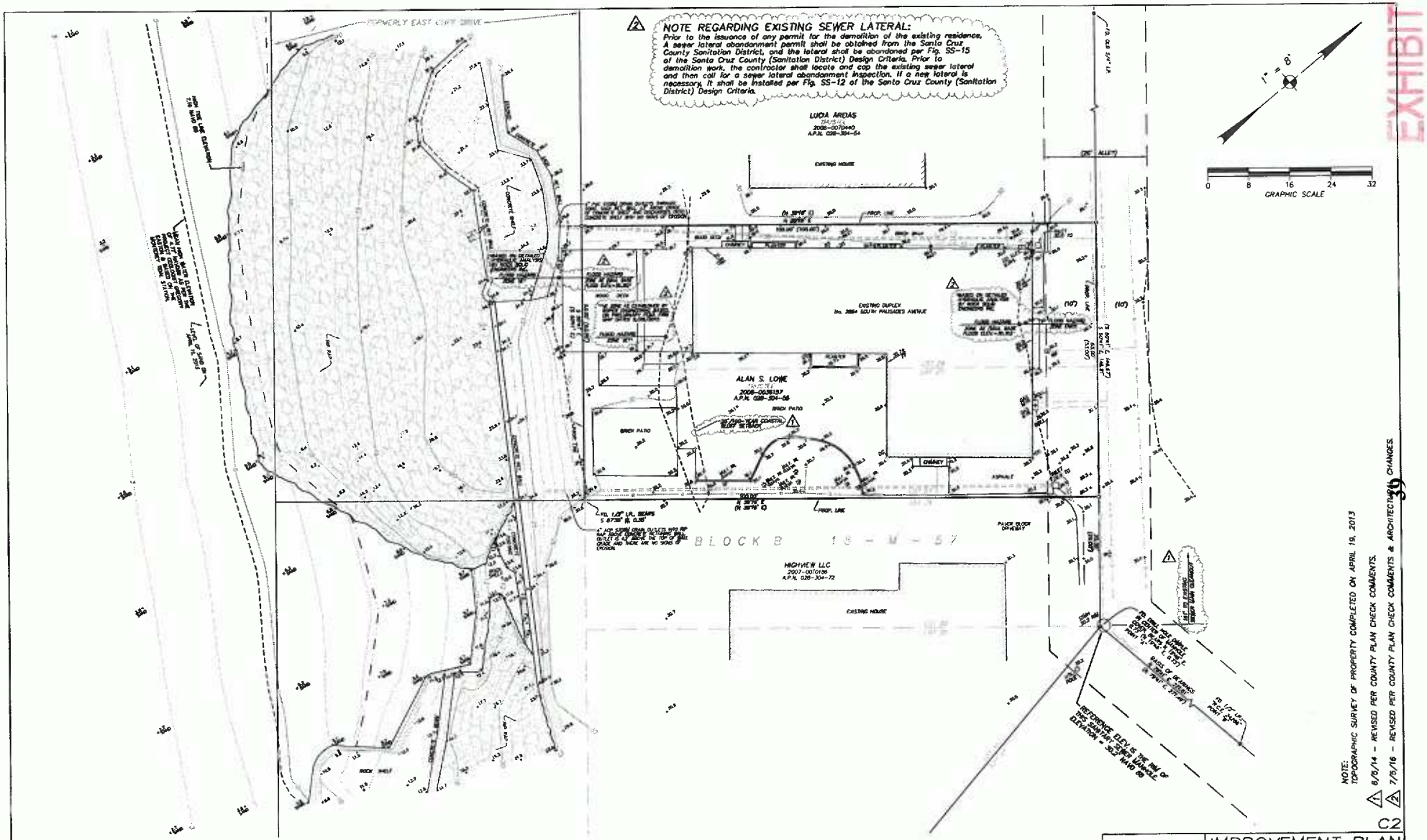
IMPROVEMENT PLAN

SHOWING PRELIMINARY GRADING, DRAINAGE, & EROSION CONTROL FOR A PROPOSED NEW HOUSE ON LANDS DESCRIBED IN THE DEED TO

ALAN S. LOWE
TRUSTEE

BY RECORDER'S DOCUMENT No. 2008-0036157
SANTA CRUZ COUNTY, CALIFORNIA
SCALE: 1" = 5' JULY 2016
BY: LUKE R. BEAUTZ, C.E., L.S.
A.P.N. 028-304-55 SHEET C1

EXHIBIT D



NOTE:
TOPOGRAPHIC SURVEY OF PROPERTY COMPLETED ON APRIL 19, 2013
⚠1 6/8/14 - REVISED PER COUNTY PLAN CHECK COMMENTS.
⚠2 7/5/16 - REVISED PER COUNTY PLAN CHECK COMMENTS & ARCHITECTURAL CHANGES.

C2

BENCH MARK

BENCH MARK IS SANTA CRUZ COUNTY BENCH MARK NO. 426, LOCATED AT MORAN LAKE PARK 44' SOUTH FROM THE CENTERLINE OF EAST CLIFF DRIVE & 8' EAST FROM THE CENTERLINE OF THE EXISTING DRAINAGE CULVERT ON THE CONCRETE WING WALL. A STD. BRASS CAP
ELEVATION = 15.17 NAVD 88

LEGEND

- • Indicates survey monument found as noted hereon.
- o Indicates nothing found or set.
- · Indicates spot elevation of existing ground.
- ( ) Indicates record data.
- ☐ Indicates existing impervious area outside of right of way to be removed. Total = 3,630 s.f.

BASIS OF BEARINGS: N 79°41' E
ESTABLISHED BETWEEN MONUMENTS FOUND AS NOTED AT POINTS "A" AND "B" AND AS SAID BEARING IS SHOWN ON 18-M-57 & 113-M-16.

N 79°41' E, 271.49' RECORD
N 79°41' E, 271.51' MEASURED

EXISTING SITE

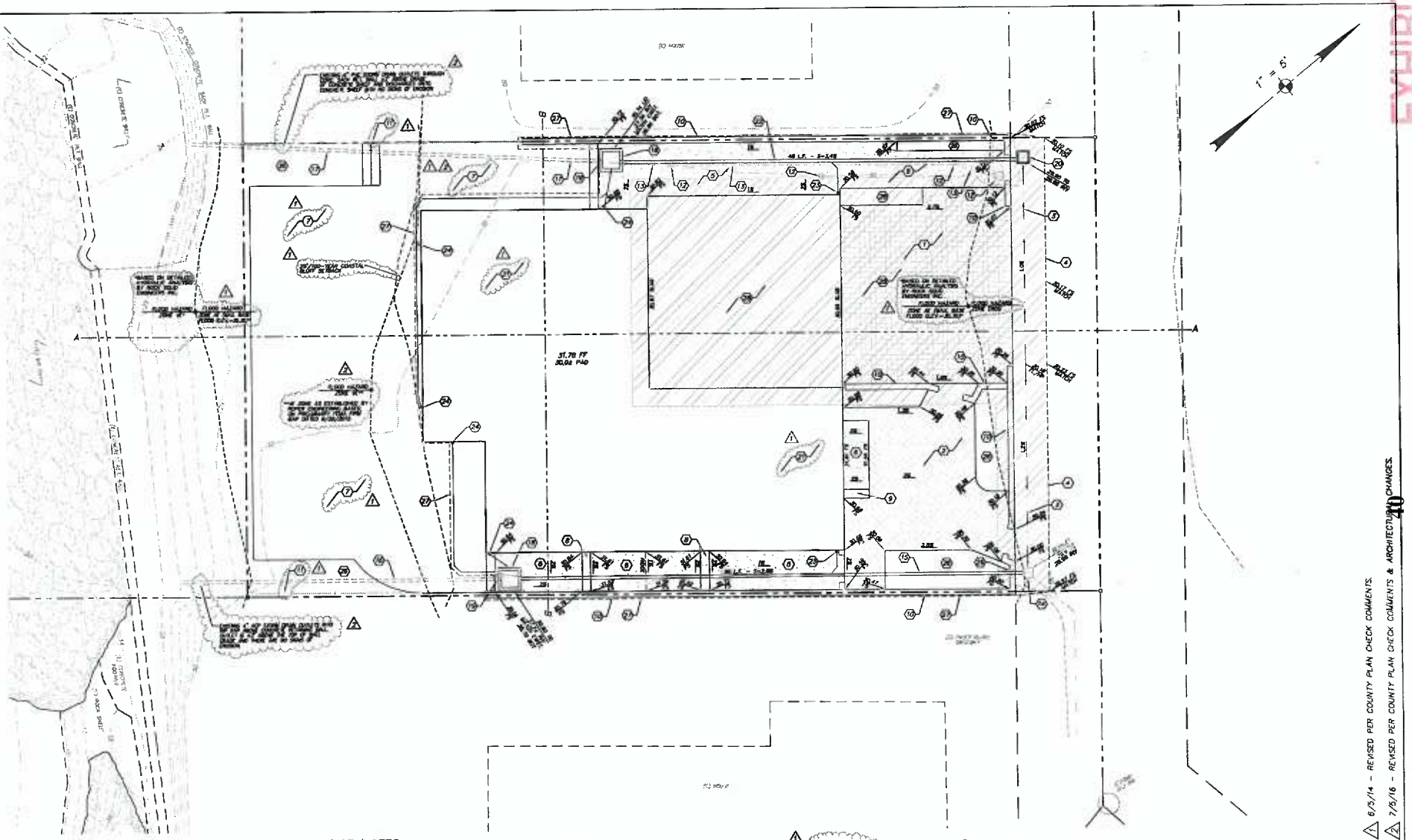
IMPROVEMENT PLAN

SHOWING PRELIMINARY GRADING, DRAINAGE, & EROSION CONTROL FOR A PROPOSED NEW HOUSE ON LANDS DESCRIBED IN THE DEED TO

ALAN S. LOWE
TRUSTEE

BY RECORDER'S DOCUMENT No. 2008-0036157
SANTA CRUZ COUNTY, CALIFORNIA
SCALE: 1" = 8' JULY 2016
BY: LUKE R. BEAUTZ, C.E., L.S.
A.P.N. 028-304-55 SHEET C2

EXHIBIT D



REFERENCE NOTES

1. INSTALL INTERLOCKING PAVER BLOCK DRIVEWAY PER MANUFACTURER'S RECOMMENDATIONS.
2. INSTALL INTERLOCKING PAVER BLOCK COURTYARD PER PAVER BLOCK MANUFACTURER'S RECOMMENDATIONS.
3. CONSTRUCT ASPHALT CONCRETE SWALE PER DETAIL C1-A.
4. SAWCUT EXISTING ASPHALT CONCRETE 4' FROM EDGE OF RIGHT OF WAY.
5. CONSTRUCT CONCRETE WALKWAY.
6. CONSTRUCT CONCRETE ENTRY PER ARCHITECTURAL PLANS.
7. SPACED DECKING PER ARCHITECTURAL PLANS.
8. CONSTRUCT CONCRETE STEPS, 1' TREAD WIDTH @ 6.8" RISE.
9. CONSTRUCT CONCRETE STEPS, 1' TREAD WIDTH @ 6.8" RISE.
10. CONSTRUCT STUCCO WALL PER ARCHITECTURAL PLANS.
11. EXISTING WOOD FENCE TO REMAIN.
12. REMOVE EXISTING INLET.
13. REMOVE EXISTING 4" PVC STORM DRAIN.
14. EXISTING INLET TO REMAIN.
15. REMOVE EXISTING 4" ACP STORM DRAIN BETWEEN EXISTING INLET TO REMAIN AND NEW TREATMENT UNIT & REPLACE WITH NEW 4" PVC STORM DRAIN.
16. EXISTING 4" ACP STORM DRAIN TO REMAIN.
17. EXISTING 4" PVC STORM DRAIN TO REMAIN.
18. CONSTRUCT WATER QUALITY TREATMENT UNIT PER DETAIL C1-B.
19. CONNECT EXISTING STORM DRAIN INTO NEW WATER QUALITY TREATMENT UNIT PER DETAIL C1-B.
20. INSTALL CHRISTY V84 DRAIN BOX W/ CAST IRON GRATE & CONCRETE BOTTOM.
21. NEW RESIDENCE WILL BE CONSTRUCTED USING A PIER AND GRADE BEAM FOUNDATION REQUIRING NO OVEREXCAVATION AND RECOMPACTION OF SUBGRADE.
22. INSTALL 4" PVC STORM DRAIN.
23. CONNECT DOWNSPOUT INTO STORM DRAIN WITH SOLID PVC PIPE.
24. CONNECT DOWNSPOUT INTO NEW TREATMENT UNIT WITH SOLID PVC PIPE.
25. PROVIDE NOTCH IN WALL FOOTING AS REQUIRED TO ACCOMMODATE STORM DRAIN.
26. NEW PLANTER AREA PER ARCHITECTURAL PLANS.
27. LIMITS OF GRADING/DISTURBANCE. MATCH EXISTING GRADE.
28. CROSS HATCHING INDICATES LIMITS OF OVEREXCAVATION AND RECOMPACTION OF TOP 12" OF SUBGRADE BELOW GARAGE SLAB AND PAVEMENT AREAS SUBJECTED TO VEHICULAR TRAFFIC AS PER THE RECOMMENDATIONS OF THE PROJECT GEOTECHNICAL REPORT.

NOTES:

1. GRADING, OTHER THAN MINOR LEVELING OF A SCALE TYPICALLY ACCOMPLISHED BY HAND, IS NOT ALLOWED WITHIN THE 25'/100-YEAR COASTAL BLUFF SETBACK.
2. ALL DECKS, STAIRS, ETC. WITHIN THE 25'/100-YEAR COASTAL BLUFF SETBACK ARE REQUIRED TO BE STRUCTURALLY DETACHED FROM THE NEW HOME.

NOTE REGARDING DRAINAGE OVER COASTAL BLUFF:

NO SITE RUNOFF WILL FLOW OVER THE EXISTING BLUFF. ALL RUNOFF FROM THE SITE WILL BE COLLECTED IN A CLOSED CONDUIT STORM DRAIN SYSTEM AND DIRECTED TO THE EXISTING STORM DRAINS SHOWN HEREON. THE EXISTING STORM DRAINS OUTLET BELOW THE EXISTING BLUFF WITH NO SIGNS OF EROSION, THEREFORE THE PROJECT WILL NOT CONTRIBUTE TO COASTAL BLUFF EROSION.

PRELMINARY GRADING AND DRAINAGE PLAN

6/3/14 - REVISED PER COUNTY PLAN CHECK COMMENTS.
7/18/16 - REVISED PER COUNTY PLAN CHECK COMMENTS & ARCHITECTURAL CHANGES.

C3

Luke Beautz

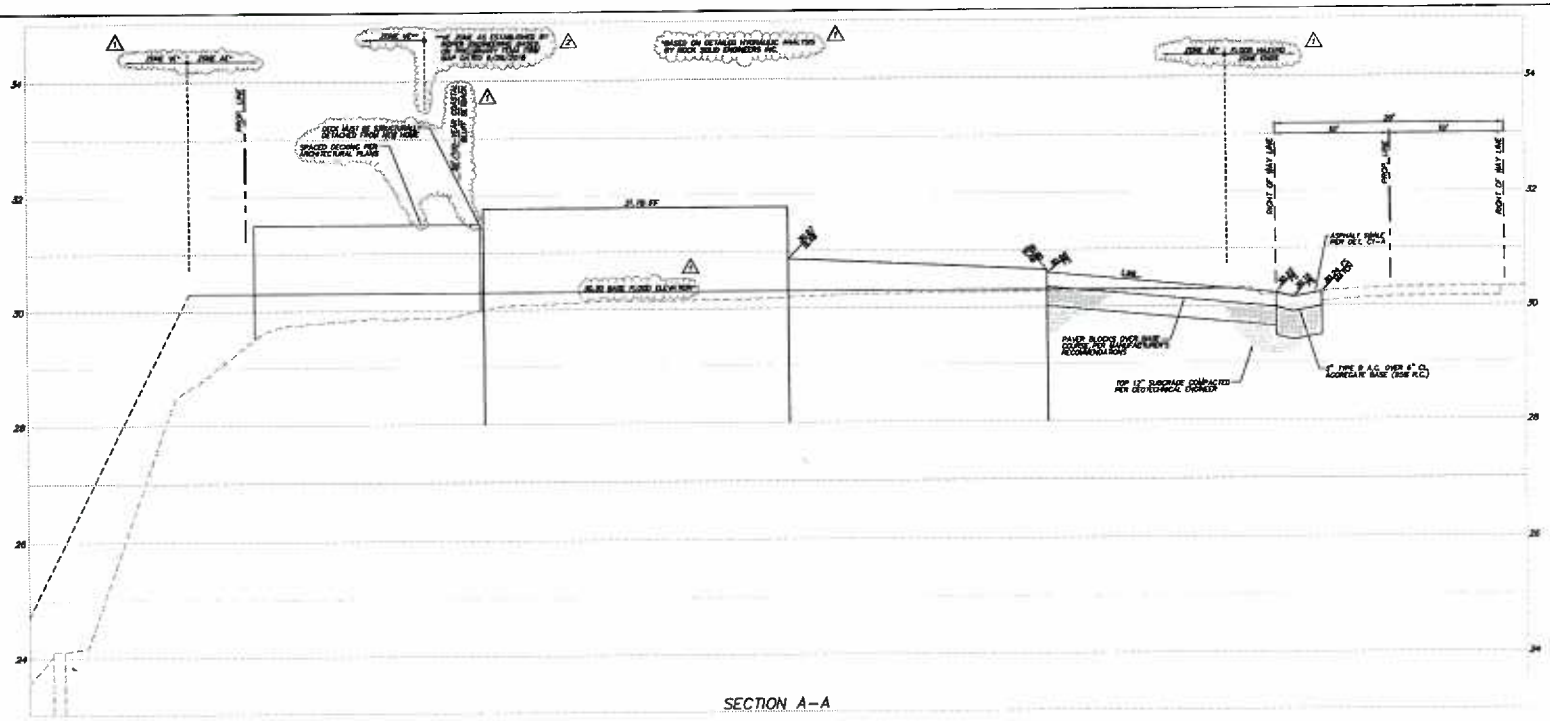
IMPROVEMENT PLAN

SHOWING PRELIMINARY GRADING, DRAINAGE, & EROSION CONTROL FOR A PROPOSED NEW HOUSE ON LANDS DESCRIBED IN THE DEED TO

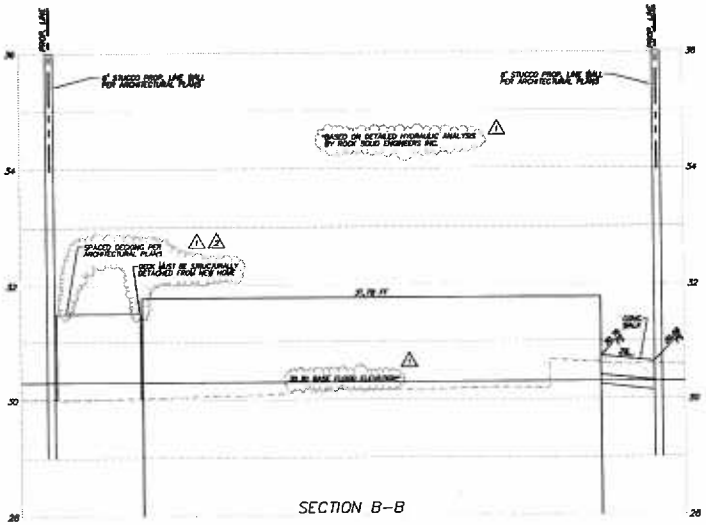
ALAN S. LOWE
TRUSTEE

BY RECORDER'S DOCUMENT No. 2008-0036157
SANTA CRUZ COUNTY, CALIFORNIA
SCALE: 1" = 5' JULY 2016
BY: LUKE R. BEAUTZ, C.E., L.S.
A.P.N. 028-304-55 SHEET C3

EXHIBIT D



SECTION A–A



SECTION B–B

PRELIMINARY SITE CROSS SECTIONS

1" = 5' HORZ.
1" = 1' VERT.

△ 6/5/14 - REVISED PER COUNTY PLAN CHECK COMMENTS.
△ 7/5/16 - REVISED PER COUNTY PLAN CHECK COMMENTS & ARCHITECTURAL CHANGES.

C4

IMPROVEMENT PLAN
SHOWING PRELIMINARY GRADING, DRAINAGE, & EROSION CONTROL FOR A PROPOSED NEW HOUSE ON LANDS DESCRIBED IN THE DEED TO
ALAN S. LOWE
TRUSTEE
BY RECORDER'S DOCUMENT No. 2008-0036157
SANTA CRUZ COUNTY, CALIFORNIA
SCALE 1" = 5' JULY 2016
BY: LUKE R. BEAUTZ, C.E., L.S.
A.P.N. 028-304-55 SHEET C4

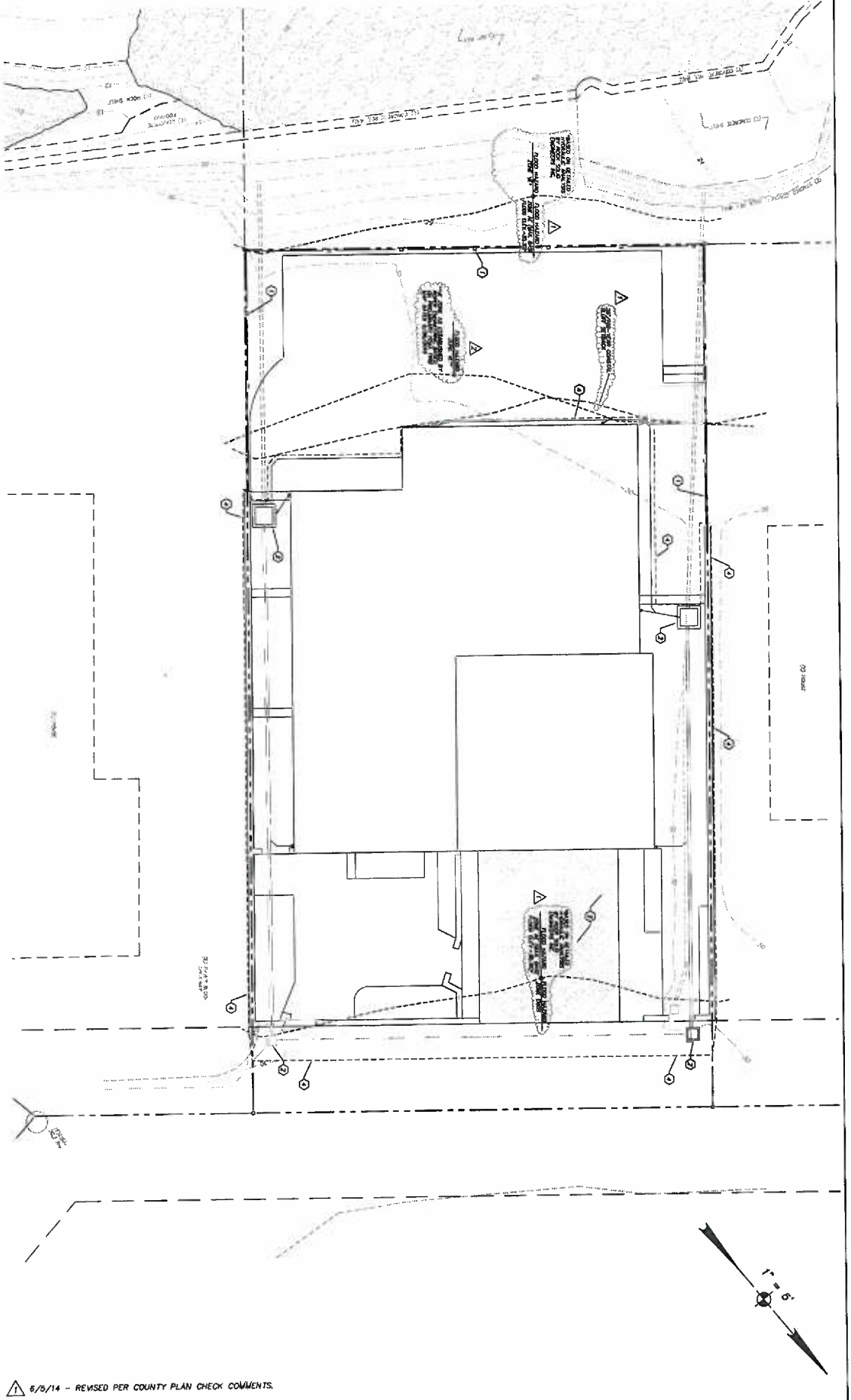
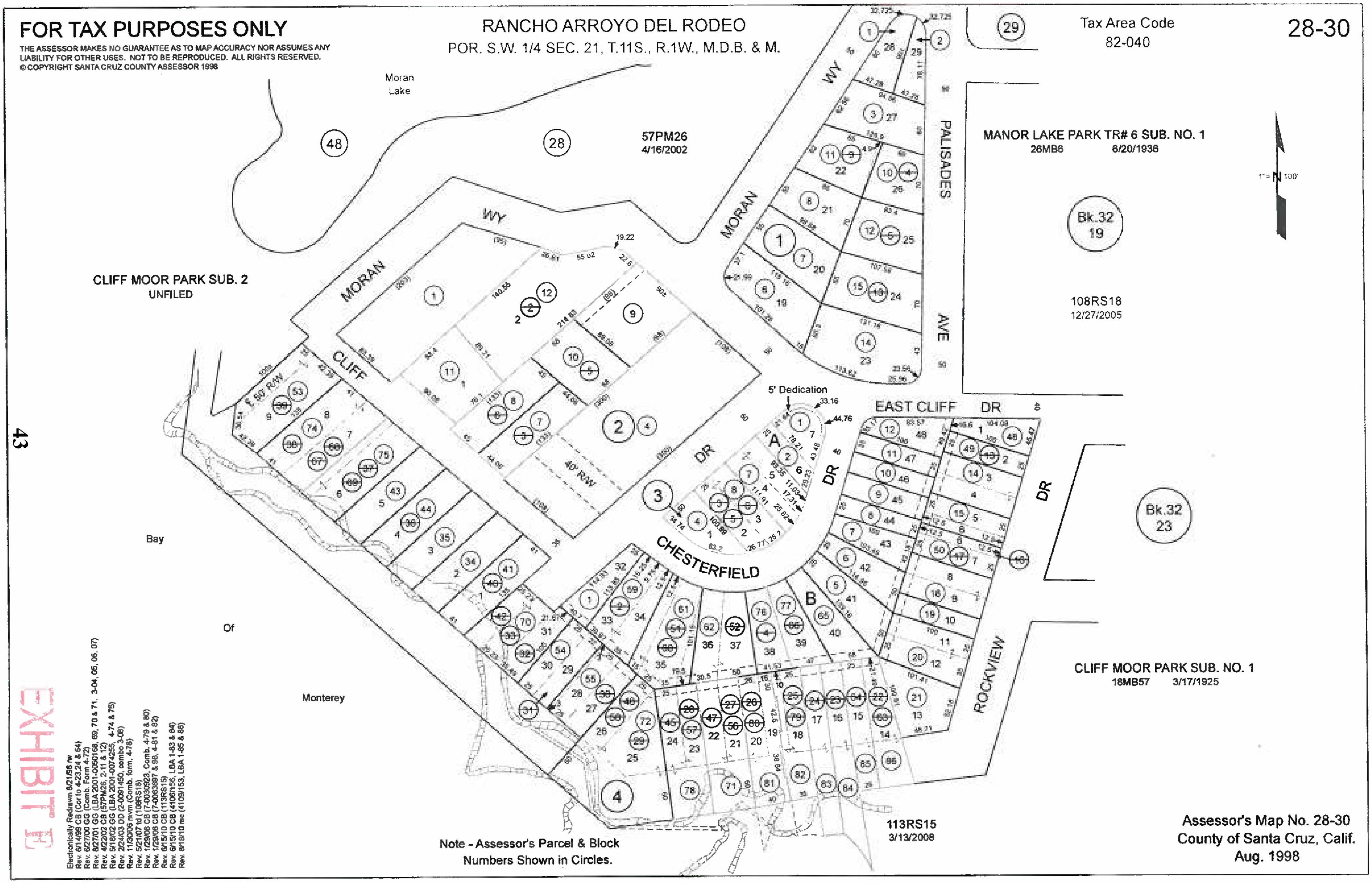

REFERENCE NOTES
1 CONSTRUCT SILT FENCE PER DETAIL C1-C.
2 INSTALL DROP INLET SEDIMENT BARRIER PER DETAIL C1-D.
3 CONSTRUCT WOODEN CONSTRUCTION ENTRANCE PER DETAIL C1-E.
LIMITS OF GRADING/DISTURBANCE: APPROX. = 5,775 S.F.
PRELIMINARY EROSION CONTROL PLAN
IMPROVEMENT PLAN
SHOWING PRELIMINARY GRADING, DRAINAGE & EROSION CONTROL FOR A PROPOSED NEW HOUSE ON LANDS DESCRIBED IN THE DEED TO
ALAN S. LOWE TRUSTEE
BY RECORDER'S DOCUMENT No. 2008-0036167
SANTA CRUZ COUNTY, CALIFORNIA
SCALE: 1" = 5'
BY: LUKE R. BENITZ, C.E., L.S.
JULY 2016
A.P.N. 028-304-55
C5
SHEET C5
1" = 5'
1 6/5/14 - REVISED PER COUNTY PLAN CHECK COMMENTS.
2 7/5/16 - REVISED PER COUNTY PLAN CHECK COMMENTS & ARCHITECTURAL CHANGES.

EXHIBIT D


FOR TAX PURPOSES ONLY
THE ASSESSOR MAKES NO GUARANTEE AS TO MAP ACCURACY NOR ASSUMES ANY LIABILITY FOR OTHER USES. NOT TO BE REPRODUCED. ALL RIGHTS RESERVED.
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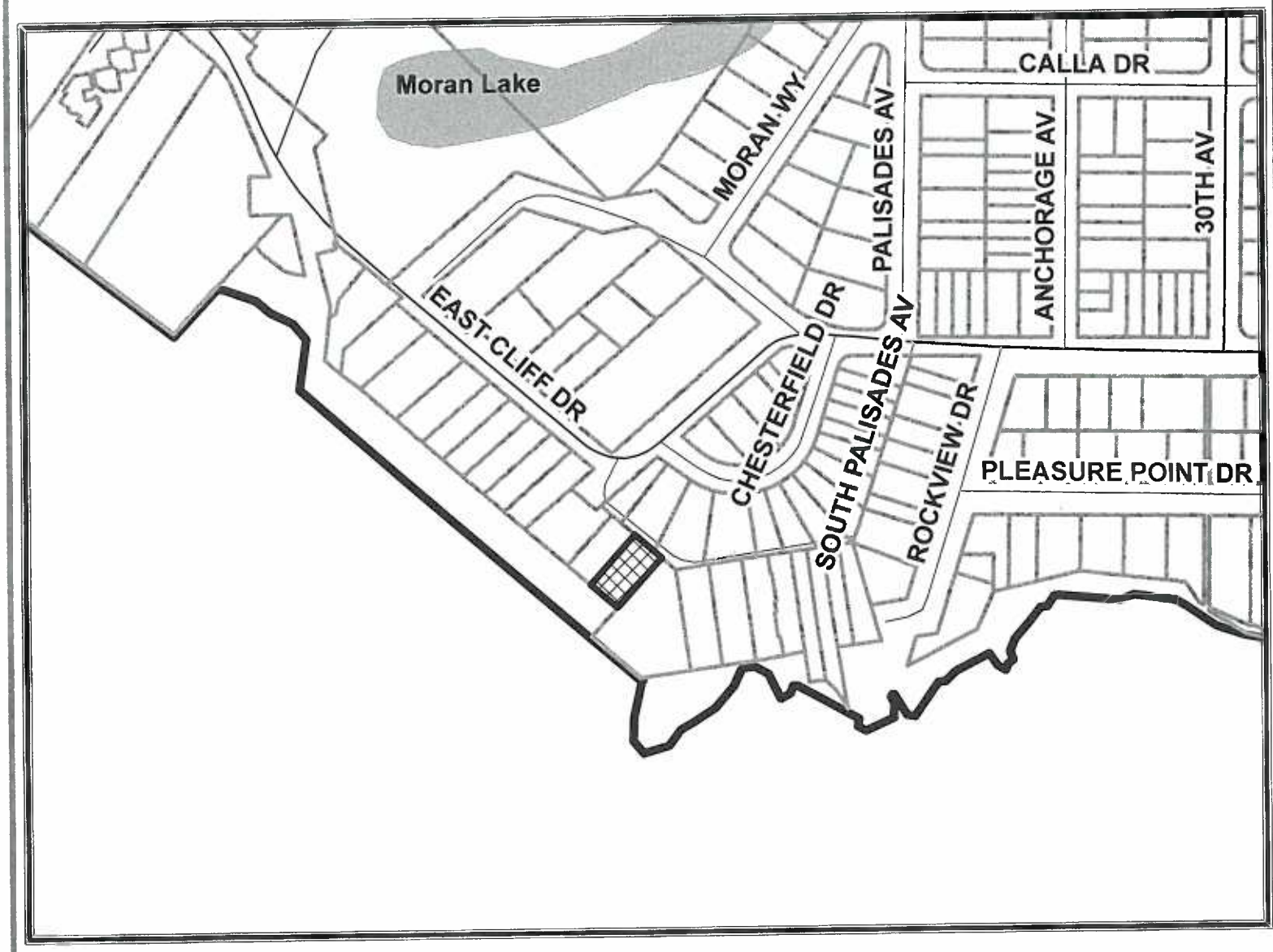
RANCHO ARROYO DEL RODEO
POR. S.W. 1/4 SEC. 21, T.11S., R.1W., M.D.B. & M.
Tax Area Code
82-040
28-30
Moran Lake
57PM26
4/16/2002
MANOR LAKE PARK TR# 6 SUB. NO. 1
26MB6 6/20/1936
Bk.32
19
108RS18
12/27/2005
CLIFF MOOR PARK SUB. 2
UNFILED
MORAN WY
PALISADES AVE
EAST CLIFF DR
CHESTERFIELD DR
ROCKVIEW DR
CLIFF DR
40' R/W
5' Dedication
Bk.32
23
CLIFF MOOR PARK SUB. NO. 1
18MB57 3/17/1925
Bay Of Monterey
113RS15
3/13/2008
Note - Assessor's Parcel & Block Numbers Shown in Circles.
Assessor's Map No. 28-30
County of Santa Cruz, Calif.
Aug. 1998
EXHIBIT E

Location Map



0 212.5 425 850 1,275 1,700 Feet

LEGEND

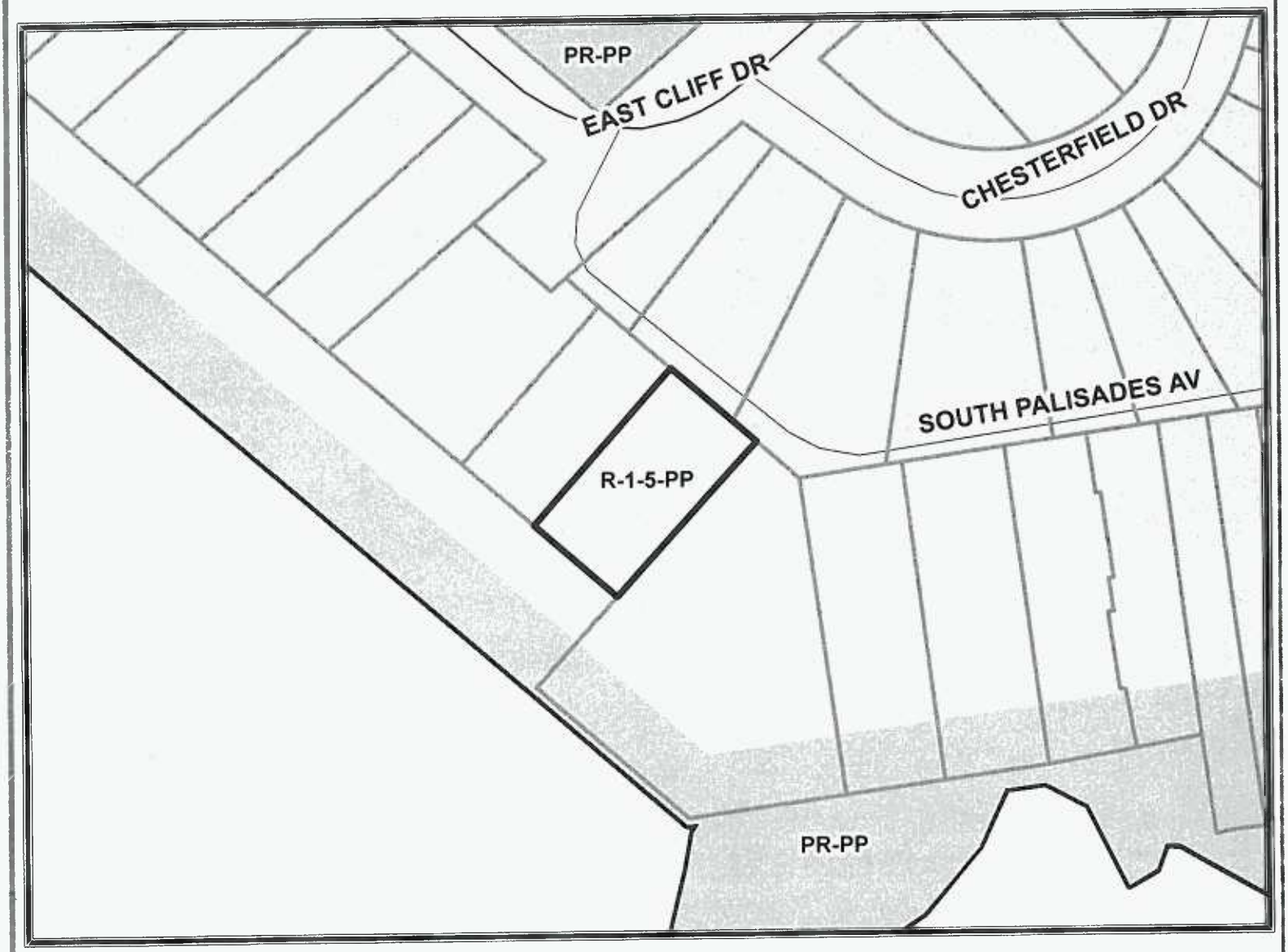
- APN: 028-304-55
- Assessors Parcels
- Street
- Lakes
- County Boundary

N W E S

Map Created by
County of Santa Cruz
Planning Department
March 2014

EXHIBIT E

Zoning Map



0 65 130 260 390 520 Feet

LEGEND

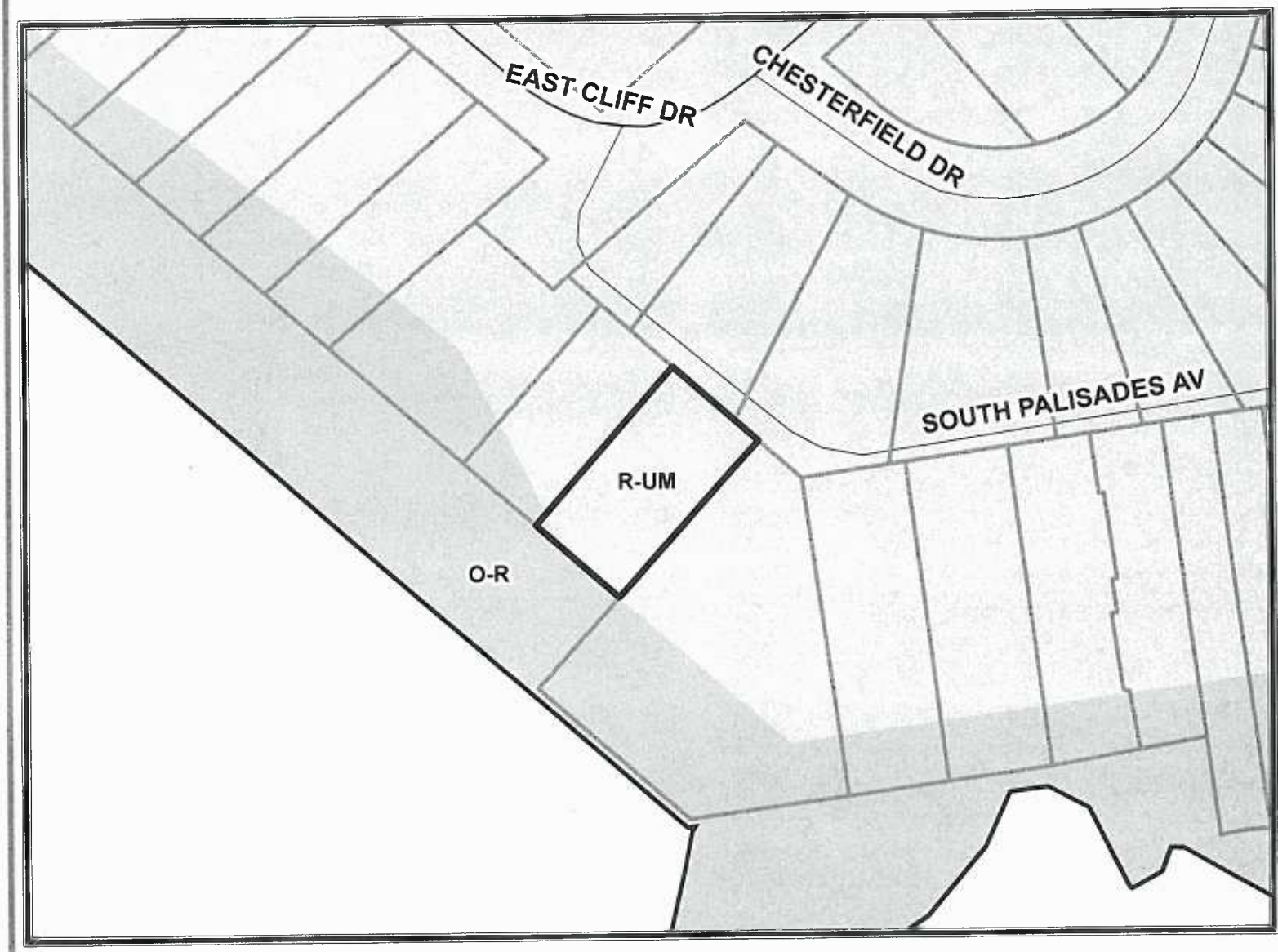
- APN: 028-304-55
- Assessors Parcels
- Street
- County Boundary
- RESIDENTIAL-SINGLE FAMILY
- PARK

N W E S

Map Created by
County of Santa Cruz
Planning Department
March 2014

EXHIBIT E

General Plan Designation Map



0 65 130 260 390 520 Feet

LEGEND

- APN: 028-304-55
- Assessors Parcels
- Street
- County Boundary
- Residential - Urban Medium Density
- Parks and Recreation

N
W E
S

Map Created by
County of Santa Cruz
Planning Department
March 2014

EXHIBIT E

Easton Geology
P.O. Box 3533, Santa Cruz, CA 95063
831.247.4317 info@eastongeology.com

GEOLOGIC INVESTIGATION

Lowe property

2864 South Palisades Avenue
Santa Cruz, California
Santa Cruz County APN 028-304-55

This report details the findings from our geologic investigation of the above-referenced coastal blufftop property.

Easton Geology Job No. C13006
10 October 2013

EASTON GEOLOGY
P.O. Box 3533, Santa Cruz, CA 95063
phone: 831.247.4317
email: info@eastongeology.com

10 October 2013

Julie and Allen Lowe
2181 Las Trampas Road
Alamo, California 94507

Job No. C13006

Re: Geologic Investigation of Coastal Blufftop Property
2864 South Palisades Avenue
Santa Cruz, California
Santa Cruz County APN 028-304-55

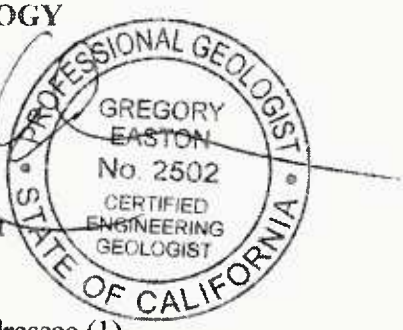
Dear Mr. and Mrs. Lowe:

We are pleased to present you the findings from our geologic investigation of your residential property located on 2864 South Palisades Avenue, in Santa Cruz, California. The purpose of our work was to provide, in conjunction with Rock Solid Engineering, the project geotechnical engineers, an evaluation of the 100-year stability of the coastal blufftop property. Santa Cruz County Planning Department regulations require new development be setback beyond the projected 100-year blufftop or a minimum of 25 feet from the coastal bluff, whichever is greater. The minimum setback, in this case, is the County required 25 feet assuming the existing permitted coastal protection structures fronting the subject bluff are maintained throughout the project lifetime and the recommendations within this report are closely followed.

Please contact us if you have any questions regarding this report.

Sincerely,

EASTON GEOLOGY



Gregory Easton
Principal Geologist
C.E.G. No. 2502

Copies: Addressee (1)
Stephanie Barnes-Castro (4 and pdf)
Rock Solid Engineering (pdf)

EXHIBIT F

TABLE OF CONTENTS

EXHIBIT F

INTRODUCTION

This report presents the results of Easton Geology's geologic investigation of the Lowe property in Santa Cruz County, California (APN 028-304-55). The coastal property, on South Palisades Avenue, is situated atop the bluff at Soquel Point (Figure 1; Site Location Map). Current development plans call for razing the existing home on the property and constructing a new single-family residence. The primary geologic hazards to the property include seismic shaking, coastal erosion, coastal flooding and wave and/or wave borne debris impact.

The scope of work performed for this investigation included 1) review of published and unpublished literature relevant to the site and vicinity; 2) analysis of stereo-aerial photographs; 3) geologic mapping of the site; 4) co-logging of two exploratory borings; 5) coordination with the project geotechnical engineers; 6) compilation and analysis of the resulting data; and 7) preparation of this report and accompanying illustrations, including a geologic map and cross section.

REGIONAL GEOLOGIC SETTING

The subject site is located atop the coastal bluff at Soquel Point which is the southeastern end of a generally northwest/southeast-trending sea cliff beginning at San Lorenzo Point to the northwest (Figure 1). This is one of many such cliffs along the northern coast of Monterey Bay, characterized by gently dipping, late Tertiary marine sedimentary rocks that are generally overlain by nearly horizontal, Quaternary terrace deposits chiefly of terrestrial origin. Beyond Soquel Point the shoreline trends to the northeast beyond Capitola (Figure 1). The seismicity of the area is influenced primarily by the northwest-trending San Andreas fault located northeast of the subject property, and the San Gregorio fault located offshore in Monterey Bay (Figure 2; Regional Geologic Map). The seismicity of the site will be discussed in more detail below.

The northwest-southeast orientation of the local shoreline is at an angle to the dominant direction of approach for refracted waves in the northern portion of Monterey Bay. As a result, littoral drift is rapid, inhibiting formation of a continuous protective beach (Griggs, 1990). Instead, a series of pocket beaches have formed which are sensitive to seasonal changes and human intervention. The oceanographic factors affecting bluff erosion and their implications for coastal development will be discussed in more detail below.

REGIONAL SEISMIC SETTING

California's broad system of strike-slip faulting has a long and complex history. Several regional faults present a seismic hazard to the subject property. The most important of these are the San Andreas, San Gregorio, Monterey Bay and Zayante-Vergeles fault zones (Figure 2). These faults are either active or considered potentially active (Buchanan-Banks et al., 1978; Burkland and Associates, 1975; Jennings et al., 1975; Greene, 1977; Hall et al., 1974; Schwartz et al., 1990; Wallace, 1990; and Working Group on Northern California Earthquake Potential [WGNCEP], 1996). Each fault is discussed below. The intensity of seismic shaking that could occur at the site in the event of a future earthquake on one of these faults will be discussed in a later section.

San Andreas Fault

The San Andreas fault is active and represents the major seismic hazard in northern California (Jennings et al., 1975; Buchanan-Banks et al., 1978; Hall et al., 1974). The main trace of the San Andreas fault trends northwest-southeast and extends over 700 miles from the Gulf of California through the Coast Ranges to Point Arena, where the fault extends offshore.

Geologic evidence suggests that the San Andreas fault has experienced right-lateral, strike-slip movement throughout the latter portion of Cenozoic time, with cumulative offset of hundreds of miles. Surface rupture during historical earthquakes, fault creep, and historical seismicity confirm that the San Andreas fault and its branches, the Hayward, Calaveras, and San Gregorio faults, are all active today.

Historical earthquakes along the San Andreas fault and its branches have caused significant seismic shaking in the Santa Cruz County area. The two largest historical earthquakes on the San Andreas to affect the area were the moment magnitude (M_w) 7.9 San Francisco earthquake of April 18, 1906 (actually centered near Olema) and the M_w 6.9 Loma Prieta earthquake of October 17, 1989. The San Francisco earthquake caused severe seismic shaking and structural damage to many buildings in Santa Cruz County. The Loma Prieta earthquake appears to have caused more intense seismic shaking than the 1906 event in localized areas of the Santa Cruz Mountains, even though its regional effects were not as extensive. There were also significant earthquakes in northern California along or near the San Andreas fault in 1838, 1865 and possibly 1890 (Sykes and Nishenko, 1984; Working Group on Northern California Earthquake Potential, 1996).

Geologists have recognized that the San Andreas fault system can be divided into segments with earthquakes of different magnitudes and recurrence intervals (Working Group on California Earthquake Probabilities, 1988 and 1990). A recent study by the Working Group on Northern California Earthquake Potential (WGNCEP) in 1996 has redefined the segments and the characteristic earthquakes for the San Andreas fault system in northern and central California. Two overlapping segments of the San Andreas fault system represent the greatest potential hazard to the subject property. The first segment is defined by the rupture that occurred from Cape Mendocino to San Juan Bautista along the San Andreas fault during the great 1906 M_w 7.9 earthquake. The WGNCEP (1996) has hypothesized that this "1906 rupture" segment experiences earthquakes with comparable magnitudes in independent cycles about two centuries long.

The second segment is defined by the rupture zone of the M_w 6.9 Loma Prieta earthquake, despite the fact that the oblique slip and depth of this event does not fit the ideal of a typical, right-lateral strike-slip event on the San Andreas fault. Although it is uncertain whether this "Santa Cruz Mountains" segment has a characteristic earthquake independent of great San Andreas fault earthquakes, the WGNCEP (1996) assumed an "idealized" earthquake of M_w 7.0 with the same right-lateral slip as the 1989 Loma Prieta earthquake, but having an independent segment recurrence interval of 138 years and a multi-segment recurrence interval of 400 years.

San Gregorio Fault

The San Gregorio fault, as mapped by Greene (1977), Weber et al. (1979), Weber and Lajoie (1974), and Weber et al. (1995), skirts the coastline of Santa Cruz County northward from Monterey Bay and trends onshore at Point Año Nuevo. Northward from Año Nuevo, it passes offshore again, touching onshore briefly at Seal Cove just north of Half Moon Bay, and eventually connects with the San Andreas fault near Bolinas. Southward from Monterey Bay, it may trend onshore north of Big Sur (Greene, 1977) to connect with the Palo Colorado fault, or it may continue southward through Point Sur to connect with the Hosgri fault in south-central California. Based on these two proposed correlations, the San Gregorio fault zone has a length of at least 100 miles and possibly as much as 250 miles.

The on-land exposures of the San Gregorio fault at Point Año Nuevo and Seal Cove show evidence of late Pleistocene displacement (Jennings, 1975; and Buchanan-Banks et al., 1978) and Holocene displacement (Weber and Cotton, 1981; Simpson et al., 1997). Although stratigraphic offsets indicate a history of horizontal and vertical displacements, the San Gregorio is considered predominantly right-lateral strike slip by most researchers (Greene, 1977; Weber and Lajoie, 1974; and Graham and Dickinson, 1978).

In addition to stratigraphic evidence for Holocene activity, the historical seismicity in the region is partially attributed to the San Gregorio fault (Greene, 1977). Due to inaccuracies of epicenter locations, even the magnitude the 6+ earthquakes of 1926 tentatively assigned to the Monterey Bay fault zone, may have actually occurred on the San Gregorio fault (Greene, 1977).

The WGNCEP (1996) divided the San Gregorio fault into the "San Gregorio" and "San Gregorio, Sur Region" segments. The segmentation boundary is located west of Monterey Bay, where the fault appears to have a right step-over (Figure 2). The San Gregorio segment is assigned a slip rate that results in a M_w 7.3 earthquake with a recurrence interval of 400 years. This value was assigned based on the preliminary results of a paleoseismic investigation at Seal Cove by Lettis and Associates (see Simpson et al., 1997) and on regional mapping by Weber et al. (1995). Simpson et al. (1997) discovered prior displacements consistent with a moment magnitude of 7 to 7¼ in their paleoseismic study at Seal Cove. The Sur Region segment is assigned a slip rate that results in a M_w 7.0 earthquake with an effective recurrence interval of 411 years. Within the Sur Region many geologists, including Greene (1977), map the San Gregorio fault zone as continuing along the Palo Colorado fault. Graham and Dickinson (1978) show the San Gregorio fault continuing along the Sur fault zone.

Monterey Bay-Tularcitos Fault Zone

The Monterey Bay-Tularcitos fault zone is 6 to 9 miles wide, about 25 miles long, and consists of many en echelon faults identified during shipboard seismic reflection surveys (Greene, 1977). The fault zone trends northwest-southeast and intersects the coast in the vicinity of Seaside and Fort Ord. At this point, several onshore fault traces have been tentatively correlated with offshore traces in the heart of the Monterey Bay-Tularcitos fault zone (Greene, 1977; Clark et al., 1974; Burkland and Associates, 1975). These onshore faults are, from southwest to northeast, the Tularcitos-Navy, Berwick Canyon, Chupines, Seaside, and Ord Terrace faults. It must be emphasized that these correlations between onshore and offshore portions of the Monterey Bay-

Tularcitos fault zone are only tentative; for example, no concrete geologic evidence for connecting the Navy and Tularcitos faults under the Carmel Valley alluvium has been observed, nor has a direct connection between these two faults and any offshore trace been found.

Outcrop evidence indicates a variety of strike-slip and dip-slip movement associated with onshore and offshore traces. Earthquake studies suggest the Monterey Bay-Tularcitos fault zone is predominantly right-lateral, strike-slip in character (Greene, 1977). Stratigraphically, both offshore and onshore fault traces in this zone have displaced Quaternary beds and, therefore, are considered potentially active (Buchanan-Banks et al., 1978). One offshore trace, which aligns with the trend of the Navy fault, has displaced Holocene beds and is therefore active by definition (Buchanan-Banks et al., 1978).

Seismically, the Monterey Bay-Tularcitos fault zone may be historically active. The largest historical earthquakes *tentatively* located in the Monterey Bay-Tularcitos fault zone are two events, estimated at 6.2 on the Richter Scale, in October 1926 (Greene, 1977). Because of possible inaccuracies in locating the epicenters of these earthquakes, it is possible that they actually occurred on the nearby San Gregorio fault zone (Greene, 1977).

The WGNCEP (1996) has assigned an earthquake of M_w 7.1 with an effective recurrence interval of 2,600 years to the Monterey Bay-Tularcitos fault zone, based on Holocene offshore offsets. Petersen et al. (1996) has a similar earthquake magnitude, but for a recurrence interval of 2,841 years. Their earthquake is based on a composite slip rate of 0.5 millimeters per year (after Rosenberg and Clark, 1995).

Zayante-Vergeles Fault

The Zayante fault lies west of the San Andreas fault and trends about 50 miles northwest from the Watsonville lowlands into the Santa Cruz Mountains. The southern extension of the Zayante fault, known as the Vergeles fault, merges with the San Andreas fault south of San Juan Bautista.

The Zayante fault has a long, well-documented history of vertical movement (Clark and Reitman, 1973), probably accompanied by right-lateral, strike-slip movement (Hall et al., 1974; Ross and Brabb, 1973). Stratigraphic and geomorphic evidence indicates the Zayante fault has undergone late Pleistocene and Holocene movement and is potentially active (Buchanan-Banks et al., 1978; Coppersmith, 1979).

Some historical seismicity may be related to the Zayante fault (Griggs, 1973). For instance, the Zayante fault may have undergone sympathetic fault movement during the 1906 earthquake centered on the San Andreas fault, although this evidence is equivocal (Coppersmith, 1979). Seismic records strongly suggest that a section of the Zayante fault approximately 3 miles long underwent sympathetic movement in the 1989 earthquake. The earthquake hypocenters tentatively correlated to the Zayante fault occurred at a depth of 5 miles; no instances of surface rupture on the fault have been reported.

In summary, the Zayante-Vergeles fault should be considered potentially active. The WGNCEP (1996) considers it capable of generating a magnitude 6.8 earthquake with an effective recurrence interval of 8,800 years.

SHORELINE HAZARDS IN THE SANTA CRUZ/CAPITOLA AREA

Overview

Most of the northern end of Monterey Bay is flanked by a prominent sea cliff 20 to 120 feet high: a clear indication of active surf erosion (in a geological time frame). From Santa Cruz to Capitola, where beaches are generally narrow and discontinuous, the documented rate of cliff retreat due to surf attack has averaged over one foot per year in some areas (Griggs and Johnson, 1979). Of course, this cliff retreat is not a steady process as the quoted rate might seem to imply, but rather occurs episodically every few years in response to large storms and/or when surf-cut notches at the base of the cliffs intercept prominent joints or other planes of structural weakness in the bedrock.

Where lacking a broad protective beach or seawall, surf erosion undercuts the base of the cliff, causing failure of the bedrock portion of the lower cliff-face. Many of the failures are controlled by near-vertical joints: when erosional undercutting intersects one of the near-vertical bedrock joints, the undercut portion of the cliff fails along the joint and falls to the beach, temporarily armoring the base of the cliff. Wave action gradually removes the debris and the process starts anew.

Primary failure of the bedrock in the lower cliff face triggers a time-lagged, secondary failure of the upper cliff, which is comprised of marine terrace deposits. The marine terrace deposits are weaker than the underlying Purisima Formation bedrock and over the long term cannot maintain a slope much steeper than 1.5:1 (their approximate angle of ultimate stability). Thus, when a portion of the lower cliff fails as previously described, the upper cliff becomes over-steepened and gradually fails by piecemeal sloughing and slumping. Evidence of this process can be seen at various points along the cliff edge in the Santa Cruz-Capitola area. High groundwater levels, storm runoff, seismic shaking, and loading from human activity are some of the factors that can hasten the secondary failure of the marine terrace deposits.

The sequence of events described above represents the most important geologic process operating in the coastal area, with continual surf erosion being responsible for the steady retreat of the coastal cliffs in the Santa Cruz-Capitola area. Because the joints in the Purisima bedrock are located at intervals ranging between 5 and 25 feet, a given segment of the lower cliff-face will remain essentially unchanged for several years and will then retreat 5 to 25 feet almost instantaneously. Secondary failure of the upper cliff-face commonly lags behind; thus, in the short term, the retreat of the cliff edge tends to be somewhat less episodic than the retreat of the cliff toe. Given a long enough period of time, however, the average rate of retreat will be the same for both the top and bottom of the cliff. The historical rates of cliff retreat in the vicinity of the subject property will be discussed in a later section.

Naturally, the construction of permanent structures in this inherently impermanent setting has met with mixed success, depending on the engineering precautions that were taken in each case.

Storm History of Monterey Bay, 1910 to Present

Review of the storm history of Monterey Bay (Appendix B) leads us to several immediate conclusions:

1. The number of large storms affecting Monterey Bay is relatively large.

2. The storms that produced the greatest damage in the interior of the bay often came from the west or southwest.

3. Structures directly exposed to wave action and designed to protect oceanfront properties from such action have been regularly damaged or destroyed.

For the period of most detailed record, 1910 to 1960, there have been at least 45 storms of some significance (i.e., either high seas, strong winds, and/or damage to at least some portion of the Monterey Bay region). Thus, considering the 50 years of detailed records, this amounts to a major storm every 1.1 years on average. Analysis of the record (Appendix B) reveals that no major storms were recorded for some intervals as long as seven years (1916 to 1923), but in other cases, five significant storms occurred within a single year (1931). If we consider the entire period, 1910 to present, we have a major storm about every 1.5 years on average.

This historical record indicates that the northern half of Monterey Bay (Moss Landing to Santa Cruz) is most susceptible to damage from storms arriving from the west or southwest (Griggs and Johnson, 1983; Johnson and Associates, 1987). Waves from the northwest, which predominate along the central coast (Figure 3; Wave Direction and Frequency), undergo refraction or bending, resulting in a significant energy loss prior to striking beaches along the interior of the bay (Figure 4; Monterey Bay Wave Refraction). Thus, although waves from the west-northwest and northwest dominate along the coastline, their effect on the interior of the bay appears to have been relatively small. In contrast, the storm waves approaching from the west, west-southwest and southwest pass primarily over the deep water on their way to the shoreline within the bay and lose little energy. These storms have produced the greatest recorded damage at the north end of the bay.

Of the 45 major storms in the study period, 1910 to 1960, 20 have been listed as coming from the southwest or west; only 12 are described as arriving from the north or northwest (the remainder list no direction of approach). Of the 13 storms which have produced significant damage along the bay's interior, only one is described as coming from the northwest; 11 arrived from the southwest, and for two of these storms the direction was not listed. Thus, at least 85 percent of the storms that have caused damage approached from the south or southwest. Looking at the frequency of arrival of these storms, 13 occurred in a period of 69 years. In other words, damaging storms have struck the area every 5.3 years on average. This does not mean, however, that storms will actually occur every 5.3 years.

The record of historical storm damage illuminates some other processes of relevance to the subject property. The past damage to the Monterey Bay coastal area was often caused by the coupling or simultaneous occurrence of high tides and huge waves.

Although there have been numerous significant storms within Monterey Bay between 1984 and 1997, these storms have caused very little damage to structures. The 1997-1998 winter storms, however, did cause some structural damage, especially the storms of January and February 1998. Numerous roads and properties adjacent to the coastal bluffs were threatened. Several rip-rap revetments along the stretch of coast between Natural Bridges State Park, to the west, and Capitola Beach, to the east, were damaged by the large surf generated by these storms. To our knowledge, there were no buildings damaged in the Monterey Bay area, although the Capitola wharf lost several pilings in February 1998.

DESCRIPTION OF SITE AND VICINITY

The Local Geologic Map (Figure 5), Site Geologic Map (Plate 1), Geologic Cross Section (Plate 2) and Log of Borings (Appendix C) depict the relevant topographic and geologic information on the subject property.

Geomorphology

The subject property is situated upon the coastal bluff at Soquel Point, an elevated marine terrace between Corcoran Lagoon and Opal Cliffs (Figure 1). The coastal bluff here is about 30 feet high and was created by the combined processes of sea level fluctuation, tectonic uplift and coastal erosion over the past tens of thousands of years. The typical process of coastal bluff formation is as follows: As sea level lowers, waves erode a relatively smooth, planar surface into the bedrock shoreline. Erosion in the highlands above the shoreline deposits sediment across the newly emergent coastal plain. During this time, steady tectonic uplift elevates the coastal plain and region, forming a terrace. As sea level begins to rise again, a bluff is eroded into the seaward edge of the elevated terrace. With continued sea level rise, the bluff erodes further inland.

The Purisima Formation bedrock and marine terrace deposits which comprise the bluff-face at the subject site were at one time regularly attacked by the surf, but have since been protected from wave attack through various mitigation measures (Plate 1; Site Geologic Map, Plate 2; Geologic Cross Section).

Aerial photographs flown in 1928 show East Cliff Drive paralleling the terrace edge, immediately seaward of the parcel. There appears to be little or no bluff protection in the earliest photographs of the site, and at times, a small pocket beach formed between a bedrock platform downcoast and a small bedrock promontory just upcoast. By 1943, the terrace underlying East Cliff Drive had eroded away, possibly during the storms of December 1931 and/or 1940 (Appendix B). With erosion of the bedrock portion of the bluff proceeding at a relatively slow rate, wave runup also appears to contribute to erosional stripping of the unconsolidated terrace deposits at the site. This pattern of erosion creates a compound bluff-face consisting of a low bedrock shelf with a narrow bench, behind which the overlying terrace deposits form the upper bluff-face. In areas where significant stripping occurs, a broad bedrock platform or promontory will form, such as the one just downcoast. Sometime after 1948, a low wall was constructed upon the elevated bedrock shelf presumably to protect against stripping of the terrace deposits. The wall spanned the parcels upcoast and downcoast of the subject property. In 1953 the construction of a concrete retaining wall located upon the bedrock shelf and inland of the low wall provided additional protection for the marine terrace deposits from erosion caused by wave runup. Aerial photographs of the site

reveal undermining of the low wall in 1961. Between 1961 and 1963, concrete filled sandbags were stacked against the terrace deposits exposed above the retaining wall along the upcoast half of the property. To help prevent wave erosion, rip-rap was placed at the base of the bluff fronting the subject property in 1965, and a cover of small rip-rap was placed on the upper bluff-face above the retaining wall along the downcoast half of the property. Additional rip-rap was placed at the base of the subject bluff and the adjacent upcoast and downcoast parcels subsequent the El Nino winter storms of 1981-82 and 1982-83. Under a grading permit issued by the Santa Cruz County Planning Department, the concrete and sandbag retaining walls were extended and a reinforced concrete pad was also constructed at this time on the upcoast portion of the bluff (SCCPD, 1983)(Plate 1).

The rip-rap revetment, concrete retaining wall, and concrete sack wall and small rip-rap cover still serve to protect the bluff-face of the subject property today. Portions of the low concrete wall are visible on the adjacent downcoast parcels, whereas any remainder of it on the subject parcel is covered by rip-rap. The concrete pad also remains.

Earth Materials and Geologic Structure

The earth materials underlying the subject property consist of Purisima Formation bedrock overlain by marine terrace deposits. The bedrock at the toe of the subject bluff is covered by a rip-rap revetment, with the toe of the revetment covered by beach sand of seasonal depth. Our observations of the earth materials on the site are in general agreement with the published geologic map of Santa Cruz County (Figure 5; Brabb, 1989).

Exploratory borings advanced on the subject property and co-logged by our firm encountered marine terrace deposits (Qcl) to depths of 16 feet, underlain by Purisima Formation (Tp) bedrock. The marine terrace deposits generally consist of yellowish brown to very dark gray, poorly consolidated, crudely stratified clay, silt, sand and gravel and cobbles. The gravel and cobble horizons are typically concentrated in the lower half of the deposits. The terrace deposits are chiefly of fluvial origin, with the materials near the contact with the underlying wave cut platform showing reworking by surf action. The basal contact of the marine terrace deposits (the platform surface) has a slight seaward gradient (Plate 2).

Underlying the marine terrace deposits, the Purisima Formation comprises the lower portion of the bluff and is not exposed at the bluff-face due to the rip-rap cover. It is however exposed immediately downcoast and consists of well jointed fine to very fine grained sandy siltstone. The exploratory borings on the subject property penetrated the Purisima Formation below 16 feet depth, and the bedrock consisted of light olive brown to dark greenish gray fine to very fine grained sandy siltstone. The siltstone is friable (breaks easily) and horizontally laminated. Jointing exposed in the elevated bedrock platform downcoast is near vertical, with dominant joint sets trending 335 azimuth (roughly paralleling the bluff-face) and 230 azimuth (roughly perpendicular), with joint spacings ranging between 2 and 6 feet. Bedding in the bedrock dips a few degrees to the south. Please refer to Appendix C (Log of Borings) for a more detailed description of the subsurface materials encountered at the subject site.

A conspicuous, erosion-resistant bedrock promontory juts seaward from the bluff-face fronting the downcoast parcels. Prior to the El Nino winter storms of 1981-82, a smaller but similar

promontory projected from the bluff-face near the upcoast portion of the property. The remainder of this promontory, which was significantly eroded during the winter storms between 1981 and 1983, is now covered by rip-rap.

GEOLOGIC HAZARDS

Seismic Shaking

Seismic shaking at the subject site will be intense during the next major earthquake along local fault systems. Modified Mercalli Intensities of up to VIII are possible at the site (see Table 1), based on the intensities reported by Lawson et al. (1908) for the 1906 earthquake and by Stover et al. (1990) for the 1989 Loma Prieta earthquake. It is important that recommendations regarding seismic shaking be used in the design for the proposed development.

Deterministic Seismic Shaking Analysis

For the purpose of evaluating deterministic peak ground accelerations for the site, we have considered the San Andreas fault zone. While other faults or fault zones in this region are active, their potential contribution to seismic shaking at the site is overshadowed by the relatively short recurrence interval of earthquakes on the San Andreas fault. Table 2 shows the moment magnitude of the characteristic or maximum earthquake, its estimated recurrence interval and the distance from the causative fault to the site. We took the fault data from "Database of potential sources for earthquakes larger than magnitude 6 in Northern California" (WGNCEP, 1996) and "Probabilistic seismic hazard assessment for the state of California" (Petersen et al., 1996).

Also shown on Table 2 are deterministically derived accelerations. These accelerations are based on an attenuation relationship developed from the analysis of historical earthquakes. It is important to understand that shaking estimates of potential future earthquakes are based on the statistical analysis of shaking generated by past earthquakes. The calculated accelerations listed in Table 2 are the best estimates given the current methods and their application to the current database of past earthquakes. Therefore, we caution that the listed values are approximations, rather than precise predictions. Actual measured "free-field" accelerations at the site may be larger. Because the historical data can be interpreted in different ways, there are a number of different attenuation relationships available.

TABLE 1
Modified Mercalli Intensity Scale

The modified Mercalli scale measures the intensity of ground shaking as determined from observations of an earthquake's effect on people, structures, and the Earth's surface. Richter magnitude is not reflected. This scale assigns to an earthquake event a Roman numeral from I to XII as follows:

I	Not felt by people, except rarely under especially favorable circumstances.
II	Felt indoors only by persons at rest, especially on upper floors. Some hanging objects may swing.
III	Felt indoors by several. Hanging objects may swing slightly. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.
IV	Felt indoors by many, outdoors by few. Hanging objects swing. Vibration like passing of heavy trucks; or sensation of a jolt like a heavy ball striking the walls. Standing automobiles rock. Windows, dishes, doors rattle. Wooden walls and frame may creak.
V	Felt indoors and outdoors by nearly everyone; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset; some dishes and glassware broken. Doors swing; shutters, pictures move. Pendulum clocks stop, start, change rate. Swaying of tall trees and poles sometimes noticed.
VI	Felt by all. Damage slight. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knickknacks and books fall off shelves; pictures off walls. Furniture moved or overturned. Weak plaster and masonry cracked.
VII	Difficult to stand. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary buildings; considerable in badly designed or poorly built buildings. Noticed by drivers of automobiles. Hanging objects quiver. Furniture broken. Weak chimneys broken. Damage to masonry; fall of plaster, loose bricks, stones, tiles, and unbraced parapets. Small slides and caving in along sand or gravel banks. Large bells ring.
VIII	People frightened. Damage slight in specially designed structures; considerable in ordinary substantial buildings, partial collapse; great in poorly built structures. Steering of automobiles affected. Damage or partial collapse to some masonry and stucco. Failure of some chimneys, factory stacks, monuments, towers, elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed pilings broken off. Branches broken from trees. Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes.
IX	General panic. Damage considerable in specially designed structures; great in substantial buildings, with some collapse. General damage to foundations; frame structures, if not bolted, shifted off foundations and thrown out of plumb. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground; liquefaction.
X	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Landslides on river banks and steep slopes considerable. Water splashed onto banks of canals, rivers, lakes. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly.
XI	Few, if any masonry structures remain standing. Bridges destroyed. Broad fissures in ground; earth slumps and landslides widespread. Underground pipelines completely out of service. Rails bent greatly.
XII	Damage nearly total. Waves seen on ground surfaces. Large rock masses displaced. Lines of sight and level distorted. Objects thrown upward into the air.

EXHIBIT F

TABLE 2
Faults, Earthquakes and Deterministic Seismic Shaking Data

Fault	Moment Magnitude of Characteristic or Maximum Earthquake (M_w)	Estimated Recurrence Interval (years)	Site Classification	Distance from Site (km)	Estimated Mean Peak Ground Acceleration (g)	Estimated Mean + One Dispersion Ground Acceleration (g)
San Andreas (1906 rupture)	7.9	210	Rock	18.0	0.30	0.47
Zayante-Vergeles	6.8	8,820	Rock	12.5	0.29	0.46
Monterey Bay - Tularcitos	7.1	2,600	Rock	12.0	0.33	0.51
San Gregorio	7.3	400	Rock	18.5	0.24	0.37

We have employed a fairly conservative attenuation relationship derived by Abrahamson and Silva (1997) in estimating the acceleration values. Given their methods, the listed accelerations are based upon numerous factors, including: magnitude, closest distance to the rupture plane, fault type (strike slip, normal or reverse with position on hanging wall or footwall) as well as site classification ("rock" site or "deep soil" site). In addition, their regression was developed for the specific setting of shallow crustal earthquakes in active tectonic regions (e.g., western north America). It therefore provides region-specific flexibility within the tectonic setting of California. We have not performed site-specific seismic shaking evaluations. No on-site or laboratory measurements were made to evaluate site-specific seismic response. The values listed, however, do reflect the site classification.

If the deterministically derived accelerations are used for engineering analysis on the subject property, we recommend utilizing the accelerations generated by the San Andreas fault. This is due to the high predicted ground accelerations and the short recurrence interval of the San Andreas fault zone. Based on the results listed in Table 2, the earthquake ground motion (mean acceleration plus one dispersion) expected at the subject property will be approximately 0.47g, based on a M_w 7.9 earthquake centered on the San Andreas fault 18.0 kilometers northeast of the site. The duration of strong shaking is dependent on magnitude. Abrahamson and Silva (1996) have suggested a relationship between magnitude, distance and duration of strong shaking. On the basis of their relationship, the duration of strong shaking associated with a San Andreas faulting event generating a magnitude 7.9 earthquake and occurring 18.0 km from the site is estimated to be about 31 seconds. This long duration of seismic shaking may be even more critical as a design parameter than the peak acceleration itself.

Coastal Flooding

The coastal blufftop at the site sits at an elevation of about 30 feet relative to the North American Vertical Datum established in 1988 (NAVD 88). The rip-rap revetment which covers the bluff-face helps protect the subject property from coastal erosion and wave runup by dissipating the energy of breaking waves. However, with accelerated sea-level rise resulting from the effects of global warming, the proposed development is subject to increasing risk of inundation by

ocean storm waves during its assumed 100-year design lifetime. The site is most at risk for coastal flooding by oceanic storms approaching from the west-southwest to south-southwest (generally parallel to our cross section line shown on Plate 1).

The Federal Emergency Management Agency has not determined base flood elevations for this reach of coastline (FEMA, 2012).

The project geotechnical engineers have performed a wave runup analysis for the subject parcel utilizing the cross-section provided by our firm. Their analysis incorporates a postulated 3.5 feet of sea level rise over the project lifetime. The results of their analysis indicate a storm wave runup of approximately 20.8 feet should be anticipated at the site during the project lifetime (Rock Solid Engineering, 2013). This equates to an elevation of about 34.4 feet NAVD 88 and is 4.4 feet higher than the subject blufftop. The potential runup elevation inland from the blufftop resulting from its overtopping was computed by our firm utilizing the slope of the terrace surface, the height of wave overtopping and the runup distance as suggested by FEMA, 2012. The result of our overtopping analysis suggests a runup elevation, or design flood elevation, of 32.2 feet on the parcel.

In addition to the site being subject to inundation from storm wave runup, the proposed development may be at risk of impact from wave-borne debris.

Coastal Erosion

We evaluated bluff retreat at the subject site utilizing previous studies, aerial photographic analysis and geologic field mapping. Previous studies have shown that almost all of the annual sand supply for beaches in the Santa Cruz area can be attributed to littoral drift moving sand "downcoast" from west to east toward Capitola (see Griggs and Johnson, 1976, and references therein). Thus, any human intervention disrupting the normal littoral flow of sand would have a serious impact on the pocket beaches in the area. The construction of the Santa Cruz Yacht Harbor in 1962-1964 represented just such an event, as documented by Griggs and Johnson in 1976. Their aerial photographic studies showed that the beach at Capitola averaged about 180 feet in width for the period 1932-1961, prior to construction of the Yacht Harbor. When the west jetty for the harbor was completed in late 1962, the annual littoral flow of sand, totaling about 300,000 cubic yards, was effectively cut off, causing the upcoast beaches to expand and the downcoast beaches to shrink. By 1965 the beach at Capitola had been reduced in width by almost 90 percent to an average of only 20 feet (Griggs and Johnson, 1976). In 1970 the city of Capitola constructed a groin and imported sand in an effort to regain the lost beach.

The beaches immediately downcoast from the harbor fared better, recovering after a few years as the buildup of sand on the upcoast side peaked and littoral drift began bypassing the jetties. However, some of the sand bypassing the jetties is now diverted into the deeper water of the bay and never actually reaches the downcoast beaches. Furthermore, in the winter months the harbor mouth traps up to 30 percent of the entire annual littoral flow of sand (Griggs and Johnson, 1976). Although this sand is now dredged and reintroduced into the littoral drift system, the downcoast beaches are nevertheless deprived of a portion of this sand in the winter months when they need it the most to help protect the bluffs from surf erosion. With the downcoast beaches starved of sand by the yacht harbor jetty, the adjacent sea cliffs are subjected to intensified surf

attack and accelerated erosion. In 1963 and 1965, the U. S. Army Corps of Engineers installed rip-rap revetments along portions of the coastline to combat erosion, a measure that met with mixed success (Griggs and Johnson, 1976; 1979).

Griggs and Johnson (1979) established 60 stations along the coastline and measured the rate of cliff retreat at each using maps and aerial photographs generally covering the period 1853 through 1973. Their station 25, located just downcoast from the subject property, measured a blufftop retreat rate of about 0.7 feet per year over a span of 42 years (1931-1973). Our air photo analysis of blufftop retreat at the subject site was generally consistent with Griggs and Johnson's rate.

We examined several sets of stereo aerial photographs of the site and vicinity spanning the years 1928 through 2003. A small structure on the subject property is observable in the 1928 photographs. The structure is situated adjacent to South Palisades Ave. An addition to the structure, extending seaward, was constructed after 1931 but before 1943. The former East Cliff Drive thoroughfare, situated between the southwestern parcel boundary and the then blufftop, also existed prior to 1943. As previously mentioned, a low concrete wall was constructed upon the bedrock shelf sometime between 1948 and 1953. The existing retaining wall was also constructed in 1953, and later, the rip-rap revetment and blufftop protection measures. The most recent changes to the subject bluff appear in the 1984 aerial photographs as an extension of the concrete retaining wall and concrete sack wall upcoast. Also present in the 1984 photos is the addition of rip-rap to the revetment fronting the subject bluff as well as the upcoast and downcoast bluff. Aerial photographs subsequent to 1984 show a void in the downcoast revetment slowly developing. The void was apparent during our recent field reconnaissance of the subject bluff. The void may have formed due to selective plucking of rip-rap stones or failure of the downcoast toe of the revetment.

The typical process of coastal bluff erosion is as follows: Over time, wave erosion undercuts the base of the bluff, creating overhangs within the bedrock. These overhangs eventually fail along planes of pre-existing weakness (e.g., fractures, joints, inactive faults, and bedding), causing the lower bluff-face to retreat, which in turn undermines the marine terrace deposits exposed in the upper 15 feet of the bluff. The over-steepened marine terrace deposits gradually recline, usually by piecemeal sloughing. This entire process is repeated in an episodic fashion, and generates the eventual retreat of entire stretches of the coastal bluff.

Erosion of the coastal bluff through the process of wave attack at the subject property has essentially been halted by the construction of the rip-rap revetment, retaining wall and accompanying protection measures at the blufftop. We measured from aerial photographs the blufftop retreat rate at the subject property prior to the construction of these measures. During the period between 1928 and 1953 the blufftop retreated about 10 feet, resulting in an average retreat rate of 0.8 feet per year at the subject property.

No signs of bluff instability were observed on the subject site during our recent field mapping. We did note however, the exposed and partially undermined footing of a portion of the concrete retaining wall on the downcoast parcel (Plate 1).

EXHIBIT F

In determining the 100-year blufftop development setback for the subject property, we assumed the permitted coastal protection structures at the site will be inspected and maintained throughout the lifetime of the proposed development. Our setback analysis considered an imaginary 1.5:1 slope from the base of the terrace deposits at the existing concrete retaining wall. This setback takes into account a few assumptions; 1) the angle of repose of the terrace deposits is 1.5:1; and 2) the wall (and revetment) are maintained over the 100-year lifetime of the project and then fail. In this case, the 100-year blufftop setback determined by our firm is less than the minimum setback of 25 feet required by the Santa Cruz County Planning Department. For clarity, we depict the minimum 25 foot setback on Plate 1.

Continued undermining of the retaining wall on the adjacent downcoast bluff poses a potential erosion hazard to the subject bluff. Additionally, failure of the downcoast portion of the wall may affect the integrity of the portion of the wall currently protecting the subject property.

Sea Level Rise

The earth experiences climatic cycles in which warming and cooling of the atmosphere and surface of the earth occurs over various lengths of time. These cycles, also known as Milankovitch cycles, determine the amount and angle of incidence of solar insolation on a given portion of the earth. Global cooling (ice ages) occurs when the amount of sunlight reaching the earth is low, and global warming occurs when the earth is receiving greater amounts of insolation. Terrestrial phenomena such as volcanic eruptions, meteor impacts, even large dust storms can also have an effect on global earth temperature.

Throughout the late Pleistocene and Holocene, sea level has been rising due to a natural warming of earth's surface and atmosphere as the earth emerges from the most recent ice-age (about 15,000 years ago). Since the onset of the industrial revolution in the early to mid-1800's, an increasing amount of man-made atmospheric pollution may be causing a significant increase in the rate of earth's warming.

Theories regarding the Greenhouse Effect state that there is an ongoing, accelerated rate of global warming due to entrapment of gases and resultant reflection of radiation in the atmosphere due, in part, to increased production of atmospheric waste by industrial societies throughout the world. With time, the continued warming of the atmosphere could cause increased melting of the polar ice caps, which in turn will result in an accelerated rise in sea level.

Since 1880, global sea level has risen nearly 8 inches. Satellite measurements of the world's oceans since 1993 show that sea levels are rising 0.12 inches or more per year (Climate Change International Scientific Congress, 2009). This is approximately double the rate of sea level rise since 1880. In 2007, the Intergovernmental Panel on Climate Change (IPCC) projected sea levels to rise between about 7 and 23 inches by 2100. This range in rates roughly matches the sea level rise rate since 1880 on the low end, and again doubles the measured rate of sea level rise since 1993. The IPCC 2007 did not factor into their estimates uncertainties in the climate-carbon cycle feedback, nor the full effects of ice sheet flow. The Climate Change International Scientific Congress in 2009 concluded that the IPCC 2007 estimates may be a lower-bound for global sea level rise, with sea levels rising by 20 to 40 inches by 2100.

Formal projections of future sea-level rise along the west coast of the United States have not been made, however some studies have proposed ranges of possible sea-level outcomes for the California Coast south of Cape Mendocino. The Committee on Sea Level Rise in California, Oregon, and Washington (2012) projects sea levels to rise between 1.6 and 11.8 inches by 2030, between 4.7 and 24 inches by 2050, and 16.5 to 65.7 inches by 2100, relative to year 2000 levels. The greater range of projected long term sea level rise arises from uncertainties in future input variables. For this study, we have selected a potential 3.5 foot rise in sea-level over the project lifetime.

Formation of the cliff fronting the subject bluff is the result of a gradual rise in sea level. Although no appreciable bluff erosion has occurred at the subject site since 1984, accelerated sea level rise will likely cause more rapid degradation of existing bluff protection measures at the site, and a more rapid rate of bluff retreat along the Santa Cruz County coastline as a whole.

It is difficult to say with any certainty what future rates of sea level rise will be, but current estimates of sea level rise in the next 100 years anticipate the most rapid rise will be toward the end of the 21st century and thus the higher rate of bluff retreat will occur toward the end of the century as well. The relevance of this for the subject property and adjacent properties is that more frequent storm wave runup will occur, and more frequent maintenance to the existing bluff protection structures may be necessary.

As modeling practices become better refined and the human contribution to global warming and resulting sea-level rise is better understood, future rates of sea-level rise and its impact on coastal erosion will become more predictable.

Sea Level Rise vs. Local Tectonic Uplift

Various researchers have determined long-term uplift rates of the Santa Cruz coastline, either through the age-dating of marine terraces, examining fission tracks in rocks, or by geodesy. The rates of coastal uplift in the Santa Cruz area reported from this research ranges between about 0.1 and 1.0 millimeter per year. Since 1993, satellite measurements have shown that the oceans are rising 3 millimeters (0.12 inches) or more per year, or about three times the highest reported uplift rate (Climate Change International Scientific Congress, 2009).

The 1989 Loma Prieta Earthquake caused uplift of the region west of the fault rupture zone, with greatest uplift occurring closer to the fault. Resurveying of benchmarks in the vicinity of the subject property after the Loma Prieta event revealed that the subject area experienced slightly over ½ inch of uplift as a result of the earthquake (County of Santa Cruz Department of Public Works, 1995). This may be a minimum value, as research by others suggests greater amounts of uplift. Because of the long-term episodic nature of regional uplift, we have not factored tectonic uplift into any sea level rise estimate for the subject site during the project lifetime.

Slope Stability

Coseismic Slope Stability

As previously mentioned, the subject property will be subjected to strong ground shaking in the event of a large magnitude earthquake centered on the nearby San Andreas fault. Past ground shaking has triggered numerous failures of varying size along the coastal bluffs in the Santa Cruz region. Review of the local newspaper coverage (Youd and Hoose, 1978), and the Carnegie Commission Report (Lawson et al., 1908) of the 1906 earthquake disclosed no documented accounts of large-scale sea cliff failure in Santa Cruz County due to the earthquake, though there was much sloughing of "earth" from the bluffs near Capitola (Lawson et al., 1908, p. 272). This apparently involved portions of the poorly consolidated terrace deposits that were shaken loose during the earthquake.

The 1989 Loma Prieta earthquake generated numerous coastal bluff failures in the Santa Cruz area. The lithology of the particular site controlled the mode of failure (Plant and Griggs, 1990). Competent, well-jointed Purisima Formation sandstone underlies the coastal bluff from Seabright Beach to New Brighton State Beach and rock falls were the typical mode of failure. Between New Brighton State Beach and Aptos Creek, translational landslides with blufftop fissuring occurred within the terrace deposits. Little failure occurred within the moderately indurated and weakly jointed underlying Purisima Formation sandstone. From Aptos Creek to Manresa State Beach similar translational landsliding occurred within the terrace deposits. Here however, the terrace deposits are underlain by Aromas Sands which also failed in shallow, dry sand flows. South of Manresa State Beach the weakly consolidated dune deposits (which overlie terrace deposits and Aromas Sand) failed as shallow translational slabs.

In the vicinity of the subject property (from Seabright Beach to New Brighton State Beach) failure of the bluff resulting from the Loma Prieta earthquake was primarily by rock fall and block fall (Plant and Griggs, 1990). The Purisima Formation bedrock in the site vicinity is well indurated but extensively jointed. Failures occurred in areas where the toe of the bluff had been undercut by wave erosion. Failure planes were primarily along joint surfaces and the size of the failure was dependent on joint spacing, orientation and the degree of undercut. Where the toe of the bluff was protected and not undercut (as exists at the subject property), failures were rare.

Aerial photographs taken after the 1989 Loma Prieta earthquake did not indicate any failure of the bluff or protection structures constructed on the bluff-face.

Deep-seated landsliding, incorporating the entire height of the coastal bluff, is possible; however, this type of landslide does not appear to be a common mode of failure. The lack of topographic evidence suggestive of large, deep-seated landsliding (i.e., scarps, bowl-shaped swales, hummocky topography) indicates this failure mechanism has not contributed to recent cliff retreat (Plant and Griggs, 1990). However, the coastal bluff in Santa Cruz County has not been subject to strong seismic shaking under wet winter conditions since the 1906 San Francisco Earthquake. No large-scale, deep-seated landslides of the coastal bluff were reported in Santa Cruz County subsequent to the 1906 event. Although, the lack of reported deep-seated landslides is not a guarantee against their occurrence; reconnaissance mapping was limited in this area and

the lack of large failures cannot be confirmed due to a lack of photographic coverage during that time frame.

Aseismic Slope Stability

The sea cliff is also subject to slope failure under aseismic conditions. Although generally smaller than seismically generated failures, storm generated failures are an order of magnitude more common (a ten-year cycle versus a hundred-year cycle). Small-scale slumping is the chief process affecting the marine terrace deposits in the upper portion of the bluff. These materials generally fail due to saturation. At the subject site however, the terrace deposits are protected by a rip-rap revetment and cover which has greatly reduced the potential for major slumping.

Liquefaction

Based on our subsurface findings and literature research, it is unlikely for liquefaction to occur on the subject property.

CONCLUSIONS

The coastal blufftop property is located in Santa Cruz County, California, at 2864 South Palisades Avenue. The coastal bluff backing the property is about 30 feet high, with a permitted rip-rap revetment, concrete retaining wall and secondary measures protecting the bluff-face from scour and wave erosion. Proposed development plans call for razing the existing home on the property and constructing a new single-family residence. Development regulations require new construction be set back from the estimated 100-year coastal blufftop or a minimum of 25 feet, whichever is greater. Provided the permitted coastal protection measures on the subject property are maintained throughout the lifetime of the project, and our recommendations are closely followed, it is our opinion that a 25 foot setback from the coastal bluff is adequate for new development on the property. The primary geologic hazards to the property include seismic shaking, coastal erosion, coastal flooding and wave and/or impact from wave borne debris.

The site is located in an area of high seismic activity and will be subject to strong seismic shaking in the future. Modified Mercalli Intensities of up to VIII are possible. The controlling seismogenic source for the subject property is the San Andreas fault, 18 kilometers to the northeast. The design earthquake on this fault should be M_w 7.9. Expected duration of strong shaking for this event is about 31 seconds. Deterministic analysis for the site yields a mean peak ground acceleration plus one dispersion of 0.47g.

The blufftop and area beyond the blufftop setback lies at an elevation of about 30 feet NAVD 88. The proposed development is at a moderate risk from inundation by ocean storm waves and possibly wave-borne debris as a result of projected sea level rise during the assumed 100-year lifetime of the project. The project geotechnical engineer has calculated a wave runup height of 20.8 feet at the subject blufftop, corresponding to a runup elevation of 34.4 feet NGVD 88. Wave runup inland from the overtopping of the blufftop has been calculated to reach an elevation of 32.2 feet. This is the design flood elevation.

A concrete retaining wall and rip-rap revetment spans the subject bluff-face and extends upcoast and downcoast along the bluff-face. Since 1984 a void has developed in the downcoast portion of the revetment due to selective plucking of rip-rap stones, or failure of the base of the revetment. This has left the adjacent retaining wall and a portion of its footing exposed to ocean waves and erosional scour.

The home on the subject property will be subject to "ordinary" risks (as defined in Appendix D) over the assumed design lifetime of 100 years if our recommendations and those of the project geotechnical engineer are followed. Appendix D should be reviewed in detail by the property owner to determine whether an "ordinary" level of risk is acceptable. If "ordinary" risks as defined are unacceptable, then the geologic hazards in question should be further mitigated to reduce the corresponding risks to a lower level.

RECOMMENDATIONS

1. The proposed new residence is geologically feasible and should be founded at or behind the 25 foot blufftop setback line depicted on Plate 1. A representative from our firm must inspect any new development on the blufftop for conformance with the blufftop setback.

2. It is the responsibility of the property owner to arrange for inspection and maintenance of the existing permitted coastal protection structures which protect the subject bluff. The concrete retaining wall and rip-rap revetment should be inspected regularly by the project engineering geologist, geotechnical engineer or similarly qualified professional. We recommend an inspection every five years or after intense winter storms. The inspection must note any changes in the blufftop, bluff-face, bluff-toe or existing protection measures and necessary maintenance and/or repairs should be performed by a qualified contractor as soon as feasible.

   The revetment and retaining wall are continuous along the bluff, spanning several parcels, and it is important that the structures function as a unit. The exposed footing of the portion of the retaining wall on the downcoast parcel should be repaired to prevent damage to the portion of wall protecting the subject property should the downcoast portion of the wall fail. The geologist and geotechnical engineers of record for the adjacent downcoast parcel should prepare and implement a remediation plan to prevent further damage to the retaining wall and potential loss of bluff. A suitable repair may include a deepened wall footing and additional rip-rap quarrystones of sufficient number and size.

   In the event the downcoast portion of the retaining wall does fail, provisions should be made to protect the subject wall and bluff. Easton Geology and Rock Solid Engineering should be contacted to inspect the condition of the revetment and retaining wall to determine an appropriate repair strategy if such failure occurs.

3. To reduce the risk of property damage associated with inundation from coastal flooding, the finished floor of the new home should be elevated above existing grade. We recommend the lowest structural member of the proposed residence be elevated at or above the design flood elevation of 32.2 feet in accordance with Santa Cruz County code

section 16.070 H(5)(c) and ASCE 24-05. Additionally, hurricane shutters, or increasing the setback distance from the top of the bluff will help alleviate potential hazards associated with wave-borne debris impact.

We recommend the new residence be supported by piers which penetrate sufficiently into the underlying terrace deposits to prevent potential undermining of the structure by scour associated with wave runup. The project geotechnical engineer has specified sufficient pier depths of 10 feet below grade.

4. The project engineers and architect should review our seismic shaking parameters and choose a value appropriate for their particular analyses.

5. Drainage from improved surfaces, such as walkways, patios, roofs and driveways on the property should be collected in impermeable gutters or pipes and either carried to the base of the bluff via closed conduit or discharged into an established storm drain system that does not issue above or behind the existing retaining wall. The functionality of any pre-existing drainage system on the subject property that satisfies this recommendation must be verified prior to any new development.

   Any seawater that drains from the property as a result of wave runup should be allowed to sheetflow evenly back toward the blufftop. Alternatively, area drains may be constructed to collect the seawater and discharge it at the base of the bluff. At no time should any concentrated discharge be allowed to spill directly onto the ground adjacent to the existing residence. The control of runoff is essential for control of erosion and prevention of ponding.

6. We request the privilege of reviewing all geotechnical engineering, civil engineering, drainage, and architectural reports and plans pertaining to the proposed development and mitigation measures.

INVESTIGATION LIMITATIONS

1. The conclusions and recommendations contained herein are based on probability and in no way imply that the proposed development will not possibly be subjected to ground failure, seismic shaking, coastal erosion or landsliding of such a magnitude that it overwhelms the site. The report does suggest that using the site for residential purposes in compliance with the recommendations contained herein is an acceptable risk.

2. This report is issued with the understanding that it is the duty and responsibility of the owner or his representative or agent to ensure that the recommendations contained in this report are brought to the attention of the architect and engineers for the project, incorporated into the plans and specifications, and that the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

3. If any unexpected variations in soil conditions or if any undesirable conditions are encountered during construction, Easton Geology should be notified so that supplemental recommendations may be given.

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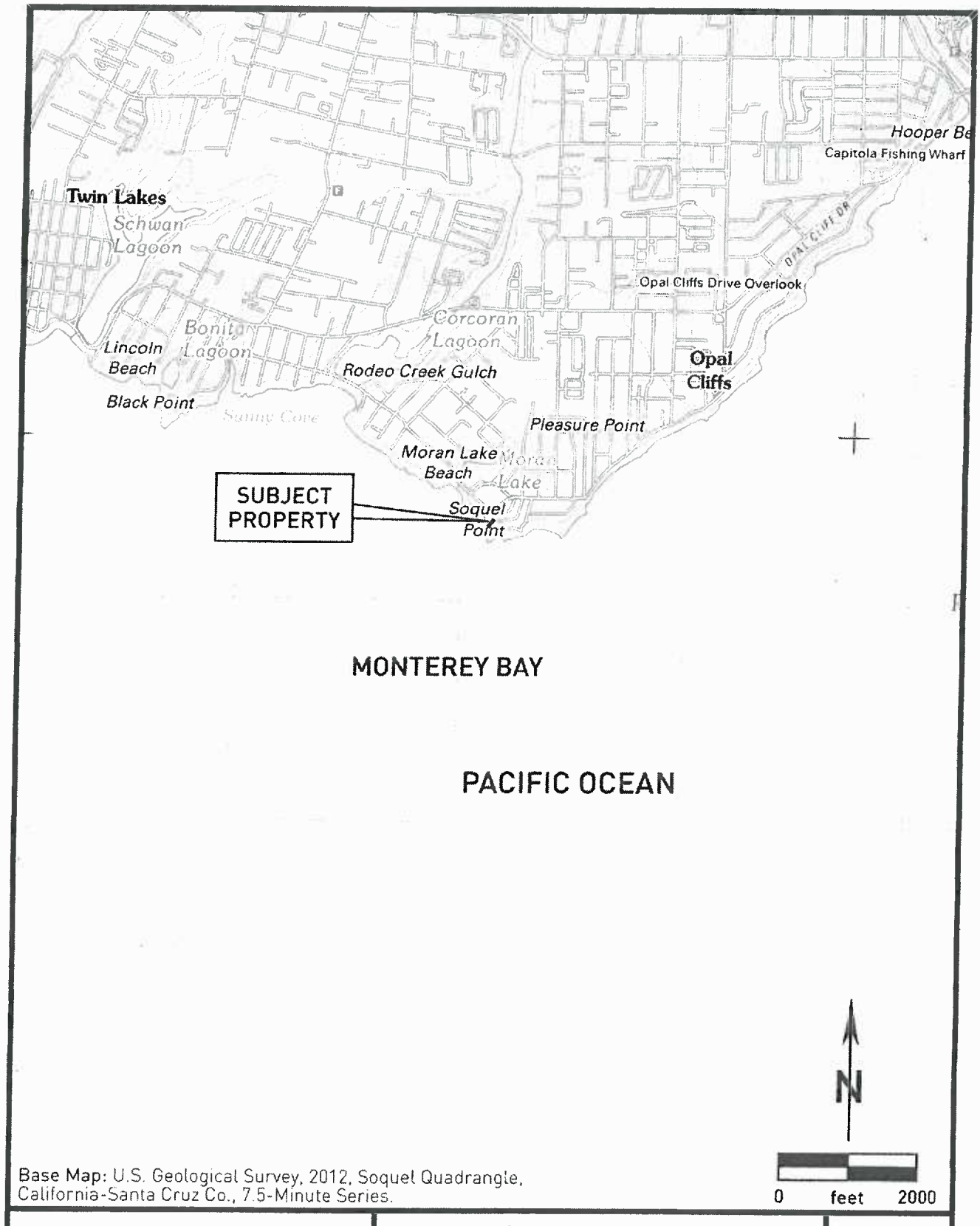
APPENDIX A

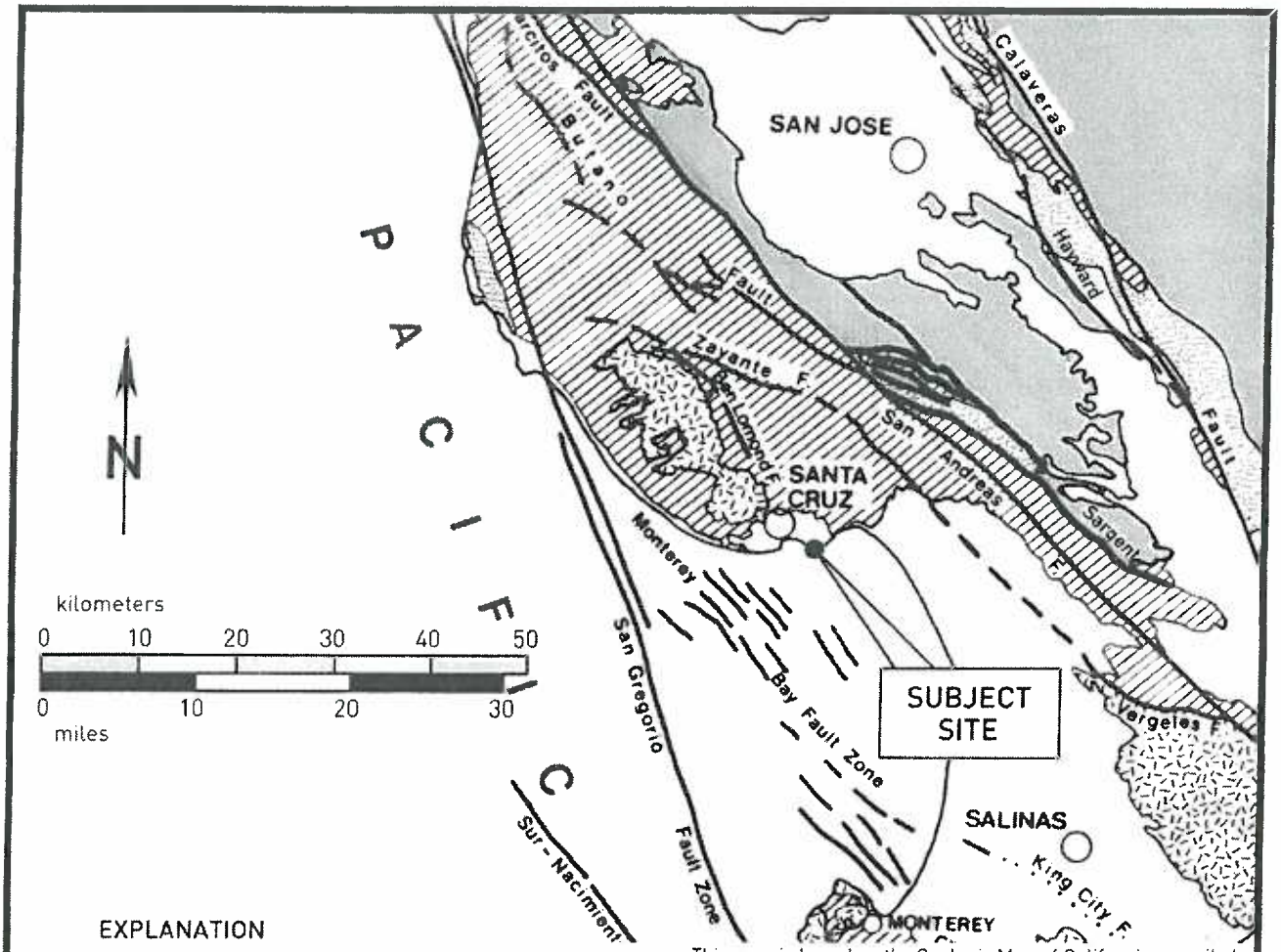
FIGURES 1 through 5



Base Map: U.S. Geological Survey, 2012, Soquel Quadrangle, California-Santa Cruz Co., 7.5-Minute Series.

EASTON GEOLOGY P.O. Box 3533 Santa Cruz, California 95063 831.247.4317	SITE LOCATION MAP Lowe property 2864 South Palisades Avenue Santa Cruz, California Santa Cruz County APN 028-304-55	FIGURE # 1 JOB # C13006

EXHIBIT F



This map is based on the Geologic Map of California compiled by C.W. Jennings, R.G. Strand, and T.H. Rogers, 1977.

EXPLANATION

ROCK UNITS

- Quaternary Sediments - marine and nonmarine deposits, some Pliocene and Pleistocene nonmarine deposits
- Tertiary Sediments - marine and nonmarine deposits, some volcanics
- Cretaceous and Tertiary-Cretaceous Sediments - Upper and Lower Cretaceous marine sediments, some Tertiary-Cretaceous marine sediments

Basement Rocks

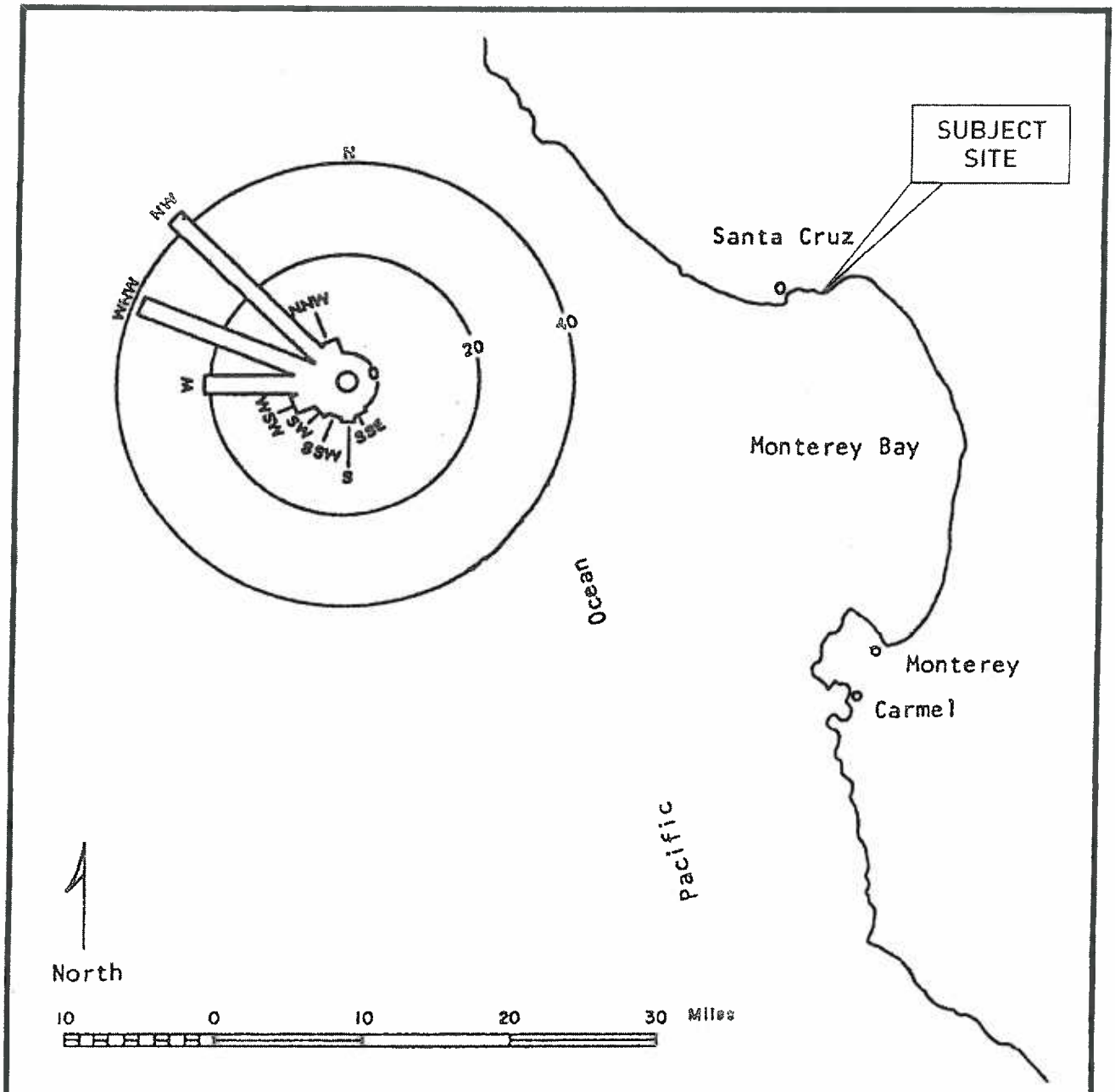
- Franciscan Complex - Cretaceous and Jurassic sediments, fragmented and sheared melange, some metamorphic and ultramafic rocks
- Plutonic, Igneous and Metamorphic Rocks - Mesozoic granitic rocks, Paleozoic or Mesozoic and Precambrian schists, pre-Cenozoic metasedimentary and metavolcanic rocks, minor Paleozoic or Mesozoic limestone

SYMBOLS

- Geologic boundary
- Fault trace

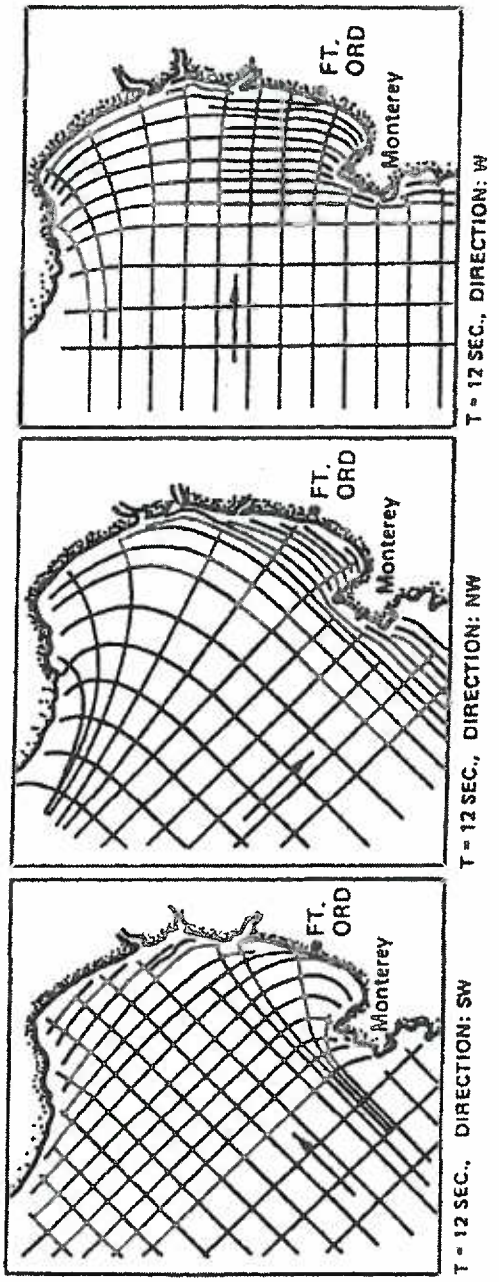
EASTON GEOLOGY P.O. Box 3533 Santa Cruz, California 95063 831.247.4317	REGIONAL GEOLOGIC MAP Lowe property 2864 South Palisades Avenue Santa Cruz, California Santa Cruz County APN 028-304-55	FIGURE # 2 JOB # C13006

EXHIBIT F



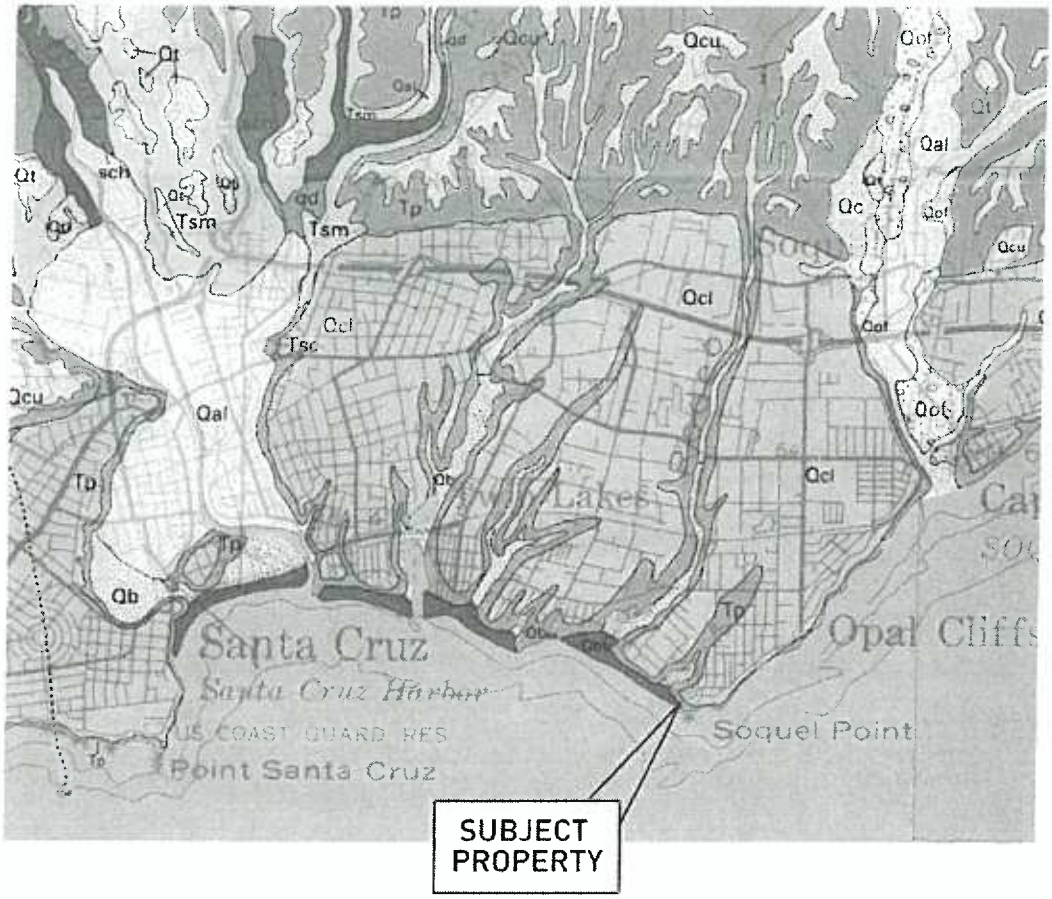
Source : National Marine Consultants, 1960.

EASTON GEOLOGY P.O. Box 3533 Santa Cruz, California 95063 831.247.4317	WAVE DIRECTION and FREQUENCY Lowe property 2864 South Palisades Avenue Santa Cruz, California Santa Cruz County APN 028-304-55	FIGURE # 3 JOB # C13006



Source : Wiegel 1964.

EASTON GEOLOGY P.O. Box 3533 Santa Cruz, California 95063 831.247.4317	MONTEREY BAY WAVE REFRACTION Lowe property 2864 South Palisades Avenue Santa Cruz, California Santa Cruz County APN 028-304-55	FIGURE # 4 JOB # C13006



EXPLANATION

Qal	Alluvial deposits, undifferentiated
Qb	Basin deposits
Qof	Older flood-plain deposits
Qbs	Beach sand
Qt	Terrace deposits, undifferentiated
Qcu	Coastal terrace deposits, undifferentiated
Qcl	Lowest emergent coastal terrace deposit
Tp	Purisima Formation
Tsc	Santa Cruz Mudstone
Tsm	Santa Margarita Sandstone
qd	Quartz diorite
sch	Metasedimentary rocks

Contact

Fault

Strike and dip of stratified rock

N

0 miles 1

Base Map: "GEOLOGIC MAP OF SANTA CRUZ COUNTY, CALIFORNIA." compiled by Earl E. Brabb, 1989, United States Geological Survey, Miscellaneous Investigation Series, Map 1-1905, scale 1:62,500.

EASTON GEOLOGY
P.O. Box 3533
Santa Cruz, California 95063
831.247.4317

LOCAL GEOLOGIC MAP
Lowe property
2864 South Palisades Avenue
Santa Cruz, California
Santa Cruz County APN 028-304-55

FIGURE # 5
JOB # C13006

EXHIBIT F

APPENDIX B

STORM HISTORY OF MONTEREY BAY AND THE CENTRAL COAST, 1910 TO PRESENT

EXHIBIT F

STORM HISTORY OF MONTEREY BAY AND THE CENTRAL COAST 1910 TO PRESENT

(Compiled from U. S. Army Corps of Engineers, 1958, 1998; Bixby, 1962; California Coastal Commission, 1978; Griggs and Johnson, 1983; Santa Cruz Sentinel and Watsonville Register-Pajaronian)

Date	*Description and Damage*	*Direction or Type of Storm*
Mar 21 1910	Heavy storm off coast, mountainous seas. No damage.	.....
Nov 22 1910	Bay was very rough and surf was running high. No ships able to enter or leave Monterey harbor. No damage.	.....
Feb 13 1911	Mountainous waves reported along the beach north of Monterey. No damage.	.....
Oct 4-11 1912	Strong northwest wind and heavy swell. Several wharves at Monterey damaged and boats beached. Heavy surf.	.....
Dec 1912	Watsonville Wharf damaged; waves washed up to Casino building; heaviest seas in history of Monterey Bay.	.....
Apr 29-30 1915	Heavy surf and strong winds. Considerable damage to structures and boats.	.....
Nov 26 1915	Large and powerful waves breaking over wharves at Monterey. No damage.	.....
Jan 27 1916	Southwest gale. Steamship pier at Moss Landing destroyed by tremendous swells.	"southwest gale"
Nov 29-Dec 1 1923	Northeast gale swept 15 boats ashore at Monterey. Heavy seas outside harbor. Freighter beached at Santa Cruz.	"northeast gale"
Feb 11-15 1926	Southerly gale winds and wave damage all along California coast. Pier damaged at Moss Landing. High tide and waves destroyed bathhouse at Santa Cruz; concession building lost practically all of underpinnings. Downtown Capitola flooded. Venetian Court apartments undercut. High waves washed completely over 2,000 feet of new sea wall at Seacliff State Beach, carrying debris back to cliff. Portions of sea wall undercut and caved in. Beach road washed almost entirely away. Sea wall at Swanton Beach partially destroyed. Seaside Company's bandstand collapsed. Breaker broke into and destroyed Ideal Fish Restaurant.	"southerly gale"
Oct 25 1926	Heavy swells running into bay. Giant combers rolled shoreward carrying bay waters almost up to high line of last February's storm. Swept up to Casino.	.....
Dec 8-9 1926	Heavy swells washed one boat ashore at Monterey. No significant damage.	.....
Feb 14-16 1927	At the time, reported to be most violent storm in history of Pacific coast. During high tide, breakers rolled clear to the esplanade. Dashed against Casino. Concrete sea wall at Seacliff State Beach destroyed.	"heavy southwester"

Oct 4 1927	Huge breakers reported along Central California coast. No damage reported.	.....
Dec 30 1928	Powerful surges in Monterey harbor causing damage to freighter attempting to moor.	.....
Jan 3 1931	Piling of Municipal Pier loosened. Boarding in front of Casino damaged.	heavy southwest swell
Feb 4 1931	Damage at Santa Cruz Casino building. High breakers and ground swells. Waves reached bottom of wharf, 14 to 20 feet above mean lower low water.	.....
Feb 20 1931	North winds of gale intensity. Several small boats wrecked.	north winds
Nov 20-21 1931	Strong winds and heavy seas beached numerous small boats at Monterey. No damage to Santa Cruz wharf.	northwest gale
Dec 23-29 1931	Violent storm. Entire coastal area affected. East Cliff Drive between Santa Maria Del Mar and Soquel Point cut by wave action and sections lost. Large quantities of sand eroded from Twin Lakes Beach. At Seacliff State Beach, concession building and bathing pavilion wrecked. Beach littered with debris brought down by storms. Giant breakers washed over pier at Capitola (20 feet above mean lower low water). Considerable damage to Casino.	winds first from southwest, then northwest
Dec 20-21 1932	Very rough on bay and waves breaking over breakwater under construction at Monterey.	winds from northwest
Dec 19 1935	Very heavy surf. Giant breakers demolished steps opposite Nichols Fishing Trip offices on wharf and damaged Stagnaro building.	.....
Dec 10-11 1937	Coast Road closed at Waddell. Boats beached at Stillwater Cove.	southwest winds
Dec 9-10 1939	High waves. Breakers and high tide combined to flood lower East Cliff Drive area. Deep water wave height hindcast at 20 feet. At Seacliff State Beach, timber bulkhead destroyed and shoreward end of pier damaged.	southwest wind waves
Jan 8 1940	Casino at Capitola almost a complete wreck. Santa Cruz Casino damaged. East Cliff Drive between Santa Cruz and Capitola weakened. Piling broke loose from wharf. Flooding of a motor camp at Seabright. Debris and mud deposited up to entrance at Casa Del Rey Hotel. Boardwalk drenched.	.....
Feb 26-28 1940	Beach eroded and littered with logs. Hindcasted waves of 25 feet in height.	southwest wind, waves and swell
Dec 26-27 1940	Highway 1 closed after 800 feet of roadway washed away at Waddell from high seas. Timbers along boardwalk collapsed. Huge sections of East Cliff Drive at Schwann's Lagoon collapsed. Crux of local weather trouble was at Seacliff State Beach. Logs up to 10 feet were tossed onto road. An 80-foot section of pier washed out. Houses damaged. 80 feet of Seacliff State Beach lost. Two sections of sea cliff bulkhead ripped out. At Moss Landing houses were under a foot of water.	.....
Jan 8-13 1941	At Seacliff State Beach, about one-half of a timber bulkhead and 60 feet of shore end of pier destroyed. Beach eroded to bedrock.	waves and swell from southwest; crests level with deck of pier (+20 feet above mean lower

EXHIBIT F

		low water)
Feb 11-13 1941	Large waves in bay. West Cliff Drive caves in. Residents in Seacliff State Beach cut off by slides.	.....
Feb 26-28 1941	Heavy winds, gigantic waves, breakers smashed Casino steps. West Cliff Drive closed due to cliff erosion from wave action. Hindcast wave height at 22 feet.	south-southwest and south- west wind waves and swell
Dec 24-25 1942	North winds and high surf beached four purse seiners at Monterey.	north winds
Jan 22 1943	High surf reported but no wave damage.	southwest winds
Dec 8-9 1943	Very strong northeast winds wrecked 40 fishing boats, piers and pilings in Monterey harbor.	northeast wind
Feb 1-2 1945	Southerly winds and heavy seas. No damage reported.	southerly winds
Mar 4 1946	North winds up to 40 knots. Two large purse seiners washed ashore.	north winds
Jan 28 1947	Northerly gale force winds; 43-foot fishing boat capsized and beached; 80-foot section of dike holding dredge spoil washed out in Monterey.	northerly gale
Apr 4 1947	Strong northerly winds with high surf in bay.	northerly winds
Feb 23 1948	Northwest winds up to 50 mph. Some boats beached in Monterey. Damage light.	northwest winds
Jan 2-3 1949	High winds and seas. Several boats adrift and one lost in Monterey.	.....
Oct 27-29 1950	Northerly gale winds accompanied by gigantic waves pounded Monterey Peninsula. Considerable shoreline erosion. Most damage caused by huge waves which swept up across Aptos Beach Drive at Rio Del Mar Beach. 15 foot combers carried fence posts smashing against residences. Beach club severely battered by waves at Rio Del Mar Beach with sea water and sand flooding many of the 33 homes along the beach. At Seacliff State Beach, 2 large pontoons were torn from their moorings. Homes along beach between Seacliff State Beach and New Brighton State Beach were not damaged as sea wall provided protection. At Santa Cruz waves were 10 to 15 feet high.	northerly gale
Dec 2 1951	Southerly winds up to 40 mph. High surf but no damage.	southerly winds
Feb 231953	Northeast gale winds up to 60 mph drove 7 large fishing boats ashore in Monterey.	northeast winds
Nov 13 1953	Southerly winds. Pleasure Pier at Santa Cruz damaged. waves overtopped sea wall at Capitola. Beaches eroded. 14-foot waves.	southerly winds

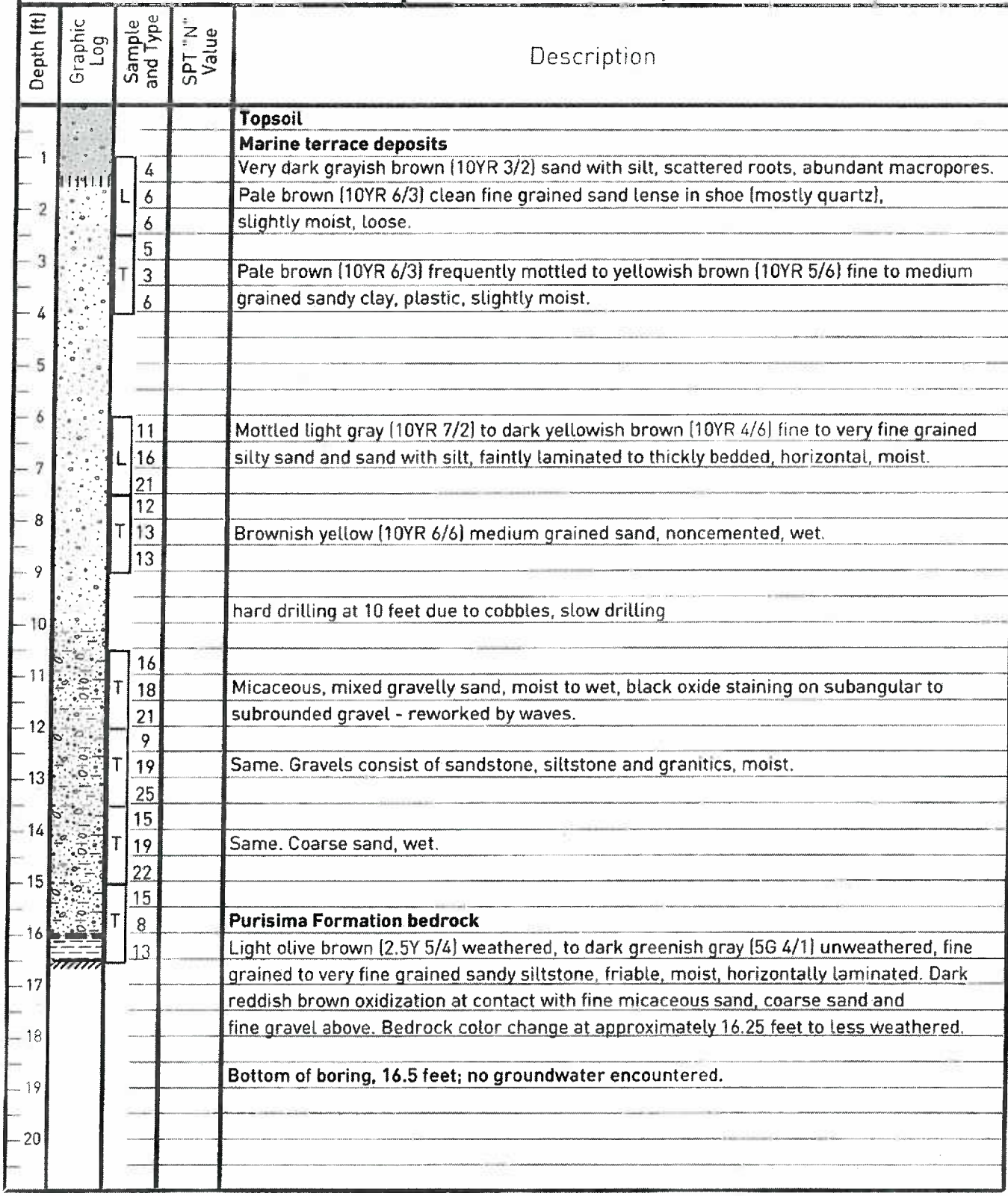
Oct 7 1954	Foreshore of beaches from Santa Cruz to Rio Del Mar lowered. 3 to 5 foot scarp.	heavy ground swells from southwest
Feb 9-10 1960	Southerly winds up to 45 mph with gigantic waves. Rio Del Mar, Capitola and Seacliff State Beach took brunt of waves. At Capitola waves smashed beach restaurants and amusement concessions. At Rio Del Mar, 25 luxury homes along Beach Road were damaged by gigantic waves. At Seacliff State Beach, camping sites were destroyed, restrooms nearly destroyed. At times during the storm, the concrete ship disappeared completely. One wave took out the end of the concession buildings on wharf. Large areas of hardtop parking areas washed away.	southerly and westerly winds
Winter 1969	Storm waves attacked the Pajaro Dunes area. Erosion of the dunes occurred in certain areas and about 12 lots experienced severe erosion with stairs being undercut. Some automobile bodies were brought in for protection and placed at the toe of the scarp cut by the waves.	.....
Feb 11-15 1976	High waves washed completely over new sea wall at Seacliff State Beach, carrying debris back to cliff. Portions of sea wall undercut and caved in.	southerly gale
Jan 8-9 1978	Sea wall at Seacliff State Beach overtopped and logs and debris scattered across parking and camping area. Extensive damage to sea wall.	storm from southwest
Feb 1980	$1.1 million in damage at Seacliff State Beach. Storm destroyed entire lower beach portion of park, taking roads, parking for 324 cars, and a 2,672 foot sea wall.	southwest
Jan 28-30 1983	$740,000 in damage at Seacliff State Beach. 2,800 feet of new sea wall damaged. 700 feet totally destroyed; 11 RV sites destroyed; restroom heavily damaged; logs and debris washed back to cliff.	waves from southwest
Feb 3-7 1998	Extensive cliff erosion, beach sour, and economic losses.	waves from south and west

APPENDIX C

LOG OF BORINGS

EXHIBIT F

EASTON GEOLOGY P.O. Box 3533 Santa Cruz, California 95063 831.247.4317	LOG OF EXPLORATORY BORING Lowe property 2864 South Palisades Avenue Santa Cruz, California Santa Cruz County 028-304-55	BORING # B-1 JOB # C13006



Depth (ft)	Graphic Log	Sample and Type	SPT "N" Value	Description
				Topsoil
				Marine terrace deposits
1		L	4	Very dark grayish brown (10YR 3/2) sand with silt, scattered roots, abundant macropores.
			6	Pale brown (10YR 6/3) clean fine grained sand lense in shoe (mostly quartz),
2			6	slightly moist, loose.
		T	5	
3			3	Pale brown (10YR 6/3) frequently mottled to yellowish brown (10YR 5/6) fine to medium
			6	grained sandy clay, plastic, slightly moist.
4				
5				
6		L	11	Mottled light gray (10YR 7/2) to dark yellowish brown (10YR 4/6) fine to very fine grained
			16	silty sand and sand with silt, faintly laminated to thickly bedded, horizontal, moist.
7			21	
		T	12	
8			13	Brownish yellow (10YR 6/6) medium grained sand, noncemented, wet.
			13	
9				
				hard drilling at 10 feet due to cobbles, slow drilling
10				
			16	
11		T	18	Micaceous, mixed gravelly sand, moist to wet, black oxide staining on subangular to
			21	subrounded gravel - reworked by waves.
12			9	
		T	19	Same. Gravels consist of sandstone, siltstone and granitics, moist.
13			25	
			15	
14		T	19	Same. Coarse sand, wet.
			22	
15			15	
		T	8	**Purisima Formation bedrock**
16			13	Light olive brown (2.5Y 5/4) weathered, to dark greenish gray (5G 4/1) unweathered, fine
				grained to very fine grained sandy siltstone, friable, moist, horizontally laminated. Dark
17				reddish brown oxidization at contact with fine micaceous sand, coarse sand and
				fine gravel above. Bedrock color change at approximately 16.25 feet to less weathered.
18				
				Bottom of boring, 16.5 feet; no groundwater encountered.
19				
20				

Boring terminated at 16.5 feet
Logged by: GFE
Date Drilled: 6-20-13
Boring Type: 4" Solid Stem Auger

Explanation:

T Terzaghi sample
M Medium sample
L Large sample

Free Water Elevation

Earth materials contact, queried where uncertain

Gradational earth materials contact

EXHIBIT F

EASTON GEOLOGY P.O. Box 3533 Santa Cruz, California 95063 831.247.4317	LOG OF EXPLORATORY BORING Lowe property 2864 South Palisades Avenue Santa Cruz, California Santa Cruz County 028-304-55	BORING # B-2 JOB # C13006

Depth (ft)	Graphic Log	Sample and Type		SPT "N" Value	Description
1					**Topsoil/fill?**
					Marine terrace deposits
2			7		
		L	7		Mottled dark to light grayish brown sandy clayey silt, clayey silty sand, and clean fine
3			12		grained sand, highly plastic clays, moist to saturated.
			7		
4		T	9		Grading to lighter grayish brown silty fine to very fine grained sand, stiff, plastic, slightly
			13		moist.
5					
6					
7					
8					
9			15		
		L	22		Dark yellowish brown (10YR 4/4) medium to coarse grained sand with occasional fine
10			27		gravel horizons, noncemented, salt and pepper apearance, abundant lithic grains, moist
			9		to wet.
11		T	14		Same, medium grained sand, well sorted, coarse gravels in lower 6 inches of sample.
			24		
12					
			15		
13		T	17		Interbedded sands, gravels and cobbles, black oxidization staining on gravels - reworked
			32		by waves.
14			12		
		T	5		
15			5		
			14		**Purisima Formation bedrock**
16		L	18	▼	Upper 6 inches of sample is light olive brown weathered bedrock, lower 6 inches is
			21		blue/gray slightly weathered to non weathered bedrock.
17					
18					
					Bottom of boring, 17 feet; groundwater at 16.3 feet.
19					
20					

Boring terminated at 17 feet
Logged by: GFE
Date Drilled: 6-20-13
Boring Type: 4" Solid Stem Auger

Explanation:

T Terzaghi sample
M Medium sample
L Large sample

▼ Free Water Elevation

-?- Earth materials contact, queried where uncertain

IIIIIII Gradational earth materials contact

EXHIBIT F

APPENDIX D

SCALE OF ACCEPTABLE RISKS FROM GEOLOGIC HAZARDS

SCALE OF ACCEPTABLE RISKS FROM SEISMIC GEOLOGIC HAZARDS

Risk Level	Structure Types	Extra Project Cost Probably Required to Reduce Risk to an Acceptable Level
Extremely low[1]	Structures whose continued functioning is critical, or whose failure might be catastrophic: nuclear reactors, large dams, power intake systems, plants manufacturing or storing explosives or toxic materials.	No set percentage (whatever is required for maximum attainable safety).
Slightly higher than under "Extremely low" level.[1]	Structures whose use is critically needed after a disaster: important utility centers; hospitals; fire, police and emergency communication facilities; fire station; and critical transportation elements such as bridges and overpasses; also dams.	5 to 25 percent of project cost.[2]
Lowest possible risk to occupants of the structure.[3]	Structures of high occupancy, or whose use after a disaster would be particularly convenient: schools, churches, theaters, large hotels, and other high rise buildings housing large numbers of people, other places normally attracting large concentrations of people, civic buildings such as fire stations, secondary utility structures, extremely large commercial enterprises, most roads, alternative or non-critical bridges and overpasses.	5 to 15 percent of project cost.[4]
An "ordinary" level of risk to occupants of the structure.[3,5]	The vast majority of structures: most commercial and industrial buildings, small hotels and apartment buildings, and single family residences.	1 to 2 percent of project cost, in most cases (2 to 10 percent of project cost in a minority of cases).[4]

1 Failure of a single structure may affect substantial populations.

2 These additional percentages are based on the assumptions that the base cost is the total cost of the building or other facility when ready for occupancy. In addition, it is assumed that the structure would have been designed and built in accordance with current California practice. Moreover, the estimated additional cost presumes that structures in this acceptable risk category are to embody sufficient safety to remain functional following an earthquake.

3 Failure of a single structure would affect primarily only the occupants.

4 These additional percentages are based on the assumption that the base cost is the total cost of the building or facility when ready for occupancy. In addition, it is assumed that the structures would have been designed and built in accordance with current California practice. Moreover the estimated additional cost presumes that structures in this acceptable-risk category are to be sufficiently safe to give reasonable assurance of preventing injury or loss of life during and following an earthquake, but otherwise not necessarily to remain functional.

5 "Ordinary risk": Resist minor earthquakes without damage: resist moderate earthquakes without structural damage, but with some non-structural damage; resist major earthquakes of the intensity or severity of the strongest experienced in California, without collapse, but with some structural damage as well as non-structural damage. In most structures it is expected that structural damage, even in a major earthquake, could be limited to repairable damage. (Structural Engineers Association of California)

Source: *Meeting the Earthquake*, Joint Committee on Seismic Safety of the California Legislature, Jan. 1974, p.9.

EXHIBIT F

SCALE OF ACCEPTABLE RISKS FROM NON-SEISMIC GEOLOGIC HAZARDS[6]		
Risk Level	Structure Type	Risk Characteristics
Extremely low risk	Structures whose continued functioning is critical, or whose failure might be catastrophic: nuclear reactors, large dams, power intake systems, plants manufacturing or storing explosives or toxic materials.	1. Failure affects substantial populations, risk nearly equals nearly zero.
Very low risk	Structures whose use is critically needed after a disaster: important utility centers; hospitals; fire, police and emergency communication facilities; fire station; and critical transportation elements such as bridges and overpasses; also dams.	1. Failure affects substantial populations. Risk slightly higher than 1 above.
Low risk	Structures of high occupancy, or whose use after a disaster would be particularly convenient: schools, churches, theaters, large hotels, and other high rise buildings housing large numbers of people, other places normally attracting large concentrations of people, civic buildings such as fire stations, secondary utility structures, extremely large commercial enterprises, most roads, alternative or non-critical bridges and overpasses.	1. Failure of a single structure would affect primarily only the occupants.
"Ordinary" risk	The vast majority of structures: most commercial and industrial buildings, small hotels and apartment buildings, and single family residences.	1. Failure only affects owners /occupants of a structure rather than a substantial population. 2. No significant potential for loss of life or serious physical injury. 3. Risk level is similar or comparable to other ordinary risks (including seismic risks) to citizens of coastal California. 4. No collapse of structures; structural damage limited to repairable damage in most cases. This degree of damage is unlikely as a result of storms with a repeat time of 50 years or less.
Moderate risk	Fences, driveways, non-habitable structures, detached retaining walls, sanitary landfills, recreation areas and open space.	1. Structure is not occupied or occupied infrequently. 2. Low probability of physical injury. 3. Moderate probability of collapse.
[6] Non-seismic geologic hazards include flooding, landslides, erosion, wave runup and sinkhole collapse		

EXHIBIT F

Easton Geology
P.O. Box 3533, Santa Cruz, CA 95063
831.247.4317 info@eastongeology.com

11 June 2014

Julie and Allen Lowe
2181 Las Trampas Road
Alamo, California 94507

Job No. C13006

Re: Response to County Comments
2864 South Palisades Avenue
Santa Cruz County APN 028-304-55
Application #: REV141017

Dear Mr. and Mrs. Lowe:

Easton Geology has prepared this response to the review comments made by the Santa Cruz County Planning Department regarding the engineering geologic and geotechnical reports for the above-referenced subject property. The Planning Department has requested additional information prior to accepting the geologic and geotechnical reports for your proposed project. To this end we have worked in tandem with the project professionals to provide the requested information. Please refer to the responses from Rock Solid Engineering and Luke Beautz which address comments not attended to by Easton Geology. We have also included in this letter clarifications to our blufftop setback and wave run-up analyses for the project.

County Review Comment 4: Please provide a maintenance heuristic that identifies when the sea wall must be inspected, and the thresholds of damage when maintenance will be required for the various parts of the seawall.

Response 4: The existing seawall at the subject site is functioning adequately. However, we recommend that it be inspected by a qualified professional every 5 years, or sooner following large oceanic storms or a strong local earthquake. The April 2013 topographic survey by Luke Beautz, the project surveyor, should be used as a baseline for future inspections of the seawall, bluff-face and blufftop. Inspections should be performed during the winter when the beach fronting the revetment has been scoured of sand. The inspections shall identify whether any significant weathering, damage or deterioration has occurred since the previous inspection or maintenance that would adversely affect future performance of the seawall. The inspections shall also identify any structural damage requiring repair in order to maintain the integrity of the seawall. The seawall at the site consists of three elements: 1) a rip-rap revetment which protects the lower portion of the bluff and provides wave-runup protection; 2) a concrete retaining wall which helps support the bluff-face and protect it from erosion; and 3) a stacked concrete sack wall and small rip-rap cover below the blufftop.

Periodic maintenance shall be required for the revetment to: 1) maintain the revetment footprint; 2) maintain a revetment slope greater or equal to its current gradient of 3:1 (horizontal: vertical); 3)

EXHIBIT F

maintain the relatively consistent and structurally sound profile of the permitted revetment; and 4) remove any debris that accumulates in or near the revetment. To maintain the revetment footprint and profile, settled quarrystones at the toe of the revetment should be placed back on the revetment in such a way that its existing footprint and a relatively smooth revetment profile are maintained. When performing maintenance to the revetment, fugitive quarrystones should be retrieved from the beach fronting or adjacent the revetment and restacked in the revetment, filling any voids. The revetment should be replenished with new quarrystones if fugitive stones cannot be retrieved. The prescribed procedures will help maintain the beach area seaward of the revetment.

The retaining wall element of the seawall between the revetment and bluff must be maintained in the event it becomes undermined, experiences bowing or tilting, or if open cracks and/or loose blocks of concrete appear. The degree of maintenance or repair required will depend on the nature and extent of damage sustained and will be determined by a qualified professional. A typical repair might include tie-backs with compression plates.

The concrete sack wall and rip-rap cover element of the seawall must be repaired or maintained if the concrete sacks or rip-rap collapse, become dislodged, or if the blufftop experiences stripping or a loss of soil through erosion. Additionally, the areas below the drainage outlets on the upper bluff-face should be inspected for signs of erosion or instability. The degree of maintenance or repair required will depend on the extent of damage and will be determined by a qualified professional. A typical repair might include a shotcreted, rebar-reinforced covering over the existing protection where needed.

A representative from our firm should inspect the seawall at the recommended intervals. Any proposed maintenance or repairs shall be performed by a qualified contractor as soon as feasible.

Clarification of Blufftop Setback and Wave Run-up Analyses

The blufftop setback calculated by our firm assumed that the existing, permitted seawall fronting the subject bluff would be maintained throughout the lifetime of the development. The existing seawall at the subject site spans the upcoast and downcoast adjoining parcels and together they function as a system. Future maintenance of the seawall on the subject property will help avoid adverse erosional impacts to the adjacent parcels. Conversely, lack of future maintenance of the seawall on the subject property may promote focused erosion on one or both of the adjacent properties and weaken the seawall system as a whole. Future maintenance will also help provide continued access along the beach fronting the seawall.

The adjusted wave run-up elevation calculated in-part by our firm utilized a slope gradient as measured between the top of bluff and the blufftop setback line. We also assumed the ground surface inland from the setback line to be of uniform slope. We have revised our analysis to reflect the broader topographic gradient of the site between the blufftop and South Palisades Avenue, as surveyed. Please refer to the response comments from the geotechnical engineer for the revised run-up values.

It has been a pleasure working with you on this project. Please contact us if you have any questions regarding this letter or other aspect of this project.

Sincerely,

EASTON GEOLOGY

Gregory Easton
Principal Geologist
C.E.G. No. 2502

Copies: addressee (1)
Stephanie Barnes-Castro, Architect (5 and pdf)
Rock Solid Engineering, attn: Yvette Wilson (pdf)

References:

Easton Geology, 2013, Geologic Investigation of Coastal Blufftop Property, 2864 South Palisades Avenue, Santa Cruz, California, Santa Cruz County APN 028-304-55, Job No. C13006, prepared 10 October 2013, 46p, 2 Plates.

Santa Cruz County Planning Department, 2014, Review of Geotechnical by Rock Solid Engineering Inc, Dated October 14, 2013: Project # 13009, and the Engineering Geology Report by Easton Geology, dated October 13, 2013: Job Number C13006, prepared 17 March 2014, 2p.

EXHIBIT F

Easton Geology
P.O. Box 3533, Santa Cruz, CA 95063
831.247.4317 info@eastongeology.com

12 June 2014

Julie and Allen Lowe
2181 Las Trampas Road
Alamo, California 94507

Job No. C13006

Re: Plan Review for Proposed Single-Family Dwelling
2864 South Palisades Avenue
Santa Cruz, California
Santa Cruz County APN 028-304-55

Dear Mr. and Mrs. Lowe:

We have completed our review of the current development plans for the proposed new dwelling on the above-referenced parcel. The plans reviewed by our firm consist of architectural sheets by Stephanie Barnes Castro, and civil engineering sheets by Luke Beautz. We specifically reviewed sheets: A1 (Site Plan & Project Data); C2 (Existing Site Survey); C3 (Preliminary Grading & Drainage Plan); and C4 (Preliminary Site Sections) for conformance with the recommendations in our Geologic Investigation (Easton Geology, 2013) and our response letter addressing Santa Cruz County Planning Department comments (Easton Geology, 2014).

The plans depict the proposed residence behind a 25 foot blufftop setback line. This blufftop setback line differs from the setback line stipulated in our 2013 report in that it distinctly mimics the top of bluff, whereas the setback line set forth by Easton Geology follows the overall trend of the blufftop on the property. The 25 foot blufftop setback line depicted on the plans is acceptable to our firm. Additionally, the proposed residence will be supported by a pier and grade beam foundation. We must review any forthcoming foundation plans for the proposed residence.

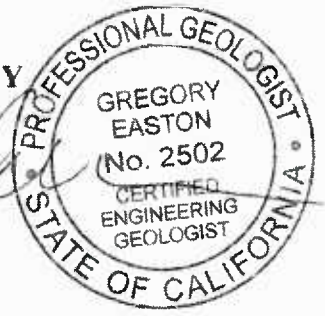
Drainage from the site will essentially remain unchanged under the proposed plans. Where runoff at the site does not infiltrate the ground surface, new storm drain inlets will collect surface drainage and release it onto armored areas below the blufftop. The area below the drainage outlets should be monitored for signs of erosion or instability. The monitoring and potential remediation of erosional conditions along the bluff-face will be included as part of the forthcoming maintenance agreement for the existing coastal protection structures at the site.

The plans are geologically acceptable and in general conformance with our geologic report and County response letter.

It has been a pleasure working with you on this project. Please contact us if you have any questions regarding this letter or other aspect of this project.

Sincerely,

EASTON GEOLOGY



Gregory Easton
Principal Geologist
C.E.G. No. 2502

Copies: addressee (1)
Stephanie Barnes-Castro (2 and pdf)
Rock Solid Engineering, attn: Yvette Wilson (pdf)

References:

Easton Geology, 2013, Geologic Investigation of Coastal Blufftop Property, 2864 South Palisades Avenue, Santa Cruz, California, Santa Cruz County APN 028-304-55, Job No. C13006, prepared 10 October 2013, 43p.

Easton Geology, 2014, Response to County Comments, 2864 South Palisades Avenue, Santa Cruz, California, Santa Cruz County APN 028-304-55, Job No. C13006, prepared 11 June 2014, 3p.

Luke Beautz, 2014, Improvement Plan, Lowe Property, 5 sheets dated June 2014, revised 6/5/14 (1st revision).

Stephanie Barnes-Castro, Architect, 2014, Lowe Residence, 2864 S Palisades Ave., Santa Cruz, CA 95062, 5 sheets dated 2/12/14, revised 6/5/14 (1st revision).

ROCK SOLID ENGINEERING, INC.
Soil Reports · Site Assessments · Manufactured Home Foundations · Expert Witness · Real Estate Inspections

GEOTECHNICAL INVESTIGATION-DESIGN PHASE

Proposed Single Family Residence
2864 S. Palisades Avenue
Santa Cruz, California
A.P.N.: 028-304-55

For:
Alan & Julie Lowe
2181 Las Trampas Road
Alamo, California 94507

Project No. 13009
October 14, 2013

1100 Main Street, Suite A, Watsonville, CA 95076 • (831) 724-5868 •Fax: (831) 763-1578 • Email:rocksolid@cruzio.com

EXHIBIT G

ROCK SOLID ENGINEERING, INC.
Soil Reports · Site Assessments · Manufactured Home Foundations · Expert Witness · Real Estate Inspections

Project No. 13009
October 14, 2013

Alan & Julie Lowe
2181 Las Trampas Road
Alamo, California 94507

SUBJECT: **GEOTECHNICAL INVESTIGATION - DESIGN PHASE**
Proposed Single Family Residence
2864 S. Palisades Avenue, Santa Cruz, California
A.P.N.: 028-304-55

Dear Mr. and Mrs. Lowe:

In accordance with your authorization, we have completed a geotechnical investigation for the proposed residence at 2864 S. Palisades Avenue, in Santa Cruz, California. This report summarizes the findings, conclusions, and recommendations from our field exploration, laboratory testing, and engineering analysis. The conclusions and recommendations included herein are based upon applicable standards at the time this report was prepared.

It is a pleasure being associated with you on this project. If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office.

Sincerely,

ROCK SOLID ENGINEERING, INC.

REGISTERED PROFESSIONAL ENGINEER
YVETTE M. WILSON
No. 60245
Exp. 12/31
CIVIL
STATE OF CALIFORNIA

Signed: 10-14-13

Yvette M. Wilson, P.E.
Principal Engineer
R.C.E. 60245

Dusty Osburn
Staff Engineer

Distribution: (1) Addressee and via email
(5) Stephanie Barnes-Castro and via email
(1) Greg Easton via email

EXHIBIT G

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Purpose

The purpose of our investigation is to provide preliminary geotechnical design parameters and recommendations for development of the site. Conclusions and recommendations related to site grading, foundations, slabs-on-grade, and wave run up are presented herein.

1.2 Proposed Development

a. Based on our conversations with you, it is our understanding that the project consists of the demolition of the existing structure and the construction of a new single family residence with an attached garage.

b. Anticipated construction consists of a wood frame structure with raised wood or slab-on-grade floors. Exact wall, column, and foundation loads are unavailable, but are expected to be typical of such construction.

c. Final grading and foundation plans were unavailable at the time of this report. It is our understanding that the information obtained during our investigation will be used in the development of a finalized plan set.

d. Also anticipated, are the construction of an attendant driveway, drainage systems and associated landscaping improvements.

1.3 Scope of Services

The scope of services provided during the course of our investigation included:

a. Review of the referenced geotechnical, geologic, and seismological reports and maps pertinent to the development of the site (available in our files).

b. Field exploration consisting of 2 borings, drilled to depths of 16.5 and 17 feet below existing grade in the area of the proposed development.

c. Logging and sampling of the borings by our Field Engineer, including the collection of soil samples for laboratory testing.

d. Laboratory testing of soil samples considered representative of subsurface conditions.

e. Geotechnical analyses of field and laboratory data.

f. Preparation of a report (6 copies) presenting our findings, conclusions and recommendations.

1.4 Authorization

This investigation, as outlined in our Proposal dated March 26, 2013, was performed in accordance with your written authorization on April 9, 2013.

1.5 Exclusions

Our services on this project are limited to the proposed structure. Our services specifically exclude suitability of the existing structure and improvements.

2. FIELD EXPLORATION AND LABORATORY TESTING PROGRAM

Details of the field exploration and laboratory testing are presented in Appendix A.

3. SITE DESCRIPTION

3.1 Location

The subject project is located at 2864 S. Palisades Avenue in Santa Cruz, California. The parcel is located on the southeast side of S. Palisades Avenue and extends seaward. The location is shown on the Location Map, **Figure 1**.

3.2 Surface Conditions

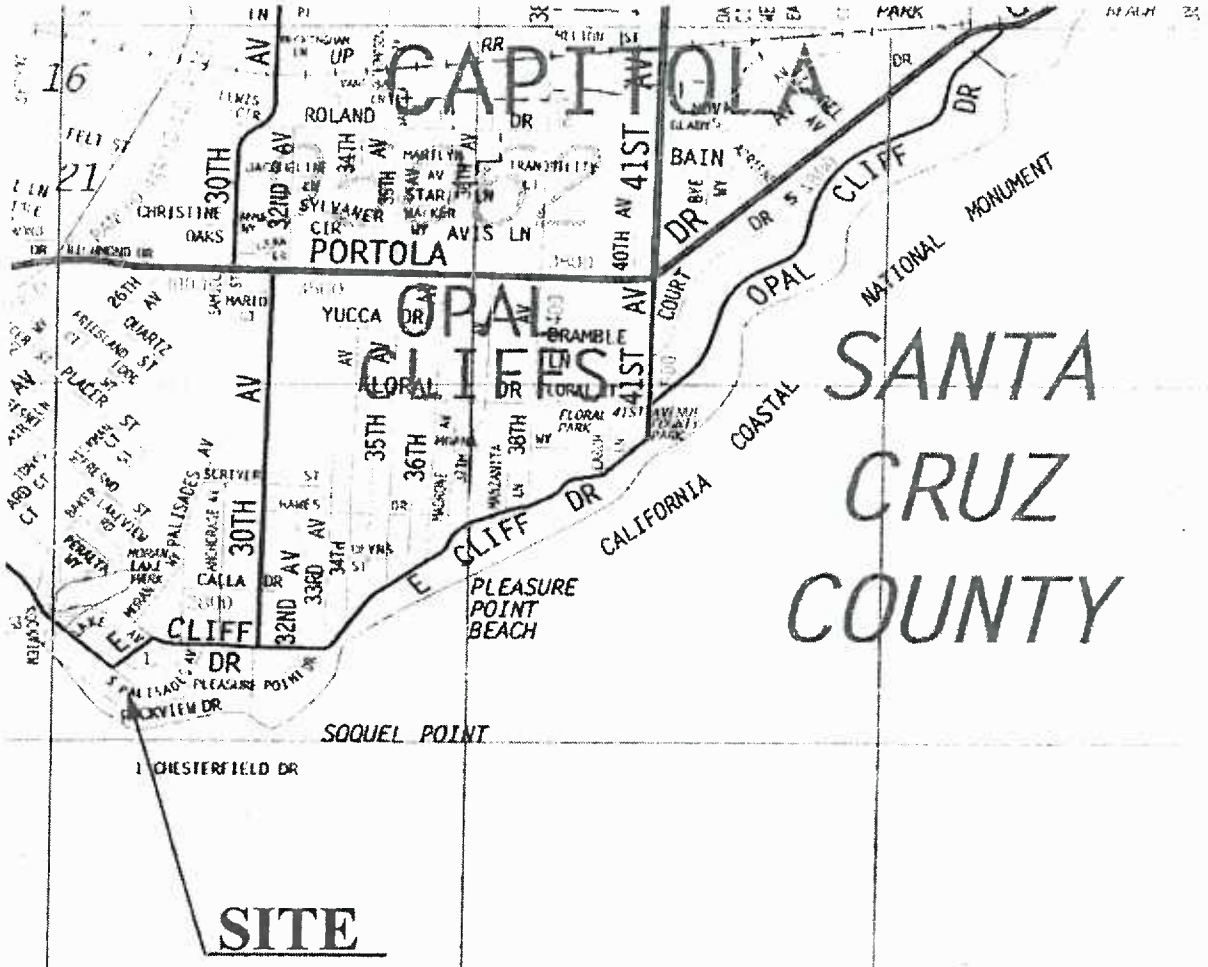
The subject site is relatively level in the proposed building envelope and then slopes down to an existing permitted retaining wall. The retaining wall is a concrete structure and is protected by large rip rap that is located from the top of the wall to the sand at an average slope of 2½:1 (H:V). The parcel is currently developed with a residence and attached duplex.

3.3 Subsurface Conditions

a. The results of our field exploration indicate that the subsurface soils present on the site are relatively consistent, however, there are variations in color, moisture content, and density.

b. Perched groundwater was encountered at a depth of 14 feet during the course of our field exploration. Perched groundwater is likely to rise in elevation during periods of wet weather and high tides.

c. The upper stratum consists of dark brown silty sand. The silty sand was observed from the surface to between 2.5 and 3 feet below existing grade. This material is generally damp to wet, loose, and non-plastic. Based on our laboratory test results, the silty sand is moderately compressible under the anticipated loads and severely collapsible upon wetting.



REFERENCE: The Thomas Guide, 2004.

ROCK SOLID ENGINEERING, INC.	LOCATION MAP	FIGURE
	2864 S. Palisades Avenue, Santa Cruz	1

EXHIBIT C

d. Underlying the silty sand stratum, tan silty clay is present. The silty clay was observed to approximately 5 to 8 feet below existing grade. This material is generally moist to wet, stiff, and plastic.

e. Beneath the clay stratum, terrace deposits were observed. The terrace deposits consist of sands and gravelly sands with sandstone and quartz gravels. The terrace deposits were encountered to depths of 16 feet below existing grade. This material is generally moist to wet with depth, medium dense to dense, and non-plastic.

f. Purisma Formation bedrock was encountered at a depth of 16 feet below grade. The bedrock was brown and grey siltstone/sandstone and was generally wet, very dense and non-plastic.

g. Complete soil profiles are presented on the Logs of Exploratory Borings and the boring locations are shown on the Boring Location Plan in Appendix A.

4. GEOTECHNICAL HAZARDS

a. Potential geotechnical hazards to man made structures include ground shaking, surface rupture, landsliding, liquefaction, and wave run-up. The potential for each of these to impact the site is discussed below.

b. Ground shaking caused by earthquakes is a complex phenomenon. Structural damage can result from the transmission of earthquake vibrations from the ground into the structure. The intensity of an earthquake at any given site depends on many variables including, the proximity of the site to the hypocenter, and the characteristics of the underlying soil and/or rock. The subject site is situated at the approximate latitude of 36°57' 18" and longitude -121°58' 35". The project location (latitude and longitude) were used in conjunction with the U.S. Geologic Survey website (Reference 13) to obtain the seismic design parameters presented in **Table 1**. All proposed structures at the subject site shall be designed with the corresponding seismic design parameters in accordance with the 2010 California Building Code (Reference 3).

Table 1
2010 CBC Seismic Design Criteria

SEISMIC DESIGN CRITERIA							
Site Class	Seismic Design Category	Spectral Response Accelerations					
		Ss	S1	SMs	SM1	SDs	SD1
C	D	1.500	0.600	1.500	0.780	1.000	0.520

EXHIBIT C

c. Surface rupture usually occurs along lines of previous faulting. Based on our review of the Faults and Their Potential Hazards in Santa Cruz County map (Reference 8), no faults are shown to cross the property. Further discussion of faults is presented in the Geologic Investigation Report (Reference 7).

d. Landslides are generally mass movements of loose rock and soil, both dry and water saturated, and usually gravity driven. Based on our review of the Preliminary Map of Landslide Deposits if Santa Cruz County (Reference 5), no landslides are mapped on the subject parcel. The subject site is relatively level and then is retained at the seaward (south end) of the property. The retaining wall is protected by an existing rip-rap revetment that slopes down to the sand. The primary concern for this property will be erosion by wave action which is addressed herein and in the Geologic Investigation Report. The potential for landsliding to occur across the site a cause damage to structures should be considered low.

e. Liquefaction, lateral spreading, and differential compaction tend to occur in loose, unconsolidated, noncohesive soils with shallow groundwater. Based on our review of Geology and Liquefaction Potential of Quaternary Deposits in Santa Cruz County, California (Reference 6) the site is mapped as Zone D, low potential for liquefaction. Our field observations confirm that the potential for these hazards to occur should be considered low, due to the presence of relatively dense, cohesive soils and the lack of a shallow groundwater table.

f. Wave run-up is the vertical height of water to which a wave will rise on a structure to infinite height. To calculate the maximum wave runup for a 100-year occurrence interval at the subject site, the computer software program ACES (Reference 10) was used. The input parameters for the program and the calculated value of Wave Run-Up, R, is presented in **Figure B-1**. Based on these calculations, the maximum wave run-up height is 20.8 feet above the Design Water Level. This equates to +34.4 feet NAVD for the design event. Further discussion is presented in Appendix B. Because the wave runup elevation is higher than the retaining wall, we anticipate that the property will be subject to wave splashing. Design criteria for the anticipated wave splash is presented in **Section 5.4.**

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 General Summary

a. Based on the results of our investigation, it is our opinion that from the geotechnical standpoint, the subject site will be suitable for the proposed development provided the recommendations presented herein are implemented during grading and construction.

b. The retaining wall and rip-rap revetment was previously permitted by the California Coastal Commission No. 3-83-166.

c. It is our opinion that the subject site will be suitable for the support of the proposed structure on a **foundation system composed of augured, cast-in-place, concrete piers and grade beams**. Recommendations for this foundation system are provided in **Section 5.3**, Foundations.

d. Laboratory consolidation test results indicate that the native, near-surface soils are moderately compressible under the anticipated loads and severely collapsible upon wetting. Site preparation, consisting of over excavation and recompaction of the native subgrade will be required prior to placement of slabs-on-grade and pavements. See **Section 5.2.6** for Preparation of On-Site Soil recommendations.

e. The property is likely to be subject to wave splashing due to wave runup at the existing retaining wall and rip rap revetment. Recommendations for development of the site for this condition are presented in **Section 5.4.**

f. At the time we prepared this report, grading and foundation plans had not been finalized. We request an opportunity to review these plans during the design stages to determine if supplemental recommendations will be necessary.

g. The design recommendations of this report must be reviewed during the grading phase when subsurface conditions in the excavations become exposed.

h. Field observation and testing must be provided by a representative of Rock Solid Engineering, Inc., to enable them to form an opinion regarding the adequacy of the site preparation, and the extent to which the earthwork is performed in accordance with the geotechnical conditions present, the requirements of the regulating agencies, the project specifications and the recommendations presented in this report. Any earthwork performed in connection with the subject project without the full knowledge of, and not under the direct observation of Rock Solid Engineering, Inc., the Geotechnical Consultant, will render the recommendations of this report invalid.

i. **The Geotechnical Consultant should be notified at least five (5) working days prior to any site clearing or other earthwork operations** on the subject project in order to observe the stripping and disposal of unsuitable materials and to ensure coordination with the grading contractor. During this period, a preconstruction conference should be held on the site to discuss project specifications, observation/testing requirements and responsibilities, and scheduling. This conference should include at least the Grading Contractor, the Architect, and the Geotechnical Consultant.

5.2 Grading

5.2.1 General

All grading and earthwork should be performed in accordance with the recommendations presented herein and the requirements of the regulating agencies.

5.2.2 Site Clearing

a. Prior to grading, the areas to be developed for structures, pavements and other improvements, should be stripped of any vegetation and cleared of any surface or subsurface obstructions, including any existing foundations, utility lines, basements, septic tanks, pavements, stockpiled fills, and miscellaneous debris.

b. All pipelines encountered during grading should be relocated as necessary to be completely removed from construction areas or be capped and plugged according to applicable code requirements.

c. Any wells encountered shall be capped in accordance with **Santa Cruz** Health Department requirements. The strength of the cap shall be at least equal to the adjacent soil and shall not be located within 5 feet of any structural element.

d. Surface vegetation and organically contaminated topsoil should be removed from areas to be graded. The required depth of stripping will vary with the time of year the work is done and must be observed by the Geotechnical Consultant. It is generally anticipated that the required depth of stripping will be 6 to 12 inches.

e. Holes resulting from the removal of buried obstructions that extend below finished site grades should be **backfilled with compacted engineered fill in accordance with Section 5.2.5.**

5.2.3 Excavating Conditions

a. We anticipate that excavation of the on-site soils may be accomplished with standard earthmoving and trenching equipment.

b. Perched groundwater was encountered at a depth of 14 feet during the course of our field exploration. Wet soils were also encountered at Boring B-2 beneath the existing brick pavers to a depth of approximately 3 feet. Based on our experience in the area, the perched water on top of the bedrock is likely to rise during periods of wet weather and high tides.

c. Although not anticipated, any excavations adjacent to existing structures should be reviewed, and recommendations obtained to prevent undermining or distress to these structures.

5.2.4 Fill Material

a. The on-site soils **may** be used as compacted fill.

b. All soils, both on-site and imported, to be used as fill, should contain less than 3% organics and be free of debris and cobbles over 6 inches in maximum dimension.

c. Any imported soil to be used as engineered fill shall meet the following requirements:

(i) free of organics, debris and other deleterious materials
(ii) be granular (sandy) in nature and have sufficient fines to allow for excavation of the foundation trenches.
(iii) free of rock and cobbles in excess of 3 inches
(iv) have an expansion potential not greater than low (EI<20)
(v) have a soluble sulfate content less than 150 ppm.

d. Imported fill material should be approved by the Geotechnical Consultant prior to importing. The Geotechnical Consultant should be notified not less than 5 working days in advance of placing any fill or base course material proposed for import. Each proposed source of import material should be sampled, tested and approved by the Geotechnical Consultant prior to delivery of any soils imported for use on the site.

5.2.5 Fill Placement and Compaction

a. Any fill or backfill required should be placed in accordance with the recommendations presented below.

b. With the exception of the upper 6 inches of subgrade in pavement and driveway areas, material to be compacted or reworked should be moisture-conditioned or dried to achieve near-optimum conditions, and compacted to achieve a minimum relative compaction of 90%. The upper 6 inches of subgrade in pavement and drive areas and all aggregate base and subbase shall be compacted to achieve a minimum relative compaction of 95%. The placement moisture content of imported material should be evaluated prior to grading.

c. The relative compaction and required moisture content shall be based on the maximum dry density and optimum moisture content obtained in accordance with ASTM D-1557.

d. The in-place dry density and moisture content of the compacted fill shall be tested in accordance with ASTM D-6780 or ASTM D-2922/ASTM D-3017.

e. The number and frequency of field tests required will be based on applicable county standards and at the discretion of the Geotechnical Consultant. As a minimum standard every 1 vertical foot of engineered fill placed within a building pad area, and every 2 vertical feet in all other areas shall be tested, unless specified otherwise by a Rock Solid Engineering, Inc. representative.

f. Fill should be compacted by mechanical means in uniform horizontal loose lifts not exceeding 8 inches in thickness.

g. All fill should be placed and all grading performed in accordance with applicable codes and the requirements of the regulating agency.

5.2.6 Preparation of On-Site Soils

a. **Augured, cast-in-place, concrete piers** will require no over excavation or recompaction of native material below foundation elements. The only earthwork anticipated for these foundation systems is that required to compact the subgrade beneath slab floors and pavements.

b. The native subgrade beneath **slabs-on-grade** should be reworked to a depth sufficient to provide a zone of compacted fill extending at least 12 inches below the bottom of the capillary break.

c. The native subgrade beneath **pavements** should be reworked to a depth sufficient to provide a zone of compacted fill extending at least 12 inches below the bottom of aggregate base coarse.

d. The zone of compacted fill must extend a minimum of 2 feet laterally beyond all pavements unless made impossible at property lines.

e. A **representative of our firm shall observe the bottom of the excavation once the required depth of overexcavation** has been achieved to verify suitability. Prior to replacing the excavated soil, the exposed surface should be scarified to a depth of 6 to 8 inches, moisture conditioned, and compacted.

f. The depths of reworking required are subject to review by the Geotechnical Consultant during grading when subsurface conditions become exposed. If wet or unstable conditions are encountered at the base of the excavation, stabilization techniques such as fabric may be required by our field representative.

5.2.7 Groundwater Table

Perched groundwater was encountered at a depth of 14 feet during the course of our field exploration. Perched groundwater is likely to be encountered above the bedrock during the wetter weather and high tides.

5.2.8 Expansive Soils

Our laboratory testing shows that the expansion index of the near surface soils are equal to 4, this indicates that the expansion potential of the near surface soils should be considered **very low**.

5.2.9 Sulfate Content

The results of our laboratory testing indicate that the soluble sulfate content of the on-site soils likely to come into contact with concrete is below the 150 ppm generally considered to constitute an adverse sulfate condition. **Type II cement** is therefore considered adequate for use in concrete in contact with the on-site soils.

5.2.10 Surface Drainage

a. Pad drainage should be designed to collect and direct surface water away from structures and slope faces to approved drainage facilities.

b. A minimum gradient of **5 percent for a distance of no less than 10 feet** measured perpendicularly from the foundation wall face, should be maintained and drainage should be directed toward approved swales or drainage facilities. If 10 horizontal feet can not be satisfied due to lot lines or physical constraints, the drainage shall be designed in accordance with the requirements of Section R401.3 of the 2010 California Residential Code.

c. Swales and impervious surfaces shall be sloped a minimum of 2 percent towards an approved drainage inlet or discharge point or as specified by the project civil engineer.

d. All roof eaves should be guttered with the outlets from the downspouts provided with adequate capacity to carry the storm water away from the structure to reduce the possibility of soil saturation and erosion. The connection should be to a solid pipe which discharges at an approved location away from the structure and the graded area.

e. **No drainage shall be allowed to discharge at the unprotected slope above the retaining wall.** Drainage should be collected and discharged at the rip rap revetment as an energy dissipater. We recommend using the existing drainage pipes and inlets for storm drain runoff.

f. Drainage patterns approved at the time of construction should be maintained throughout the life of the structures. The building and surface drainage facilities must not be altered nor any grading, filling, or excavation conducted in the area without prior review by the Geotechnical Consultant.

g. Irrigation activities at the site should be controlled and reasonable. Planter areas should not be sited adjacent to walls without implementing approved measures to contain irrigation water and prevent it from seeping into walls and under foundations and slabs-on-grade. Large trees should be planted a minimum distance of ½ their mature height away from the foundation.

5.2.11 Utility Trenches

a. Bedding material may consist of sand with SE not less than 20 which may then be jetted, unless local jurisdictional requirements govern.

b. Existing on-site soils may be utilized for trench backfill, provided they are free of organic material and rocks over 6 inches in diameter.

c. If sand is used, a 3 foot concrete plug should be placed in each trench where it passes under the exterior footings.

d. Backfill of all exterior and interior trenches should be placed in thin lifts and mechanically compacted to achieve a relative compaction of not less than 95% in paved areas and 90% in other areas per ASTM D-1557. Care should be taken not to damage utility lines.

e. Utility trenches that are parallel to the sides of a building should be placed so that they do not extend below a line sloping down and away at an inclination of 2:1 (H:V) from the bottom outside edge of all footings.

f. Trenches should be capped with 1.5± feet of impermeable material. Import material must be approved by the Geotechnical Consultant prior to its use.

g. Trenches must be shored as required by the local regulatory agency, the State Of California Division of Industrial Safety Construction Safety Orders, and Federal OSHA requirements.

5.3 Foundations

5.3.1 General

a. It is our opinion that the subject site will be suitable for the support of the proposed structure on a **foundation system composed of augured, cast-in-place, concrete piers and grade beams.**

b. At the time we prepared this report, grading and foundation plans had not been finalized. We request an opportunity to review these plans during the design stages to determine if supplemental recommendations will be necessary.

5.3.2 Augured Cast-In-Place Concrete Piers

a. It is our recommendation that the proposed augured cast-in-place concrete piers have a **minimum embedment depth of 10 feet below lowest adjacent grade.**

b. The minimum recommended shaft diameter is **18 inches.**

c. The estimated allowable downward and pullout capacities for 18 inch and 24 inch diameter, augured, cast-in-place, concrete piers are presented in **Figures 2.1** and **2.2** for the proposed construction. These were computed assuming a minimum embedment depth of 10 feet. These capacities do not include the weight of the shaft.

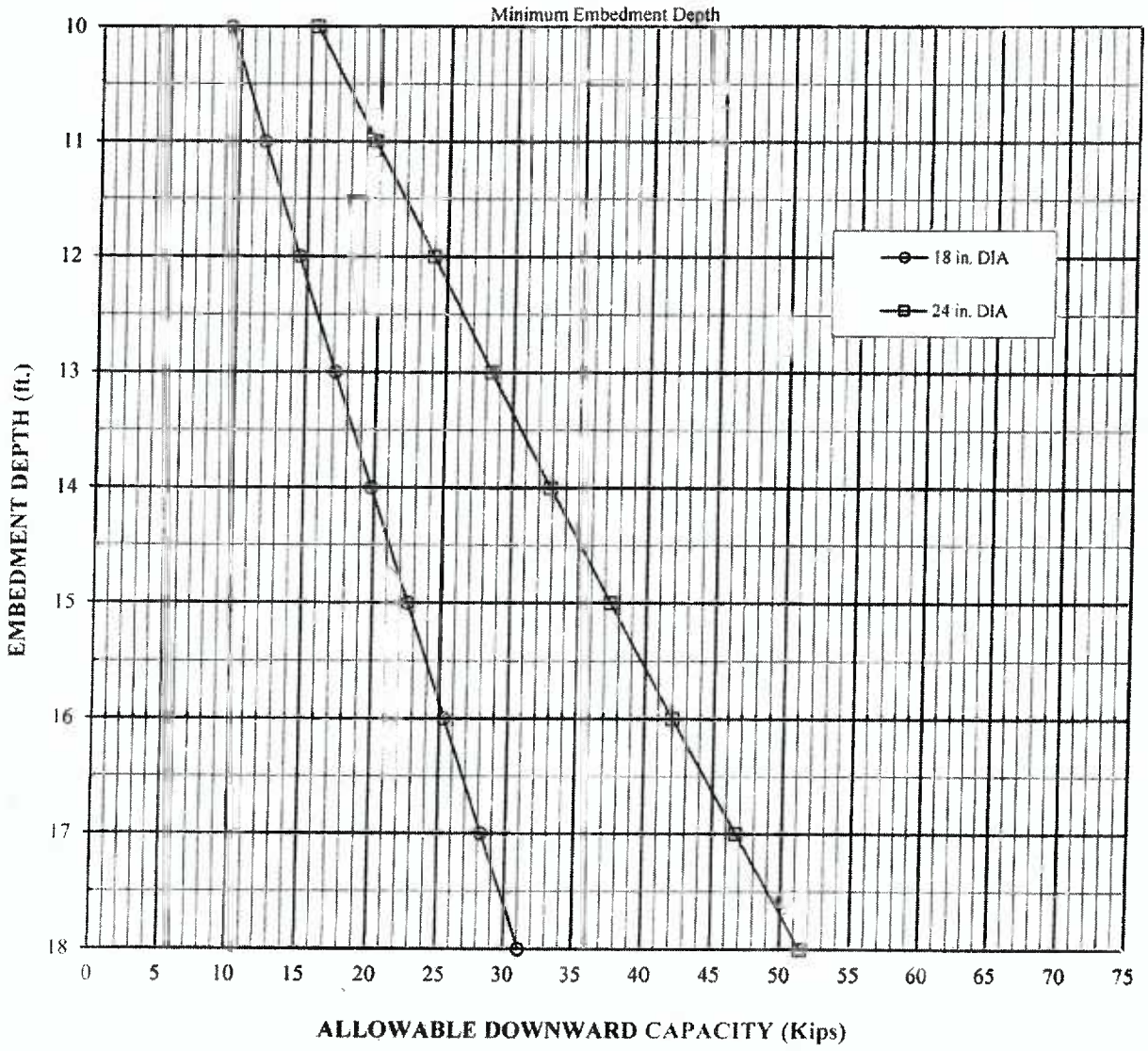
d. The recommended capacities apply to a single shaft, as this is the anticipated configuration. If multiple piers are used, group efficiencies should be evaluated on the basis of actual structural configurations in order to assess possible reductions in capacity due to group influences.

e. Active pressures of 35 psf/ft shall be applied to the upper 2 feet of soil against the shaft. The pressures may be applied acting on a plane which is 1½ times the shaft diameter.

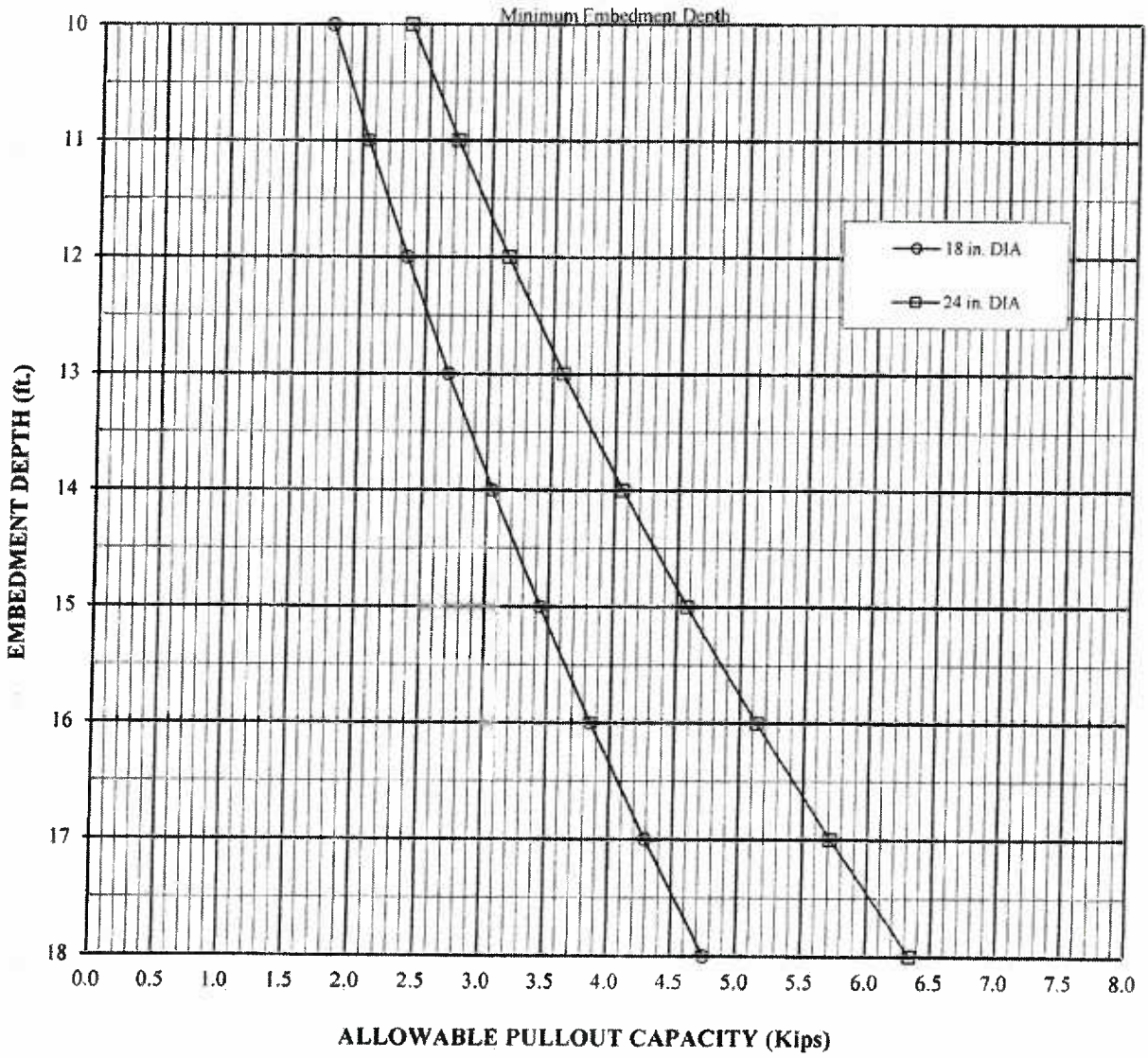
f. Passive pressures of 400 psf/ft, acting over a plane 1½ times the shaft diameter, may be assumed for design purposes. Neglect passive pressure in the upper 2 feet of soil.

g. Piers should be spaced no closer than 2.5 diameters, center to center, with a minimum 3.0 diameters preferred.

h. In order to account for potential scour due to wave runup, the grade beams on the southwest side of the structure should either be embedded **24 inches or designed assuming no soil support.**



ROCK SOLID ENGINEERING, INC.	DOWNWARD CAPACITY for AUGURED CAST-IN-PLACE CONCRETE PIERS	FIGURE 2.1



ROCK SOLID ENGINEERING, INC.	PULLOUT CAPACITY for AUGURED CAST-IN-PLACE CONCRETE PIERS	FIGURE 2.2

i. The augured excavations shall be clean, dry, and free of debris and loose soil. Furthermore, excavations should not deviate more than 1% from vertical.

j. If the contractor chooses to use casing, it must be pulled during the concrete pour. It must be pulled slowly with a minimum of 4 feet of casing remaining embedded within the concrete at all times.

k. For shaft depths in excess of 8 feet, concrete should be placed via a tremie. The end of the tube must remain embedded a minimum of 4 feet into the concrete at all times.

l. All shaft construction must be observed and approved by the Geotechnical Consultant. Any piers constructed without the full knowledge and continuous observation of Rock Solid Engineering, Inc. will render the recommendations of this report invalid.

m. The piers should contain steel reinforcement as determined by the Project Structural Engineer in accordance with applicable CBC or ACI Standards.

5.3.3 Slabs-on-Grade

a. Concrete floor slabs may be founded on compacted engineered fill per the recommendations in section 5.2.6. The subgrade should be proof-rolled just prior to construction to provide a firm, relatively unyielding surface, especially if the surface has been loosened by the passage of construction traffic.

b. It is important that the subgrade soils be thoroughly saturated for 24 to 48 hours prior to the time the concrete is poured. **For compacted engineered fill with a low expansion potential, the subgrade should be presoaked 4 percentage points above optimum to a depth of 1.0 feet.**

c. The slab-on-grade section should incorporate a minimum 6 inch capillary break consisting of 3/4 inch, clean, crushed rock, or approved equivalent. Class II baserock is not recommended. Structural considerations may govern the thickness of the capillary break.

d. The slab underlayment for vapor transmission should be specified in accordance with the applicable building codes. If the clients wants additional expertise with regards to preventing vapor transmission through the slab, the client should hire a water proofing specialist.

e. Slab thickness, reinforcement, and doweling should be determined by the Project Structural Engineer, based on the design live and dead loads, including vehicles.

5.4 Wave Runup Protection

a. The results of our wave runup analysis indicate that the elevation of the wave runup is +34.4 feet (NAVD). However, the minimum required setback from the top of bluff is 25 feet for the new residence. With the setback, we do not anticipate direct wave impact on the structure but rather splash overtopping of the retaining wall that will quickly dissipate over the 25 feet setback.

b. The adjusted runup elevation from the splash overtopping is calculated to be 2.2 feet above existing grade. The adjusted runup elevation is +32.2 feet (NAVD). The structure shall be designed in accordance with the CBC Section 1612.4.

c. We recommend that the residence be constructed on the southwest side facing the ocean with windows that will be resistant to the impact of water and/or debris. We also suggest that floor coverings for the first floor be chosen that will not be damaged by seawater.

d. We also suggest that Xypex (or approved equivalent) waterproofing be considered for the concrete design.

e. The wave runup analysis is based on the existing retaining wall and rip rap revetment structure. These protection structures must be maintained over the lifetime of the structure and must be immediately repaired if damaged. Based on our review of the permit for the retaining wall (Reference 4), the staff report notes that "it shall be the permittee's responsibility to maintain the rock on the subject parcel. Any rock that is moved (i.e. by storm wave) shall be retrieved by owner. The retaining wall and rip rap should be observed every 5 years and after major storms by the Project Soils Engineer to document any damage to the wall and rip rap and make repair recommendations as necessary.

5.5 Settlements

Total and differential settlements beneath foundation elements are expected to be within tolerable limits. Vertical movements are not expected to exceed 1 inch. Differential movements are expected to be within the normal range (½ inch) for the anticipated loads and spacings. These preliminary estimates should be reviewed by the Geotechnical Consultant when foundation plans for the proposed structures become available.

6. LIMITATIONS

a. Our investigation was performed in accordance with the usual and current standards of the profession, as they relate to this and similar localities. No other warranty, expressed or implied, is provided as to the conclusions and professional advice presented in this report.

b. The samples taken and tested, and the observations made, are considered to be representative of the site; however, soil and geologic conditions can vary significantly between sample locations.

c. As in most projects, conditions revealed during construction excavation may be at variance with preliminary findings. If this occurs, the changed conditions must be evaluated by the Project Geotechnical Consultant and the Geologist, and revised recommendations be provided as required.

d. This report is issued with the understanding that it is the responsibility of the Owner, or of his Representative, to ensure that the information and recommendations contained herein are brought to the attention of the Architect and Engineer for the project and incorporated into the plans, and that it is ensured that the Contractor and Subcontractors implement such recommendations in the field.

e. This firm does not practice or consult in the field of safety engineering. We do not direct the Contractor's operations, and we are not responsible for other than our own personnel on the site; therefore, the safety of others is the responsibility of the Contractor. The Contractor should notify the Owner if he considers any of the recommended actions presented herein to be unsafe.

f. The findings of this report are considered valid as of the present date. However, changes in the conditions of a site can occur with the passage of time, whether they be due to natural events or to human activities on this or adjacent sites. In addition, changes in applicable or appropriate codes and standards may occur, whether they result from legislation or the broadening of knowledge.

g. Accordingly, this report may become invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and revision as changed conditions are identified.

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APPENDIX A

FIELD EXPLORATION AND LABORATORY TESTING PROGRAM

FIELD EXPLORATION PROCEDURES

A-1. Subsurface conditions were explored by drilling 2 borings to depths of 16.5 and 17 feet below existing grade. The borings were advanced with a mobile drill rig equipped with 4 inch solid stem augers. The approximate locations of the borings are shown on the Boring Location Plan, **Figure A-1**. The Key to Logs, **Figure A-2**, gives definitions of the terms used in the Logs of Exploratory Borings. The Logs of Exploratory Borings are presented in **Figures A-3** and **A-4**.

A-2. Drilling of the borings was observed by our Field Engineer who logged the soils and obtained bulk and relatively undisturbed samples for classification and laboratory testing. The soils were classified, based on field observations and laboratory testing, in accordance with Unified Soil Classification System.

A-3. Relatively undisturbed soil samples were obtained by means of a drive sampler. The hammer weight and drop being 140 pounds and 30 inches, respectively. The number of "Blows/Foot"required to drive samplers are indicated on the logs.

A-4. Exploratory borings were located in the field by measuring from know landmarks. The locations, as shown, are therefore within the accuracy of such a measurement.

A-5. Groundwater was encountered at a depth of 14 feet during the course of our field exploration. Wet soils were also encountered beneath the brick patio at B-2. Perched groundwater is likely to rise during periods of wet weather.

LABORATORY TESTING PROCEDURES

A-6. Classification

Soils were classified in accordance with the Unified Soil Classification System. Moisture content and in-situ density determinations were made from relatively undisturbed soil samples. The results are presented in the Logs of Exploratory Borings and in the Summary of Laboratory Test Results, **Figure A-5**.

A-7. Direct Shear

Direct shear strength tests were performed on representative samples of the on-site soils in accordance with laboratory test standard ASTM D 3080-98. Samples were relatively undisturbed, or remolded as specified. To simulate possible adverse field conditions, the samples were saturated prior to testing unless otherwise noted. A saturating device was used which permitted the samples to absorb moisture while preventing volume change. The direct shear test results are presented in **Figures A-6 and A-7**.

A-8. Consolidation

Consolidation tests were performed on representative, relatively undisturbed samples of the underlying soils to determine compressibility characteristics. The samples were saturated during the tests to simulate possible adverse field conditions. The test results are presented in **Figures A-8 & A-9**.

A-9. Expansion Index

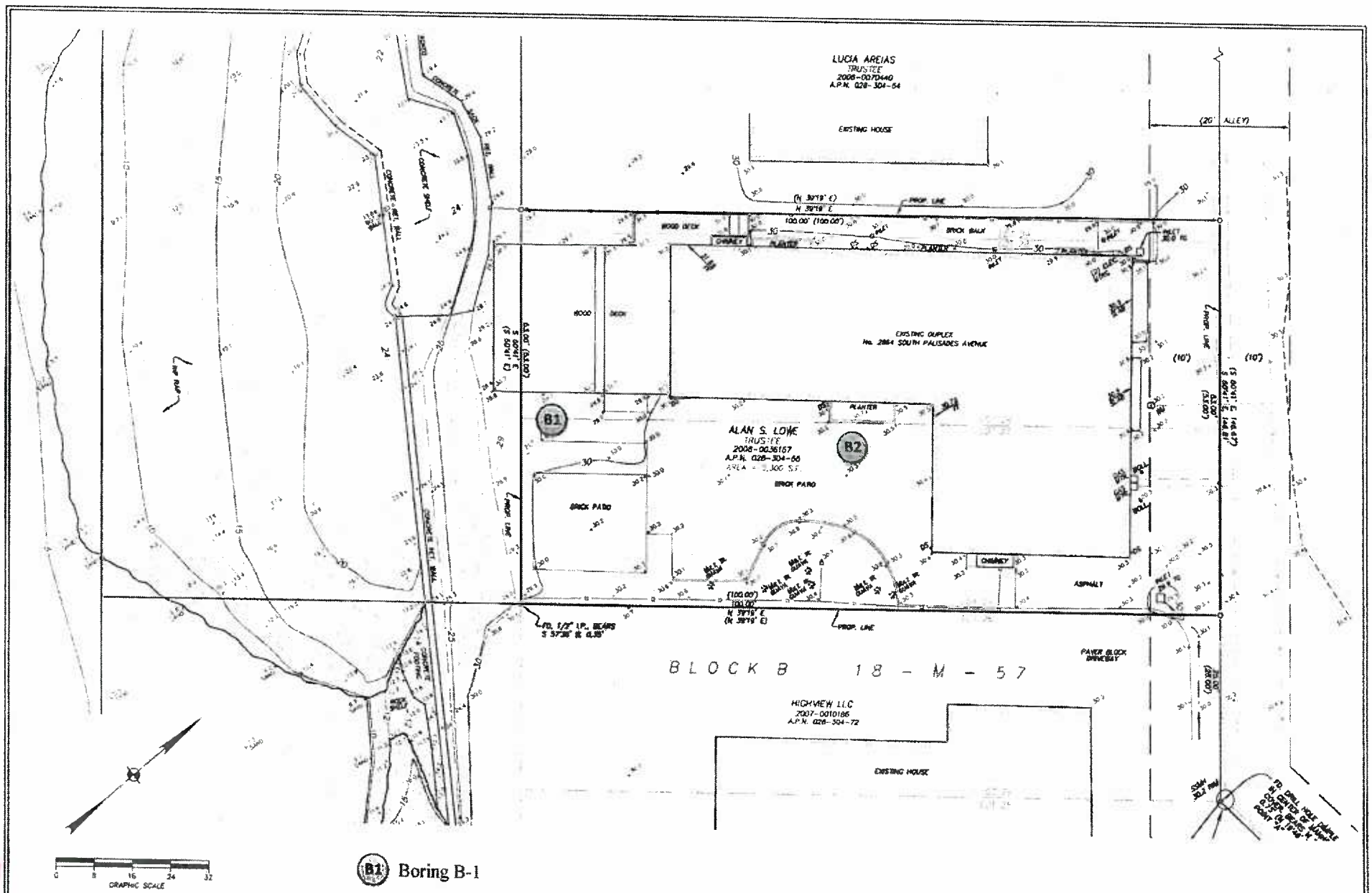
Expansion tests were performed on representative, remolded samples of the on-site soils in accordance with laboratory test standard ASTM D 4829-95. The test results are presented in **Figure A-5**.

A-10. Amount of Materials in Soil Finer than the No. 200 Sieve

Determination of the amount of materials in the soil finer than the No. 200 sieve analyses were performed on samples considered representative of the on-site soils. The laboratory test was performed in accordance with ASTM: D 1140. The test results are presented in **Figure A-5**.

A-11. Soluble Sulfates

The soluble sulfate content was determined for samples considered representative of the on-soils likely to come in contact with concrete in accordance with test method California 417. The test results are presented in **Figure A-5**.



Surveyor's Map by Luke R. Beautz, Dated April 2013

ROCK SOLID ENGINEERING, INC.

BORING LOCATION PLAN

2864 S. Palisades Avenue, Santa Cruz

FIGURE A-1

KEY TO LOGS

UNIFIED SOIL CLASSIFICATION SYSTEM

PRIMARY DIVISIONS			GROUP SYMBOL	SECONDARY DIVISIONS
COARSE GRAINED SOILS More than half of the material is larger than the No. 200 sieve	GRAVELS More than half of the coarse fraction is larger than the No. 4 sieve	CLEAN GRAVELS (Less than 5% fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
		GRAVEL WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines
	SANDS More than half of the coarse fraction is smaller than the No. 4 sieve	CLEAN SANDS (Less than 5% fines)	SW	Well graded sands, gravelly sands, little or no fines
			SP	Poorly graded sands, gravelly sands, little or no fines
		SAND WITH FINES	SM	Silty sands, sand-silt mixtures, non-plastic fines
			SC	Clayey sands, sand-clay mixtures, plastic fines
FINE GRAINED SOILS More than half of the material is smaller than the No. 200 sieve	SILTS AND CLAYS Liquid limit less than 50		ML	Inorganic silts and very fine sands, silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomacaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils

GRAIN SIZE LIMITS

SILT AND CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		
No. 200	No. 40	No. 10	No. 4	3/4 in.	3 in.	12 in.	

US STANDARD SIEVE SIZE

RELATIVE DENSITY	
SAND AND GRAVEL	BLOWS/FT*
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	OVER 50

CONSISTENCY	
SILT AND CLAY	BLOWS/FT*
VERY SOFT	0 - 2
SOFT	2 - 4
FIRM	4 - 8
STIFF	8 - 16
VERY STIFF	16 - 32
HARD	OVER 32

MOISTURE CONDITION
DRY
DAMP
MOIST
WET

* Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1 3/8 inch I.D.) split spoon (ASTM D-1586).

ROCK SOLID ENGINEERING, INC.

FIGURE A-2

LOG OF EXPLORATORY BORING

Project No.:	13009	Boring:	B1
Project:	2864 S. Palisades Avenue	Location:	Top of Bluff
	Santa Cruz, California	Elevation:	29.7'
Date:	June 20, 2013	Method of Drilling:	Big Beaver 4" Solid Stem Auger
Logged By:	YW		140 lb. Safety Hammer

2" DIA Sample | 2.5" DIA Sample | Bulk Sample | Terzaghi Split Spoon Sample | Static Water Table

Depth (ft.)	Soil Type	Undisturbed	Bulk	Description	Blows	Dry Density (pcf)	Moisture Content (%)	Wet Density (pcf)	Direct Shear c (psf)	Direct Shear φ °	Miscellaneous Laboratory Testing
	SM		X	Dark Brown SILT with Sand. Dry, Loose, Non-plastic.	12	103.4	10.2	113.9			Consolidation #200 Wash Sulfate
	CL		X	Tan CLAY with Sand. Moist, Stiff, Plastic.	9		19.0				
5	ML		X	Tan SILT with Sand. Moist, Dense, Non-plastic.	37	109.3	16.6	127.5			
	SP		X	Brown SAND. Dry to Moist, Medium Dense, Non-Plastic.	26		20.7				
				Drill Water Added. Increased Drilling Difficulty.			10.3				
10				**Terrace Deposits:**							
	SP		X	Gravelly SAND. Dry, Dense, Non-plastic.	39		6.6				
			X	Quartz Rock. Material Consistent. Sandstone Cobble in Shoe	44		8.7				
			X	Material Consistent. Gravels, Sandstone Cobbles.	41		9.9				
15	SP/SM		X	**Bedrock (Purisima Formation)**							
			X	Brown Sandstone/Siltstone. Wet, Medium Dense.	21						
			X	Blue Grey Sandstone/Siltstone. Wet, Medium-Dense.			42.1				
				Boring Terminated @ 16.5 ft. Groundwater Not Encountered. Boring Backfilled With Cuttings.							
20											
25											

ROCK SOLID ENGINEERING, INC.

FIGURE A-3

EXHIBIT G

LOG OF EXPLORATORY BORING

Project No.:	13009	Boring:	B2
Project:	2864 S. Palisades Avenue	Location:	Center of Lot (Brick Patio Near Structure)
	Santa Cruz, California	Elevation:	30.3'
Date:	June 20, 2013	Method of Drilling:	Big Beaver 4" Solid Stem Auger
Logged By:	YW		140lb. Safety Hammer

2" DIA Sample | 2.5" DIA Sample | Bulk Sample | Terzaghi Split Spoon Sample | Static Water Table

Depth (ft.)	Soil Type	Undisturbed	Bulk	Description	Blows	Dry Density (pcf)	Moisture Content (%)	Wet Density (pcf)	Direct Shear c (psf)	Direct Shear φ °	Miscellaneous Laboratory Testing
	SM		X	Dark Brown Silty SAND. Wet, Medium Dense, Non-Plastic. Fine Grained.	19						Sulfate Consolidation
	CL		X	Tan Silty CLAY. Wet, Stiff, Plastic.		109.2	18.5	129.4	1070	14	E.I.=4
5	CL/ ML		X	Increased Silt Content	22		19.4				
				Terrace Deposits:							
10	SP		X	Brown SAND. Moist. Medium Dense. Non-plastic.	49	105.7	8.0	114.2			
			X	Material Consistent. Fine Grained. Dense	38		7.6				
			X	Increased Gravels			6.6				
			X	Interbedded Sands and Gravels. Dense.	49		8.1				
	▽			**Groundwater**							
			X	Dark Brown SAND. Wet, Loose, Non-plastic.							
15			X	Tan SAND. Wet, Loose, Non-plastic.	10		19.0				
				Bedrock (Purisima Formation)							
	(ML)		X	Dark Grey SILTSTONE. Wet, Medium Dense. Non-plastic.	22		16.3				#200 Wash
20				Boring Terminated @ 17 ft. Groundwater at 14 Feet Boring Backfilled With Cuttings.							
25											

ROCK SOLID ENGINEERING, INC.

FIGURE A-4

SUMMARY OF LABORATORY TEST RESULTS

BORING	DEPTH	SOIL TYPE	IN-SITU			DIRECT SHEAR		GRAIN SIZE (%)				EXPANSION INDEX	SOLUBLE SULFATES (ppm)
			DRY DENSITY (pcf)	MOISTURE CONTENT (%)	WET DENSITY (pcf)	COHESION (psf) (PEAK)	FRICTION ANGLE (PEAK)	GRAVEL	SAND	SILT	CLAY		
B1	1.0	ML	103.4	10.2	113.9					57			23
B1	2.5	CL		19.0						79			
B1	6.0	SM	109.3	16.6	127.5								
B1	6T	ML		16.6									
B1	6B	SM		20.7									
B1	7.5	SP		10.3									
B1	10.5	SP		6.6									
B1	12.0	SP		8.7									
B1	13.5	SP		9.9									
B1	15.0	(SP/SM)		42.1									
B2	2.0	CL	109.2	18.5	129.4	1070	14						99
B2	3.5	CL		19.4								4	
B2	3 to 4	CL		19.1									
B2	9.0	SP	105.7	8.0	114.2	350	43						
B2	10.5 T	SP		7.6									
B2	10.5 B	SP		6.6									
B2	12.0	SP		8.1									
B2	13.5	SP		19.0									
B2	15.0	(SP/SM)		16.3						99			

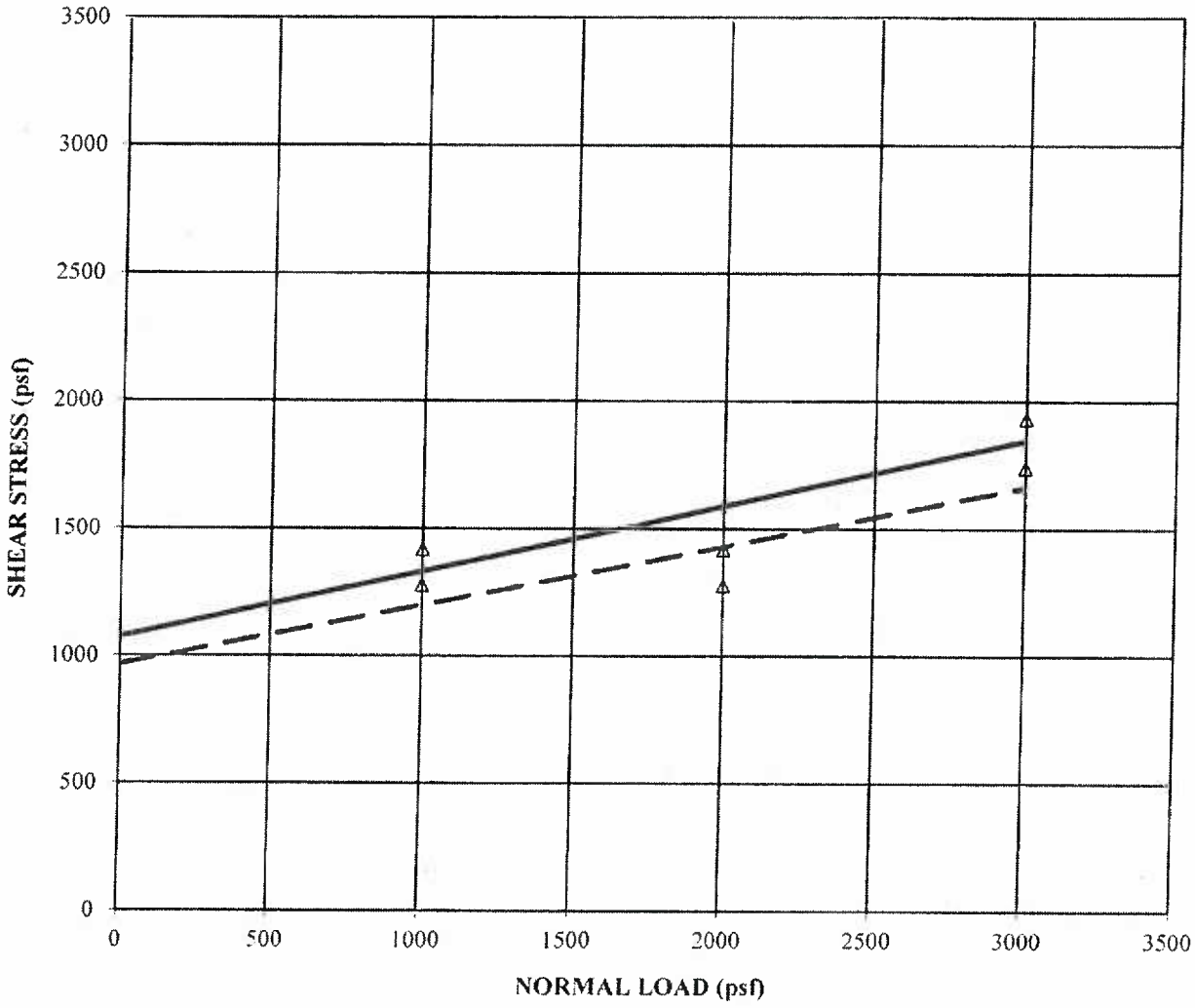
ROCK SOLID ENGINEERING, INC.

FIGURE A-5

EXHIBIT G

BORING:	B2		COHESION (psf)	FRICTION ANGLE
DEPTH (ft):	2.0			
SOIL TYPE (USCS):	CL	PEAK	1070	14
		RESIDUAL	960	13

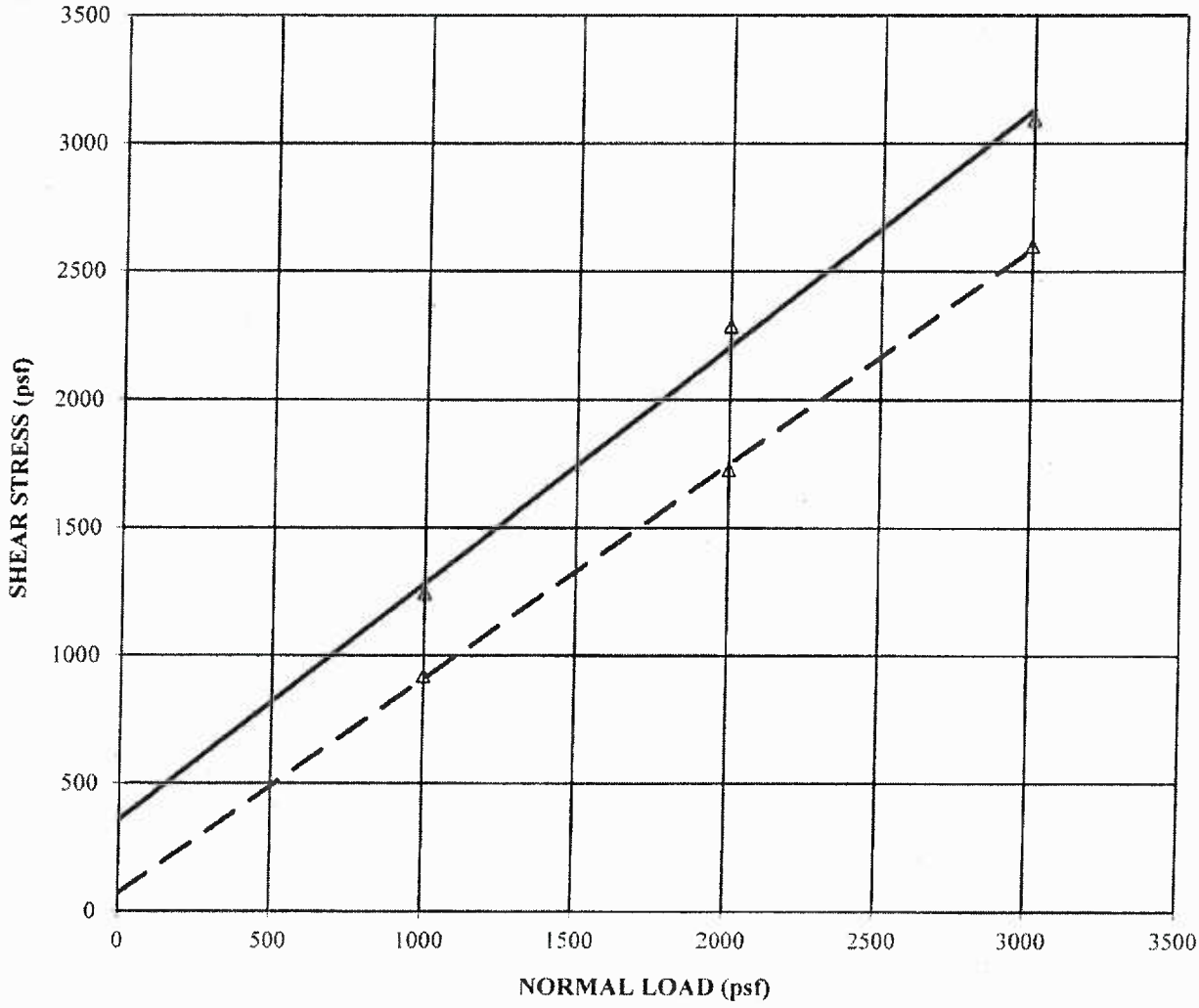
TEST SAMPLE TYPE:	FIELD MOISTURE:	18.5%
IN-SITU (SATURATED)	SATURATED MOIST:	22.1%



ROCK SOLID ENGINEERING, INC.	DIRECT SHEAR TEST RESULTS	FIGURE
	2864 S. Palisades Avenue, Santa Cruz	A-6

BORING:	B2		COHESION (psf)	FRICTION ANGLE
DEPTH (ft):	9.0			
SOIL TYPE (USCS):	SP	PEAK	350	43
		RESIDUAL	70	40

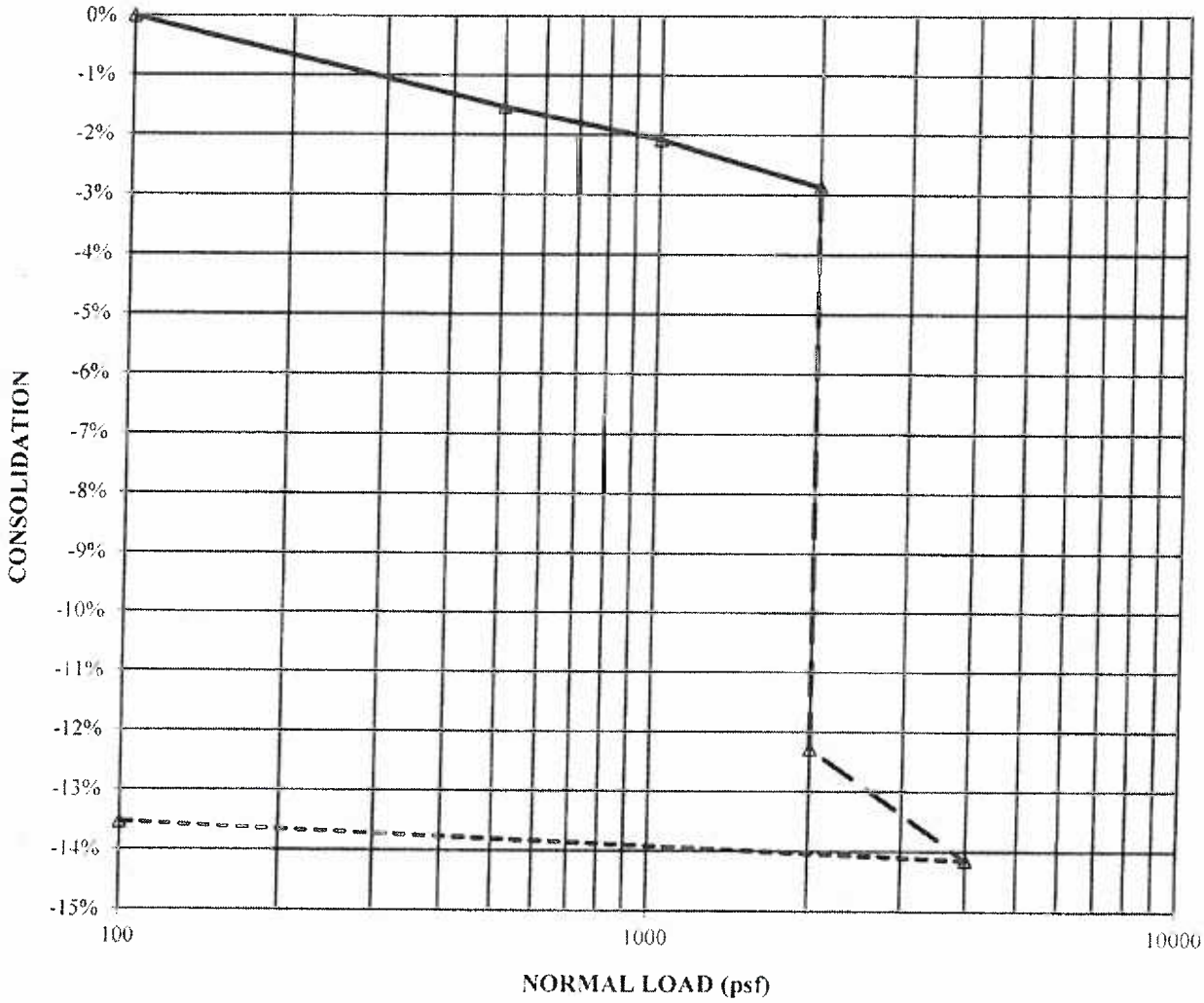
TEST SAMPLE TYPE:	FIELD MOISTURE:	8.0%
IN-SITU (SATURATED)	SATURATED MOIST:	22.7%



ROCK SOLID ENGINEERING, INC.	DIRECT SHEAR TEST RESULTS	FIGURE
	2864 S. Palisades Avenue, Santa Cruz	A-7

EXHIBIT G

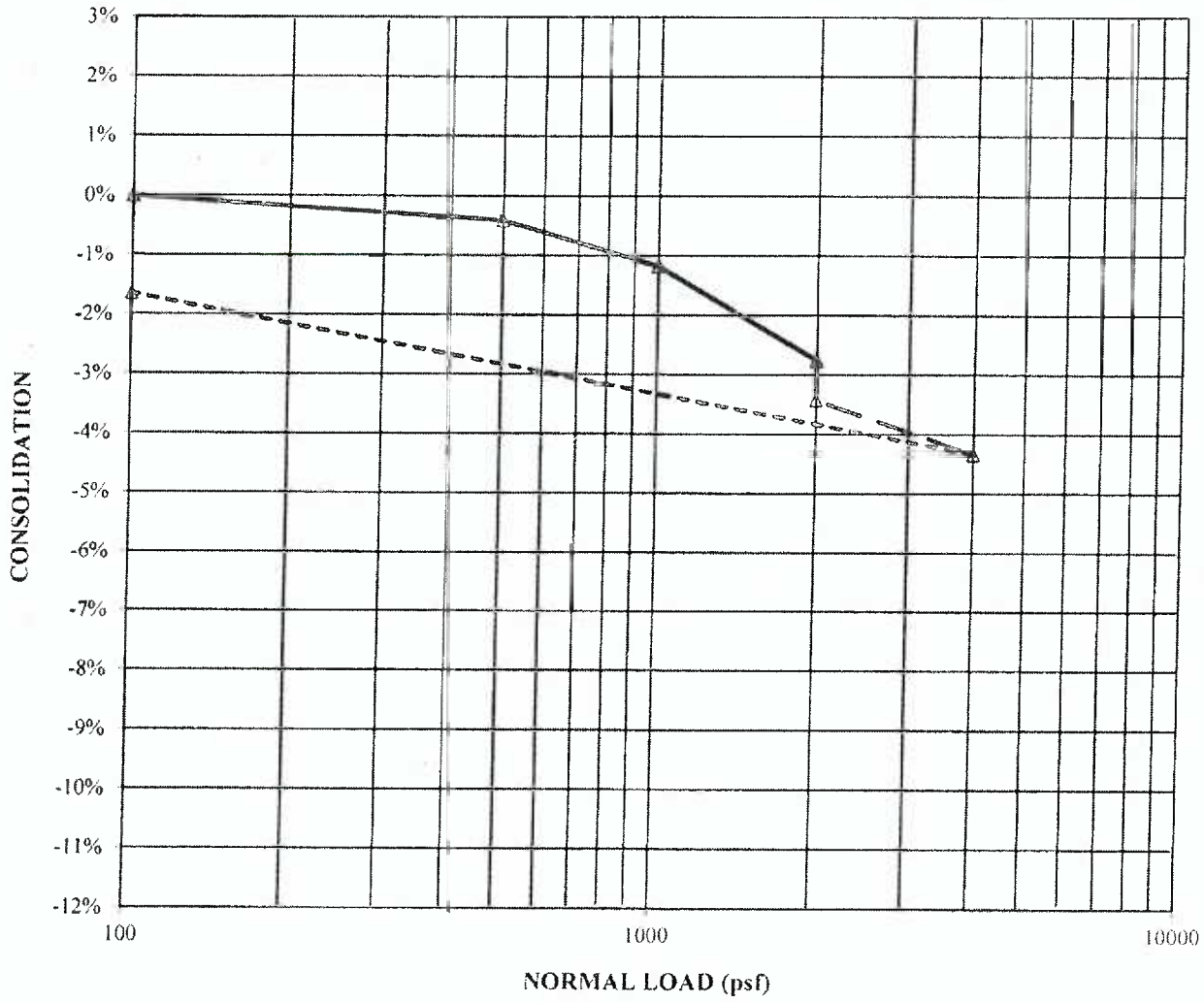
BORING:	B1	FIELD MOISTURE	
DEPTH (ft):	1.0	SATURATED	
SOIL TYPE (USCS):	ML	REBOUND	
SEATING WEIGHT:	220 psf	FIELD MOISTURE:	10.2%
		SATURATED MOIST:	17.6%



ROCK SOLID ENGINEERING, INC.	CONSOLIDATION TEST RESULTS	FIGURE
	2864 S. Palisades Avenue, Santa Cruz	A-8

EXHIBIT G

BORING:	B2	FIELD MOISTURE	
DEPTH (ft):	2.0	SATURATED	
SOIL TYPE (USCS):	CL	REBOUND	
SEATING WEIGHT:	250 psf	FIELD MOISTURE:	18.5%
		SATURATED MOIST:	23.2%



ROCK SOLID ENGINEERING, INC.	CONSOLIDATION TEST RESULTS	FIGURE
	2864 S. Palisades Avenue, Santa Cruz	A-9

EXHIBIT G

APPENDIX B

WAVE RUN-UP ANALYSIS

WAVE RUNUP ANALYSIS

B-1 Introduction

Because of the proximity of the parcel to the coastal bluff, we have performed a quantitative wave runup analysis to estimate the potential for waves to overtop the existing retaining wall. Our analysis was based on the Surveyor's Map (Reference 1) and the Geologic Cross Section prepared by the Easton Geology (Reference 7). Our analysis was based on methods suggested in the Coastal Engineering Manual (Reference 12). The software program ACES was also used for our calculations. The input parameters for the program are presented in **Figure B-1**. Further discussion of the shoreline hazards are presented in the Geologic Investigation Report (Reference 7).

B-2 Parcel Geometry

The parcel is relatively level from the street for approximately 90 feet. The site then slopes down to an existing permitted concrete retaining wall with a rip rap revetment that continues to the ocean sand surface below. The cross section used for our analysis was prepared by Easton Geology and is included as **Figure B-2.**

B-3 Still Water Level

The still water level (SWL) is the maximum possible water elevation anticipated for the ocean conditions with a 100 Year recurrence interval. The following values were used for our design.

Still Water Level Summary	**Feet Above MSL (Mean Sea Level)**
Astronomic High Tide	4.2
El Niño Effects	2.0
Projected Sea Level Rise	3.5
Total:	**+9.7 MSL**

B-4 Design Water Level

For our analysis the Design Water Level (DWL) is considered to be the SWL plus the short term effects of wave setup. Based on the NOAA tidal stations (Reference 8), the datum of our cross sections (NAVD) is -2.9 feet MSL at the subject site. By summing 2.9 feet for MSL, 9.7 for SWL, and 1 foot for wave setup, the Design Water Level (DWL) is 13.6 feet.

B-5 Design Wave Height and Period

The maximum wave height and peak period are important factors in the calculation of the wave runup value. Based on our review of the historic NOAA Buoy data (Reference 8), wave heights offshore can reach 20 to 25 feet with corresponding periods of 18 to 20 seconds. However, the wave height offshore does not correspond with the wave height at the shore. The wave height at the shore is limited by the water depth. We have therefore used a wave height of 13.5 feet.

WAVE RUNUP

Numerous laboratory tests have been conducted over the years resulting in data for wave runup. Figure 5-2-1 shows parameters involved in discussing wave runup, and the next two sections present equations used in ACES for rough and smooth slopes.

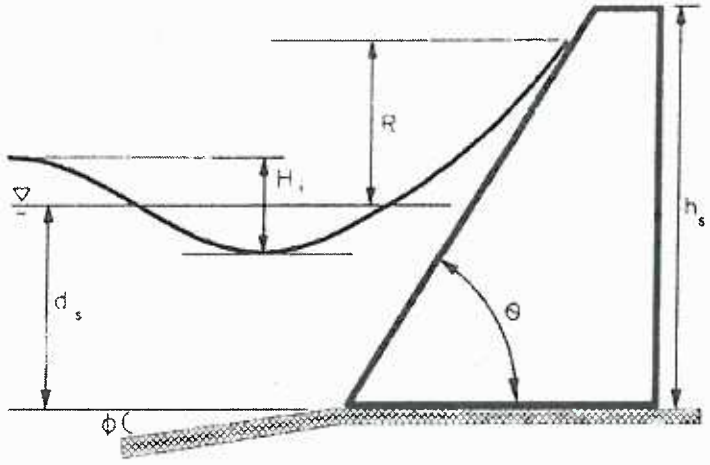


Figure 5-2-1. Wave Runup and Overtopping

DESIGN PARAMETERS

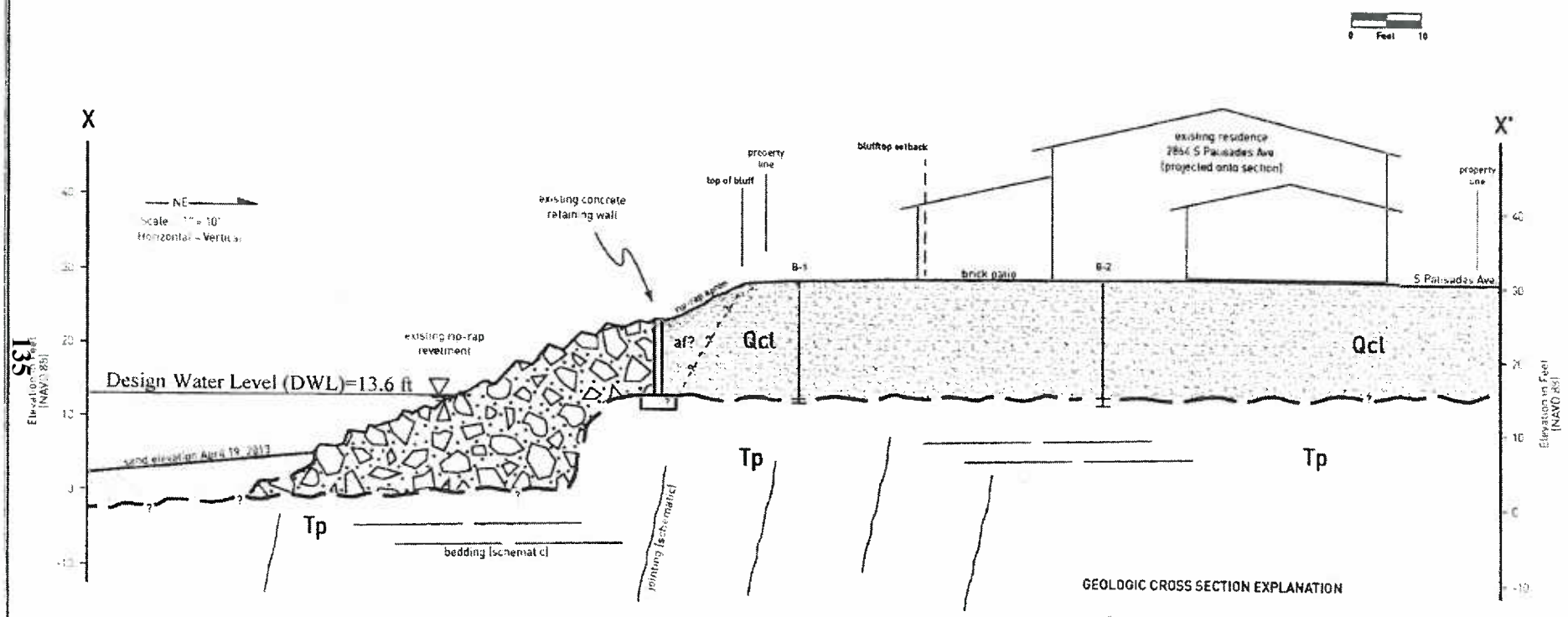
d_s = DEPTH OF WATER (ft) =	16	Feet
H_i = INCIDENT WAVE HEIGHT (feet)=	13.5	Feet
ϕ = NEAR SHORE SLOPE ANGLE=	4	Degrees
Θ= STRUCTURE (REVETMENT) SLOPE =	20	Degrees
h_s = HEIGHT OF STRUCTURE	24	Feet
T = WAVE PERIOD	20	seconds
R = RUNUP (feet)=	20.8	Feet

ROCK SOLID ENGINEERING, INC.	**WAVE RUN-UP**	Figure B-1

GEOLOGIC CROSS SECTION
Lowe property
2864 South Palisades Avenue
Santa Cruz, California
Santa Cruz County APN 028-304-55

Scale 1" = 10' Hor.	Date 7/25/13	Project #	Drawing Number
By GFE, gle	Revised	C13006	PLATE 2

EASTON GEOLOGY
P.O. Box 3533
Santa Cruz, California 95063
831.247.4317



0 Feet 10

GEOLOGIC CROSS SECTION EXPLANATION

Symbols

Geologic contact - dashed where approximate, queried where uncertain.

B-2 Exploratory boring (advanced 20 June 2013, Rock Solid Engineering).

Earth Materials

af	Wall backfill
Qct	Marine terrace deposits
Tp	Purisima Formation bedrock

Cross Section By Easton Geology (Reference 7) - Water Level Added by R.S.E.

ROCK SOLID ENGINEERING, INC.

CROSS SECTION

2864 S. Palisades Avenue, Santa Cruz

Figure B-2

EXHIBIT G

ROCK SOLID ENGINEERING, INC.
Soil Reports • Site Assessments • Manufactured Home Foundations • Expert Witness • Real Estate Inspections

Project No. 13009
June 17, 2014

Alan & Julie Lowe
2181 Las Trampas Road
Alamo, California 94507

SUBJECT: **RESPONSE TO COUNTY COMMENTS**
Proposed Single Family Residence
2864 S. Palisades Avenue, Santa Cruz, California
A.P.N.: 028-304-55

REFERENCES: See Attached

Dear Mr. and Mrs. Lowe:

We have reviewed the review comments provided by the County of Santa Cruz Planning Department (Reference 1) . Please find our responses listed below:

Comment 1: *The site's coast line sea wall includes both a section of riprap, and a vertical stacked concrete wall. Please explain why only the rip rap seawall was analyzed.*

Response 1: The vertical stacked concrete wall extends approximately 12 feet into the parcel from the up coast side. The cross section analyzed was the most representative of the parcel condition and the most conservative as well for the wave runup. During our analysis, the wave runup value was checked by varying the seawall structure height from the top of the poured concrete portion of the seawall and the top of the stacked concrete wall portion . This value did not effect the wave runup value.

As the seawall may be overtopped during the design event, the stacked concrete sacks provide protection against accelerated erosion. Based on our review of the grading permit for this portion of the wall (Reference 4), the stacked concrete sacks is part of a section of the seawall that was built in 1983. This portion of the wall consists of a poured concrete wall that is partially supported by deadman (drilled piers). The deadman serve as tiebacks for the seawall. The drilled piers have a concrete grade beam that ties them together. The concrete sack are founded on the grade beam.

All elements of the seawall should be included in the maintenance of the seawall in order to prevent accelerated erosion especially near the deadman tiebacks. The recommended maintenance is included in the response by Easton Geology.

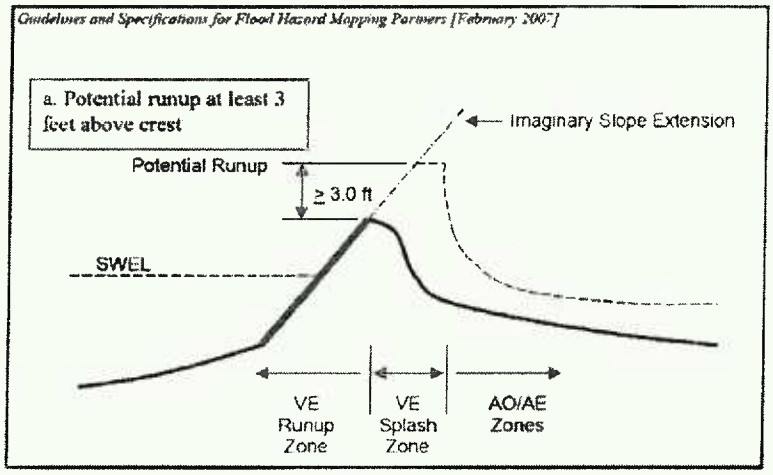
EXHIBIT G

Comment 2: *Please show in cross-section the base flood elevation, stillwater elevation, wave height elevation and run up, and the flow over topping.*

Response 2: Figure B-2 has been revised to add the requested items. See attached.

Comment 3: *Please explain the reduction in base flood elevation to 32.2.*

Response 3: The runup elevation of +34.4 feet (NAVD) is a theoretical elevation that would result if the seawall continued to a infinite elevation. This is illustrate below as the Imaginary Slope Extension.



However, because the top of the seawall is lower than the calculated runup, the wave will exceed the top the seawall as splash overtopping. We therefore followed the procedure provided in the Guidelines and Specifications for Flood Hazard Mapping, Section D.2.8.1.7 (Reference 2) to calculate the adjusted runup elevation.

The Adjusted Runup elevation was calculated as $R_a=(C+mX)$ as shown in the excerpt (next page).

Guidelines and Specifications for Flood Hazard Mapping Partners [February 2007]

A distinct type of overflow situation can occur at low bluffs or banks backed by a nearly level plateau, where calculated wave runup may appreciably exceed the top elevation of the steep barrier. A memorandum entitled *Special Computation Procedure Developed for Wave Runup Analysis for Casco Bay, FIS - Maine, 9700-153* provides a simple procedure to determine realistic runup elevations for such situations, as illustrated in Figure D.2.8-10 (French, 1982). An extension to the bluff face slope permits the computation of a hypothetical runup elevation for the barrier, with the imaginary portion given by the excess height R' = (R-C) between the calculated runup and the bluff crest. Using that height (R') and the plateau slope (m), Figure D.2.8-11 defines the inland limit to a wave runup (X) corresponding to the runup above the bluff crest (mX) or an adjusted runup elevation of R_a = (C + mX). This procedure is based on a Manning's "n" value of 0.04, with some simplifications in the energy grade line, and is meant for application only with positive slopes landward of the bluff crest. A different treatment of wave overflow onto a level plateau, for possible Flood Map Project use, is provided in *Overland Bore Propagation Due to an Overtopping Wave* (Cox and Machemehl, 1986).

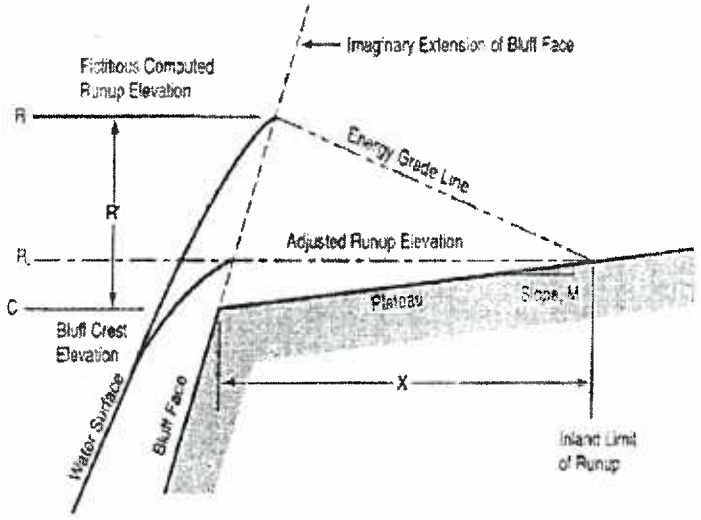


Figure D.2.8-10. Treatment of Runup onto Plateau above Low Bluff

We originally calculated the slope within the 25 foot setback and with a bluff top of 30 feet. However, upon further review, it is more appropriate to use the slope from the top of the bluff to the property line and a bluff top of 29 feet as shown on the geologic map.

Using this method, the slope m is .014 and Inland limit of Runup is 92 feet from the bluff top.

The Adjusted Runup Elevation, **R_a is therefore, 30.3 feet.**

EXHIBIT G

Comment 4: *Please provide a maintenance heuristic that identifies when the sea wall must be inspected, and the thresholds of damage when maintenance will be required for the various parts of the seawall.*

Response 4: Easton Geology has addressed this comment in their letter title Response to County Comments.

Item 5a: *The report indicates that the home will be impacted by the portion of the wave that over tops the sea wall. In compliance with the Building Code and FEMA standards, the home must be designed to prevent damage and flooding from waves or overflow.*

Response 5a: The recommendations provided in the referenced Geotechnical Investigation Report meet this criteria.

Item 5b: *Some of the proposed drainage improvements and any maintenance to the riprap will require approval by the coastal commission.*

Response 5b: Understood.

Item 5c: *Before the issuance of the Building Permit a civil engineer will need to indicate if maintenance is required for existing seawall.*

Response 5c: Our engineer has observed the seawall and it is in good condition. No maintenance is currently needed.

Item 5d: *The bottom of the lowest supporting horizontal structure of the lowest floor must be 1 foot above the Base Flood Elevation.*

Response 5d: This comments appear to come from the 2013 CBC, Section 1612.5 (#2). Which is titled "For construction in flood hazard areas subject to high-velocity wave action".

I asked for a clarification on this requirement. Antonella Gentile responded that County Code Section 16.10.070(f)(3)(f) applies. That section of the code requires that "the top of the highest horizontal structural member (joist or beam) which provides support directly to the lowest floor, and all elements that function as a part of the structure, such as furnace, hot water heater, etc., shall be elevated at least one foot above the 100-year flood level".

The plans will comply with this county code requirement. Please note that based on our review of the analysis, the Adjusted Runup is 30.3 feet.

Item 5e: *No walls, drainage catch basins and pipes, or fill shall be allowed in the 25 foot jurisdictional setback. Only minor grading to allow appropriate permissible is allowed.*

Response 5e: Understood.

Item 5f: *No deflection of waves or over flow is allowed.*

Response 5f: Per our conversation with Antonella Gentile, the structure will not be located in the V zone and therefore this comment does not apply.

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office.

Sincerely,

ROCK SOLID ENGINEERING, INC.

Signed: 6-17-14

Yvette M. Wilson, P.E.
Principal Engineer
R.C.E. 60245

Distribution: (1) Addressee
(5) Stephanie Barnes-Castro, Architect and via email
(1) Greg Easton via email

EXHIBIT G

REFERENCES

1. County of Santa Cruz, Planning Department, Review of Geotechnical by Rock Solid Engineering, Inc., Dated October 14, 2013: Project #: 13009, and the Engineering Geology Report by Easton Geology, Dated October 13, 2013, Job Number C13006, APN: 028-304-55, Application #: REV141017.

2. FEMA, Guidelines and Specifications for Flood Hazard Mapping Partners, Section D.2.8, February 2007.

3. Rock Solid Engineering, Inc., Geotechnical Investigation Report, Proposed Single Family Residence, 2864 S. Palisades Avenue, Santa Cruz, California, A.P.N.: 028-304-55, Project No. 13009, Dated October 14, 2013.

4. Santa Cruz County Planning Department, Grading Permit No. 1872, Assessor's Parcel Number 28-304-54, -55, 2862 and 2864 S. Palisades Drive, Santa Cruz, Dated 8/12/83.

WAVE RUNUP

Numerous laboratory tests have been conducted over the years resulting in data for wave runup. Figure 5-2-1 shows parameters involved in discussing wave runup, and the next two sections present equations used in ACES for rough and smooth slopes.

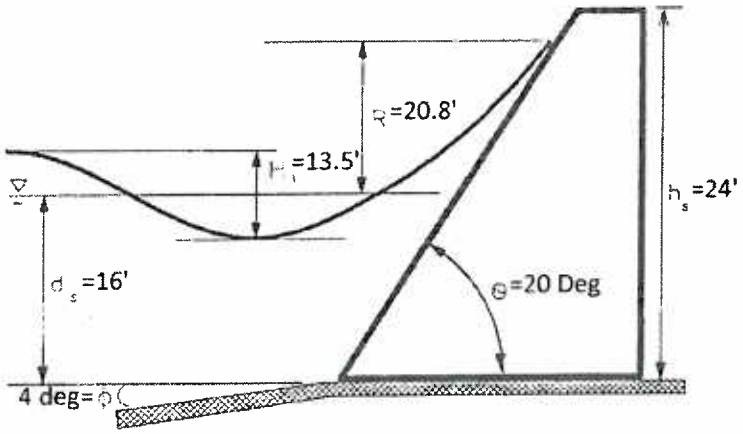
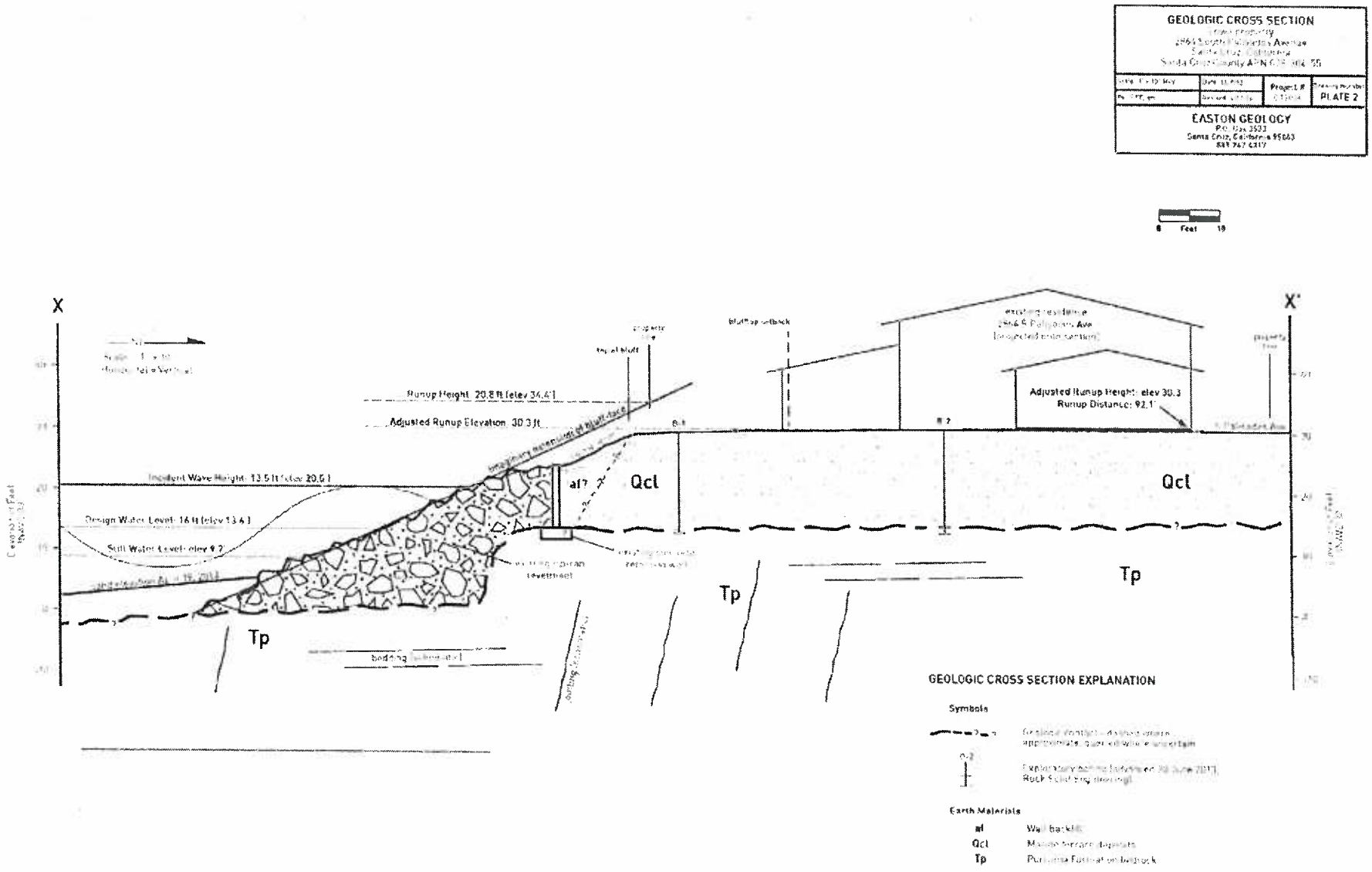


Figure 5-2-1. Wave Runup and Overtopping

DESIGN PARAMETERS

d_s = DEPTH OF WATER (ft) =	16 Feet
H_i = INCIDENT WAVE HEIGHT (feet)=	13.5 Feet
ϕ = NEAR SHORE SLOPE ANGLE=	4 Degrees
Θ= STRUCTURE (REVETMENT) SLOPE =	20 Degrees
h_s = HEIGHT OF STRUCTURE	24 Feet
T = WAVE PERIOD	20 seconds
R = RUNUP (feet)=	20.8 Feet

ROCK SOLID ENGINEERING, INC.	**WAVE RUN-UP**	Figure B-1



Cross Section By Easton Geology (Reference 7)

ROCK SOLID ENGINEERING, INC.	**CROSS SECTION** 2864 S. Palisades Avenue, Santa Cruz	Figure B-2

Easton Geology, Inc.
P.O. Box 3533, Santa Cruz, CA 95063
831.247.4317 info@eastongeology.com

7 July 2016

Julie and Allen Lowe
2181 Las Trampas Road
Alamo, California 94507

Job No. C13006

Re: Seawall Alternatives Analysis
2864 South Palisades Avenue
Santa Cruz, California
Santa Cruz County APN 028-304-55

Dear Mr. and Mrs. Lowe:

This letter summarizes our analysis of potential seawall alternatives at the subject property where you propose to construct a new single-family residence. Existing coastal protection structures at the site, some of which date back to 1953, include a rip-rap revetment which protects the bedrock portion of the bluff against wave erosion, and a concrete wall, concrete sack wall, and small rip-rap which help retain the terrace deposits comprising the upper bluff. Modifications to the seawall system were constructed in 1983 (Permit No. 3-83-166) and included fortifying the revetment and extending the concrete wall. The seawall system at the site extends onto the adjacent up and downcoast parcels and is in acceptable condition overall. Future maintenance, however, will be necessary to protect the parcel and the existing or proposed development from bluff erosion. This maintenance is allowed under Permit No. 3-83-166, which states that *"The safety of improved structures on this parcel is dependent, in part, on the construction and maintenance of an engineered seawall approved by the County and Coastal Permit process."*

We considered several alternatives to maintaining the coastal protection structures at the site. Our analysis considered the following: 1) maintaining the existing seawall system; 2) not maintaining the seawall system; 3) removing the seawall system; and 4) modification of the seawall system. For each alternative, we have considered the 100-year stability of the blufftop and how each alternative would affect the proposed development.

Alternative 1: Seawall System Maintained

Maintenance of the existing seawall system at the site will help protect the bluff and blufftop developments from coastal erosion[1]. Maintaining the integrity of the seawall system also benefits the adjacent up and downcoast parcels which are similarly protected but are susceptible to wave runup, bluff erosion, and outflanking of their coastal protection structures. Maintaining the seawall system at the subject property will provide 100-year stability for the blufftop and proposed development.

1. Section 16.10.070(H)(3)(g) of the Santa Cruz County Code states: All shoreline protection structures shall include a permanent, County approved, monitoring and maintenance program.

EXHIBIT H

Planned maintenance to the seawall system at the site may involve periodic, minor disturbance to the beach area seaward of the property.

Alternative 2: Seawall System Not Maintained

Unmaintained, the coastal protection structures at the site will deteriorate and fail to protect the subject bluff. As a consequence, renewed coastal erosion will eventually jeopardize the improvements on the parcel. The adjacent up and downcoast parcels will also be affected by erosion of the subject bluff as their protection structures become outflanked and their improvements become threatened.

Settlement of the revetment seaward of the subject property will expose portions of the seawall system which protect the terrace deposits from wave attack. The weakened revetment will be less effective at preventing wave runup and related overtopping of the blufftop. Although a sandy beach only occasionally exists seaward of the property, lateral beach access may be impacted as fugitive rip-rap migrates seaward and downcoast from the revetment.

The existing seawall system has essentially halted bluff retreat at the subject site for as much as 60 years. Renewed bluff retreat at the site will likely be greater than the pre-development rate of bluff retreat as the bluff adjusts to the oceanographic and atmospheric conditions existing at that time. Ascertaining the functional longevity of the seawall system at the site is very difficult, if not impractical. As such, accurately determining the time at which bluff erosion at the site resumes, and the position of the bluff edge in 100 years is tenuous. We have estimated the position of the 100-year top of bluff on the subject property assuming the seawall system is not maintained. This estimate is based on a generous assumption that the seawall system continues to provide protection for 50 years, and that the renewed bluff erosion rate is one foot per year. Simply put, erosion of the bluff edge will resume in 50 years, resulting in 50 feet of bluff retreat in 100 years if the seawall system is not maintained. Given that the parcel extends about 100 feet inland from the current bluff edge, and that the Santa Cruz County Planning Department requires new development on the parcel be positioned beyond the 100-year top of bluff[2] and set back 20 feet from the right-of-way, the buildable area on the lot would be limited to a depth of about 20 feet. Development on the parcel would not be feasible given these constraints.

Alternative 3: Removal of the Coastal Protection Structures[3]

The existing seawall system has essentially halted bluff retreat at the subject site for as much as 60 years. Removal of the seawall system will allow for renewed coastal erosion at the site. The erosion rate, however, will likely be greater than the pre-development rate of bluff retreat as the bluff adjusts to the oceanographic and atmospheric conditions existing at that time. Assuming an

2. Section 16.10.070(H)(1)(b) of the Santa Cruz County Code states: *For all development, including that which is cantilevered, and for nonhabitable structures, a minimum setback shall be established at least 25 feet from the top edge of the coastal bluff, or alternatively, the distance necessary to provide a stable building site over a 100-year lifetime of the structure, whichever is greater.*

3. Section 16.10.070(H)(3)(a) of the Santa Cruz County Code states: *Shoreline protection structures shall only be allowed on parcels where both adjacent parcels are already similarly protected, or where necessary to protect existing structures from a significant threat, or on vacant parcels which, through lack of protection threaten adjacent developed lots, or to protect public works, public beaches, and coastal dependent uses.*

erosion rate of one foot per year and removal of the seawall system which currently protects the subject bluff, there would be 100 feet of bluff retreat in 100 years. Given that the parcel extends about 100 feet inland from the current bluff edge, the entire property would be lost to bluff retreat in 100 years, obviously precluding any development of the property. Additionally, a public right-of-way, utilities, and the improvements on the adjacent up and downcoast subject properties would be threatened under this scenario.

Lateral beach access seaward of the subject bluff would not be significantly improved if the seawall were removed: a continuous revetment extends several hundred feet upcoast and a tall bedrock promontory lies just downcoast. The upcoast revetment and downcoast promontory, in conjunction with variable sand and tide conditions, significantly limit access along this stretch of coastline.

Alternative 4: Modifying the Coastal Protection Structures

The configuration of the current coastal protection structures is per design. Modifications to this seawall system, especially the rip-rap revetment, will likely have a negative consequence for the subject property and adjacent up and downcoast parcels. Restacking the revetment to a steeper profile, for example, may increase wave runup and result in higher and more frequent inundation of the blufftop while at the same time decrease the stability of the revetment. A sandy beach only occasionally exists seaward of the revetment and any gain in beach footprint or coastal access below the revetment would be minimal. The steeper revetment profile would necessitate more frequent maintenance and thus subject the beach fronting the revetment to significant disturbance.

Removing the revetment from the subject bluff and replacing it with a vertical concrete seawall would have an unknown effect on the wave runup characteristics at the site and adjacent parcels. Focused erosion would occur at the wall's base and would require periodic maintenance. The overall disturbance to the beach area fronting the subject bluff resulting from the removal of the rip-rap revetment and replacing it with an engineered concrete seawall would be significant. Due to a lack of a permanent sandy beach at the subject site, construction of any modifications to the existing seawall system would be difficult.

In lieu of modifying a short segment of the seawall system which protects the subject site, replacing the entire revetment which extends upcoast and downcoast with an engineered concrete seawall would provide sufficient long-lasting protection for the subject bluff and this reach of coastline as a whole.

In summary, we recommend that the seawall system at the site be maintained in order to provide continued protection for the bluff and the proposed blufftop development. The remaining alternatives analyzed do little to benefit existing residential improvements, the proposed development, public safety, or beach access. Beach access, public safety, and the improvements on adjacent parcels will continue to benefit from periodic maintenance of the seawall system.

The proposed development is set back 25 feet from the top of the bluff and does not depend on new coastal protection structures, but relies on the existing, permitted seawall system to provide

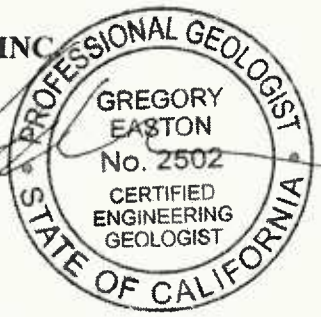
EXHIBIT H

100-year stability to the site[4]. This is considered the pre-development condition for the proposed project.

Please contact us if you have any questions regarding this letter or other aspects of this project.

Sincerely,

EASTON GEOLOGY, INC.



Gregory Easton
Principal Geologist
C.E.G. No. 2502

Copies: addressee (1)
Hamilton Swift & Associates, attn: Deidre Hamilton (3 + pdf)
Stephanie Barnes-Castro (1 + pdf)
Rock Solid Engineering, attn: Yvette Wilson (pdf)

References:

Easton Geology, 2013, Geologic Investigation of Coastal Blufftop Property, 2864 South Palisades Avenue, Santa Cruz, California, Santa Cruz County APN 028-304-55, Job No. C13006, prepared 10 October 2013, 43p.

4. Section 16.10.070(H)(1)(c) of the Santa Cruz County Code states: *The determination of the minimum setback shall be based on the existing site conditions and shall not take into consideration the effect of any proposed protection structures, such as shoreline protection structures, retaining walls, or deep piers.*

ROCK SOLID ENGINEERING, INC.
Soil Reports • Site Assessments • Manufactured Home Foundations • Expert Witness • Real Estate Inspections

Project No. 13009
July 1, 2016

Alan and Julie Lowe
2181 Las Trampas Road
Alamo, California 94507

SUBJECT: **ALTERNATIVES ANALYSIS**
2864 S. Palisades Avenue
Santa Cruz, California
A.P.N: 028-304-55

REFERENCES: See Attached

Dear Mr. and Mrs. Lowe:

The purpose of this letter is to compare the potential alternatives to the proposed project from the geotechnical standpoint to determine if there is another approach to the project other than what was recommended in the Geotechnical Investigation (Reference 3).

The proposed project consists of demolishing the existing residence and the construction of a new residence in approximately the same location. The property is currently protected by a coastal protection structure.

The alternatives that are considered herein are:

- The existing site conditions remain the same (ie. keep coastal protection structure and maintain it as necessary)
- The existing site conditions remain the same (ie. keep coastal protection structure but no maintenance allowed).
- No coastal protection structure (ie. analyze with no coastal protection structure)
- Modification of the existing coastal protection structure. (ie. remove or modify rip rap)

1. Alternative 1:

   a. Description

   Alternative 1 consists of keeping the pre-development application site conditions unchanged. The pre-development application conditions consist of a coastal protection structure that was permitted in 1983 under Administrative Coastal Development Permit No. 3-83-166.

   The coastal protection structure consists of a concrete seawall with a rip rap revetment that spans this parcel, the up coast parcel (2862 S. Palisades) and a portion of the down coast parcel as shown in **Figure 1**.

   For this alternative, the seawall would be maintained as necessary to provide continued protection for the property, adjacent properties and structures.

1100 Main Street, Suite A, Watsonville, CA 95076 • (831) 724-5868 • Fax: (831) 763-1578 • Email: yvette@rocksolidengineers.com

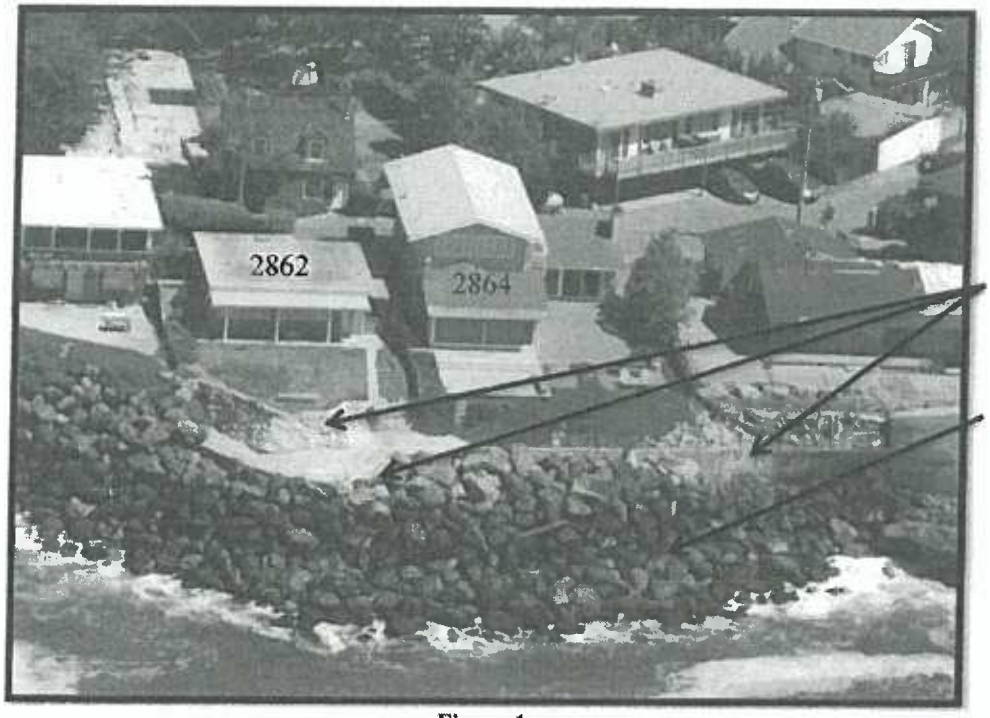


Figure 1

b. Discussion

The coastal protection structure is a permitted structure that has been in place for over 30 years. Some of the coastal protection at this site dates back to 1953. The surrounding land use consists of developed residential properties that are similarly protected by coastal protection structures as shown in **Figures 2 and 3**.

Special Condition 4 of the Coastal Development Permit (Reference 1) states "*It shall be the permittee's responsibility to maintain the rocks on the subject parcel. Any rock which is moved (i.e. by storm waves) shall be retrieved by the owner. In the event that the wall needs routing maintenance or emergency repair, a waiver from the executive Director or an amendment to this permit shall be required.*

Based on our discussions with the Project Geologist, it would be infeasible to not maintain the exiting coastal protection structure as the 100 year stability of the parcel cannot be maintained without the coastal protection structure. In addition, the stability of adjacent parcels would be negatively impacted by the lack of maintenance of this portion of the structure.

c. Applicable Codes

i. County Code 16.10.070(H1c) "*The determination of the minimum setback shall be based on the existing site conditions and shall not take into consideration the effect of any proposed protection measures…*"

ii. The coastal protection structures are existing rather than proposed. The geotechnical and geologic reports have therefore taken into account the existing site conditions as per this section of the county code.

iii. County Code 16.10.070(H3a) "*Shoreline protection structures shall only be allowed on parcels where both adjacent parcels are already similarly protected*". Both adjacent parcels are already similarly protected; therefore the county code also allows shoreline protection structures for this parcel.

d. Impact

i. The impact of the keeping the existing site conditions will be minimal as the seawall and rip rap would not be altered. This means there will be no construction on or near the beach at this time. However, periodic planned maintenance of the coastal protection will be necessary.

ii. Coastal access will also not be altered. Currently there is access to the beach both up coast and down coast of the project within 600 feet of the property as shown in **Figures 2 and 3**.

iii. The cost impact will be minimal for this option as the exiting coastal protection structure will not be reconstructed nor altered.

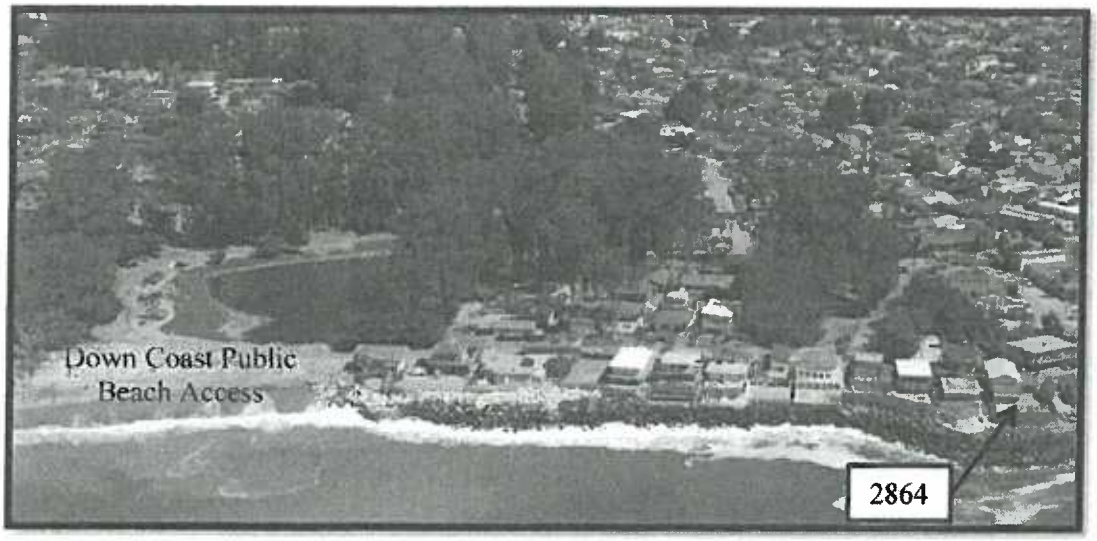


Figure 2

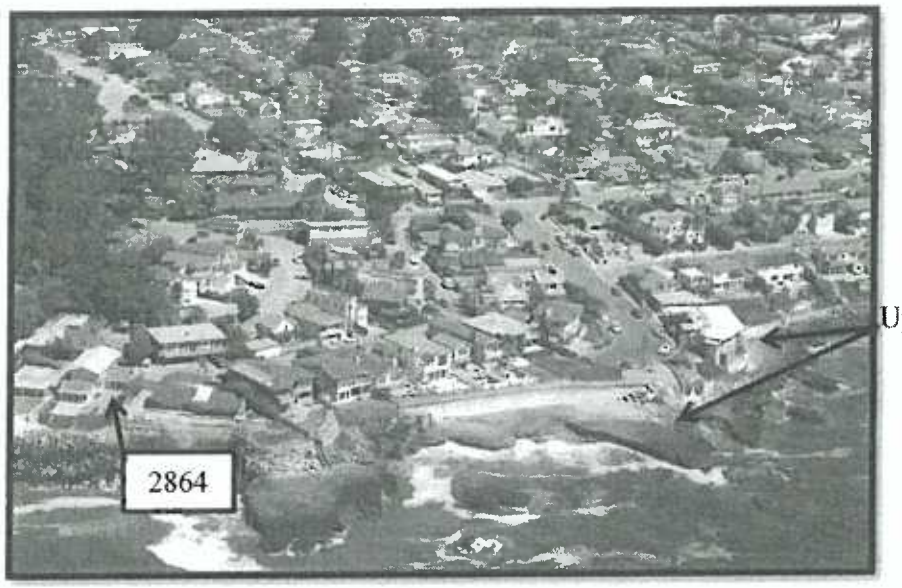


Figure 3

2. Alternative 2

a. Description

Alternative 2 consists of keeping the pre-development application site conditions unchanged similar to Alternative 1 but contemplating the option that the existing coastal protection structure would not be maintained.

b. Discussion

It would be infeasible to not maintain the exiting coastal protection structure as the 100 year stability of the parcel cannot be maintained without the coastal protection structure. Given the size of the property and the required property line and bluff setbacks, the 100 year setback would result in very limited buildable area at best and potentially an unbuildable lot.

Because of the urban location of this property in a stretch of coastline that is similarly protected, the stability of adjacent parcels would be negatively impacted by the lack of maintenance of this portion of the structure.

The existing coastal protection structure spans across property lines. Any proposed requirement to not maintain the seawall for this property would also therefore affect the up coast property which is not currently proposing any development on their parcel.

c. Applicable Codes

i. County Code 16.10.070(H1c) "*The determination of the minimum setback shall be based on the existing site conditions and shall not take into consideration the effect of any proposed protection measures…*"

ii. The coastal protection structures are existing rather than proposed. The geotechnical and geologic reports have therefore taken into account the existing site conditions as per this section of the county code.

iii. County Code 16.10.070(H3a) "*Shoreline protection structures shall only be allowed on parcels where both adjacent parcels are already similarly protected*". Both adjacent parcels are already similarly protected; therefore the county code also allows shoreline protection structures for this parcel.

3. Alternative 3

a. Description

Alternative 3 consists of considering the proposed development without a coastal protection structure.

b. Discussion

i. Without a coastal protection structure, the subject property would be subject to erosion and bluff retreat. The Project Geologist has attempted to calculate a 100 year setback based on no coastal protection structure. However, because the erosion has been halted for approximately 60 years by coastal protection structures, it is difficult if not impractical to calculate. He has however estimated that the position of the bluff would be 100 feet from its current position. As the property measures only 100 feet, this would be the equivalent of a "taking" of the property.

ii. In addition, a proposal to have no seawall on this parcel would have impacts to the surrounding area. Removing the seawall from this parcel would expose up coast and downcoast properties to accelerated erosion and potential damage to their coastal protection structures, property and structures. As seen in **Figures 2 and 3,** all of the properties along this urban coastline are protected by coastal protection structures. Removing one small portion of the protection is infeasible as it is required to protect adjacent properties.

iii. Removing the coastal protection structure would also have long term impacts to public utilities and public roads as the erosion would eventually reach the public roads.

c. Applicable Codes

i. County Code 16.10.070(H1c) "*The determination of the minimum setback shall be based on the existing site conditions and shall not take into consideration the effect of any proposed protection measures…*" The coastal protection structures are existing rather than proposed. The county code therefore does not require that the setback be analyzed without the existing coastal protection structure.

ii. County Code 16.10.070(H3a) "*Shoreline protection structures shall only be allowed on parcels where both adjacent parcels are already similarly protected*". Both adjacent parcels are already similarly protected; therefore the county code also allows shoreline protection structures for this parcel.

d. Impacts

i. The cost impact of removing the existing coastal protection structure would be significant as it would require removal of approximately 650 tons of large rip rap boulders and demolishing and removing the existing concrete wall. The cost impact must also consider that removing of the seawall would create an unbuildable lot and would therefore have to include the reduction in property value.

ii. Although removal of the rip rap and walls may provide more coastal access to the beach, it would only be for the small width of the property (approximately 53 feet) that fronts the ocean while the remaining stretch of beach up coast would still have rip rap revetments. Down coast the beach terminates at a large bedrock promontory. The combination of the existing revetments up coast and the bedrock promontory along with tide conditions make this stretch of beach difficult to access regardless of the proposed development.

4. Alternative 4:

a. Description

Alternative 4 consists of considering modification to the existing coastal protection structure that would provide additional coastal access. This may consist of redesigning the rip rap revetment slope to reduce the footprint of the rip rap to increase the useable beach area or the replacing the existing structure with a vertical seawall structure that would reduce or eliminate the need for a rip rap revetment.

b. Discussion

The rip rap revetment is part of a permitted coastal protection structure that has an approved engineered design. Based on our review of the Grading Permit issued by the County of Santa Cruz (Reference 5) and the Administrative Coastal Development Permit (Reference 1), both permits reference the placement of the rip rap as part of the approved project. Since the rip rap is part of an engineered plan, it would be infeasible to change the rip rap design especially since the design has performed well since the construction in 1983. Redesign of the rip rap could destabilize the entire coastal protection structure and increase wave run up.

Removal of the existing coastal protection structure and replacing it with a vertical seawall would have unpredictable consequences on the up coast and downcoast stability of the protected coastline and is not advisable based on our discussions with the County Geologist. Such a design would necessitate a review of this stretch of coastline as a whole rather than a piece meal modification to one small portion of the design.

It would also require modifying only a portion of an existing structure that was permitted and spans across property lines.

c. Impacts

i. The cost impact of modifying the existing structure by redesigning the rip rap revetment would have to consider that the modification could have the potential to destabilize not only the coastal protection structure on this property but on adjacent properties.

ii. Modification of the rip rap could provide additional beach access. For example, restacking the rip rap at an angle of 2:1 (H:V) could result in the rip rap being moved 10 feet closer to the seawall.

iii. The cost impact of a new vertical seawall would be significant and potentially prohibitive as it would require removal of the existing structure and the design and construction of a new costly seawall.

In summary, the existing geotechnical report was prepared after considering the available options. Given the size and location of the subject property, we recommend that the existing coastal protection structure be kept as is and maintained as necessary to protect this and adjacent properties.

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office.

Sincerely,

ROCK SOLID ENGINEERING, INC

Signed: 7/1/16

Yvette M. Wilson, P.E
Principal Engineer
R.C.E. 60245

Distribution: (1) Addressee and via email
(3) Stephanie Barnes-Castro and via email
(1) Greg Easton and via email

EXHIBIT H

REFERENCES

1. California Coastal Commission, Central Coast District, Administrative Coastal Development Permit, No. 3-83-166, Dated September 15, 1983.

2. Easton Geology, Geologic Investigation, Lowe Property, 2864 South Palisades Avenue, Santa Cruz, California, Santa Cruz County, APN 028-034-55, Easton Geology Job No. C13006, Dated October 10, 2013.

3. Rock Solid Engineering, Inc., Geotechnical Investigation-Design Phase, Proposed Single Family Residence, 2864 S. Palisades Avenue, Santa Cruz, California, A.P.N.: 028-304-55, Project No. 13009, Dated October 14, 2013.

4. Rock Solid Engineering, Inc., Response to Comments, Proposed Single Family Residence, 2864 S. Palisades Avenue, Santa Cruz, California, A.P.N.: 028-304-55, Project No. 13009, Dated June 17, 2014.

5. Santa Cruz County Planning Department, Grading Permit, Assessor's Parcel Number 28-304-54, -55, Job Location 2862 and 2864 S. Palisades Drive, Santa Cruz, No 1872, Dated 8-12-83.

EXHIBIT H

Public Comments and Correspondence

EXHIBIT I

Lezanne Jeffs

From: Lezanne Jeffs
Sent: Tuesday, January 10, 2017 5:02 PM
To: 'Rosie Brady'
Subject: RE: Proposed development at 2864 South Palisades Avenue

Hi Rosie,

The revetment that you speak of is subject to a Coastal Development Permit that was issued by the California Coastal Commission in 1983, and therefore the County does not have any jurisdiction over this coastal protection structure. However, maintenance of the rip rap revetment is allowed under the 1983 Permit and therefore, as a condition of approval of the current Permit for the replacement dwelling, the property owners are required to perform maintenance of the rip rap revetment (retrieving and re-stacking fugitive boulders/removing unnecessary rock to an approved off-site location, etc.). Such maintenance is also required to be ongoing and the property owner will be required to submit details of such operations to both the County and the Coastal Commission as it occurs. Maintenance of the seawall itself is not currently authorized by the Coastal Commission.

Geologic and Geotechnical and Wave Run-Up Reports prepared in support of the proposed project concluded that it was not feasible to significantly revise the existing protection structures (wall and rip rap) that protect this parcel, without compromising the safety of the proposed home as well as the safety of neighboring parcels.

Therefore, as a further condition of approval, the property owner is required to agree to not contest the formation of a Geologic Hazards Abatement District (GHAD). This GHAD will require that any new coastal protection structure for the site be developed as part of a coordinated beach and bluff management strategy together with neighboring properties along South Palisades (although sections of a proposed protection structure could be developed separately) and would require that any future seawall development be designed to minimize visual impacts of the seawall, protect and enhance visual resources in the area and increase public access to the beach (remove rip rap etc). Therefore, at such time as the existing seawall itself requires maintenance (which is not allowed under the 1983 Permit), or other parcels in the neighborhood propose to revise the seawalls that protect this section of the coast, this will trigger the formation of the GHAD to result in a revised and visually improved coastal protection structure in this area. All new development along South Palisades has been/will be conditioned to mandate participation in the GHAD.

More detailed information on the GHAD and the specific conditions of approval are all included in the staff report that will be available online before the hearing (as previously described).

I hope that this information is helpful. I would be happy to discuss this further should you call me at the number below.

Sincerely,

Lezanne

Lezanne Jeffs
Senior Planner
Development Review
Tel:(831) 454 2480
lezanne.jeffs@santacruzcounty.us

From: Rosie Brady [mailto:rosie.y.brady@gmail.com]
Sent: Tuesday, January 10, 2017 12:43 PM

To: Lezanne Jeffs <Lezanne.Jeffs@santacruzcounty.us>
Subject: Re: Proposed development at 2864 South Palisades Avenue

Hi Lezanne,

I am more concerned about the shoreline armoring and what is happening with the monstrosity revetment that is on the ocean side of the property. Is that going to be addressed in the staff report?

Thanks,
Rosie

On Tue, Jan 10, 2017 at 9:41 AM, Lezanne Jeffs <Lezanne.Jeffs@santacruzcounty.us> wrote:

Hi Rosie,

The project is for the construction of a replacement house on the parcel. Plans will be available online about one week before the hearing at www.sccoplanning.com >> Agendas and Minutes >> Zoning Administrator >> 2017 >> January 20. The plans are included as Exhibit D of the staff report which is available by clicking the underlined link beneath the item number. If you would like to view the plans earlier I can make the full sized plans available through the Planning Department records room, 4th floor of the County building at 701 Ocean Street, Santa Cruz.

The new house is similar in size to the existing structure but will be set back 20 feet from the edge of So. Palisades (the current structure is 2 feet back). It has a pitched roof and is similar in proportion to the newer house 2 doors down (to the left in views from the street). Also similar to that house, a 5 foot tall wall and gate is proposed just back from the edge of the street that will be set back with planting on the street side.

I hope that this answers your questions.

Sincerely,

Lezanne

Lezanne Jeffs

Senior Planner

Development Review

Tel:(831) 454 2480

lezanne.jeffs@santacruzcounty.us

From: Rosie Brady [mailto:rosie.y.brady@gmail.com]
Sent: Monday, January 09, 2017 6:39 PM
To: Lezanne Jeffs <Lezanne.Jeffs@santacruzcounty.us>
Subject: Proposed development at 2864 South Palisades Avenue

Hi Lezanne,

I am wondering if you could send me more information about the proposed development at 2864 South Palisades Avenue, Santa Cruz, CA APN:028-304-55? I live down the street and I'm curious about what the project entails.

Thanks!

Rosie