

# Staff Report to the Zoning Administrator

Applicant: County of Santa Cruz, DPW Owner: County of Santa Cruz, Department of Public Works APN: No Situs, work within the public rightof-way (except a small portion of work within APN 032-251-01) **Agenda Date:** 10/1/04 **Agenda Item #:** 8

Time: After 11:00 a.m.

**Project Description:** Proposal to repair four crib walls in emergency failing condition through installation of soil nails, primary and secondary shotcrete facing, and finish facing with sculpting and staining (total 300 linear feet); temporarily removing and replacing portions of a stairway as needed to accomplish the work; and approximately 733 cubic yards of grading.

Location: Southeast side of East Cliff Drive between 33<sup>rd</sup> Avenue and 36<sup>th</sup> Avenue

Supervisorial District: First District (District Supervisor: Jan Beautz)

**Permits Required** Regular Grading Permit and Coastal Development Permit (Emergency Grading and Coastal Permit issued)

#### Staff Recommendation:

- Approval of Application 04-0307, based on the attached findings and conditions
- Certification that the proposal is exempt from further Environmental Review under the California Environmental Quality Act.

#### Exhibits

- A. Project plans reduced (with Special Provisions Documents on file)
- B. Findings
- C. Conditions
- D. CEQA Exemption Determination
- E. Location Map & Assessor's Parcel Map
- F. Zoning Map & General Plan Map
- G. Emergency Permit w/Conditions
- H. SAGE Geostructural Letters dated

4/1/04 and 3/24/04

- I. Existing Crib Wall Condition Report by DPW dated March 22,2004
- J. SAGE Final Construction Drawings & Calculations Letter dated 5/28/04
- K. Haro, Kasunich & Associates Construction Drawings peer review letter dated 5/19/04
- L. Background Reference Materials List

County of Santa Cruz Planning Department 701 Ocean Street, 4th Floor, Santa Cruz CA 95060

#### **Parcel Information**

Parcel Size:	N/A - work within public right-of-way; adjacent parcel is 1.7 acres		
Existing Land Use - Parcel:	Public right-of-way and coastal bluff w/crib walls		
Existing Land Use - Surrounding:	Residential, public right-of-way, & public beach		
Project Access:	East Cliff Drive		
Planning Area:	Live <b>Cak</b>		
Land Use Designation:	O-R (Existing Parks and Recreation)		
Zone District:	PR (Parks, Recreation and Open Space District)		
Within Coastal Zone:	<u>X</u> Inside Outside		
Appealable to Calif. Coastal Comm.	X Yes No		

#### **Environmental Information**

Geologic Hazards:	Not a mapped constraint. Geostructural Engineering Reports regarding the failing crib walls have been reviewed and accepted by the County
Soils:	Marine Terrace deposits and Purisima sandstone/siltstone (por. is artificial fill)
Fire Hazard:	Not a mapped constraint
Slopes:	Steep coastal bluffs are protected by the existing crib walls that will be repaired by the soil nail wall overlay
Env. Sen. Habitat:	Portion mapped biotic & portion mapped floodplain
Grading:	Approximately 733 cubic yards
Tree Removal:	No trees proposed to be removed
Scenic:	Not mapped scenic, but within East Cliff Drive scenic roadway comdor and visible from the beach. Project includes repair of existing walls that will have a naturalized finish.
Drainage:	Walls include drainage outlets per engineered plans attached with Exhibit "A"
Traffic:	Traffic control plans submitted
Roads:	Existing roads adequate
Parks:	Existing park facilities adequate
Archeology:	Not mapped/no physical evidence on site

#### **Services Information**

Inside Urban/Rural Services Line:	X Yes No
Water Supply:	Santa Cruz Water District
Sewage Disposal:	City of Santa Cruz Sanitation
Fire District:	Central Fire Protection District
Drainage District:	Zone 5

#### Setting/History

Coastal erosion and deterioration of the reinforcement of the walls have damaged four crib-retaining walls between 33<sup>rd</sup> and 36" Avenues on the bluff along the south and southeast side of East Cliff Drive. An inspection by Sanders & Associates Geostructural Engineers (SAGE) revealed **an** 

immediate need to repair these existing walls to avoid failures of the walls and adjacent bluff (see Emergency Designation below for further discussion).

A separate application (00-0797) with an EIR is pending for a larger project including improvements to East Cliff Drive from  $32^{nd}$  to  $41^{st}$  Avenues. That application, which includes pedestrian and bicycle paths, bluff protection structures, and  $32^{nd}$  Avenue park improvements, was filed by the County Redevelopment Agency. The Army Corp of Engineers were co-sponsors for the bluff protection portion of the work.

This application (04-0307) was submitted on 6/29/04 and deemed complete on 7/28/04. An Emergency Permit for the needed repairs was issued on 7/1/04 and work began 12 days later. An additional 60-day time extension for the Emergency Permit was granted by the Planning Department on 8/27/04.

#### **Proposed Project**

The County Department **of** Public Works proposes to repair four failing crib walls in emergency condition through removing portions of the existing crib walls, installing approximately 300 linear feet of soil nail walls, with primary and secondary shotcrete facing, and finish facing with sculpting and staining to the existing crib walls along the bluff adjacent to East Cliff Drive. **This** work also involves temporarily removing and replacing portions of the beach access stairway between 35'' and 36'' Avenues as needed, and approximately 733 cubic yards of grading.

The project crib walls are designated Walls 1, 2, 3, and 4, progressing from west to east. The geostructural engineers concluded that Walls # 1, 2, and 4 are in advanced stages of failure and that collapse should be considered imminent (see History / Project Setting discussion above). The Wall 3 repair consists of installing soil nails and infilling below and around an existing drainpipe outfall which has been severely undercut. Finishing will be performed to match natural bluffs, as with the other wall repairs. In regards to the temporary removal and replacement of the wood stairs adjacent to Wall #4, the contractor **is** instructed to remove *as* little *as* possible of the stairway and railing as is necessary for excavation, soil nail installation, and shotcrete installation at the adjacent crib wall #4. As these stairs provide the only public access to this section of beach they must be re-installed as soon as practical. Alternate beach access exists at the stairs at 38'' Avenue and at 41<sup>st</sup> Avenue.

All work is required to be staged from the roadway above and all construction work and equipment operations will be performed above the mean high water line. The Purisima rock formation and the beach at the foot of the soil nail walls will be protected from concrete and shotcrete spillage. A limited staging area will be used in the East Cliff Drive right-of-way between  $32^{nd}$  and  $33^{rd}$  Avenues, as delineated on the plans. One lane of traffic is to be maintained on East Cliff Drive to the maximum extent possible. Road closures are allowed when necessary due to lack of space on East Cliff Drive, especially during drilling operations. A traffic control/local detour plan and an overall detour plan were submitted. A minimum width of **5** feet of roadway is to be reserved for pedestrians and bikes at all times.

#### Zoning, General Plan Consistency and Local Coastal Program Consistency

The coastal bluff crib wall repairs are an allowed use within the property's Parks, Recreation and

Open Space (PR) zoning district, a designation which allows public facilities uses. The purpose of the PR district is to preserve and protect the County's undeveloped lands and public lands as open space. This is done by limiting development on sites within this zone district and reviewing proposed development to determine if the development is compatible with these goals. In this case, the proposed development will help protect the public beach below and East Cliff Drive, a public road with underground public utilities, located along the top of the bluff. The wall repairs will be constructed in a manner to limit the loss of beach access or beach use during construction while maximizing public safety and will result in no permanent beach or access loss after the project is completed, and the walls will be finished to blend in with adjacent natural bluffs. Therefore, this project is consistent with all pertinent County ordinances and the purposes of the "PR" zone district.

The project is also consistent with the site's existing Parks and Recreation (0-R) General Plan and LUP designation. The project includes bluff stability, restoration and erosion control. These activities will enhance the maintained use of the public roadway for coastal access and the beach for public recreation. The project does not impact the beach and minimizes closure of the stairs during construction to protect the structure. The proposed design of the coastal crib walls will improve current conditions, and will be visually compatible with the surrounding area as the walls will be finished, sculptured and naturally colored to match adjacent natural bluffs.

The project is intended to improve **coastal** stability in compliance with General Plan requirements (GP **6.2**). The repair of the crib walls are consistent with General Plan policy **6.2.16** in that these are structural shoreline protection measures which protect the adjacent public roadway with public facilities and improvements, the public beach, and coastal dependent uses from a significant threat.

The existing walls are currently failing and repairs to the walls, including wall support for a drainage outfall, and portion of a stair replacement are all within the public right-of-way (with a very small portion of the work located on the adjacent County Parks parcel **APN 032-251-01**). No private development is associated with this project. Alternative building sites are not feasible for the repair of the existing walls. Relocation or partial removal of the failing crib walls could result in worsened bluff failure conditions, partial loss of the roadway, and potential exposure of utility lines. The repairs provide protection of the upper bluff and roadway above, while minimizing the impacts to the face of the bluff. The repair of the walls are necessary as the edge of the roadway is very close to the edge of the top of the bluff and no other non-structural measures would have been feasible. The shoreline protection structures were designed to meet approved engineering standards.

The repaired crib walls will not permanently reduce or restrict public beach access, adversely affect shoreline processes and sand supply, increase erosion on adjacent properties, or cause harmful impacts on wildlife and fish habitats or archaeological or paleontological resources. The walls are designed to minimize adverse impacts to recreation and to minimize visual intrusion. The crib walls will be located against the bluff and the work will stay above the purisima bedrock layer and not encroach onto the beach. The surface finishing work with sculpting and staining will ensure a naturalized appearance of the face of the walls and repaired areas.

A continuing monitoring and maintenance program is required after construction of the structures. This program involves a report filed with the County Director of Public Works every five years or less, which must detail the condition of the structures and list any recommended maintenance or repair work, as well as, note any completed maintenance or repairs that occurred since the previous

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report. The program allows for County repair or maintenance of these walls if deemed necessary to protect the public health and safety, as long as the scope and area of work are not expanded from this project.

#### Scenic/Design Review

The repaired walls will only slightlybe visible from the adjacent portion of East Cliff Drive above the bluff, which **is** designated a scenic roadway, but will be visible from the beach. The proposed crib wall repairs comply with the requirements of the County Design Review Ordinance, in that the proposed project will incorporate design features including installing finish facing on the soil nail walls, with sculpting and staining to create a naturalized finish appearance and to reduce the visual impact of the proposed walls.

#### **Emergency Designation**

The emergency determination was made based upon two reports by Sanders & Associates Geostructural Engineering (SAGE) (Exhibit H) that concluded that due to erosion, undermining, loss of infill and support, and resulting destabilization, the project walls were in advanced stages of failure and that collapse was considered to be imminent due to the potential of sudden collapse triggered by numerous factors including seismic shaking, fnrther bluff erosion, vibrations from severe storm waves or vehicles on East Cliff Drive, human interaction, or further disintegration of the wall elements. It was determined that should failures occur, they could result in losses such as the elimination of the walls and the ground adjacent *to* them, or the loss of the roadway and buried utilities, and present an immediate threat to public safety with potential for injury or loss of life should portions of a wall collapse. The project therefore qualifies under both the emergency coastal and grading provisions which are discussed as follows:

Emergency Coastal Permit (13.20.090) – This project meets the criteria of Chapter 13.20.090 (Emergency Projects) of the Santa Cruz County Code in that the wall repairs are an emergency measure to prevent further damage to the existing walls and bluff and to protect life and health of pedestrian, bicycle, and vehicular users of the public East Cliff Drive roadway above the slope and recreational users of the public beach below. Further, the applicant has submitted plans, technical reports and information sufficient to comply with the requirements for a regular Coastal Permit (13.20.090(c) & (d)).

Emergency Grading Permit (16.20.116) – AGrading Permit is required for the approximately 733 cubic yards of soil to be moved in conjunction with this project. Grading permits are also required for shoreline protection structures where fill (including concrete) is placed within a Coastal Hazard Zone (16.20.115). An Emergency Grading Permit was granted pursuant to County Code Section 16.20.1 16 in conjunction with the Emergency Coastal Permit.

#### **Environmental Review**

This project was determined by the Planning Department to be **an** emergency and has been determined to be statutorily exempt from the California Environmental Quality Act (CEQA) under CEQA Guidelines Section 15269, Emergency Projects (Public Resources Code 21080(b) – Emergency Action).

#### 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

- APPROVAL of Application Number **04-0307**, based on the attached findings and conditions.
- Certification that the proposal is exempt from further Environmental Review under the California Environmental Quality Act.

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: <u>www.co.santa-cruz.ca.us</u>

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### **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.

The portion of the East Cliff Drive right-of-way where the project **is** located has a zoning and general plan designation of Parks, Recreation and Open Space. The project includes repairing coastal bluff crib walls and is consistent with the Parks, Recreation and Open Space(O-R) General Plan and LUP designation in that it helps preserve and maintain the open space, park and recreation uses of the beach area below and the stair access to the beach. The project includes bluff stability, restoration and erosion control. These activities will serve to protect the use of the beach and coastal access public right-of-way above. These are beneficial actions for any zone district and particularly important on properties near the coast. The coastal crib walls being repaired are consistent with the property's Parks, Recreation and Open Space (PR) zoning district, a designation which allows public facilities and open space uses. The purpose of the PR district is to preserve and protect the County's undeveloped lands and public lands as open space. This is done by limiting development on sites within this zone district and reviewing proposed development to determine if the development is compatible with these goals.

In this case, the proposed development will help protect the public beach below and East Cliff Drive, a public road located along the top of the bluff. The wall repairs will be constructed in a manner to limit **loss** of beach or beach access, and the crib walls will be finished to blend with surrounding natural bluffs. Geologic regulations have been satisfied by existing technical review processes. Therefore, this project is consistent with all pertinent County ordinances and the purposes of the "PR" zone district.

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

Public access exists to the beach at the east end of the project site **from** the bluff down to the beach via a public stairway between 35" and 36" Avenues. The project does not impact the beach and minimizes closure of the neighborhood access stairs during construction to protect the structure. No public access structures exist along the rest of the project area. The proposed project is to shore up existing failing coastal bluff crib walls to protect the existing public roadway above and beach below. The proposal does not conflict with any existing utility or open space easements or development restrictions that encumber the project site. Safe public pedestrian and bicycle access along East Cliff Drive will be maintained at all times during construction.

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

Section 13.20.130 **of** the County Code establishes the design criteria for coastal zone development. This section requires that new development be sited, designed and landscaped to be visually compatible and integrated with the character of the surroundingneighborhood. The

proposed design of the coastal crib walls will improve current conditions, and will be visually compatible with the surrounding area. The walls will not project above the top of the bluff or the adjacent road elevation. Site disturbance including grading and removal of vegetation is minimized with the proposed project and no trees will be impacted. The new walls will simulate the natural bluff landforms. Disturbed areas are required to be revegetated for erosion control purposes. The project is conditioned to use native plant and wildflower erosion control seed mixes and mulch that does not have the potential to spread non-native seeds instead of straw, wherever possible. The project does not involve any blufftop development, however, repaired walls are located, designed and finished to fit the physical setting of the bluff face carefully so that their presence is subordinate to the natural character of the site and maintains the dominant natural features. The walls were designed to fit the topography of the site with minimal cutting, grading, or filling for construction, and natural appearing materials and colors which blend with nearby bluffs and complement vegetative cover in the area are used. The walls will be visible from the beach, but the scenic integrity of the open beach below will be maintained. The construction stays above the purisima shelf layer and does not pass the high water mark or encroach onto the beach. The wall finishes will be sculpted and stained to match nearby natural bluffs. The design of the proposed walls minimizes visual intrusion by incorporating materials and finishes which will be compatible with and harmonize with the character of the area, and that will appear natural when finished.

**4.** That the project conforms with the public access, recreation, and visitor-servingpolicies, 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.

The walls are being repaired in **an** area that has been significantly eroding. The repaired walls will not extend down past the purisima shelf or encroach into the beach, allowing continued public use of the beach. None of the proposed work directly affects areas maintained by the County Parks Department. The primary use **of** the associated properties above and below these walls is public access and recreation and the repair of the crib walls will support these uses. The crib wall repairs will result in increased safety for users of East Cliff Drive, the public stairs down *to* the beach, and the public beach. The project minimizes temporary closure of the **36**<sup>th</sup> Avenue stairs during construction *to* protect the structure. During this time, adequate alternate accesses exist to the nearby beaches and ocean. The project includes the temporary repair and replacement of portions of the public stairs as needed to protect public access to the beach.

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

The project area is within the East Cliff Drive scenic road comdor of the coastal zone and the work will be visible from the adjacent beach. The scenic resource preservation policies of the Local Coastal Program require that development minimize visual intrusion from the beach and from scenic roadways (GPILCP Objective 5.10b). Any potential visual intrusion is minimized and the project will have no adverse impact upon the surrounding visual resources. The proposed walls are on the bluff face and will not be readily visible from East Cliff Drive. All

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existing public ocean vistas from the roadway will be preserved.

The walls will be visible from the beach, but the new walls will be an improvement from the existing failing crib walls, which appear as long gray horizontal beam type structures and are not naturalized or blended with the existing bluff in any way. New permanent shoreline protection structures visible from a public beach must use natural materials and finishes to blend with the character of the area and integrate with the landform. The proposed finished surface contours will be blended with the adjacent natural terrain to achieve a smooth transition and natural appearance. The finish sculpting and coloring of the concrete will also result in a naturalized bluff appearance that will integrate with surroundingnatural bluffs. Disturbed areas are required to be revegetated for erosion control purposes with a seed mix consisting of only native plants and wildflowers wherever possible. All of the work will be performed from the top of the bluff and no construction equipment is permitted on the beach. Additionally, public facilities are allowed uses in the PR (Parks) zone district of the area, as well as the General Plan and Local Coastal Program land use designation.

The proposed walls are consistent with the structural shoreline protection measures policy (GP/LCP 6.2.16). This policy limits structural shoreline protection measures to structures that protect public works, public beaches, or coastal dependent uses. These walls serve all three uses in that they will help preserve the public roadway and associated utilities above and the public beach below with associated coastal dependent uses. Removal of the failing crib-walls would have created environmental impacts and potentially weakened the bluff more as opposed to protecting it. There are no feasible non-structural measures to adequately protect the bluff, beach and roadway above (regardless of from an engineering or economic standpoint). The proposed walls will be located against the bluff face above the beach, above the high water mark, and will not reduce or restrict public beach access, adversely affect shoreline processes and sand supply, increase erosion on adjacent properties, or cause harmful impacts on wildlife and fish habitats or archaeological or paleontological resources. The wall repairs will not impact recreational opportunities along the beach and will minimize any visual intrusion. The location of the walls are based on existing County benchmarks as referenced on the plans. The structures were designed pursuant to prevailing building technologies, engineering standards, and materials performance standards (such as ASTM, AASHTO, ACI, and CALTRANS specifications) to insure the optimum in safety and stability. The project is also conditioned *so* that a permanent monitoring and maintenance program be instituted that requires a report be filed with the County a minimum of every five years that details the condition of the structures and lists any recommended maintenance or repair work. This maintenance program allows for minor County repairs or maintenance of the protective structures, if deemed necessary to protect the public health and safety.

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### **Development 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 this project will increase the safety for motorists, bicyclists and pedestrians along East Cliff Drive and for beach goers below in that the walls were in an emergency state of disrepair and there was risk of failure that could have impacted the use of the public road and underground utilities and the safety of the users of the road or along the adjacent public beach. The walls being repaired are located within the road right-of-way down the bluff face and will not affect any public or private buildings. Construction will comply with prevailing building technologies (including performance standards for the materials such as ASTM, AASHTO, ACI, and CALTRANS specifications) to insure the optimum in safety. The repaired crib walls will not deprive adjacent properties or the neighborhood of light, air, or open space as they are vertical walls located along the face of the bluff. During construction the adjacent roadway will be closed as needed to vehicular traffic to provide sufficient room for construction vehicles along the south side of the roadway, while ensuring a safe travel way for pedestrians and bicyclists along the northern portion of the roadway for accessing this coastal stretch. **All** of the work will be performed from the top of the bluff and no construction equipment is permitted on the beach.

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.

This finding can be made, in that the proposed location of the crib walls repairs and the conditions under which they will be maintained will be consistent with all pertinent County ordinances and the purpose of the PR (Parks) zone district. The primary use of the associated properties above and below these walls is public access and the repair of the crib walls will support this use. The crib wall repairs will result in increased safety for users of East Cliff Drive, the public beach, and the public stairs down to the beach. This is consistent with the purposes of the PR (Parks) zone district that covers the southeast half of the road where the project is located. A continuing monitoring and maintenance program is required after the repairs are completed. This program requires that a report must be filed with the County Department of Public Works every five years or less, as determined by a qualified professional, detailing the condition of the structures and listing any recommended maintenance or repair work. **This** maintenance program allows for minor County repairs or maintenance of the protective structures, if deemed necessary to protect the public health and safety.

**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.

The majority of the repair work will be located within the southerly part of the East Cliff Drive

right-of-way, along the bluff face. This portion of the roadway and the public beach/park to the south has a General Plan designation of Existing Parks and Recreation (0-R). This finding can be made, in that the proposed crib wall repairs will be beneficial to the adjacent public facilities and beach uses consistent with the use requirements specified for the Parks and Recreation land use designation in the County General Plan. The proposed walls are located above the purisima bedrock layer and will not impact the public beach below or available open space. The walls will serve to better protect access to the coast and the health and safety of coastal users. The walls will have a sculpted finish that will be colored and stained to be consistent with natural bluffs in the area. No specific plans have 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 crib walls are primarily located within the existing road right-of-way with a small portion of work on an existing undeveloped lot. The crib wall repairs will not result in a use that increases traffic. In fact, the bluff wall repairs will **further** protect the existing public roadway and associated utilities in East Cliff Drive. As there will not be any increase in traffic generated by the proposed use, the proposed project will not adversely impact existing roads and intersections in the surroundingarea. Temporary traffic impacts during construction will be handled by a required Traffic Control Plan and Local Detour Plan as needed.

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 crib wall repairs will not result in any land use density impacts and the walls will be finished in a manner to blend with the nearby natural bluffs.

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

This finding can be made, in that the proposed repaired crib walls will be of an appropriate scale and type of design that will be compatible with the aesthetic qualities **of** the surrounding properties and will not reduce or visually impact available open space in the surrounding area. The walls will be finished with a sculpted and textured material that transitions into the natural bluff at the ends and is stained with colors to replicate the adjacent natural bluff soil and rock formations.

### **Conditions of Approval**

- Exhibit A: County of Santa Cruz Department of Public Works and SAGE Geostructural Engineering Inc. dated June 8,2004, and accompanying Special Provisions
- I. This permit authorizes the repairhe-construction of four crib walls (including minor repairs on Wall #3 to support the drainage outfall), installation of soil nail walls, shotcrete facing, and finish facing with sculpting and staining (total **300** linear **feet**); the temporary removing and replacing of portions of a stairway; and approximately **733** cubic yards of grading.

#### Note: The work on this project has begun pursuant to an issued Emergency Permit. The following conditions identified with an \* were also conditions of the Emergency Permit and were either addressed prior to the start of construction or are being addressed during construction.

Prior to exercising any rights granted by this permit including, without limitation, any site disturbance or the start of construction, the applicant/owner shall comply with the following conditions:

- A. \*A construction plan shall be submitted to the Planning department for review and approval prior to the initiation of construction. All construction shall be strictly confined to the areas shown on the approved plan.
- \*A pre-construction meeting shall be held prior to any ground disturbance and shall be attended by representatives of both prime contractors (foreman, superintendent, and representatives of any major subcontractors), and representatives from the Redevelopment Agency, The Department pf Public Works, and the Planning Department. Notification of this meeting shall occur at least 48 hours in advance and shall be provided by the Department of Public Works.
- II. During construction the applicant/owner shall ensure the following conditions are satisfied:
  - A. \*All work shall conform to the project plans prepared by the Department of Public Works and SAGE Geostructural Engineering Inc. dated June 8,2004, and accompanying Special Provisions.
  - B. \*All construction shall be staged from above and no equipment or machinery, with the exception of hand-operated equipment, shall be allowed on the beach.
  - C. \*Stockpiling of excavated material will not be allowed on the beach.
  - D. \*Exposed dirt surfaces shall be wetted down periodically to minimize dust generation during construction.

### **EXHIBIT C**

- E. \*Construction activities shall be limited to the hours of 8:00 **am** to 5:00 pm weekdays, unless a change to this schedule is approved in writing by the Planning Director. No work shall occur on holidays.
- F. \*Traffic shall be routed around the project area according to the Traffic Control Plan, prepared by the Department of Public Works, dated May 28<sup>th</sup>, 2004 (sheet 12 of project plans).
- *G.* \*The contractor shall submit a Detailed Local Traffic Control Plan including a Local Detour Plan to address periodic construction-related lane closures to the Department of Public Works for review and approval at least 5 days in advance of any such lane closures.
- H. \*A five-foot wide pedestrian walkway/bicycle path shall be kept open at all times.
- I. \*Pursuant to Sections 16.40.040 and 16.42.100 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-Coronerif 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 16.42.100 shall be observed.
- J. Disturbed areas of the bluff top shall be revegetated for erosion control purposes (Erosion Control Note #4, Sheet 1 of 12). However, erosion control mixes used to seed the bare areas should consist of only native plants and wildflowers wherever possible. An alternative that does not have the potential to spread non-native seeds should be used to cover bare surfaces, if feasible instead of the proposed straw mulch.
- III. All construction shall be performed according to the approved plans. Prior to final inspection, the applicant/owner must meet the following conditions:
  - A. All site improvements shown on the final approved plans shall be installed.
  - B. Sign, date, and return to the Planning Department one copy of the approval to indicate acceptance and agreement with the conditions thereof.
  - *C*. Submit notations or drawings documenting variations in the final construction from the plans marked Exhibit "A" on file with the Planning Department. The final construction shall be in substantial compliance with the approved plans.
  - D. The project geostructural engineer should perform periodic inspections during grading and construction. The project geostructural engineer shall inspect the

completed project and shall submit to Environmental Planning a letter addressing that the improvements have been constructed in conformance with the approved project plans and the geostructural analysis/reports attached herein as exhibits.

- **IV.** Operational Conditions
  - A. All improvements, walls, (drainage and erosion control) and landscaping shall be permanently maintained.
  - B. A monitoring and maintenance program must be followed that requires that a report by a registered civil engineer be filed with the County Public Works Director after construction of the structures, every five years or less, as determined by a registered civil engineer. The reports shall detail the condition of the structures and list any recommended maintenance or repair work. This maintenance program may allow for County maintenance and repair of these shoreline protection walls if deemed necessary to protect the public health and safety, as long as the scope and area of work are not expanded from this approval. Any maintenance or repair work performed should also be noted in the reports.

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 two years from the effective date unless you obtain the required permits and commence construction.

Approval Date:

Effective Date:

Expiration Date:

Don Bussey Deputy Zoning Administrator Melissa Allen, Project Planner

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.

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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: 04-0307

Assessor Parcel Number: Not APN specific (small portion within APN 032-251-01) **Project Location:** Within the East Cliff Drive right-of-way between 33<sup>rd</sup> and 36<sup>th</sup> Avenues

**Project Description:** Proposal to repair four crib walls in emergency failing condition through installation of soil nails (walls), shotcrete facing, and finish facing with sculpting and staining (total 300 linerar feet); removing and replacing portions of a stairway as needed; and approximately 733 cubic yards of grading. The project requires an Emergency Coastal Permit, Emergency Grading Permit, regular Coastal Permit and regular Grading Permit.

**Person or Agency Proposing Project:** County of Santa Cruz, Department of Public Works, Attention Ralph Norberg

#### **Contact Phone Number:** (831) 454-2160

- 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.** <u>X</u> <u>Statutory Exemption</u> other than a Ministerial Project (CEQA Guidelines Section 15260 to 15285).
- Specify type: CEQA Guidelines Section 15269 Emergency Projects (Public Resources Code 21080(b) – Emergency Action)

#### E. \_\_\_\_ CategoricalExemption

#### F. Reasons why the project is exempt:

Necessary actions to prevent a health and safety emergency that include emergency wall repairs to maintain public service facilities necessary to maintain service for the East Cliff Drive public roadway.

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

Melissa Allen, Project Planner

Date:



# Location Map i<u>c.</u> Cini PORTOLA DR ЪC OPAL CLIFF DR S FORTY FIRST **38TH** a min **34TH AV 36TH AV** J'an J HAST QUEPOR **30TH AV** Monterey Bay PROJECT LOCATION EASTICLIFF APN 032-251-01 1000 1000 0 2000 Feet Ν Map created by Santa Cruz County Planning Department: July 2004 EXHIBIT E







### EMERGEN CY GRADING AND COASTAL PERMIT

PERMIT No. : 04-0307

County of Santa Cruz Planning Department 701 Ocean Street Santa Cruz, CA 95060 Telephone: (408) 454-2260 Fax: **(408)** 454-2131

County of Santa Cruz Department of Public Works Owner's Name Department of Public Works	032–251–01 Assessor's Parcel Number (831) 454–2160			
Applicant's Name	Telephone Number			
<u>701 Ocean Street. Santa Cruz,</u> Address	CA 95060			
Location of Emergency Work	East Cliff Drive			
	33rd Avenue to 36th Avenue			

Emergency Caused By \_\_\_\_\_\_ Failing crib walls

Emergency Status Verified By <u>Evaluation by Sanders and Associates Geostructural</u> <u>Engineering</u>, Inc. and "Existing Crib Wall Conditions Report (see Attachment 1).

Work Authorized Repair of four failing crib walls through installation of soil

nail\_walls (300\_11near\_feet). and removing and replacing portions of a stairway as needed to accomplish the work. Includes approximately 733 cubic vards of grading.

IN ACCORDANCE WITH SECTION 13 20 090 OF THE COUNTY CODE, AN EMERGENCY COASTAL ZONE PERMIT MAY BE ISSUED FOR PROJECTS UNDERTAKEN TO PREVENT LOSS **OF**, OR DAMAGE TO LIFE, HEALTH, OR PROPERTY; OR TO RESTORE, REPAIR, OR MAINTAIN PUBLIC WORKS, UTILITIES, AND SERVICES DURING AND IMMEDIATELY FOLLOWING **A** NATURAL DISASTER OR SEFUOUS ACCIDENT THE PLANNING DIRECTOR MAY REQUEST, **AT** THE APPLICANT'S EXPENSE, VERIFICATION BY A QUALIFIED PROFESSIONAL OF THE NATURE OF, AND SOLUTIONS TO, THE EMERGENCY SITUATION

#### **CONDITIONS OF ISSUANCE:**

- 1. Only the work specifically described above **is** authorized. Any additional work requires separate authorization. If the scope of work authorized by this permit is exceeded, **a** notice of violation resulting in civil penalties may be issued.
- 2. At the time of issuance of this permit the applicant shall submit a completed application, including the appropriate fees, for a regular permit Within **90** days **of this** permit issuance, all required technical reports and project plans must be submitted unless the Planning Director grants a time extension. Failure to submit the required information will void this permit.
- 3 The work authorized by this permit must begin within **15** days of issuance or the permit will he voided
- 4. This permit shall expire **60 days** after issuance
- 5. Other Conditions: Comply with project Conditions of Approval (Attachment 2) and accomplish all work in conformance with the project plans and specifications (Attachment 3)

Issued by: uu 9 Assistant Planning Director Title:

Date <u>July 1, 2004</u>

I have read the above permit conditions and limitations and agree to conform to the conditions described above

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Owner G

Tom Bolich, Director of Public W

### **Conditions of Approval** East Cliff Dr. Emergency Coastal and Grading Permits (Application 04-0307)

- 1. All work shall conform to the project plans prepared by The Department of Public Works and SAGE Geostructural Engineering Inc. dated June 8,2004, and accompanying Special Provisions.
- 2. A construction plan shall be submitted to the Planning Department for review and approval prior to the initiation of construction. All construction shall be strictly confined to the areas shown on the approved plan.
- 3. Construction activities shall be limited to the hours of 8:00 **am** to 5:00 pm weekdays, unless a change to this scheduled is approved in writing by the Planning Director. No work shall occur on holidays.
- 4. A pre-construction meeting shall be held prior to any ground disturbance and shall be attended by representatives of both prime contractors (foreman, superintendent, and representatives of any major subcontractors), and representatives from the Redevelopment Agency, the Department of Public Works, and the Planning Department. Notification of this meeting shall occur at least 48 hours in advance and shall be provided by the Department of Public Works.
- 5. Traffic shall be routed around the project area according to the Traffic Control Plan, prepared by The Department of Public Works, dated May 28th, 2004 (sheet 12 of project plans).
- 6. The contractor shall submit a Detailed Local Traffic Control Plan including a Local Detour Plan to address periodic construction-related lane closures to the Department of Public Works for review and approval at least 5 days in advance of any such lane closures.
- 7. A five foot wide pedestrian walkway/ bicycle path shall be kept open at all times.
- 8. All construction shall be staged from above and no equipment or machmery, with the exception of hand-operated equipment, shall be allowed on the beach.
- 9. Stockpiling of excavated material will not be allowed on the beach.
- 10. Exposed dirt surfaces shall be wetted down periodically to minimize dust generation during construction.

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ATTACHMENT

- 11. To minimize the amount of dust generated by drilling operations, an injection bore anchor system shall be used. This system results in simultaneous drilling and grouting of the soil nail bore holes and greatly reduces dust generation.
- 12. No overburden or wet cement shall be allowed to enter the marine environment. Authorization to begin drilling or shotcrete operations will not be given until the contractor **has** demonstrated the ability to fully contain grout backwash and shotcrete overspray.
- 13. The walls shall be colored and textured to match the adjacent bluff conditions.
- 14. Bare areas resulting from construction activities shall be treated according to the erosion control notes included on Sheet 1 of the project plans.





#### SANDERS & ASSOCIATES GEOSTRUCTURAL ENGINEERING, INC.

4180 Douglas Blvd., Suite 100 • Granite Bay, CA 95746 • (916) 729-8050 • Fax: (916) 729-7706

April 1,2004 Job No. SE99-033 SC-RA2

Mr. Tom Bolich santa Cruz county Department of Public Works 701 Ocean Street, Room 410 Santa Cruz, CA 95060-4000

#### Re: Addendum to Notice of Unsafe Conditions East Cliff Drive Beach Retaining Walls Santa Cruz County, California

Dear Tom:

We understand that the County of Santa Cruz Redevelopment Agency and Department of Public Works are concerned about the safety measures recommended in our Notice of Unsafe Conditions, dated March 24,2004, which we feel are necessary due to the conditions of the failing crib walls along the East Cliff Drive bluff. Our recommendations included cordoning off portions of the cliffs and beach, which may prevent public access to some areas of the beach. We understand that this is not a pleasant prospect and will not be popular with beach and ocean users. Consequently, as you requested, we have prepared this letter to further clarify and expand our assessment of the unsafe retaining wall conditions described in our previous letter and explain why we feel it is imperative that these minimum safety measures be adopted to reasonably safeguard the public.

#### WALL CONDITIONS

The conditions of the subject crib walls have deteriorated since **cur** last site visit on September 12, 2002, to the point that some sections of the walls have destabilized and appear to pose significant threats to public safety. Specifically, the crib elements have further weakened and, in some cases, have completely fractured, loss of crib infill materials has continued, and the wall foundations have been locally undermined. A brief description of our observations of these **walls** is presented below. For reference purposes, we have designated the subject crib **walls** as Walls 1, 2, 3, and **4**, progressing from west to east.



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FXHIBIT

Mr. Tom Bolich Job No.SE99-033 SC-RA2 April 1,2004 Page 2 of 3

#### <u>Wall 1</u>

The crib wall foundation at the eastern end of Wall 1 has been partially undermined, and the terrace deposits adjacent thereto have been lost, effectively removing basal and lateral support for the wall. These conditions, along with the loss of infill materials, have caused the wall to destabilize (i.e., the wall may not have enough weight to resist lateral earth forces).

#### <u> Wall 2</u>

Wall 2 is the only crib wall along the bluff founded entirely on terrace deposits. Erosion of the terrace deposits has undermined the central portion of the wall, resulting in the complete loss of infill in one section of the crib wall. Consequently, a vertical shaft **has** formed and daylights in the overlying asphalt concrete. The lower crib elements have ruptured where the wall is undermined, effectively eliminating much of the bluff support in **this** area, and putting the wall in danger of immediate collapse.

Wall 3 exhibits moderate structural distress, apparently due to corrosion within the fascia, although only the undermined concrete support for the adjacent outfall pipe appears to be in danger of collapse.

The loss of wall infill at Wall **4** has created voids up to **3** feet from the wall face, which has caused the wall to destabilize. In addition, the crib elements at the top of the wall have disintegrated, and are no longer retaining the infill material. Some infill material and pieces of crumbled fascia are perched precariously on facing elements, and we feel there is a significant **danger** of raveling rubble injuring stairway and beach users.

#### WALL FAILURE

We strongly feel that Walls 1, 2 and 4 are in advanced stages of failure. Sudden collapse could be triggered by any of a number of factors, including seismic shaking, further bluff erosion, vibrations from severe storm waves or vehicles on East Cliff Dive, human interaction, and further disintegration of the wall elements. Based on our observations, it is our opinion that the factors of safety against structural failure of the walls are approaching unity in many cases. We therefore believe that collapse of Walls 1, 2 and 4 should be considered imminent (i.e., collapse could occur at any time).

#### POTENTIAL LOSS

Should wall failures occur, losses would include the elimination of the walls and the ground immediately adjacent to them. Loss of ground may also include **loss** of the roadway and buried utilities. Of greatest concern, however, is the immediate threat to public safety and



Mr. Tom Bolich lob No. SE99-033 SC-RA2 April 1,2004 Page 3 of 3

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potential for injury or **loss** of life should portions of a wall fall onto someone. It is specifically because of this danger that we believe access to the areas immediately in front of and behind the walls should be restricted as described in our March  $24^{\text{th}}$  letter.

If you have any further questions regarding this issue, please call me.

Sincerely,

SANDERS & ASSOCIATE? GEOSTRUCTURAL ENGINEERING, INC.

Steven H. Sanders, P.E., G.E. (#46456) President

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cc: Mr. Paul Rodrigues, Santa Cruz County Redevelopment Agency



#### SANDERS & ASSOCIATES GEOSTRUCTURAL ENGINEERING, INC.

4180 Douglas Bivd., Sulte 100 · Granite Bay, CA 95746 ... (916) 729-8050 - Fax: (916) 729-7706

March 24, 2004 JobNo. SE99-033

Mr. Paul Rodriguez Santa Cruz County Redevelopment Agenq 701 O c an Street, Room 510 Santa Cruz, CA 95060

Post-It" Fax Note	7671	Dete	3/24	pages 6	
To Paul Rode	GUER	From	Bill	Millhone	
Co./Dept. S.C. P	- A	Co.			
Phone \$ 831. 454. 2280		Phone #			
Fex I	. 3420	IF=*			

Re: URGENT : Notice of Unsafe Conditions East Cliff Drive Beach Retaining Walls Santa Cruz, California

Dear Paul:

Ai registered Professional Engineers in the State of California, we are obligated to inform owners of any condition we believe poses a hazard to public safety. Pursuant thereto, we have prepared this letter to inform you of unsafe retaining wall structures **dong** the East **diff** Drive bluff between Pleasure Point and the O'Neil residence.

During our site visit on March 23, 2004, we observed moderate to severe discress, including broken crib elements, loss of crib infill materials, and undermining of the wall foundations, in the four crib type retaining walls at the rite. The walls exhibiting severe discress are in the advanced phases of failure, and collapse should be considered imminent.

For reference purposes, we have designated the subject crib walls as Walls 1, 2, 3, and 4, progressing from west to east. Walls 1, 2, and 4 exhibit severe distress and appear to pose a significant risk to public safety (see attached photos). In our opinion, public access should be restricted within at least 10 feet behind, and 40 feet in front of Walls 1. 2 and 4. Wall 3 exhibits moderate distress and only the undermined concrete support for the adjacent outfall appears to be in danger of collapse. We believe the area within at least 20 feet of the outfall should be restricted to public access.

If you have any questions regarding this letter, please call me.

Sincerely,

SANDERS & ASSOCIATES GEOST DUCTURAL ENGINEERING, INC. anders P.E., G.E. (#4 President

SHT. / OF 6

EXHIBIT H

Retaining Walls \_ Landslide Repeir + Shoring . Foundations \_ Civil/Structural Engineering



Wall #1\_\_\_







Wall # 2

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# EXHIBIT H

SHT. 4 OF 6



Wall #3

# EXHIBIT H



. From:

03/24/2004 15:43 #253 P.006

025 a Wall # 4 EXHIBIT h Wall #4 SHT\_6\_0F\_6\_ 43

#### EXISTING CRIB WALL CONDITION REPORT EAST CLIFF DRIVE

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Prepared by:

County of Santa Cruz Redevelopment Agency & The Department of Public Works

3/22/2004



#### **INTRODUCTION**

#### PURPOSE

The County of Santa Cruz, Redevelopment Agency and Department of Public Works staff has conducted an initial investigation and assessment of the retaining structures along the coastal bluff on East Cliff drive from 33<sup>rd</sup> to 36" avenue. The evaluation will be used to aid in determining the most appropriate plan for protecting public safety within and directly below the county right of way, by preventing structural failure of the deteriorating crib walls. The condition of the existing structures has been inventoried and rated for deterioration that may be relevant to the strength and serviceability of each structure. A preliminary appraisal of non-conformance in geometry and deficiencies in design details with respect to current standards has been incorporated.

#### SITE SUBSURFACE STUDIES

The geology of the cliff in this area was defined by Cordilleran Exploration Inc. in 1983 as consisting of two distinctly different rock units. Their study was done for proposed seawall construction on adjacent up coast private property. The lower section (bottom 5-10 feet) of the cliff consists of fine-grained silty sandstones of the purisima formation. The upper section consists of sand and gravels of the first marine terrace. Cordilleran Inc characterized the highly jointed nature of the purisima layer as "susceptible to rapid wave erosion". In 1997 Haro, Kasunich and Associates Inc. further defined the soil column after sampling soil borings and testing the soil strengths. Three distinct zones were identified. The upper terrace deposits, lower terrace deposits and the purisima siltstone/sandstone layer. The lower terrace deposit begins at around 9.5 feet below the road surface. This zone contains medium dense rounded gravels that are uncemented in nature having lower shear strength than the upper deposits. Kasunich referenced the study area as "statically stable" in his 1997 geotechnical slope stability analysis. Erosion in the terrace material and slump slides caused by runoff were given as conditions affecting the bluff stability. The other cause of instability cited in this report was episodic collapse of the sandstone purisima shelf due to wave cutting and earthquakes. Kasunich recommended that the bluff be armored with structural shotcrete with grouted tendons down the face of the bluff extending 3 feet below the toe of the bluff.

#### FEDERAL CONSISTENCY / ARMYCORPS PROPOSED PROJECT

On November 7,2003 the US Army Corps of Engineers presented a project to the California Coastal Commission that proposed to armor the bluff from 33<sup>rd</sup> Avenue to 36<sup>th</sup> Avenue using a continuous structural shotcrete wall with grouted soil nails. The 30-foot plus wall was designed to be embedded **3** feet below the toe of the cliff. The Coastal Commission unanimously objected to the consistency determination for the proposed project due to what staff interpreted as "inadequate analysis of less environmentally damaging alternatives". Presently the County of Santa Cruz RDA staff is reviewing other shorter term armoring permutations that would have less environmentalimpact. This condition



report will be used to help lead the Redevelopment Agency on to the next step towards a favorable design solution before failure occurs.

#### **METHOD OF INSPECTION**

On March  $2^{nd}$ , 2004, during a one-foot minus tide Department of Public Works **staff** engineers visited the site and visually inspected the structures and the surrounding bluff area from  $33^{rd}$  Avenue to  $36^{th}$  Avenue. *An* initial inspection of the stairway and comfort station at **36''** Avenue was also performed. Photographs were taken to record the existing condition. The findings are as follows.



### **CRIB WALL #1** (33<sup>rd</sup> Avenue) (fig.1)

STA 0+69.25 /12.467m R to STA 0+79.61 /10.991m R Length = 52 feet (8 crib sections @ 6.5 feet) Height = 18 feet (18 crib sections @ 1 foot) Depth = 6.5 feet into slope Batter = 1:19 Elevation difference from roadway to top of wall = about 4 feet below Elevation difference from bottom of wall to purisima shelf = 0 feet





#### **GEOMETRY & LAYOUT**

The structure consists of **two** individual walls butted end to end. A 26' wide by 14' high portion constructed from four 6.5' interlocking sections and a 26' wide by 18' high portion, also constructed using four 6.5' sections. The crib structure is a gravity retaining wall that uses the weight of the

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structure and the infill material to retain the uncemented bluff deposits of the upper and lower terrace. The top of the wall is located approximately **4'** below the edge of pavement. The face of the wall is 25' from the edge of pavement at the western most side and 15' from the edge of pavement on the eastern most side.

#### FOUNDATION

The crib wall was constructed using the purisima shelf as a platform to bear the load of the wall. The toe of the wall sits at the interface between the lower terrace deposit and the sandstone purisima formation. The bearing capacity of the sandstone formation may be influenced by the highly jointed nature of the undermined shelf. On the eastern end of the wall the purisuma is eroded back leaving the comer of the crib section unsupported.

#### INFILL

The reinforced concrete crib sections are infilled mainly with six-inch angular imported rock. A portion of the fill rock has passed through the six-inch openings at the face of the wall. Voids in the fill extend back into the slope for over **3** feet beyond the wall face in a few areas. In general most **of** the fill is intact.

#### STRUCTURE HISTORY

The wall is believed to have been constructed between 1984 and 1986 (visual inspection of aerial photos, UCSC archives). No plans or as-builts could be located. The wall consists of two non-interlocking four section units. The two separate units may indicate it was expanded at a later date.

#### DEFICIENCIES

A few of the cribs in the bottom eastern portion of the wall sag. The cribs in this section are severely cracked with much of the steel rebar exposed and rusted through (fig. 2). The section of the steel rebar **has** been reduced in several of the cribs by over 50%. The purisima shelf in this area appears to have broken **off** after the wall was constructed, undermining the structure. A semi-circular, three tiered, 10'x16' concrete platform has been constructed to stabilize and act as a foundation for the wall (fig. 3). An 8.5'x1' concrete end treatment delineated in the 1996topo survey on the east end of the wall has collapsed and is laying in pieces on the purisima shelf. A large void in the backfill exists where the end treatment was located. There is a three-foot diameter circular hole at the eastern end of the wall that can be seen from the bluff top (fig. 4). Runoff flowing through the hole will accelerate the flushing of infill through the face openings. The extent of the concrete erosion in the crib sections appear far advanced for a 20 year old wall. It was noted that the aggregate used in the concrete is not well-graded and over 1.5" diameter (fig2). During this period County operations manufactured cribs using unskilled work crews. The manufacturing process included mix design, pouring and curing the sections. It is not know what the level of quality control was for the manufacturing process.

# EXHIBIT I

#### **DESIGN STANDARDS**

Using Caltrans current standard plans (July 2002) C7-F the wall height exceeds the maximum allowable wall height for this particular wall type and loading case. This type of wall (type **A**, single crib section in depth) is only designed to be used to retain 14' of material given a 1:6 batter. For a vertical wall (batter=0) the maximum height would be less than 10'. Crib wall standards have not changed significantly in the last twenty years. Crib sections are designed using a minimum concrete compressive strength of 3250 psi and rebar with a tensile strength of 60,000 psi. The elements would have to be lab tested to determine the present strength of the concrete and steel used in the cribs but the degree of spalling indicates that a lower compressive strength concrete mix design may have been used to construct these cribs.

#### DRAINAGE

At the west end of the wall **an** 18-inch HDPE storm drain outlet free flows **9** feet above the purisuma shelf. This outfall was installed in 2000 to replace an 18-inch cmp that terminated above the western end of the wall. A 45-degree elbow was used as an end treatment for this pipe to protect from wave action. The pipe was designed to protrude 5 feet from the face of the bluff as recommended by Haro, Kasunich and Associate. The outlet pipe was placed in a 3.2-foot thick wrapped earth wall section that abuts a 2-foot wide cobble wall, which in turn abuts the crib wall. The earthen wall shows sign of erosion. Some erosion appears to have occurred in the purisuma layer directly below this outfall. The outfall drains the runoff from the road surface along East Cliff,  $30^{th}$ ,  $32^{nd}$  and  $33^{rd}$  Avenues. The 25-year flow at the outfall has been estimated at 14.3 cfs. The portion flowing down from  $32^{nd}$  and  $33^{rd}$  avenues runs through advanced storm water filtration units before entering the outfall. The remainder of the runoff occumng locally at the bluff top is drained through the pervious infill behind the wall. The face of the crib wall is open allowing the water to flow through the wall with no pore water pressure build-up.

#### ADJACENT WASHOUT AREAS

Fifteen feet west of the wall the runoff from the bluff top concentrates into a steep ravine that flows down the slope face (fig. 5). Rechanneling the runoff by extending the wooden batter board and collecting the water into a new inlet could alleviate the situation. Thirty-eight feet east of the wall is another area with an indented purisima shelf (fig. 6). The hinge point at the top of bluff has retreated several feet into the roadway surface. Four guardrail posts are hanging in mid air. Temporary railing and dike have been installed (fig 7). The protrusion of the railing footing has created an irregular flowline where ponding water occurs during high intensity storm events.

#### RATING

Over 20% of the cribs are in poor condition, 10% of the crib sections are in a state of advanced deterioration. There is sufficient corrosion of reinforcement and loss of concrete section to impact strength. This wall warrants strength analysis. Significant loss of embedment on the eastern end and the loss of infill material may jeopardize the ability of the wall to resist severe wave action during extreme high tides, as well as to withstand lateral forces imposed during seismic events.



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#### CRIB WALL #2 (fig 8)

#### STA 1+10.42 / 8.506m R to STA 1+26.15 / 8.17m R

Western portion Length = 18 feet Height = 7 feet Depth = 6.5 feet into slope No Batter Elevation difference from roadway = 2 feet below Elevation difference from purisima shelf = 15.3 feet above purisima Eastern portion Length = 33 feet (5 crib section @ 6.6 feet) Height = 9 feet Depth = 6.5 feet Batter = 1:6 Elevation difference from roadway to top of wall = about 0.3 feet below Elevation difference from bottom of wall to purisima shelf = **14** feet above





#### **GEOMETRY & LAYOUT**

The structure again consists of two individual walls butted nearly end to end. The western most section is an 18.3' wide by 6' high wall constructed from three 6' interlocking sections. The second portion is 33.3' wide by 9' high made from four 8.25' sections. The walls parallel the roadway at about 2.5' off the edge of pavement. The western most section has a 20'x 1.2' wooden retaining wall at the top. The western end of the wall is 2' below the road surface. The eastern end is about 0.35' below the roadway.

#### FOUNDATION

The crib walls retain the upper terrace deposits. The western portion rests 15.3' above the purisima shelf, on the soil strata classified as very stiff fine sandy silt. The eastern portion sits at the interface between the upper and lower terrace deposits described as coarse silty sand, with rounded gravels. The toe of this wall is about 14' above the purisima formation. The slope below the wall at its mid point is near vertical, since the purisima shelf cuts in almost to the face of the wall.

#### INFILL

The crib walls are infilled with imported rock which ranges in size from two inch drain rock to quarter ton riprap. Voids in the fill extend back into the slope in one section for the entire depth of the crib (6.5').

#### **STRUCTURE HISTORY**

Plans were located that show this wall was originally designed in 1976 **as** part of a project to widen the road and add a bikeway along East Cliff Drive from 17" to  $41^{st}$  Avenue. At this location the road was widened by 4 feet on the ocean side. The plans show an eighteen-foot long wall that is six feet high which matches the wall on the western end. The other sections of the wall must have been added at a later date.

#### DEFICIENCIES

The condition of the concrete in the individual crib sections is good with very little deterioration, there is some cracking but no exposed rebar. The eastern portion of the wall was constructed on **an** unconfined soil zone that contains rounded gravels and has a very low bearing capacity. The material failed leaving no support under three of the eastern most crib sections. The eastern portion of the wall is structurally unstable. The three middle sections of the wall appear to be bridging with a large rock about to slip through. From the top you can see that one entire section is void of fill material. The back of the cribs can be seen. At the toe of the bluff there are approximately five cubic yards of recycled concrete slabs that were hauled from offsite to act as riprap at the toe since the purisima shelf was worn away in this area. The material is undersized and not interlocking. Instead of providing protection to the bluff it most likely moves around and batters the slope during high tide/ big wave periods.



#### DESIGN STANDARD

The western portion is standard. The eastern portion is non-standard. The elevation of the wall is too high with respect to the roadway structural section. The asphalt for the road is located directly on the crib structure with no backfill in between. A minimum two foot separation backfilled with

95% compacted class II base rock is standard. The voids in the infill drain rock created **an** unstable base for the roadway. Most likely settlement and cracking occurred in this area creating a sump that would drain onsite road runoff. This runoff may have caused the uncemented material at the toe of the wall to slump.

#### DRAINAGE

There is a 6' flexible HDPE pipe near the west end of the wall. This pipe outfalls the **flow** from a single inlet at the edge of pavement (check).

#### ADJACENT WASHOUT AREA

At the top of the eastern end of the wall in the section without infill the asphalt concrete (ac) dike has broken off. A temporary 3' inset dike and wooden railing have been installed. This failed section extends several feet beyond the wall. Two traffic guardrail posts are unsupported.

#### RATING

Most of the cribs are in good condition. 20% are in fair condition with some minor cracking but no rebar exposed or surface evidence of rebar corrosion. Due to the failure at the toe of the eastern portion of the wall one crib is missing. Structurally the wall is unstable in its present unsupported condition. The purisima has eroded back into the bluff at this point. Immediate steps should be taken to support and fill the wall in order to protect the roadway from further damage and prevent this wall from becoming a hazardous pile of rubble at the base of the cliff.

# EXHIBIT I

#### CRIB WALL #3 (35<sup>th</sup> Avenue)(fig.12)

#### STA 2+47.91 / 10.648m R to STA 2+53.58 / 10.357m R

Length = 18 feet (3 crib sections @ 6 feet) Height = 15 feet (15 crib sections @ 1 foot) Depth = 6.5 feet (1 crib section) into slope Batter = 1:6 Elevation difference from roadway to top of wall = about 3 feet below Elevation difference from bottom of wall to purisima shelf = 2 feet





#### **GEOMETRY & LAYOUT**

The 18' wide by 15' high structure was constructed using three 6' interlocking concrete reinforced crib sections. The top of the wall is located approximately **3'** below the road surface. The wall parallels the edge of pavement at about a 7' offset.



#### FOUNDATION

The wall sets 2' above the purisima formation with a dense patch of ice plant growing at the toe.

#### INFILL

The crib sections of this wall are infilled with small rock from 1 to 2 inches in diameter. Voids in the infill extend back into the wall by only about 6 inches.

#### **STRUCTURE HISTORY**

No plans could be located for this particular crib wall. As part of the 1976 Bikeway widening project a G1 inlet was installed at the edge of pavement along the top of the wall. No details for the inlet or outfall were included in the plans. The wall was constructed after the 1976 bikeway project and before the 1991 RDA project that redirected the flow at the outfall.

#### DEFICIENCIES

The condition of the concrete in the individual crib sections is fair. Half of the cribs exhibit deep cracks longitudinal with the face. Spalling of the concrete is present and some reinforcement is exposed. The infill material is relatively undisturbed except in the area of the drainage pipe.

#### **DESIGN STANDARD**

Using Caltrans current standard plans (July 2002) C7-F the wall height exceeds the maximum allowable wall height for this particular wall type and loading case by only one foot. The wall embedment (should be 2.5' min) at the toe appears sufficient and undisturbed. Design strength of crib materials is unknown.

#### DRAINAGE

At the eastern side of the wall an 18-inch cmp outfall free flows 9' above the purisuma formation. The pipe protrudes 8' from the face of the wall and is set in a stone masonry wall support structure that abuts the eastern end of the crib wall. The stone portion of the wall ends 5' from the base of the crib wall and is unsupported. Most likely an earthen mound or another support structure previously existed below the stonewall that eroded away. The cmp pipe is rusted through on the entire bottom half back to the face of the wall. The drainage area for the runoff out flowing at this pipe was modified with a 1991 drainage improvement project. The pipe now drains only a portion of the roadway and a small section of the residential area on  $35^{th}$  avenue. The rest of the flow was diverted to the  $34^{th}$  or 36'' avenue outfalls.

#### ADJACENT WASHOUT AREA

Just beyond the wall on the eastern end the slope has eroded back into the roadway with a cut of 1' plus along a **30'** section. Five guardrail posts are hanging in mid air. Chunks of ac are lying on the slope below. A temporary guardrail and ac dike have been installed.



#### RATING

More than half of the cribs exhibit deep cracking and some spalling with exposed rebar that shows sign of corrosion but loss of section in the concrete and steel is incidental and does not significantly affect the strength or serviceability of this wall. The presence of vegetation at the toe of this wall indicates that wave runup is not a factor jeopardizing the stability of this wall. The poor condition of the outfall pipe and its surrounding foundation is however problematic.



#### CRIB WALL #4 (fig.13)

#### STA 3+09.58 / 10.641m R to STA 3+25.43 / 10.943m R

Length = 52 feet (8 crib sections @ 6.5 feet) Height = 16 feet (16 crib sections @ 1 foot) Depth = 6.5 feet (1 crib section) into slope Batter = 1:25 Elevation difference from roadway to top of wall = about 3.2 feet Elevation difference from bottom of wall to purisima shelf = 0 feet





#### **GEOMETRY & LAYOUT**

This wall consists of two non interlocking 26' wide by 16' high structures each made from four 6.5' interlocking concrete reinforced crib sections layed out end to end. The top of the wall is located 3.2' below the road surface and runs parallel to the traveled way at **an** offset of 6.5' from



the edge of pavement. The wall retains the terrace deposits directly east of the comfort station located between  $35^{th}$  and  $36^{th}$  avenue.

#### FOUNDATION

The wall sits on the purisima formation. The purisima has been altered in front of the middle of the wall. The shelf has been covered with an 8" layer of concrete in the area. Several large rocks protrude from the concrete but it is not clear how far back the concrete alteration extends back into the purisuma.

#### INFILL

The crib sections of this wall are infilled with what appears to be native backfill. Voids in 50% of the cribs extend back into the wall by about 2 inches. In the other half of the cribs the voids are about 2 feet deep.

#### **STRUCTURE HISTORY**

No plans could be located for this particular crib wall. The comfort station was built in the sixties but no wall design plans were included. The stairway configuration for the comfort station was modified at least twice. The original design had the stairway going straight out from the middle of the structure to the beach. A 1989 photo shows the stairway right along the crib wall. Presently there is a jog in the railing not shown in the 1989 photo. Coastal Conservancy funds were used to re-built the stairway in 1983. The wall was constructed after the 1983 comfort station/stairway retrofit project and before the 1989 photo.

#### DEFICIENCIES

The condition of the concrete in the individual crib sections is poor in several of the sections but fair overall. In some of the crib sections the concrete is eroded away entirely leaving only rusted rebar in the middle. Most of the cribs are in fair condition with minimal exposed rebar but advanced concrete spalling. Voids in the infill extend back in some section by 2 feet.

#### **DESIGN STANDARD**

Using Caltrans current standard plans (July 2002) C7-F the wall height exceeds the maximum allowable wall height for this particular wall type and loading case by only two feet. The ends of the wall cannot be seen however and it is possible that this wall extends back into the roadway more than one single crib section. It is not likely however that it would have been constructed in this manor this close to the traveled way because a lengthy road closure would have been required. Design strength of crib materials is unknown. The severe erosion of the concrete indicates a low strength mix design may have been used. *Also* again poorly graded over sized aggregate was used in the mix.

#### DRAINAGE

The runoff from the area is collected by way of an ac dike that drains into an outfall at 36<sup>th</sup> avenue



#### ADJACENT WASHOUT AREAS

Seventy-five feet west of the wall above a 12-inch storm drain outfall the ac dike has broken off from the roadway. Again at a location fifty-five feet from the east end of the wall above the 18-inch **36''** avenue outfall the edge of pavement has failed. At both locations temporary ac dike and wooden railing have been installed.

#### RATING

About 5% of the cribs are in poor condition with signs of advanced deterioration, significant corrosion of the reinforcement and severe loss of concrete section. The majority of the cribs have advanced concrete loss but little exposed rebar or significant corrosion. The wall is well supported at the foundation due to the concrete fortified purisuma platform, making it structurally stable.

# EXHIBIT I

#### COMFORT STATION & STAIRWAY (fig. 14)

#### **STA** 2+92.75 to **STA** 3+16.93

Building footprint =  $27.4 \times 11.4$  feet Concrete slab =  $34.3 \times 8.5$  feet Elevation difference from roadway to top of building = **1.3** feet Elevation difference from bottom of building to purisima shelf approx. = 12 feet



fig. 14

#### **GEOMETRY, LAYOUT, FOUNDATION & HISTORY**

A brief visual inspection was conducted of the structural elements of the stairway located at the old comfort station between  $35^{\text{th}}$  and  $36^{\text{th}}$  avenues. The comfort station is no longer in use. This stairway is the only public access to this highly used stretch of beach and should be assessed and maintained in order to allow continued use.

EXHIBIT I

The 27.4 x 11.4 foot building was constructed parallel to the roadway at the edge of pavement. The bluff was vertically cut eight feet and a Type 2 cantilever wall was used to retain the soil and act as the back wall and back foundation for the building. A  $\mathcal{A}$ ' x 14" grade beam running along the opposite side supports the foundation of the front of the building. The foundation was mainly built on cut consolidated material, except for the eastern comer which sets on fill material. In front of the building there is a 34.3 x 8.5 foot slab that was originally poured as a mat over both consolidated native material and engineered fill.

A storm event in 1979 destroyed the original lower stairway and caused the slab to be undercut in the fill section. The comfort station and stairway had to be closed as a result. In 1983, a new support structure for the slab and new stairways were designed and constructed. The retrofitted support is a **34.3** foot long, 12"x18" reinforced concrete girder with two cross beam pile caps at each end extending back to the original grade beam, supported by two 18" reinforced concrete piers and two 12"x12" reinforced concrete columns equally spaced across the main retrofit beam. The retrofit girder intersects the slab so that a **3.3** foot section of the slab is cantilevered. The columns and piers were designed to be embedded into the purisima formation. Since as-builts were not located, the actual depth of the piers and columns cannot be verified.

As part of the retrofit project an entire new stairway was constructed including twelve 18" reinforced concrete piers and four reinforced concrete columns. The stairway has five sections with three wooden landings, the concrete slab at the restroom level acting as a landing and another concrete landing at the bottom anchoring the base into the purisima. The main section of stairs descending from the building level to the beach has a rise of 25 feet and a run of 45 feet. Ail of the wooden structural material appears to be ACZA pressure treated Douglas fir. At the base of the stairway an large unspecified amount of **3** to 5 ton rock was placed around the piers and either keyed in **3** feet or placed on the sandstone bedding. The rock was placed on filter fabric.

#### DEFICIENCIES

The main retrofit concrete girder has large longitudinal stress cracks at the eastern end. The reinforcement is not visible so it is difficult to determine if there is loss of steel section. Some of the cracks in the beam have been patched. The reinforced concrete pier directly below the damaged end of the beam is also cracked. These cracks appear significant. The designer of the 1983 retrofit project (Donald Ifland) inspected digital images (3/15/04) showing the structural condition of the grade beam and piers. In his opinion, the deterioration is from either lateral forces due to slumping material on the uphill side and lack of resisting support on the downhill side. Or the embedded rusting steel tubes inserted in the top of the pier may be expanding the pile from the interior and could have caused the pile to explode outward. Mr. Ifland recommended that a small core be taken at the crack so that the reinforcing steel can be inspected for level of deterioration. If not much rusting is found, he would suggest that; the cracks be epoxy injected, the steel casing be sandblasted and painted with a zinc compound, butyl rubber or urethane tubing be inserted in the space between the steel tube and the pier and that this area be caulked to prevent continued rust formation. If significant rust is present replacement may be necessary.

The concrete slab is also is poor condition. There is a longitudinal crack across the front end facing the ocean. At the crack the concrete is severely spalling and the ends of the rusted rebar exposed.



The **ACZA** pressure treated wood under the structure is in good condition. The deck and railing wood **is** more worn and in fair condition. **A** majority of the steel connections including the connections at the steps are severely rusted. There is significant peeling and loss of steel section on one of the steel pier connector tubes. More than 50% of the steel has rusted through. The concrete slab on the side facing the beach has considerable spalling with the rebar rusted and exposed at the ends. It is recommended that a thorough structural evaluation be conducted so that the level of deterioration can be accessed to maintain public safety.

#### **DESIGN STANDARD**

Not enough detail information is available to compare the existing structural elements to current design standards. The rebar exposed in the slab appears

#### DRAINAGE

**A** 4-inch **PVC** storm drain runs from a floor drain located near the eastern back comer of the slab down to the purisima shelf.

#### RATING

Significant deterioration of the structure elements were noted during our visual inspection. How these deficiencies could affect the structural stability needs further evaluation by a registered structural engineer before a determination can be made about the present and future serviceability.

## EXHIBIT I



#### SANDERS & ASSOCIATES GEOSTRUCTURAL ENGINEERING, INC.

4180 Douglas Blvd., Suite 100 Granite Bay, CA 95746 (916) 729-8050 Fax: (916) 729-7706

May 28,2004 Project No. SE99-033 SC-PW Task 6

Mr. Tom Bolich Director of Public Works Santa Cruz County Department of Public Works 701 Ocean St., Rm. 410 Santa Cruz, CA 95060-4000

#### RE: FINAL CONSTRUCTION DRAWINGS AND CALCULATIONS Emergency Repairs at Existing Crib Walls East Cliff Drive, 33<sup>rd</sup> to 36<sup>th</sup> Avenue Santa Cruz County, CA

References:

- 1. Construction Drawings, Emergency Repairs at Existing Crib Walls, East Cliff Drive, 33rd to 36th Avenue, for County of Santa Cruz, prepared by Sanders & Associates Geostructural Engineering, dated May 28,2004, Sheets 2 10.
- 2. Calculations, Emergency Repairs at Existing Crib Walls, East Cliff Drive, 33<sup>rd</sup> to 36<sup>th</sup> Avenue, for County of Santa Cruz, prepared by Sanders & Associates Geostructural Engineering, dated May 28,2004.

Dear Tom:

We are pleased to submit the above referenced construction drawings and calculations for emergency repair of the failing crib walls along East Cliff Drive between  $33^{rd}$  and  $36^{th}$  Avenues. The work vvill be performed under an emergency permit, with a primary purpose of stabilizing the affected crib wall structures. Soil nails extending through the existing structural frame of the crib walls vvill stabilize the crib walls. Surface protection vvill be provided with a reinforced shotcrete facing, sculpted, stained, and textured to replicate the local bluff scill and rock formations. The soil nail stabilization will cover the existing crib wall facings with extensions on either side to transition into the natural bluff.

The emergency repair structures depicted on the construction drawings are intended to provide immediate, local crib wall stability and flank protection for the current configuration of the coastal bluff. The subject repairs will not prevent or delay undercutting of the Purisima Formation bedrock, nor the continued retreat of unprotected Marine Terrace Deposits. Without additional protection of the bluff, continued erosion **vvill** eventually destabilize the repaired structures, and further action **vvill** be required.

Final Construction Drawings and Calculations East Cliff **Drive** Emergency **Crib** Wall **Repairs** Project No. SE99-033 SC-PW **Task** 6 May 28,2004 p. 2

Upon completion of the emergency repairs, we recommend that the County proceed with plans for further bluff protection. Of particular concern are the existing undercuts or cavities in the underlying Purisima bedrock, and the untreated *flanks* of the repair structures. At a minimum, further bluff protection should include filling of the cavities with stained and sculpted shotcrete, and similarly maintaining the edges of the repair structures as natural erosion occurs.

If you have any questions please call us.

Sincerely yours, Sanders & Associates Geostructural ering, Inc. PROFESSION

Em. 9/05 Steven H. Sanders, P.E., G.E. (#46456)
President

OF CALL

Drew G. Kennedy, CEG (#2127) Senior Engineering Geologist

Bill Millhone, P.E. (#62051)

Senior Engineer

- Attachments: 1. Construction Drawings, Emergency Repairs at Existing Crib Walls, East Cliff Drive, dated May 28,2004, Sheets 2 - 10. (I signed original set on mylar, I signed original sed on bond)
  - 2. Calculations, Emergency Repairs at Existing Crib Walls, East Cliff Drive, dated May 28,2004. (4 signed original copies)

63

cc: Mr. Ralph Norberg, Santa Cruz County Depamnent of Public Works Mr. Paul Rodrigues, Santa Cruz County Redevelopment Agency



Sanders & Associates Geostructural Engineering, Inc.

CONSULTING GEOTECHNICAL & COASTAL ENGINEERS

Project No. SC5404 19 May 2004

SANDERS & ASSOCIATES GEOSTRUCTURAL ENGINEERS, INC. 4180 Dougias Boulevard, Suite 100 Granite Bay, California 95746

Attention: Mr. Drew Kennedy

Subject: Review of 90% Submittal

Reference: Construction Drawings Emergency Crib Wall Repairs East Cliff Drive 33<sup>rd</sup> to 36<sup>th</sup> Avenue Santa Cruz County, California

Dear Mr. Kennedy:

This letter outlines cur review of the geotechnical and coastal engineering aspects of the 90% submittal construction drawings for the referenced project. The construction drawings were prepared by Sanders & Associates Geostructural Engineers (SAGE) and dated 17 May 2004. Our firm prepared the <u>Addendum Geotechnicai and Coastal Enaineering</u> Investiaation for the Coastal Bluff Stabilization Project - East Ciiff Drive - 33<sup>rd</sup> to 36<sup>th</sup> Avenue dated 26 May 1998.

Three cribwalls supporting the blufftop and adjacent East Cliff Drive improvements have severely deteriorated and pose a hazard to the public. The three failing cribwall areas will be repaired by the installation of soil nail type retaining walls. The soil nail walls will be covered with colored and sculpted artificial rock fascia.

The blufftop repairs will extend down to about +10 feet NGVD with an additional **3** feet embedment into the bedrock beach platform. The ends of the three walls will be embedded or cut into the bluff face about 1 foot.

Our general comments regarding the proposed blufftop retaining walls are as foilows:

a) It is our opinion the 6 inches of concrete cover on the seaward side of the structural steel including ends of the soil nail tendons is appropriate for about elevation +10 feet NGVD and above. We would recommend at least 12 inches of concrete cover for a seawall below +10 feet NGVD in order to account for wave erosion or abrasion.



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Sanders & Associates Geostructural Engineers, Inc. Project No. SC5404 East Cliff Drive 19 May 2004 Page 2

b) The base of the blufftop repairs will be protected from undermining for some time in the future by means of the 3 foot embedment into the bedrock platform and the setback of the base of the wall (BW) beyond an imaginary line projected landward at 1:1 (H:V) from the base of the bluff/back of wave cut notch. Over time the bedrock platform will erode and a seawall will need to be constructed at the base of the bluff to support the toe of the blufftop retaining walls and prevent the loss of backfill materials The ends of the blufftop walls will also need to be maintained as the adjacent unprotected blufftop recedes.

We visited the site at low tide on 19 May 2004. Based on our site visit, we offer the following comments:

- 1) Termination of the lateral ends of any retaining wall system is difficult. The termination of the downcoast end of proposed Wall 4 is particularly difficult. Per plan, the proposed wall will extend beyond the downcoast end of the existing crib wall and wrap around the upcoast flank of a terrace deposits headlands. An erosion gully has began to bisect the oversteepened terrace deposits headlands near the downcoast end of the proposed wall. The proposed downcoast wall end will be oufflanked due to surficial erosion and natural recession of the oversteepened terrace deposits leaving a seaward projecting segment of the concrete faced retaining wall. To maximize the efficiency of the wall system, we present two alternatives to the proposed design for consideration as follows:
  - a) Scale back the terrace deposit headlands and extend the proposed blufftop wall downcoast to the O'Neill property boundary; or
  - b) Terminate the proposed wall immediately beyond the cribwall and upcoast of the headlands.

At the proposed Wall 2 location, we noted **two seacaves** that will need to be taken into consideration during construction of the toe of the proposed retaining wall system. At the upcoast end there is a seacave at least 18 feet deep as measured from the seaward vertical face of the undercut bedrock beach platform. At the downcoast end we observed **a** seacave at least 8 feet deep. During construction we recommend these *two* areas be flushed out in order to establish the base of the wall relative to the aforementioned 1:1 (H:V) setback from the base of the bluff.

One additional area of concern would be the placement of a rail system at the top of the blufftop walls to reduce the potential for public to fall off the top of the proposed near vertical walls.



Sanders & Associates Geostructural Engineers, Inc. Project No. SC5404 East Cliff Drive 19 May 2004 Page 3

If you have any questions regarding this letter, please call Rick Parks at our office at 831-722-4175, extension 212.

Very truly yours,

#### HARO, KASUNICH AND ASSOCIATES, INC.

· iC Rick L. Park G.E. 2603 REGIS No. 2603 Exp. 31 Perco

RLP/dk

Copies: 2 to Addressee 1 to Santa Cruz County; Attn: Mr. Paul Rodrigues

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EXHIBIT K

#### EXHIBIT L

#### APPLICATION #04-0307

#### BACKGROUND REFERENCE MATERIALS LIST\*

#### \*REPORTS AVAILABLE FOR REFERENCE WITH THE COUNTY PLANNING DEPARTMENT

- 1. Geotechnical Investigation Update and Supplemental Design Criteria Letter by Haro, Kasunich and Associates, Inc. dated January 25, 2001
- 2. Addendum Geotechnical and Coastal Engineering Investigation Report by Haro, Kasunich and Associates, Inc. dated May 26, 1998
- 3. Geotechnical Investigation for Coastal Bluff Stabilization Project Report by Haro, Kasunich and Associates, Inc. dated June 13, 1997