CALIFORNIA COASTAL COMMISSION
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REGULAR CALENDAR
STAFF REPORT AND PRELIMINARY RECOMMENDATION

Application No.: 6-01-159

Applicant: Ann Dunham
W. Terry Hunefeld

Agent: Bob Trettin

Description: Construction of an approximately 40 ft.-long, 13 ft.-high and 27 in.-thick tiedback concrete seawall incorporating two rows of approximately 30 ft.-long rock anchors.

Site: On the public beach below 308/310 Neptune Avenue, Encinitas, San Diego County. APN: 256-352-04

STAFF NOTES:

Summary of Staff's Preliminary Recommendation: Staff is recommending denial of the proposed development as the applicant has not demonstrated that the existing residential structure is subject to threat such that a seawall is required to protect the existing residential structure pursuant to Section 30235 of the Coastal Act. The proposed seawall will have adverse impacts to shoreline sand supply, visual resources and public access and recreational opportunities. There are also alternatives available which will likely reduce the potential future threat without involving structural solutions and their associated landform alteration and beach impacts.

Substantive File Documents: Certified City of Encinitas Local Coastal Program (LCP); City of Encinitas Case No. 00-114 MUP/EIA; "Preliminary Geotechnical Evaluation/Request for Emergency Processing Proposed Lower Bluff Seawall for Dunham/Hunefeld Residence" by Soil Engineering Construction, Inc., dated March 17, 2000; "Third Party Review,

Dunham/Robert Trettin, Case No. 00-114 MAUP" by Geopacifica Geotechnical Consultants dated September 26, 2000; "Geotechnical Review Memorandum" by Dr. Mark Johnsson dated May 7, 2000; "Responses to Geotechnical Memoradum" by Soil Engineering Construction" dated June 18, 2001; "Geotechnical Review Memorandum" by Dr. Mark Johnsson dated July 23, 2001; Response to Geotechnical Review Memorandum" by Soil Engineering Construction dated September 28, 2001; "Geotechnical Review Memorandum" by Dr. Mark Johnsson dated December 11, 2001; "Landslide Hazards in the Encinitas Quadrangle, San Diego County, California", Open File Report, dated 1986 by the California Division of Mines and Geology; San Diego Association of Governments (July 1993) Shoreline Preservation Strategy (including technical report appendices, The Planners Handbook, Beachfill Guidelines, and Seacliffs, Setbacks and Seawalls Report); "Batiquitos Lagoon Dredging Survey", dated September 1994, State Land Commission; Reconnaissance Report for the Encinitas Shoreline by the U.S. Army Corps of Engineers, dated March 1996; Final Draft Technical Report for the City of Encinitas Comprehensive Coastal Bluff and Shoreline Plan by Moffatt and Nichol Engineers, dated February 1996; CDP Nos. 6-85-396/Swift, 6-89-136-G/Adams, 6-89-297-G/Englekirk, 6-92-82/Victor, 6-92-212/Wood, 6-93-36-G/Clayton, 6-93-85/Auerbach, et. al, 6-93-131/Richards, et al, 6-93-136/Favero, 6-93-181/Steinberg, 6-95-66/Hann, 6-98-39/ Denver/Canter, 6-98-131/Gozzo, Sawtelle and Fischer, 6-99-9/Ash, Bourgualt, Mahoney, 6-99-35-G/MacCormick, 6-99-75-G/Funke, Kimball, 6-99-131-G/Funke, Kimball, 6-99-41/Bradley, 6-00-009/Ash, Bourgault, Mahoney, 6-00-74/Gerber, Funke, Kimball, 6-00-171-G/Brown, Sonnie, 6-01-005-G/Okun, 6-01-040-G/Okun, 6-01-041-G/Sorich, 6-01-42-G/Brown, and Sonnie, 6-01-62-G/Sorich.

I. PRELIMINARY STAFF RECOMMENDATION:

MOTION: ***I move that the Commission approve Coastal Development Permit No. 6-01-159 for the development proposed by the applicant.***

STAFF RECOMMENDATION OF DENIAL:

Staff recommends a **NO** vote. Failure of this motion will result in denial of the permit and adoption of the following resolution and findings. The motion passes only by affirmative vote of a majority of the Commissioners present.

RESOLUTION TO DENY THE PERMIT:

The Commission hereby denies a coastal development permit for the proposed development on the ground that the development will not conform with the policies of Chapter 3 of the Coastal Act. Approval of the permit would not comply with the California Environmental Quality Act because there are feasible mitigation measures or alternatives that would substantially lessen the significant adverse impacts of the development on the environment.

II. Findings and Declarations.

The Commission finds and declares as follows:

1. Detailed Project Description. Proposed is the construction of an approximately 40 foot-long, 13 foot-high and 27 inch-thick tiedback concrete seawall on the public beach at the toe of the bluff below an existing approximately 4,272 sq. ft. duplex. The seawall is proposed to incorporate two rows of approximately 30 foot-long rock anchor tiebacks to be installed into the bluff. The face of the seawall is proposed to be colored and sculpted to closely match the surrounding natural bluff. In addition, to address the adverse impacts on local sand supply associated with the proposed seawall, the applicants propose to pay an in-lieu fee of $5,083.30 to the San Diego Association of Governments' (SANDAG) beach sand mitigation fund.

The existing duplex is located approximately 35 feet landward of an existing approximately 80 foot-high bluff. Based on public property data, the duplex was constructed in approximately 1972 prior to the implementation of the Coastal Act. No evidence of prior coastal developments permits for the subject property has been found. However, a similarly designed approximately 9 foot-high seawall is located below the adjacent property to the north and was approved by the Commission in 1993 (CDP No. 6-93-85 Auerbach, et. al). In approving the seawall on the north side of the subject site, the Commission did not determine that the structure was required to protect the residence at the top of the bluff. Instead the approval involved seawall construction on six non-contiguous lots spanning 13 properties to the north and was approved as a comprehensive preventative measure. At the time, the City of Encinitas had suggested that a Geologic Hazards Abatement District (GHAD) would soon be approved and implemented to fill in the gaps between these non-contiguous seawalls. While the GHAD was created, it was soon abolished before action could be taken to fill the gaps between the 13 seawalls. The bluffs south of the subject site remain in their natural state and do not contain seawalls or other shoreline protection.

The subject site is located in the City of Encinitas approximately 500 feet south of Stone Steps public access beach stairway. The subject seawall development lies seaward of the mean high tide line (MHTL). In September 1994, State Lands Commission surveyed the MHTL in Encinitas and concluded that the MHTL follows the toe of the bluff in the City of Encinitas ("Batiquitos Lagoon Dredging Survey", 1994). The City of Encinitas has a certified LCP and has been issuing coastal development permits since May of 1995.

However, because the proposed development lies seaward of the MHTL, it is located within the Commission's area of original jurisdiction, where permit jurisdiction is not delegated to the local government. As such, the standard of review is Chapter 3 policies of the Coastal Act, with the certified LCP used as guidance.

2. Geologic Conditions and Hazards. Section 30235 of the Coastal Act states, in part:

> Revetments, breakwaters, groins, harbor channels, seawalls, cliff retaining walls, and other such construction that alters natural shoreline processes shall be permitted when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion, and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply.

In addition, Section 30253 of the Coastal Act states, in part:

> New development shall:
>
> (l) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.
>
> (2) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs...

Coastal Act Section 30235 acknowledges that seawalls, revetments, cliff retaining walls, groins and other such structural or "hard" solutions alter natural shoreline processes. Thus, such devices are required to be approved only when necessary to serve coastal dependent uses or to protect public beaches or existing structures in danger from erosion. The Coastal Act does not require the Commission to approve shoreline altering devices to protect vacant land or in connection with construction of new development. A shoreline protective device proposed in those situations is likely to be inconsistent with various other Coastal Act policies. For example, Section 30253 addresses new development and requires that it be sited and designed to avoid the need for protective devices that would substantially alter natural landforms along bluffs and cliffs.

In addition, the Commission has generally interpreted Section 30235 to require the Commission to approve shoreline protection only for existing principal structures that are subject to threat. The Commission must always consider the specifics of each individual project, but has found in many instances that accessory structures such as patios, decks and stairways are not required to be protected under Section 30235 or can be protected from erosion by relocation or other means that does not involve shoreline protection. The Commission has historically permitted at grade structures within the geologic setback area recognizing they are expendable and capable of being removed rather than requiring a protective device that alters natural landforms along bluffs and cliffs.

The proposed development is located at the base of a coastal bluff in the City of Encinitas. The coastal bluff at the site consists of a dense bedrock unit (Torrey Sandstone) that forms near vertical to overhanging seacliffs, capped by marine terrace deposits that form steep bluffs ranging from 30 to more than 50 degrees. Bluffs in this area are subject to a variety of erosive forces and conditions (e.g., wave action, reduction in beach sand, oversteepened blocks of Torrey Sandstone). As a result of these erosive forces, the bluffs and blufftop lots in the Encinitas area are considered a hazard area. Furthermore, in 1986 the Division of Mines and Geology mapped the entire Encinitas shoreline as an area susceptible to landslides, i.e, mapped as either "Generally Susceptible" or "Most Susceptible Areas" for landslide susceptibility (ref. Open File Report, "Landslide Hazards in the Encinitas Quadrangle, San Diego County, California", dated 1986). Documentation has been presented in past Commission actions concerning the unstable nature of the bluffs in these communities and nearby communities (ref. CDP Nos. 6-93-181/Steinberg, 6-92-212/Wood, 6-92-82/Victor, 6-89-297-G/Englekirk, 6-89-136-G/Adams). In addition, a number of significant bluff failures have occurred along the Solana Beach/Encinitas coastline which have led to emergency permit requests for shoreline protection (ref. CDP Nos. 6-87-86-G and 6-87-167-G/Bourgault, Mallen & White; 6-93-181/Steinberg, 6-93-131/Richards et al, 6-93-36-G/Clayton, 6-93-024-G/Wood, 6-92-212/Wood, 6-92-73-G/Robinson, 6-91-312-G/Bradley, 6-98-029/Bennet, 6-98-157-G/Colton and 6-99-41-G/ Bradley).

Section 30235 of the Coastal Act requires the Commission to approve shoreline protective devices if the existing structure is in danger from erosion. However, it is the opinion of the Commission's staff geologist that the structure is not currently threatened. The applicant has submitted several geotechnical reports and updates concerning the subject property which assert that the duplex at the top of the bluff is threatened by "either gradual failures due to undercutting along the base of the bluff or a massive failure occurring from the toe of the bluff extending upward toward the residences located at the top of the bluff." The applicant's report asserts that a slope stability analysis for the site results in a factor of safety against a landslide at a low 1.13 ("Responses to Geotechnical Review Memorandum" by Soil Engineering Construction, Inc., dated June 18, 2001). Based on this low factor of safety, the applicant asserts that the duplex is currently threatened by a landslide. The Commission's staff geologist has reviewed the applicant's geotechnical information and determined that the geotechnical information does not adequately demonstrate the residences are currently threatened. First, the Commission's staff geologist notes that on bluffs composed of Torrey Sandstone, coastal erosion and bluff retreat usually takes the form of gradual erosion of the base of the bluff where it is impacted by waves, commonly creating wave-cut notches, overhangs, and seacaves. Typically, oversteepened Torrey sandstone bluffs fail by massive block fall of such undermined bluffs. Following failure of the lower bluff, the unsupported upper bluff (consisting of marine terrace deposits) commonly slumps shortly thereafter. Massive failures of the entire bluff are very rare in bluffs underlain by the Torrey sandstone. The Commission's staff geologist was not able to reproduce the very low factor of safety calculated by the applicant's geologists. Instead, his calculations showed a much higher factor of safety for the entire bluff of 1.4

("Geotechnical Review Memorandum" by Dr. Mark Johnsson dated July 23, 2001). The applicant's geologists disagreed with this review memorandum, and provided a hand-calculation of the factor of safety based on the Ordinary Method of Slices (OMS) (REF). The Commission's staff geologist responded that the OMS method is too simplistic and results in an overly conservative low factor of safety. Using the more reliable "Bishops Method" of slope stability analysis, the Commission's staff geologist hand-calculated a factor of safety against landslide ranging upward from 1.32. (A factor of safety of 1.5 is considered safe). Regardless of the overall bluff's factor of safety, the Commission's geologist indicates that the typical bluff failure mechanism along this section of the Encinitas shoreline involves large block falls rather than a deep-seated landslide. In addition, he notes that "[w]hatever the factor of safety for such a deep-seated landslide, if the factor of safety for a block fall along fractures or new failure planes oriented parallel to the bluff face is lower, then that mechanism of bluff collapse will occur rather than the deep-seated landslide." ("Geotechnical Review Memorandum" by Dr. Mark Johnsson dated December 11, 2001.) In his opinion, block falls are the dominant failure mechanisms within the Torrey Sandstone along this section of the Encinitas shoreline. The applicant's "Preliminary Geotechnical Evaluation" by Soil Engineering Construction dated March 17, 2000, also supports the finding that block falls are the predominant failure mechanism for the area. The applicant's report of March 2000 describes the subject site as "near identical in nature" to a block fall that occurred at 232-246 Neptune Avenue in January of 2000:

> Based on our review of the failure of the site at 232-246 Neptune, and on our analyses of the site, it is our professional observation that the sites are near identical in nature. The relatively unstable geologic composition, over-steepened mid and upper bluff, and the severe undercutting which was the underlying cause of the January failure, are all conditions that are present, have developed concurrently, at the subject site. (Page 3)

> It is our opinion that an imminent threat to the subject properties – as well as the potential threat to those using the section of public beach adjacent to the bluff – will consist of a large volume bluff failure. The emergency nature of this threat is due primarily to the previously referenced substantial bluff undercut. (Page 5)

Because it appears that block falls within the Torrey Sandstone are the predominant failure mechanism at the site, the question is whether the duplex at the top of the bluff is currently threatened by a block fall event. The duplex is located approximately 35 feet landward of the approximately 80 foot-high coastal bluff. The applicant's engineer has documented that the existing oversteepened bluff undercut within the Torrey Sandstone extends approximately 20 feet high and 7 to 10 feet in depth. The applicant's engineer asserts that the block fall is expected to "fail to a more a vertical condition" ("Reponses to Geotechnical Review Memorandum" dated June 18, 2001). The existing bluff extends approximately 55 feet seaward of the upper bluff edge with a slope of approximately 42 to 47 degrees. If the block fall were to occur, it would likely result in the failure of a block approximately 10 feet wide, as this is the approximate amount of overhang at the site. The remaining portion of the upper bluff would then extend approximately 40 feet

seaward of the bluff edge. Following a block fall within the Torrey Sandstone, the upper terrace deposits over an extended period of time will lay back to a natural equilibrium angle (analogous to the angle of repose in unconsolidated sediments) above the terrace deposits at an angle of approximately 33 degrees. Based on the applicants' plans, a 33 degree angle of repose plotted from the seaward top of the Torrey Sandstone following an approximately 10 foot wide block fall would not intersect with the existing residential structure. In addition, it appears that one or more additional block falls could form and fail before the residence would be threatened. Therefore, even with the predicted block fall, it does not appear that the residence will immediately be threatened. After review of the applicant's geologic reports and project plans, the Commission's staff geologist believes that the existing residence is not threatened.

> In summary, the slope stability analyses do not indicate that bluff collapse through a deep-seated landslide through the Torrey Sandstone at the base of the bluff is imminent. The geometry of these bluffs, particularly that at the more northern site (Dunham-Hunefeld; the site modeled here) does suggest that a block fall is likely in the near future. However, as explained in my previous memos, such a failure would not place the structures at the top of the bluff in danger for some time—probably many years. Accordingly, the proposed seawalls must be considered preventative in nature, and are not needed at this time to assure the stability of the structures at the top of the bluff. ("Geotechnical Review Memorandum" by Dr. Mark Johnsson dated December 11, 2001.)

Thus, based upon the current distance between the residences and the bluff edge, the likely mechanism of bluff failure (block fall), predicted equilibrium slope of the marine terrace deposits, and the lack of evidence for deep-seated landslides, there is no evidence that the existing residence is in danger from erosion and therefore, the Commission is not required to approve a shoreline altering device pursuant to Section 30235. In this case, the proposed shoreline protective device is intended to reduce continuing erosion to prevent loss of additional property even though the existing principal structures are not actually "in danger". Thus, the Commission is not required to approve a shoreline altering device. Further, as discussed below, approval would be inconsistent with other Chapter 3 policies which address visual quality of coastal areas, minimization or landform alteration and protection of public access and recreational opportunities. Also, there are alternatives available which will likely reduce the potential future threat without involving structural solutions and their associated landform alteration and beach impacts.

A number of adverse impacts to public resources (beach, bluff and access) are associated with the construction of shoreline structures. In this particular case, the natural shoreline processes referenced in Section 30235 of the Coastal Act, such as the formation and retention of sandy beaches, will be altered by construction of a seawall, since bluff retreat is one of several ways that beach quality sand is added to the shoreline. This retreat is a natural process resulting from many different factors such as undercutting by wave action of the toe of the bluff causing bluff collapse, saturation of the bluff soil from ground water causing the bluff to slough off and natural bluff deterioration. When a seawall is

constructed on the beach at the toe of the bluff, it directly impedes these natural processes.

In addition to the above cited impacts, seawalls can threaten the stability of a site if the wall should become damaged in the future (e.g. as a result of wave action, storms, etc.) which could lead to the need for more shoreline or bluff stabilization devices. Damaged seawall structures could also adversely affect the shoreline by resulting in debris on the beach and/or creating a hazard to the beach going public. Seawalls need to be designed to withstand the effects of wave actions and major storms and need to have their structural condition monitored on an annual basis to ensure proper maintenance and repair.

Some of the effects which a structure may have on natural shoreline processes can be quantified. Three of the effects from a shoreline protective device which can be quantified are 1) loss of the beach area on which the structure is located; 2) the long-term loss of beach which will result when the back beach location is fixed on an eroding shoreline; and 3) the amount of material which would have been supplied to the beach if the back beach or bluff were to erode naturally.

Based on review of the proposed seawall application, the Commission finds that the following impacts on beach sand supply would result from construction of the proposed seawall. The proposed seawall, which is approximately 40 ft. long by 27 inches thick, will encroach onto and permanently displace an estimated 90 sq. ft. of public beach area that is currently available for public use. In addition, over the expected life of the seawall, it is estimated that an additional 176 sq. ft. of public beach area will be lost to public use due to the seawall's prevention of the landward migration of the beach in this location (based on information provided by the applicant's engineer that the expected life of the seawall is approximately 22 years and the long-term erosion rate at the base of the bluff is .2 ft. per year). Finally, based on a rough approximation of current and future bluff profiles, it is estimated that approximately 239 cubic yards of beach quality sand will be deprived the beach over the life of the seawall due to the seawall's alteration of the natural erosion of the bluff.

The above-described impacts on the beach and sand supply have previously been found to result from seawalls in other areas of Encinitas. In March of 1993, the Commission approved CDP #6-93-85/Auerbach, et al for the construction of a seawall fronting six non-continuous properties located on the north side of the subject site. In its finding for approval, the Commission found the proposed shoreline protection would have specific adverse impacts on the beach and sand supply and required mitigation for such impacts as a condition of approval. The Commission made a similar finding for several other seawall developments along Neptune Avenue (ref. CDP Nos. 6-93-36-G/Clayton, 6-93-131/Richards, et al, 6-93-136/Favero, 6-95-66/Hann, 6-98-39/ Denver/Canter, 6-98-131/Gozzo, Sawtelle and Fischer, 6-99-9/Ash, Bourgualt, Mahoney, 6-99-41/Bradley and 6-00-74/Grey Diamond Marketing, Funke, Kimball.)

In addition to the adverse impacts the seawall will have on the beach as detailed above, the Commission finds that the proposed seawall would also have adverse impacts on adjacent unprotected properties caused by wave reflection, which leads to accelerated erosion. Numerous studies have indicated that when continuous protection is not provided, unprotected adjacent properties experience a greater retreat rate than would occur if the protective device were not present. This is due primarily to wave reflection off the protective structure and from increased turbulence at the terminus of the seawall. According to James F. Tait and Gary B. Griggs in Beach Response to the Presence of a Seawall (A Comparison of Field Observations) "[t]he most prominent example of lasting impacts of seawalls on the shore is the creation of end scour via updrift sand impoundment and downdrift wave reflection. Such end scour exposes the back beach, bluff, or dune areas to higher swash energies and wave erosion." As such, as the base of the bluff continues to erode on the unprotected adjacent properties, failure of the bluff is likely. Thus, future failures could "spill over" onto other adjacent unprotected properties, prompting requests for much more substantial and environmentally damaging seawalls to protect the residences. This then starts a "domino" effect of individual requests for protection.

In this case, the north end of the proposed seawall will be attached to an existing seawall of similar size. Therefore, end effects on its north side will not be a concern. However, the bluffs on the south side of the subject site remain in their natural state and will, therefore, be subject to end effects from the proposed seawall. Although the proposed seawall could be designed with features to reduce impacts of the wall on adjacent properties, at best, the above described impacts can be reduced, but not eliminated. The proposed seawall design also includes a return wall at the south end of the seawall, which go into the bluff perpendicular to the wall and the bluff face. This return wall is an important component of a seawall as they protect the wall from wave flanking, which could lead to erosion behind the wall. Regardless of whether accelerated erosion were to occur on the adjacent unprotected properties, the southern adjacent bluffs will continue to erode due to the same forces that are causing them to erode currently. As this occurs, more surface area of the return wall is exposed to wave attack leading to increased turbulence and accelerated erosion of the adjacent unprotected bluff.

According to information contained in the Planners Handbook (dated March 1993), which is included as Technical Appendix III of the Shoreline Preservation Strategy adopted by the San Diego Association of Governments (SANDAG) on October 10, 1993, "[a] longer return wall will increase the magnitude of the reflected wave energy. On a coast where the shoreline is retreating, there will be strong incentives to extend the length of the return wall landward as adjacent property is eroded, thereby increasing the return wall, and its effects on neighboring property, with time."

The Commission also finds that there are other alternatives available that could reduce the risk from erosion, while not requiring the construction of shoreline altering structures and their associated impacts on beach sand supply. Such alternatives include, but are not limited to, directing all blufftop drainage away from the bluff towards the street, removing or capping any existing permanent irrigation within the designated geologic

setback area, installing a means of reducing groundwater before it reaches the bluff, underpinning the existing home foundations, removing at-grade accessory structures, and beach sand replenishment. While these alternatives will not prevent the natural erosion from occurring at the base of the bluff, they would reduce the risk associated with any subsequent upper bluff failure resulting from block falls at the base of the bluff or caused by groundwater, landscape watering or stormwater runoff.

In summary, while it is clear that the toe of the bluff fronting the existing residential structure is subject to wave action, the applicants have not documented that the undercutting places the residential structure in danger from erosion or subsequent bluff failure such that a seawall is required. Thus, the Commission is not required to approve the proposed protection. In addition, as noted above, the proposed seawall will contribute to erosion and geologic instability over time on adjacent unprotected properties and also deplete sand supply, occupy public beach and fix the back of the beach. Additionally, there are other less damaging alternatives available to reduce the risk from bluff erosion. Therefore, the Commission finds that the proposed seawall is inconsistent with Sections 30235 and 30253 of the Coastal Act and must be denied.

3. Visual Resources/Alteration of Natural Landforms. Section 30251 of the Coastal Act states, in part:

> The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas.

The proposed development will occur on a public beach at the base of an approximately 80 foot-high coastal bluff fronting a duplex. A similarly designed seawall lies on the adjacent northern property. The bluffs south of the subject site remain in their natural state without shoreline protection devices or private access stairways. Therefore, even with the proposed color and sculpturing treatment of the seawall, the construction of an approximately 40 ft.-long, 13 ft.-high and 27 in.-thick tiedback concrete seawall would have adverse impacts on the visual resources of the area. The design of the seawall which includes measures to color and sculpt the structure to match the surrounding bluffs is similar to seawalls recently approved by the Commission to protect threatened structures. In this case, however, the applicants have failed to adequately demonstrate the residential structure at the top of the bluff is currently threatened and, therefore, the seawall unnecessary. Therefore, since the proposed development will have significant adverse impacts on visual resources and is unnecessary to protect the existing principle structure, the proposed development is inconsistent with Section 30251 of the Coastal Act and must be denied.

4. Public Access/Recreation. Section 30604 (c) of the Coastal Act requires development between the nearest public road and the sea to be in conformity with the

public access and recreation policies of Chapter 3. In addition, Section 30210 of the Coastal Act is applicable to the proposed development and states:

> In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.

In addition, Section 30212 of the Act is applicable and states, in part:

> (a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where:
>
> (l) it is inconsistent with public safety, military security needs, or the protection of fragile coastal resources,
>
> (2) adequate access exists nearby....

In addition Section 30240(b) of the Coastal Act is applicable and states:

> (b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.

The beach seaward of the proposed seawall is public trust lands because it is seaward of the MHTL. The State Lands Commission (SLC) retains ownership of the public trust lands, however, in this case, the SLC leases the area to the City of Encinitas. The site is located approximately three lots south of the City of Encinitas' "Stone Steps" public access stairway. The beach at the project site is used by local residents and visitors for a variety of recreational activities. Thus, the proposed seawall is located on sandy beach area that would otherwise be available to the public. The project will have several adverse impacts on public access.

The proposed seawall will extend approximately 2.25 feet onto the public beach occupying approximately 90 sq. ft. (40 ft. by 2.25 ft.) of usable public beach. Although the wall is minimally designed at 2.25 feet in width, the beach along this area of the coast is narrow and at high tides and winter beach profiles, the public may be forced to walk virtually at the toe of the bluff or the area may be impassable. As such, any encroachment of structures, no matter how small, onto the sandy beach in this area, reduces the beach area available for public use. This is particularly true given the existing beach profiles and relatively narrow beach.

In addition to the above-described direct interference with public access by the proposed seawall, there are a number of indirect effects as well. The adverse impacts of the

proposed seawall on shoreline processes, sand supply and beach erosion rates, as described previously in section 2 of this report, alter public access and recreational opportunities. The loss of sandy beach area and the loss of sand contribution to the beach reduce the beach area available for public access and recreation. The seawall will reduce lateral beach access by encroaching onto the beach and will have adverse impacts on the natural shoreline processes. As stated elsewhere in these findings, Section 30235 of the Act allows for the use of such a device where it is required to protect existing development that is threatened by erosion and where it has been designed to eliminate or mitigate adverse impacts upon shoreline sand supply. Although the applicants propose to mitigate the loss of sand through the payment of an in-lieu fee to SANDAG's sand replenishment program, the seawall is a preventative measure only and not necessary to protect the existing residential structure from the imminent threat of erosion. In addition, while the payment of an in-lieu fee could address potential adverse effects on shoreline sand supply, the payment would not compensate for the adverse visual impacts of a seawall or the alteration of the natural bluffs.

Therefore, since the no project alternative will involve less beach encroachment and since the proposed development will have both significant direct and indirect adverse impacts to public access and recreational opportunities, the proposed development is inconsistent with the public access and recreation policies of the Coastal Act and, therefore, must be denied.

3. Local Coastal Planning. Section 30604 (a) also requires that a coastal development permit shall be issued only if the Commission finds that the permitted development will not prejudice the ability of the local government to prepare a Local Coastal Program (LCP) in conformity with the provisions of Chapter 3 of the Coastal Act. In this case, such a finding cannot be made.

The subject site is located on the beach within the City of Encinitas. In November of 1994, the Commission approved, with suggested modifications, the City of Encinitas Local Coastal Program (LCP). Subsequently, on May 15, 1995, coastal development permit authority was transferred to the City. Although the site is within the City of Encinitas, it is within the Commission's area of original jurisdiction. As such, the standard of review is Chapter 3 policies of the Coastal Act, with the City's LCP used as guidance.

As shoreline erosion along the coast rarely affects just one individual property, it is imperative that a region wide solution to the shoreline erosion problem be addressed and solutions developed to protect the beaches. Combined with the decrease of sandy supply from coastal rivers and creeks and armoring of the coast, beaches will continue to erode without being replenished. This will, in turn, decrease the public's ability to access and recreate on the shoreline.

Based on specific policy and ordinance language requirements in the LCP suggested by the Commission and accepted by the City, the City of Encinitas is in the process of developing a comprehensive program addressing the shoreline erosion problem in the

City. The intent of the plan is to look at the shoreline issues facing the City and to establish goals, policies, standards and strategies to comprehensively address the identified issues. To date, the City has conducted several public workshops and meetings on the comprehensive plan to identify issues and present draft plans for comment. However, based on recent discussions with City Planning Staff, it is uncertain when the plan will come before the Commission as an LCP amendment or when it will be scheduled for local review by the Encinitas City Council.

The bluffs in this section of the Encinitas coastline are in public ownership. The bluffs south of the subject site are, for the most part, pristine, devoid of shore and bluff protection structures or private access stairways; and, there is no visible evidence of landslides. The typical mechanism of bluff sloughing along this section of Encinitas involves the formation and collapse of oversteepened block sections of Torrey Sandstone which, according to the Commission's staff geologist, would not at this time threaten subject residences at the top of the bluff. As such, it is premature to commit this stretch of bluffs to armoring without a thorough analysis of alternatives.

If this project is approved, it sends a signal that there is no need for site specific geotechnical review to determine the safe location for placement of new development on the blufftop and will result in total armoring of the shoreline where there is any existing development even if the development is not in danger from erosion. This approach is not consistent with Section 30253 and the public access and recreation policies of the Coastal Act. In addition, it should be noted that other residences in the area are located approximately the same distance from the bluff as the residences subject to this permit review. Therefore, a decision that shoreline protective measures are appropriate as preventive measures to arrest erosion and preserve existing property when existing structures are clearly not threatened, should be done through a comprehensive planning effort that analyzes the impact of such a decision on the entire reach. The Commission should not approve "piece meal" construction of seawalls for individual properties which could further exacerbate the problem. Planning for comprehensive protective measures which may include a combination of continual lower bluff protection constructed in substantial segments, limits on future bluff development and ground and surface water controls, in conjunction with beach replenishment, should occur to avoid the need for substantial alteration of the natural landform in the future.

Based on the above discussion, the proposed seawall development has been found to be inconsistent with numerous Chapter 3 policies of the Coastal Act because the need for the seawall has not been documented and because its adverse impacts on beach sand supply and on adjacent unprotected properties would be significant. The Commission finds that approval of the proposed seawall development will prejudice the ability of the City of Encinitas to prepare a comprehensive plan addressing the City's coastline as required in the certified LCP and consistent with Chapter 3 policies and, therefore, it must be denied.

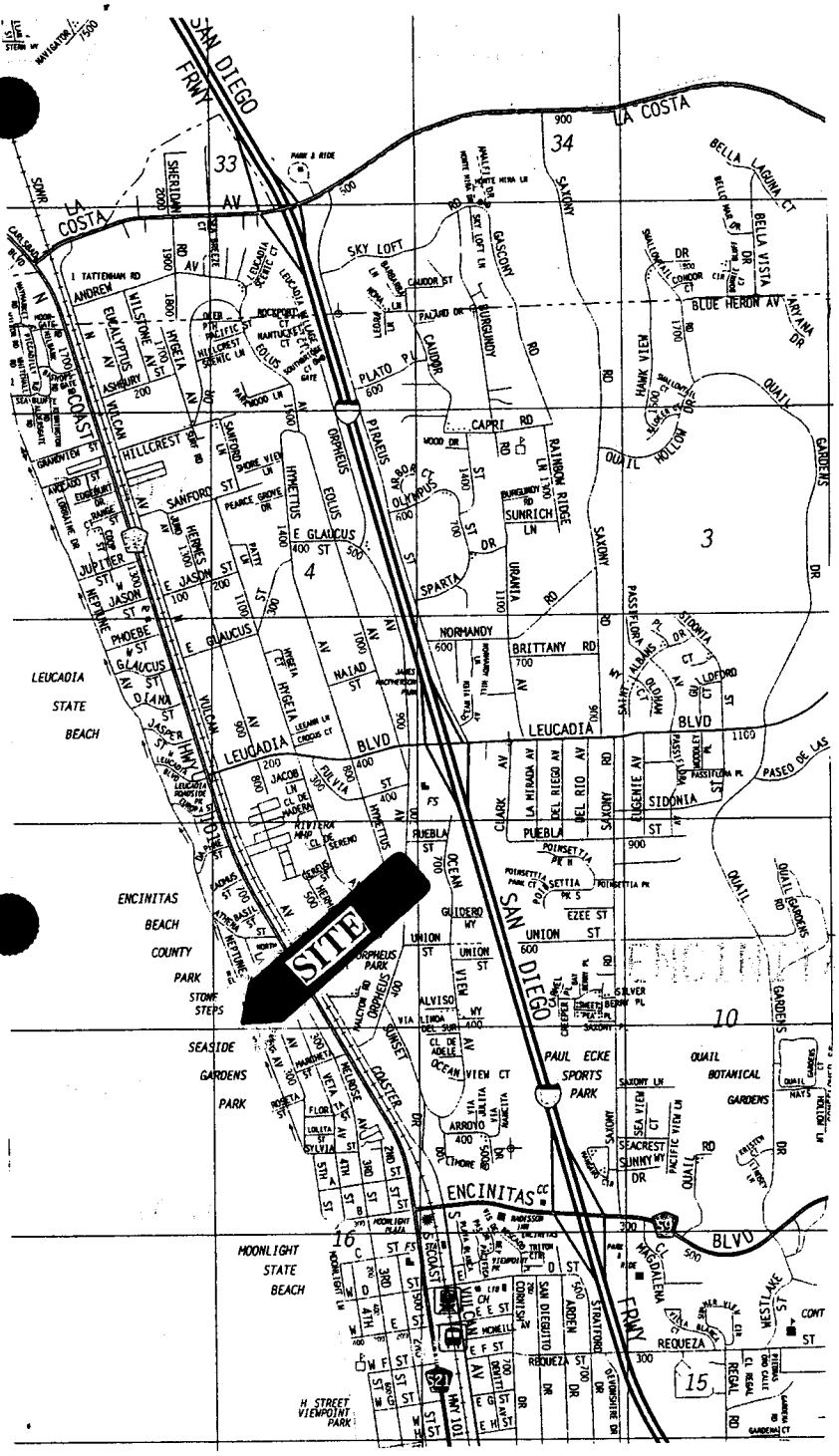
4. Consistency With the California Environmental Quality Act (CEQA). Section 13096 of the Commission's Code of Regulations requires Commission approval of Coastal Development Permits to be supported by a finding showing the permit, to be

consistent with any applicable requirements of the California Environmental Quality Act (CEQA). Section 21080.5(d)(2)(A) of CEQA prohibits a proposed development from being approved if there are feasible alternatives or feasible mitigation measures available which would substantially lessen any significant adverse effect which the activity may have on the environment.

As previously stated and incorporated herein by reference, the proposed development would result in adverse impacts to coastal resources by altering and depleting shoreline sand supply, decreasing geologic stability and reducing visual quality of a scenic beach area. There are feasible alternatives available which would have substantially less significant environmental effects than the proposed seawall.

These feasible alternatives include the no project alternative which would allow the natural process of bluff erosion to continue; reducing erosion at the top of the bluff by assuring all drainage is directed away from the bluff edge; removing any existing permanent irrigation within the geologic setback area; installation of a means of reducing groundwater from reaching the bluff face; underpinning the residences; removing accessory structures; and other non-structural means to increase stability of the residence and the site and assure continued security for the residences from potential bluff erosion/failure. Therefore, as currently proposed, the Commission finds the proposed project is not the least environmentally damaging feasible alternative.

(G:\San Diego\Reports\2001\6-01-159 Dunham, Hunefeld Final stfrpt.doc)



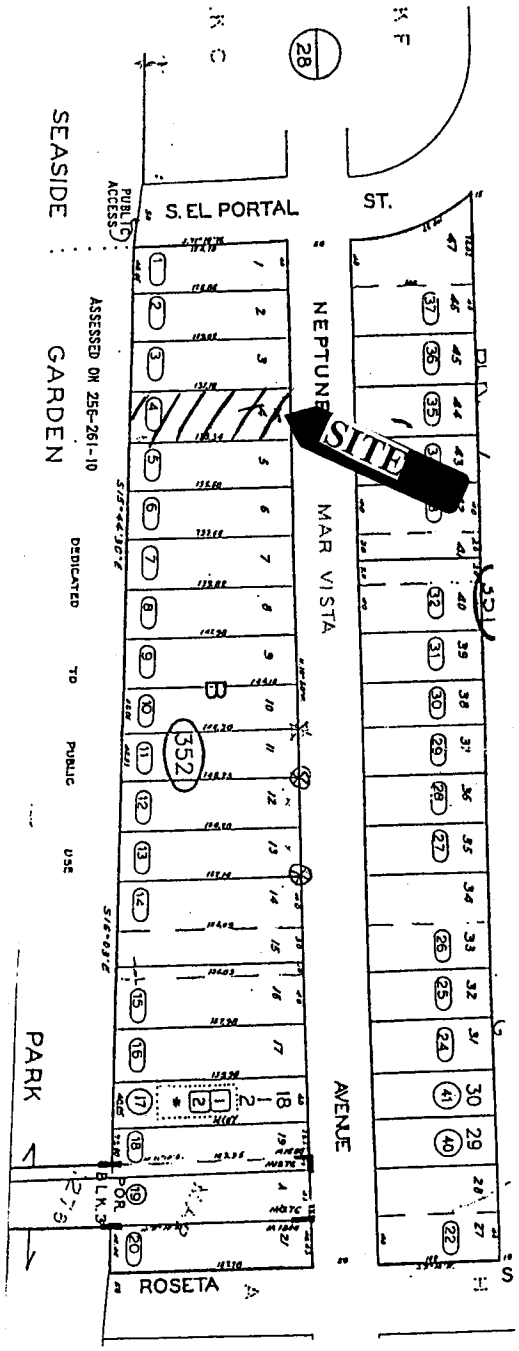


EXHIBIT NO. 1
APPLICATION NO.
6-01-159
Location Map

California Coastal Commission

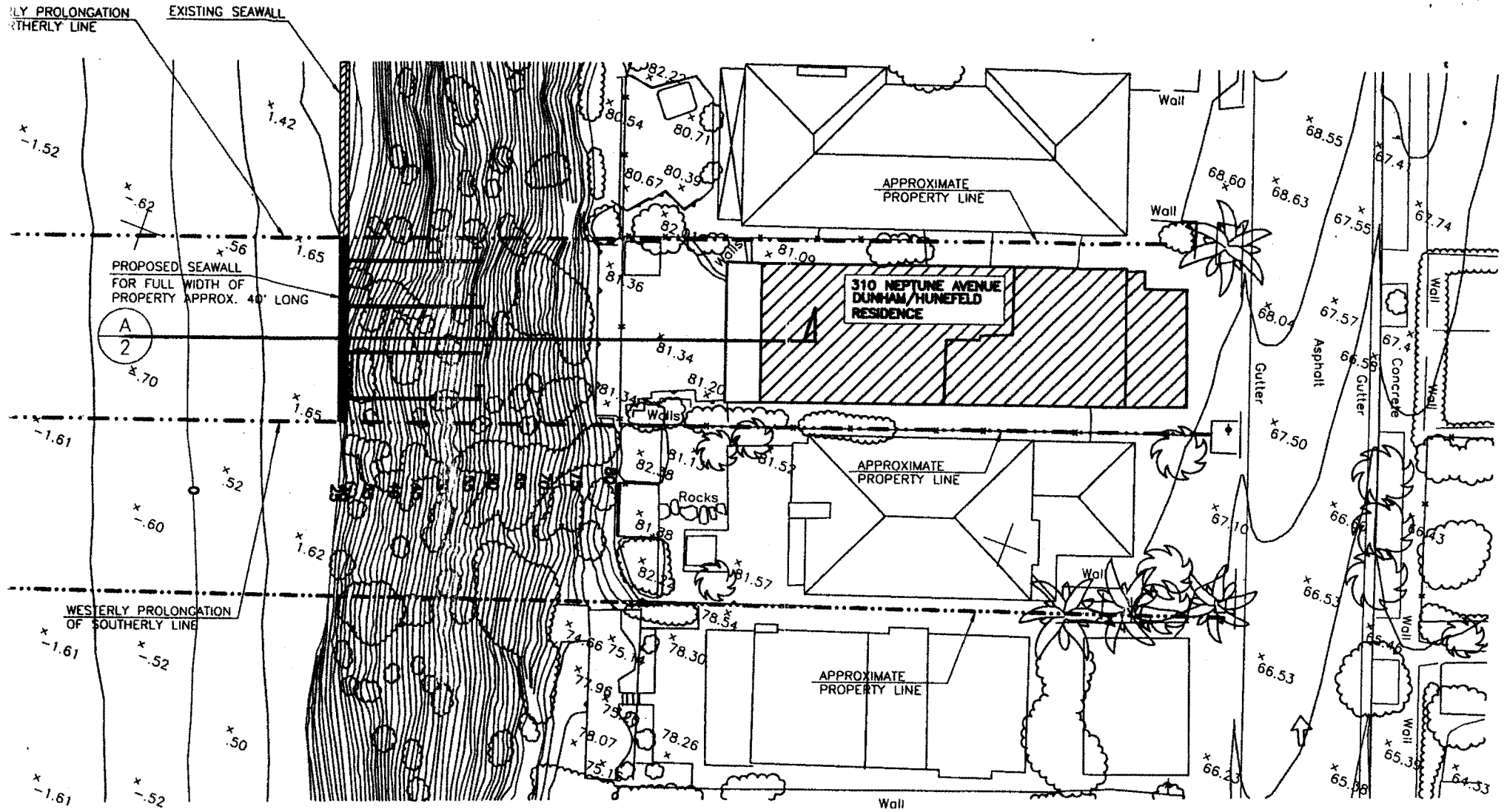


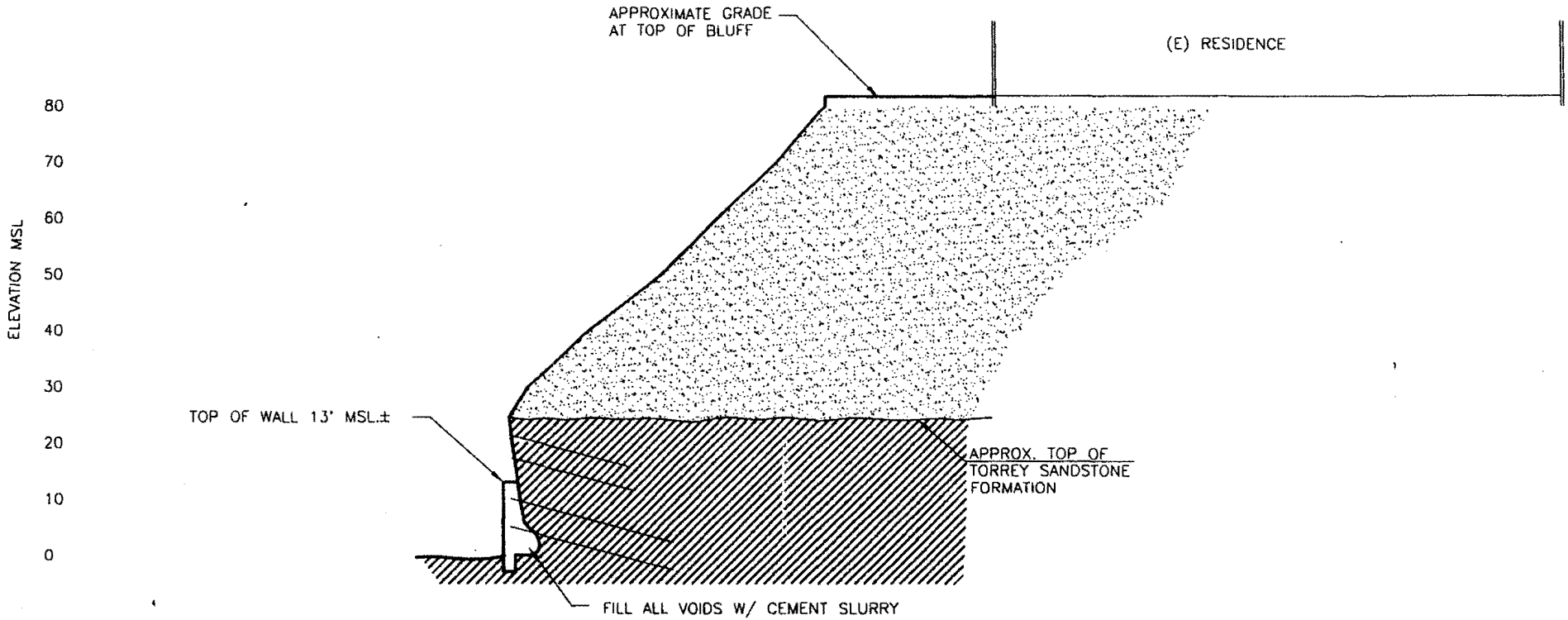
EXHIBIT NO. 2
APPLICATION NO.
6-01-159
Plot Plan
California Coastal Commission

20 0 20 40 60 FEET

TOPOGRAPHIC MAP OF
NEPTUNE AVENUE, LEUCADIA
FOR
SOIL ENGINEERING CONSTRUCTION, INC.

Towill, inc.
5933 SEA LION PLACE, SUITE 100 CARLSBAD, CA 92008

SCALE 1" = 20'	CONTOUR INTERVAL 1 FT.		
DATE OF PHOTOGRAPHY	JOB NO.	SHEET	OF
FEBRUARY 2, 2000	7470-600	1	1



PROFILE SECTION A/2

SCALE: 1"=20'

EXHIBIT NO. 3
APPLICATION NO.
6-01-159
Profile

California Coastal Commission

STATE OF CALIFORNIA – THE RESOURCES AGENCY GRAY DAVIS, GOVERNOR

CALIFORNIA COASTAL COMMISSION
45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105-2219
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RECEIVED
MAY 14 2001
CALIFORNIA
COASTAL COMMISSION
SAN DIEGO COAST DISTRICT

7 May 2000

GEOTECHNICAL REVIEW MEMORANDUM

To: Gary Cannon, Coastal Program Analyst
From: Mark Johnsson, Senior Geologist
Re: CDP applications 6-01-052 (Dunham/Hunefield) and 6-01-053 (Taylor/Harper)

In reference to the above seawall applications, I have reviewed the following documents:

1) Soils Engineering Construction, Inc, 2000, "Repairs to Lower Bluff, 310 Neptune Avenue, Encinitas, California" 3 sheet set of site plans and engineering drawings, signed by R.D. Mahony (CG 16459 GE 554) and dated 28 February 2000.
2) Soils Engineering Construction, Inc, 2000, "Preliminary geotechnical evaluation/request for emergency processing, proposed lower bluff seawall, Dunham/Hunefield residence, 308-310 Neptune Avenue, Encinitas, California", 8 page preliminary geotechnical report signed by J.W. Niven (RCE 57517), and R.D. Mahony (CEG 847 GE 554), and dated 17 March 2000.
3) Soils Engineering Construction, Inc, 2000, "Findings for section 30.34.020 B9, C & D of the municipal code, Dunham/Hunefield Residence, 308-310 Neptune Avenue, Encinitas, California" 6 page geotechnical findings signed by R.D. Mahony (CEG 847 GE 554), and J.W. Niven (RCE 57517), and dated 12 April 2000.

4) Soils Engineering Construction, Inc, 2000, "Repairs to Lower Bluff, 252 and 258 Neptune Avenue, Encinitas, California" 3 sheet set of site plans and engineering drawings, signed by R.D.Mahoney (CG 16459 GE 554) and dated 28 March 2000
5) Soils Engineering Construction, Inc, 2000, "Preliminary geotechnical evaluation/request for emergency processing, proposed lower bluff seawall, Taylor and Harper residences, 252-258 Neptune Avenue, Encinitas, California," 8 page preliminary geotechnical report signed by J.W. Niven (RCE 57517), and R.D. Mahony (CEG 847 GE 554), and dated 7 April 2000.
6) Soils Engineering Construction, Inc, 2000, "Findings for section 30.34.020 B9, C & D of the municipal code, Taylor and Harper Residences, 252 and 258 Neptune Avenue, Encinitas, California", 6 page geotechnical findings signed by R.D. Mahony (CEG 847 GE 554), and J.W. Niven (RCE 57517), and dated 12 April 2000.

EXHIBIT NO. 4
APPLICATION NO.
6-01-159
Geotechnical Review by Commission Geologist dated 5/7/00
Page 1 of 3
California Coastal Commission

These are the same documents that I reviewed last year in reference to emergency permit requests for the identical proposed projects (those requests were denied). In addition, I have seen the city staff reports, and I have visited the sites on several occasions (from the base of bluff only).

Since these two projects are substantially similar (very similar site geology, similar site geometry, similar proposed structures designed by the same engineering firm), I will combine my comments on both projects, only drawing distinctions where necessary.

First, I note that the geotechnical investigations undertaken are only preliminary in nature, and do not contain the full level of investigation usually expected for substantial development. In particular, they do not contain shear test data to support the soil/rock strength parameters adopted in the slope stability calculations, they do not contain site-specific estimates of erosion rate, and the reference (5) does not contain any data from on-site borings. Nevertheless, the values adopted for soil/rock strength parameters (friction angle and cohesion) are reasonable, and within our experience for analogous geologic materials from adjacent sites. An appropriate erosion rate will be necessary when calculating a sand mitigation fee; I am available for discussion of an appropriate rate if and when these calculations are undertaken.

The slope stability analyses at both sites appear to adequately address one type of slope failure. The analyses have been constrained to test for the stability of failure of the entire bluff, with a failure plane extending through the Torey sandstone, uninterrupted through the overlying terrace deposits, and culminating in a headscarp within the foundation envelopes of buildings at the top of the bluff. At both sites, such a failure surface shows a rather low factor of safety (1.1 to 1.2 static, 0.8 during earthquake loading). I note that the pseudostatic analysis undertaken to test for failure during earthquake loading uses a horizontal ground acceleration of 0.2g; it is currently our practice to request analyses using ground accelerations of 0.15g unless there are compelling extenuating circumstances.

These slope stability analyses do not, however, test for the stability of the upper bluff. Nor do they address the actual mechanism of bluff failure more common on these seacliffs: the block failure of the undercut lower seacliff (in the competent Torey sandstone), resulting in loss of support to the overlying terrace deposits, which then fail by surface slumping. The difference is important because, regardless of the low global factor of safety, if the episodic block fall/upper bluff slumping has a lower factor of safety, then the latter mechanism will be the means of bluff retreat. Surficial slumping of the terrace deposits will not place the homes, set back between ~20 and ~30 feet, in imminent danger. Further, I note that on the site plans the current upper bluff slope is a rather moderate 42 degrees; this is not far from the expected angle of repose of these deposits, which should be somewhat steeper than 37 degrees (37 degrees is the reported friction angle; since there is some cohesion in these deposits, the angle of repose is steeper than the friction angle). Thus, without block fall collapse of the lower bluff, only modest erosion by surficial processes should be expected in the upper bluff.

Clearly, continued undercutting of the lower bluff will eventually lead to such block failure, and surficial slumping of the upper terrace deposits. These collapses will, ultimately, threaten the residences at the top of the bluff. It is my opinion that the residences will not be threatened in the

immediate future (2 to 4 years), our usual standard for granting seawall permits. However, predicting geologic events into the future is uncertain, and the residences certainly could be threatened sooner, especially if we experience unusually stormy winters in the next few years.

Additional information could change these conclusions. Information that is missing from this application, and would aid in more fully evaluating the hazard at the sites include:

1) A discussion of the mechanism of bluff failure at these sites.
2) A discussion, supported by quantitative slope stability calculations, of the stability of the upper bluffs.
3) A discussion of the role of ground water and surface drainage in surficial and deep-seated instability at the site
4) Better documentation of shear strength parameters for the Torey Sandstone and the terrace deposits.
5) Clarification of the line of cross section in reference (4)—since both sections marked on the plan are labeled "A2," it is difficult to say with certainty which line is used for the section.
6) Clarification of the actual principal structure at 258 Neptune Avenue (reference 4). Is the outlined area west of the hatchured area an enclosed, principal structure (in which case the setback from the bluff top is ~30 feet) or is it only a deck or patio (in which the setback of the principal structure is over 60 feet).

Finally, I note that there appears to be adequate room on the lot at 252 Neptune Avenue to move the small structure eastward, away from the bluff. This alternative should be thoroughly investigated. In addition, the upper rows of tiebacks above the proposed seawalls are identified as "temporary," and for worker safety during construction of the seawalls. Their force is not included in the slope stability calculations. Accordingly, if a permit is granted, I recommend that it be conditioned for the removal of the temporary tiebacks, at least for their unbonded length, immediately following construction of the seawalls.

I hope that this review is helpful. Please do not hesitate to contact me with any questions you may have.

Sincerely,

Mark Johnsson
Senior Geologist

STATE OF CALIFORNIA—THE RESOURCES AGENCY GRAY DAVIS, GOVERNOR

CALIFORNIA COASTAL COMMISSION
45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105-2219
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FAX (415) 904-5400

23 July 2001

GEOTECHNICAL REVIEW MEMORANDUM

To: Gary Cannon, Coastal Program Analyst
From: Mark Johnsson, Senior Geologist
Re: CDP applications 6-01-052 (Dunham/Hunefield) and 6-01-053 (Taylor/Harper)

In reference to the above applications, I have completed my review of the following document:

> Soil Engineering Construction 2001, "Responses to geotechnical review memorandum, Coastal Development Permit #6-01-052/Dunham/Hunefield and #6-01-053/Taylor/Harper", 5 p. geotechnical letter report dated 18 June 2001 and signed by J. W. Niven (PE C57517) and R. D. Mahony (GE 554).

This document was in response to my memo of 7 May 2000 in which I reviewed a number of other geotechnical reports related to the proposed construction of two seawalls in Encinitas. In preparing this memo I have re-examined the documents listed in my 7 May memo, and visited the sites, which I viewed from the beach. Since these two projects are substantially similar (very similar site geology, similar site geometry, similar proposed structures designed by the same engineering firm), I will combine my comments on both projects, only drawing distinctions where necessary.

As expressed in my 7 May 2000 memo, I was concerned that the low global factor of safety given for the reflected an unrealistic failure mechanism. As I expressed in that memo:

> The analyses have been constrained to test for the stability of failure of the entire bluff, with a failure plane extending through the Torrey sandstone, uninterrupted through the overlying terrace deposits, and culminating in a headscarp within the foundation envelopes of buildings at the top of the bluff. At both sites, such a failure surface shows a rather low factor of safety (1.1 to 1.2 static, 0.8 during earthquake loading).

I have since modeled the stability of the bluff myself, using the more overhanging of the two bluff geometries (below 310 Neptune Avenue) as provided in figure 3 of the document referenced above. Although I used the same input parameters (unit weight, cohesion, friction

EXHIBIT NO. 5
APPLICATION NO. 6-01-159
Geotechnical Review by Commission Geologist dated 7/23/01

angle) and similar analysis methods as in the 17 March 2000 and 7 April 2000 Soil Engineering Construction reports, I was unable to reproduce the reported low factors of safety for the overall stability of bluff. My analysis showed a static factor of safety of 1.400 using the Bishop method, and 1.398 using the mathematically more rigorous Morgenstern-Price method (see attached figures). Although these figures are below the figure of 1.5 generally required for new construction, they do show that the bluff is not in imminent danger of failure through a mechanism involving collapse of the entire bluff along a failure plane extending uninterrupted through the Torrey sandstone and the overlying terrace deposits.

In any case, as acknowledged in the 18 June 2001 report referenced above, this mechanism of failure has not been observed in Encinitas or Solana Beach on bluffs made up of Torrey Sandstone and overlying marine terrace deposits. The typical failure mechanism for these bluffs is block fall in the lower bluff (Torrey Sandstone), which is commonly oversteepened or overhanging due to marine erosion. The unsupported upper bluff then eventually fails, leading to retreat of the bluff edge. It is retreat of the upper bluff that ultimately threatens structures at the top of the bluff.

In response to my request, the 18 June 2001 report presents an analysis of the stability of the upper bluff at both sites. The analysis resulted in a calculated factor of safety of 1.38 (static) at both sites, demonstrating that the upper bluffs are not in imminent danger of failure. This is consistent with the slope of the upper bluff at both locations, which is approximately 42 degrees and not appreciably steeper than the angle of repose of this material.

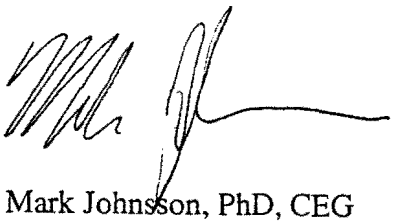
If the lower bluff were to fail, the stability of the upper bluff would be much reduced. Slumping would be expected, which would migrate landward following a mechanism similar to that outlined in figure 1 of the 18 June 2001 report cited above. Since the upper bluffs at these sites are very nearly at their expected angle of repose, the edge of the upper bluff would ultimately migrate landward an amount approximately equal to the landward extent of the lower bluff failure. Given that the lower bluff overhang is 7 to 10 feet; 7 to 10 feet of landward migration of the upper bluff might occur. This migration would probably not be instantaneous, and would likely occur in stages following collapse of the lower bluff. In any case, the structures, set back between 20 and 30 feet from the current bluff edge, would not be imminently threatened.

Accordingly, given that section 30235 of the Coastal Act requires the Commission to approve seawalls only "when required to serve coastal dependent uses or to protect existing structures or public beaches in danger from erosion" it is my opinion that the Commission is not required to permit the proposed seawalls at this time.

No appreciable change in the geometry of the lower bluff has been demonstrated at either site, however, over the roughly 16 months since the initial geotechnical reports were prepared. Nevertheless, I concur that a collapse of the lower bluff at 310 Neptune may be imminent. The bluff at that site is severely overhanging, and exhibits fractures along which a block failure could occur. This site is very similar in geometry and geology to that at the site of the January 2000 bluff collapse which killed a woman on the beach. Accordingly, the overhanging bluff does present a very real hazard; but the immediate hazard is to the beach-going public, not to the

structure at the top of the bluff. I recommend that the danger be acknowledged by signage on the beach.

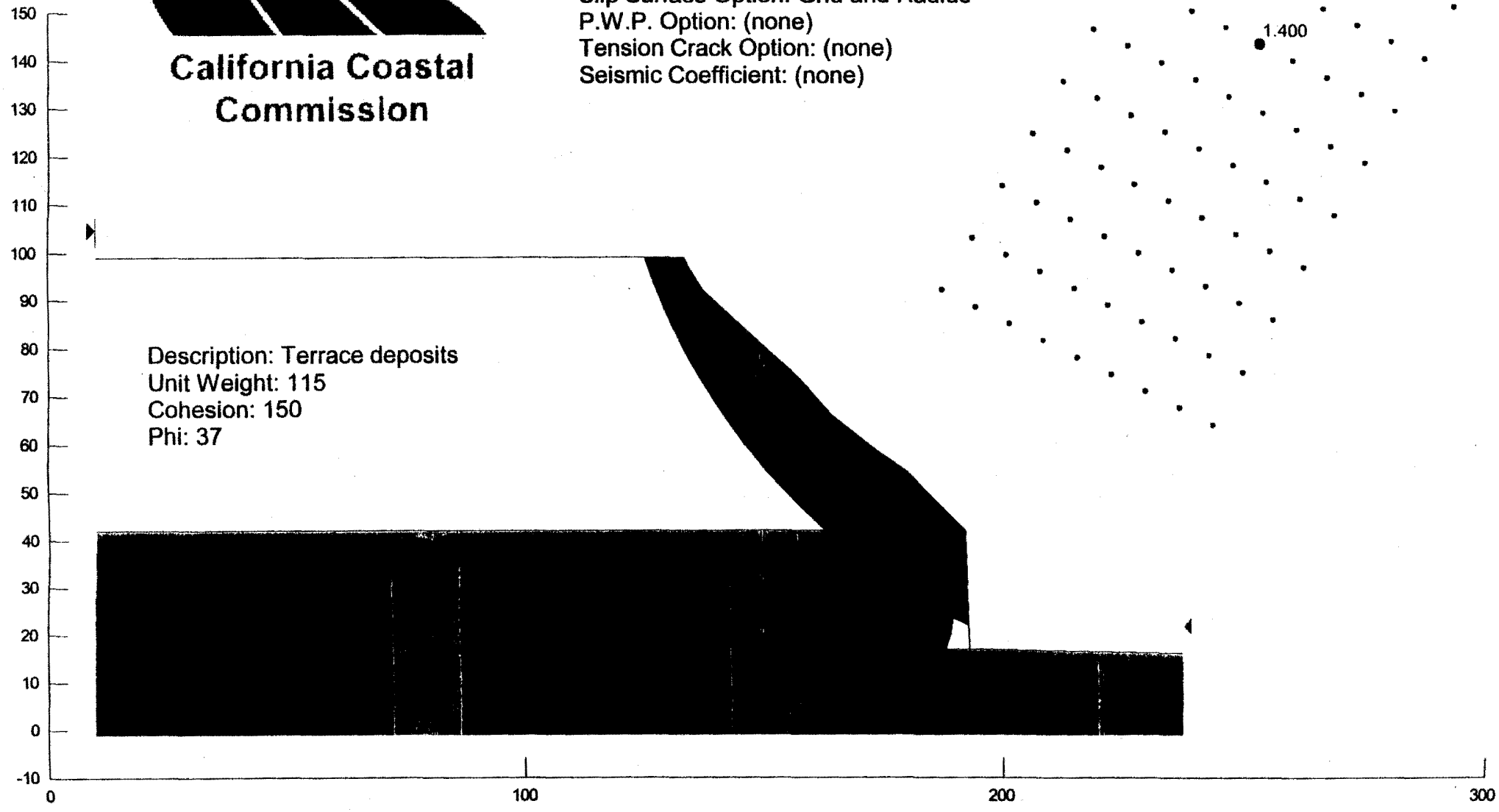
Sincerely,

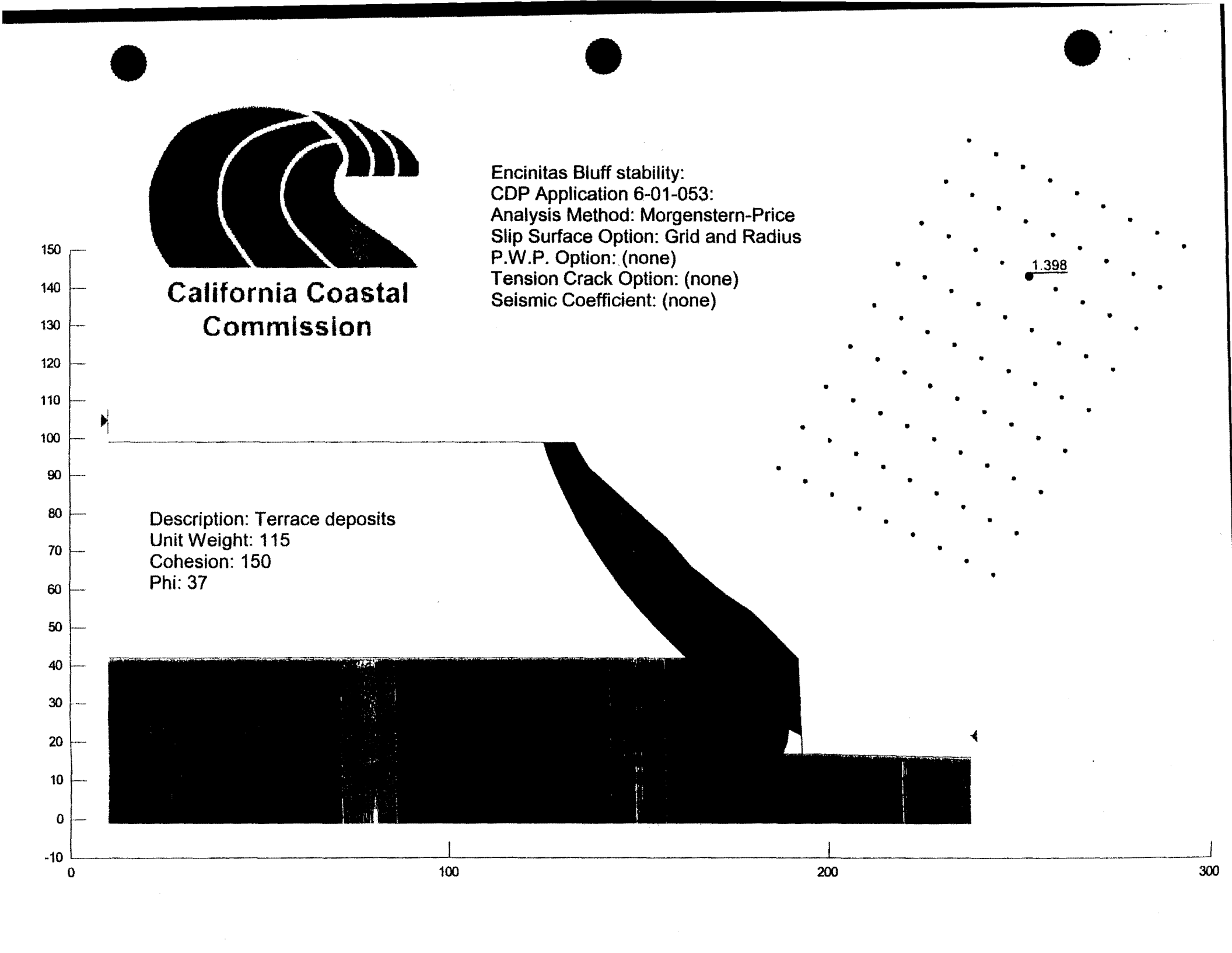


Mark Johnsson, PhD, CEG
Senior Geologist

California Coastal Commission

Encinitas Bluff stability:
CDP Application 6-01-053:
Analysis Method: Bishop
Slip Surface Option: Grid and Radius
P.W.P. Option: (none)
Tension Crack Option: (none)
Seismic Coefficient: (none)




California Coastal Commission
Encinitas Bluff stability:
CDP Application 6-01-053:
Analysis Method: Morgenstern-Price
Slip Surface Option: Grid and Radius
P.W.P. Option: (none)
Tension Crack Option: (none)
Seismic Coefficient: (none)
1.398
Description: Terrace deposits
Unit Weight: 115
Cohesion: 150
Phi: 37
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
0
100
200
300

STATE OF CALIFORNIA— THE RESOURCES AGENCY GRAY DAVIS, GOVERNOR

CALIFORNIA COASTAL COMMISSION

45 FREMONT, SUITE 2000
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FAX (415) 904- 5400

11 December 2001

GEOTECHNICAL REVIEW MEMORANDUM

To: Gary Cannon, Coastal Program Analyst
From: Mark Johnsson, Senior Geologist
Re: CDP applications 6-01-159 (Dunham/Hunefield) and 6-01-160 (Taylor/Harper)

In reference to the above applications, I have reviewed the "results of slope stability calculations for a 'slab' type failure" faxed to me by John Niven.

I have checked the calculations, and they do, indeed, indicate that one of the hypothetical failure surfaces examined produces a static factor of safety of only 1.17. I note that these calculations are based on the Ordinary Method of Slices (OMS) method of slope stability calculation.

There are many means of performing slope stability calculations. Most methods divide a cross-sectional view of the bluff into a number of slices lying above a hypothetical slide plane. The driving force (the component of the slice's weight that is oriented parallel to the slide plane) of all of the slices are summed, and divided by the sum of all of the slice's resisting forces (which is a function of the strengths of the soil or rock at the base of the slice). The result is the factor of safety.

An important difference between the various methods of computing factors of safety is how they handle forces between slices. Because no slices exist in reality—they are only computational constructs—it is very important that forces be smoothly handed off between slices in order to accurately model the natural continuum of forces acting on the bluff. For example, Bishop's Simplifed method balances interslice forces with respect to moment equilibria, whereas Janbu's Simplified method balances on the basis of force equilibria. Computationally more intensive methods, such as Spencer's, Morgenstern-Price, and the Generalized Limit Equilibria methods, balance interslice forces with respect to both moment and force equilibria.

The OMS method, in contrast, ignores interslice forces entirely—its fundamental underlying assumption is that there are *no* interslice forces. Consequently, it is well-established that this method produces overly conservative (i.e., low factor of safety) results. Most textbooks introduce the concept of slope stability analyses using the computationally simple OMS method, but then caution against it's use. For example, Coduto (1999) writes:

EXHIBIT NO. 6
APPLICATION NO.
6-01-159
Geotechnical Review by Commission Geologist dated 12/11/01
Page 1 of 3

> The simplifying assumption in the ordinary method of slices reduces the problem to one that is both statistically determinate and suitable for hand calculations. Nevertheless, we need to ask "how valid is this assumption?"
>
> If we consider a typical slice...the resultant of the shear and normal forces on the [downhill side] is really larger than that on the [uphill side], and thus contributes to the normal force, *N*. However, the OMS ignores this contribution and computers *N* based only on the weight of the slice. This produces an *N* value that is too low, an *s* value that is too low, and therefore an *F* [factor of safety] that is too low. Thus, the OMS is conservative.
>
> This conservatism is most pronounced when α is large. For shallow circles, the computed factor of safety is generally no more than 20 percent less than the "correct" value, but deep, small radius circles that extend well below the groundwater table have much more error, sometimes producing computed *F* values as much as 50 percent too low (Wright, 1985).

I note that the slope angle, α, in the current example is 42 to 47 degrees—a very large value. Using the slice weights, lengths, and slope angles presented in John Niven's analysis, and using the same cohesion, friction angle, and unit weights as in SEC's original submittal, I recalculated the factor of safety along the more critical of the two hypothetical surfaces evaluated by Mr. Niven using the Modified Bishop's Method. This method must be solved iteratively, since *F* (the factor of safety) appears on both sides of the governing equation. One first assumes a value for *F*, then computes a new value. This new value is then used to calculate a second new value. The process is repeated until the estimated and computed values "converge," or are essentially equal. The results of my calculations are attached to this memo, starting with the value of *F* calculated by the OMS (1.17), the resultant factor of safety converges at 1.32. This value is somewhat lower than the value of 1.40 that I calculated using Bishop's method and the computer program Slope/W (see my memo of 23 July 2001). The difference likely lies in the rather crude analysis performed here: only 3 slices were effectively used in the hand calculation (my previous analysis used 30 slices), the failure surface is assumed to be made up of only two planes (the other analysis used numerous failure surfaces to model a curved failure surface), identical unit weights are assumed for each material making up the bluff (in reality the Torrey sandstone is more dense than the marine terrace deposits), and it appears that the thicknesses of the two rock/soil units are somewhat different in the two analysis.

Whatever the factor of safety for such a deep-seated landslide, if the factor of safety for a block fall along fractures or new failure planes oriented parallel to the bluff face is lower, then that mechanism of bluff collapse will occur rather than the deep-seated landslide. Although the current state-of-the-art does not allow us to calculate the factor of safety for block falls such as this, the fact that block falls are common occurrences in the Torrey Sandstone whereas deep-seated landslides are not, suggests that block falls are the dominant failure mechanism of these cliffs.

In summary, the slope stability analyses do not indicate that bluff collapse through a deep-seated landslide through the Torrey Sandstone at the base of the bluff is imminent. The geometry of these bluffs, particularly that at the more northern site (Dunham/Hunefield; the site modeled here) does suggest that a block fall is likely in the near future. However, as explained in my previous memos, such a failure would not place the structures at the top of the bluff in danger for some time—probably many years. Accordingly, the proposed seawalls must be considered preventative in nature, and are not needed at this time to assure the stability of the structures at the top of the bluff.

Finally, it is important to note that most of the discussion of slope stability that has ensued between the applicant's consultants and Coastal Commission staff has focused on a single cross-section, and it is assumed that the bluff at this site is the most critical of the four properties under discussion. This cross section is of the bluff at 310 Neptune Avenue. The geometries of the lower bluffs as depicted in the cross sections provided in SEC geological reports dated 17 March 2000 (for 308-310 Neptune avenue) and 7 April 2000 (for 252-258 Neptune Avenue) appear to be identical or nearly so. In fact, it appears that the bluff at the more southern site (252-258 Neptune) is considerably less undercut and overhanging than the bluff at 310 Neptune.

It is undoubtedly true that continued marine and subaerial erosion will, eventually, threaten these structures. The types of seawalls that are being proposed are the type of structure that could probably be approved under section 30235 of the Coastal Act. However, it is my opinion that there is a sufficient window of time to work towards a more comprehensive solution to armoring this section of the Encinitas shoreline.

I hope that this review is helpful. Please do not hesitate to contact me if you have further questions.

Sincerely,

Mark Johnsson, Ph.D., CEG

Reference cited:

Coduto, D. P., 1999, Geotechnical Engineering: Principles and practices: Upper Saddle River, New Jersey, Simon and Schuster, 759 p.

GC

18 February, 2002

California Coastal Commission
San Diego Region
San Diego, California

Re: Application No 6-01-159
Application No 6-01-160

Dear Commissioners,

As these two applications are similar in asking for a wall to fill an undercut, I would like to make this observation to both.

Last year, 2001, our coastline of San Diego County received approximately 17 million dollars of sand to our beaches. Oceanside and Carlsbad received a big portion of this. If the normal drift of sand takes place, both Encinitas and the Solana beaches will be enhanced. This will help prevent the undercutting of the bluffs. I ask that we wait and see that the beach build up with new sand prevents more undercutting.

Sincerely,

Roy E. Warden

Roy E. Warden

24 February, 2002

California Coastal Commission
San Diego Area
7575 Metropolitan Drive, Suite 103
San Diego, CA 92108-4402

Re: March, 2002 Agenda Item Tu 10d
Application No. 6-01-159

CalBeach Advocates supports staff's recommendation to DENY the proposed seawall construction on the public beach below 308/310 Neptune Avenue in Encinitas, California.

Hardened structures on an eroding coastline like San Diego have serious adverse impacts. They should only be allowed when no other alternatives exist and the threatened home existed at the time the Coastal Act was enacted. The "existing structure" clause was added to the Coastal Act to "grandfather" then existing homes.

In the current case, the existing duplex was constructed prior to Coastal Act implementation. However, the structure is no in imminent danger according to the Commission's expert staff. Further, staff has identified several feasible alternatives.

Sincerely,

Sheelagh Williams
President, CalBeach Advocates
A Non-Profit Organization