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STATE OF CALIFORNIA - THE RESOURCES AGENCY PETE WILSON, *Governor*

CALIFORNIA COASTAL COMMISSION
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W13C

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Hearing Date: 4/7-10/98
Commission Action:

STAFF REPORT: REGULAR CALENDAR

APPLICATION NO.: 3-97-65

APPLICANT: Adrian Motroni/ Aileen Bardwell
AGENT: Soil Engineering Construction, Inc., Michelle Pipitone

PROJECT LOCATION: 106 Grove Lane, APN 036-161-12.
108 Grove Lane, APN 036-161-03.
Capitola, Santa Cruz County

PROJECT DESCRIPTION: Shotcrete erosion control seawall, approximately 15 ft. high by 150 ft. long. See detailed description in Finding 1.

Lot area:
- 18,000 sq.ft. - Bardwell, APN 36-161-12, 106 Grove Lane (Antigua Apartments)
- 7,500 sq.ft. - Motroni, APN 36-161-03, 108 Grove Lane

Zoning District: Automatic Review/Multi-Family Residential/Low Medium

Land Use Plan Designation: Residential-Medium Density

APPROVALS RECEIVED: City of Capitola Conditional Use Permit and Coastal Permit AS/CUP/CP/97-73 11/6/97; CEQA - Mitigated Negative Declaration 11/6/97

APPROVALS PENDING: Monterey Bay National Marine Sanctuary; Regional Water Quality Control Board Waste Discharge Permit or Waiver; U. S. Army Corps of Engineers Section 404 or Nationwide Permit, Department of Parks and Recreation approval for access and staging on Parks property.

SUBSTANTIVE FILE DOCUMENTS: City of Capitola certified Local Coastal Program, April 1990; U. S. Army Corps of Engineers, Santa Cruz Harbor and Vicinity Shoaling Reconnaissance Report, January 1994; Site Evaluation of Cliff Erosion for Stan Webb, 110 Grove Lane, Purcell, Rhoades & Associates, July 1985; A Geotechnical Site Update for 106 and 108 Grove Lane, Purcell, Rhoades and Associates, July 24, 1997; Grove Lane Engineering Calculations, Soil Engineering

Consultants, March 17, 1997.

SUMMARY OF STAFF RECOMMENDATION:

The staff recommends that the Commission **approve with conditions** the proposed seawall. The following chart provides a brief synopsis of the staff recommendation.

Coastal Act Policy/CEQA	Recommended Findings (Finding Number)	Recommended Conditions. (Condition Number)
CA 30235: Shoreline protective works allowed when required to protect existing structures in danger from erosion. **CEQA 21080.5(d)(2)(i):** Development allowed when no feasible less environmentally damaging alternative is available.	Current Motroni setback 22 feet. Current Bardwell setback 18 feet. Bluff is eroding ± 1 ft/yr. Erosion episodic. Existing structures are in danger from erosion. (1, 2, 3) No feasible alternatives to seawall structure. Sand replenishment for structure protection and relocation infeasible. Relocation not feasible.(4)	Submit final plans (1.A) consistent with geotechnical recommendations and requirements of USACOE (4.B),. MBNMS (4.C), RWQCB (1.C) and City of Capitola. (4.A.)
Section 30235: Projects must be designed to eliminate or mitigate impacts on shoreline sand supply.	Project designed against bluff to minimize impact; tapering into existing upcoast seawall and into natural bluff downcoast. (2) However, quantifiable impacts to sand supply not mitigated.(4)	• Submit final plans(1.A) consistent with geotechnical recommendations and requirements of USACOE (4.B), MBNMS (4.C), RWQCB (1.C) and City of Capitola (4.A). • Deed restriction for monitoring and maintenance (1.E.) • Final engineering report at project completion. (3) • Deed restriction for waiver of liability. (6.) • In-lieu Impact Mitigation Fee Required (7)
Section 30253: Minimize risks, assure structural stability, do not contribute to erosion.	• Located on eroding bluff subject to wave action. • Designed for structural stability. • Liability responsibility is not the Commissions. (5)	
Section 30210-14: Protect and maximize public access.	• Located on public trust lands. • Impacts to sand supply not mitigated • Vertical design with minimal direct encroachment (8 inches). • Must access, stage and construct from State Parks Beach. State Parks to manage time and location. (8)	• Submit State Lands General Lease (1.D.) • Submit State Parks approval and conditions.(1.B.) • In-lieu Impact Mitigation Fee Required to mitigate impacts to sandy beach for public access and recreation (7)
Section 30230-31: Protect biological productivity and quality of coastal waters with special protection for areas of special biological significance.	Contiguous with MBNMS. Construction could impact water quality of marine environment.(6)	Submit evidence of MBNMS approval. (4.C.) Submit RWQCB permit or waiver. (1.C) Construction monitoring required to assure debris etc.does not enter water. (2)
Section 30244: Reasonable mitigation for adverse impacts on paleontological resources.	Located in sensitive paleontological area. No survey done. (8)	Submit survey and mitigation as required by State Historic Preservation Office standards. (5).

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Exhibits

STAFF RECOMMENDATION:

The staff recommends that the Commission adopt the following resolution:

I. Approval with Conditions.

The Commission hereby grants a permit, subject to the conditions below, for the proposed development on the grounds that the development will be in conformity with the provisions of Chapter 3 of the California Coastal Act of 1976, will not prejudice the ability of the local government having jurisdiction over the area to prepare a Local Coastal Program conforming to the provisions of Chapter 3 of the Coastal Act, is located between the sea and the first public road nearest the shoreline and is in conformance with the public access and public recreation policies of Chapter 3 of the Coastal Act, and will not have any significant adverse impacts on the environment within the meaning of the California Environmental Quality Act.

II. Standard Conditions

1. Notice of Receipt and acknowledgment. The permit is not valid and development shall not commence until a copy of the permit, signed by the permittee or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.

2. Expiration. If development has not commenced, the permit will expire two years from the date this permit is reported to the Commission. Development shall be pursued in a diligent manner and completed in a reasonable period of time. Application for extension of the permit must be made prior to the expiration date.

3. Compliance. All development must occur in strict compliance with the proposal as set forth in the application for the permit, subject to any special conditions set forth below. Any deviation from the approved plans must be reviewed and approved by the staff and may require Commission approval.

4. Interpretation. Any questions of intent or interpretation of any conditions will be resolved by the Executive Director or the Commission.

5. Inspections. The Commission staff shall be allowed to inspect the site and the project during its development, subject to 24 hour advance notice.

6. Assignment. The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.

7. Terms and Conditions Run with the Land. These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittee to bind all future owners and possessors of the subject property to the terms and conditions.

III. Special Conditions.

1. PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the permittee shall submit to the Executive Director for review and approval:

A. Final Plans: Final plans for the seawall shall include bluff top drainage/erosion control plans. Only native plant species shall be incorporated into the erosion control plans. Construction specifications shall include protection of rebar from marine exposure. The final plans shall incorporate the recommendations of the Purcell, Rhoades and Associates, Geotechnical Site Evaluation Update for 106 and 108 Grove Lane, Capitola, CA, July 24, 1997. Any recommendations made by the Monterey Bay National Marine Sanctuary, Regional Water Quality Control Board and City of Capitola, and conditions of this coastal development permit shall supersede recommendations of the Purcell, Rhoades and Associates Update.

The final plans shall include identification of the staging area, equipment, method of access and operations. If the project is to be staged on the bluff top, legal evidence of property owners' permission (SPRR et al.) to access and operate from the site shall be submitted.

B. State Department of Parks and Recreation. Written evidence that the State Department of Parks and Recreation has approved equipment access and a staging area on State Parks property for construction of the seawall. All State Parks requirements shall be conditions of this permit.

C. Regional Water Quality Control Board Approval: Written evidence from the Regional Water Quality Control Board that the proposed project has a water quality certification or waiver thereof under Section 401 of the Clean Water Act.

D. State Lands Commission: A copy of the State Lands General Lease or other documentation which provides for the project to proceed without prejudice to the completion of the lease. A copy of the lease shall be forwarded for the Commission's record upon receipt.

E. Monitoring/maintenance Plan: A monitoring/maintenance plan that provides for inspection of the seawall after every major storm (as defined by the geotechnical engineer) and at least annually to identify any loss of fill or structural damage before it becomes a major problem. The inspection should be done by a qualified civil engineer. The engineer should report his findings to the property owner with a copy to the Coastal Commission. The report should be commensurate with the need, i.e., a single paragraph would be adequate if there was no evidence of damage or a full analysis of damage and recommended action might be needed. It is the permittee's responsibility to maintain the seawall in a structurally sound manner.

Each land owner/permittee shall execute and record a deed restriction, in a form and content acceptable to the Executive Director, which shall provide for a monitoring program

as set forward above.

2. Construction Monitoring: The project geotechnical engineer, geologist and civil engineer will conduct site inspections during construction to ensure compliance with all of the recommendations and standards of the engineering reports and drawings.

No concrete or construction debris shall enter ocean waters. All construction materials and debris must be removed from the beach at the conclusion of the construction operation. It shall be the responsibility of the permittee to assure that shoreline protection structures on adjacent properties are not damaged during construction and to repair any damage to the adjacent property's shoreline protection structures that may be caused by the permittee's construction.

3. Final Engineering Report:

Within 30 days of completion of the project the applicant shall submit an engineering report by a qualified professional engineer verifying that the seawall has been constructed in conformance with the final approved plans.

4. PRIOR TO COMMENCEMENT OF CONSTRUCTION, the permittee shall provide to the Executive Director:

A. Compliance with City Conditions: Evidence that City of Capitola conditions, Exhibit A attached, have been met and that City Planning and Building Department approval has been issued.

B. U. S. Army Corps of Engineers Permit: A copy of a U. S. Army Corps of Engineers permit, letter of permission, or evidence that no Corps permit is necessary.

C. Monterey Bay National Marine Sanctuary Approval: Written evidence of approval from the Monterey Bay National Marine Sanctuary or documentation that no such approval is necessary.

5. Archaeology/Paleontology. PRIOR TO COMMENCEMENT OF CONSTRUCTION, the permittee shall submit to the Executive Director for review and approval with a copy to the City of Capitola, a paleontological survey report prepared following the basic directives as applicable of Section 17.11.030 of the Capitola Zoning Ordinance. To protect any retrievable paleontological resources on the site, the permittee shall have a qualified paleontologist on site during construction and permit reasonable halts of construction if and when a paleontological resource is discovered. Any paleontological resources retrieved from this site shall be deposited into the collection of a recognized non profit paleontological specimen repository with a permanent curator, such as a museum or university.

Prior to the pour of the concrete footing, the permittee shall submit a letter from the paleontologist stating that adequate investigation time was available. A copy of the letter

shall be submitted to the Coastal Commission. A follow up survey report/letter by the paleontologist shall be submitted to the Executive Director within 60 days of completion of the project for the Commission's administrative records.

6. Assumption of Risk. PRIOR TO THE ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the landowners shall each execute and record a deed restriction, in a form and content acceptable to the Executive Director, which shall provide: (a) that the applicant understands that the site may be subject to extraordinary hazard from storm waves, erosion or flooding and the applicant assumes the liability from such hazards; and (b) that the applicant unconditionally waives any claim of liability on the part of the Commission and agrees to indemnify and hold harmless the Commission and its advisors relative to the Commission's approval of the project for any damage due to natural hazards. The document shall run with the land, binding all successors and assigns, and shall be recorded free of prior liens which the Executive Director determines may affect the interest being conveyed and free of any other encumbrances which may affect said interest.

7. Beach Sand Replenishment/Public Access Enhancement Fund. PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the applicants shall provide evidence, in a form and content acceptable to the Executive Director that, for APN 036-161-03, a fee of no less than $2,730 and no more than $16,409, and for APN 036-161-12, a fee of no less than $5,544 and no more than $33,315, has been deposited in an interest bearing account designated by the Executive Director, in-lieu of providing sand to replace the sand and beach area that will be lost due to the impacts of the proposed protective structure. The methodology used to determine the appropriate mitigation fee for the subject site shall be that described in the staff report dated March 25, 1998, prepared for Coastal Development Permit 3-97-65. The California Coastal Commission shall be named as trustee of this account, with all interest earned payable to the account for the purposes stated below.

The purpose of the account shall be to aid in the restoration of beaches within the Capitola vicinity of the Santa Cruz littoral cell (between Capitola Wharf and New Brighton State Beach) through the establishment of a beach sand replenishment/public access enhancement program. The funds shall solely be used to implement projects which provide sand to the region's beaches, not to fund operations, maintenance, or planning studies. The funds shall be released only upon approval of an appropriate program by the Executive Director of the Coastal Commission. If these funds have not been spent for such sand replenishment in ten years time from the issuance of the Coastal Development Permit, they shall be used for public access/recreational beach improvements within the Capitola vicinity of the Santa Cruz littoral cell (between Capitola Wharf and New Brighton State Beach), subject to the approval of the Executive Director, but shall not be used to fund operations, maintenance, or planning studies.

IV. FINDINGS AND DECLARATIONS.

The Commission hereby finds and declares:

1. Project Location, Description and Surrounding Development.

Project Location and Surrounding Development: The subject parcels are located on the north Monterey Bay coastline in the Grove Lane area of the City of Capitola (see Exhibit 1, Location Map). The parcels are two of a five-parcel residential enclave whose shape approximates a triangle with its base running parallel to the ocean; the Southern Pacific Railroad right-of-way (SPRR) defines its right side and Escalona Gulch its left. Grove Lane, a 20-foot road right-of-way, provides access across the SPRR from Bay Avenue, a shoreline arterial. Grove Lane cul-de-sacs within the inland boundaries of the five parcels. From Bay Avenue the land slopes moderately to the bluff edge.

The parcels are located on top of a sixty-five (65) foot bluff above a narrow beach which is under water during many high tides. The southern (seaward) parcel boundaries fall on the beach below. The beach adjoining the applicants' parcels is part of New Brighton State Beach; the main body of the park lies about a 1000 feet downcoast. Upcoast of Escalona Gulch is the Depot Hill neighborhood which is separated from the bluff edge by Grande Avenue, now closed to traffic due to bluff failures. Beyond Depot Hill is Capitola Village and Beach located at the mouth of Soquel Creek, approximately 3200 feet from the subject parcels. See Exhibit 2, Vicinity Map, and Exhibit 3, Grove Lane Survey and Bluff Location Map, attached.

Along the Central California coastline, the mean high water line is the boundary of the Monterey Bay National Marine Sanctuary. Lands below the ordinary high water line are also the sovereign lands of the State of California.

The Motroni parcel (approximately 7500 sq.ft.) at 108 Grove Lane has an existing single family residence setback from 22 to 26 feet from the bluff edge; a wooden deck extends from the rear of the structure to the bluff edge. The front yard setback from the Grove Lane right-of-way is approximately 60 feet and is undeveloped but used for parking. The Motroni residence was built in the 1930's and completely remodeled in 1976.

The Bardwell parcel (approximately 18,000 sq.ft.) at 106 Grove Lane contains the Antigua Apartments, a 15 unit complex which was built in the early 1960s. It is a large three-story stucco structure over thirty feet high and with a footprint of approximately 6,120 square feet. The apartment building is setback from 18 to 32 feet from the bluff edge; a concrete deck extends to the bluff edge. On the inland, Grove Lane, side of the structure, the ground level meets the building at the second floor level. Carports are attached the length of the building. A separate two story (also split level) 6 space carport is situated at the Grove Lane entrance. The main structure is setback from Grove Lane 26 to 80 feet. See Exhibit 3, Grove Lane Survey Map attached.

Project Description: The applicants, who own adjacent parcels, propose to construct at the base of the bluff a reinforced concrete (shotcrete) erosion control seawall approximately 8 inches thick and 15 feet high. The Motroni parcel has an approximate 50 foot beach frontage and the Bardwell parcel an approximate 100 foot beach frontage. The 150 lineal feet wall will span both properties and connect to a seawall on the adjacent upcoast Webb parcel. A 2 feet wide by 2 feet deep reinforced concrete footing (keyway) will be installed to support the facing. Rock and sand will be removed from the beach at the base of the bluff and a trench excavated into competent bedrock for the keyway. Three horizontal rows of 20 feet deep rock anchors (tiebacks) are proposed. A total of 20 anchors will be drilled and grouted in place. The bottom two rows of "tiebacks" at approximately 8 and 14 feet above the ground will support the shotcrete facing. The upper row of tiebacks, located 14 feet above the top of the shotcrete wall, will stabilize the cliff face itself. The wall material will be colored to match an existing adjacent seawall (Webb) which blends well with the natural bluff face.

Seepage is very extensive throughout the bluff face and the plans indicate that 12-inch wide geocomposite drainage material will be placed vertically at intervals of 5 feet and that 1 1/2 inch diameter PVC pipe weep holes will allow for seepage discharge from behind the wall. The engineer recommends that the siting of the drain holes be determined on site during construction. (See Exhibit 4, Elevations.)

Equipment, Staging Area and Beach Access: Equipment working from the beach is proposed to enter at Seacliff State Beach, more than a mile downcoast but the nearest feasible beach access. The equipment needed includes a Caterpillar 215 Excavator; a 60-ton crane; a rubber tire all terrain track loader and, possibly, a bulldozer to bring in the crane. The location of the staging area has not been fully determined. If staging from the blufftop is feasible, the excavator will work on the beach to excavate the keyway. The concrete to fill the keyway and any localized depressions undercuts will be pumped from equipment located above. The applicant reports that most construction will be feasible from hanging or temporary scaffolds. However, staging from the blufftop may not be feasible because of restricted access for the large equipment on the sites. If staging from the blufftop is not feasible, the staging area is proposed to be located downcoast of the site where the beach widens. The access route and the staging area require use of State Park properties. These public access issues are discussed in Finding 5.

The beach below the bluff is narrow and covered with water at most high tides. The period of construction could take several days or weeks because of the need to adjust to the tidal cycles. The applicant proposes to work at night as necessary to take advantage of low tides. State Parks has indicated that construction should be completed by Memorial Day (May 25) weekend.

Location of Proposed Seawall Relative to Mean High Water Line: Dunbar and Craig, License Land Surveyors, prepared a survey (January 1998) stating that the "mean high high water (elevation = 2.4) falls somewhere on the cliff face". Based on this information the California State Lands Commission has determined that the seawall will be located on sovereign lands

subject to the common law public trust. The State Lands Commission is currently processing a General Lease for use of the site. The coastal permit has been conditioned to required submittal State Lands Lease or evidence that the project may proceed pending completion of lease processing. The Monterey Bay National Marine Sanctuary is currently reviewing the survey to determine their jurisdiction and requirements. The coastal permit has been conditioned to require submittal of written evidence of the MBNMS approval.

The City of Capitola has a certified Local Coastal Program and, therefore, has coastal development permit authority except in the Commission's original jurisdiction. The City approved a coastal development permit for the construction of the seawall November 6, 1997 with the intent that it apply to any portion of the wall within the City's permit jurisdiction. The City conditioned the permit to require a coastal development permit from the Coastal Commission with the intent that it apply to any portion of the wall within the Commission's original jurisdiction. The Commission's coastal development permit has been conditioned to require compliance with City conditions (see Exhibit A attached), and the following findings discuss the relevant policies of the certified Capitola Local Coastal Program.

2. Analysis of Danger from Erosion to Existing Structures

The Coastal Act policy 30235 governs construction of shoreline protective works or other such construction that alters natural shoreline processes:

> *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. Existing marine structures causing water stagnation contributing to pollution problems and fish kills should be phased out or upgraded where feasible.*

The City of Capitola LCP Policy VII-9 reflects the Coastal Act and states in part:

> *Shoreline structures such as seawalls, revetments, groins, and breakwaters, shall be permitted only to serve coastal dependent uses, to protect existing development (other than accessory structures), or to protect public beaches in danger from erosion, and shall be permitted only if non structural solutions (such as artificial beach nourishment and relocating structures) have proved to be infeasible... Such structures shall be designed to eliminate or mitigate adverse impacts on local shoreline sand supply, public access, marine habitats and paleontological resources...*

With the exception of new coastal-dependent uses, Section 30235 and the Capitola LCP Policy VII-9 limit construction of shoreline protective works to those required to protect existing structures or public beaches in danger from erosion. The Coastal Act provides

these limitations because shoreline structures, as a result of wave interaction, will seasonally and in the long term affect the configuration of the shoreline and the beach profile and will, when located on an eroding shoreline, have an adverse impact on the shoreline resulting in the ultimate loss of the beach. These impacts are discussed in detail in Finding 4. In general, though, beaches fit into one of three categories: (1) eroding, (2) equilibrium, or (3) accreting. As will be discussed below, it is clear that the applicants' parcels are located on an eroding shoreline.

Three site specific evaluations of the site geology and erosion were submitted by the applicant: (1) Site Evaluation of Cliff Erosion for Stan Webb, 110 Grove Lane, Purcell, Geotechnical Site Update for 106 and 108 Grove Lane by Purcell, Rhoades and Associates, July 24, 1997, [updated the earlier Webb report]; (2) Geotechnical Site Evaluation Update - Supplemental letter report, Purcell, Rhoades and Associates, September 30, 1997; and (3) Geotechnical Investigation of Howard Rasmussen Property, Grove Lane, Rogers Johnson, & Associates, February 11, 1983. In addition, other information is relevant to the general vicinity. This includes a reconnaissance by the Army Corps of Engineers; prior Commission permits and observations; and information gathered on site by the Commission's Civil Engineer and Distinct staff during review of this project.

As summarized below, these reviews support the following findings: (1) that the shoreline at the parcels is actively eroding; (2) that the level of danger from erosion to secondary structures, i.e., decks and drainage facilities, is immediate; and (3) that the primary residential structures are in danger from erosion in the near term.

a. Shoreline Retreat in Immediate Project Vicinity

(1) U. S. Army Corps of Engineers, Santa Cruz Harbor and Vicinity Shoaling Reconnaissance Report, January 1994

The U. S. Army Corps of Engineers, *Santa Cruz Harbor and Vicinity Shoaling Reconnaissance Report*, January 1994, (COE Report) investigated the shoreline from the mouth of San Lorenzo River to New Brighton State Beach (approximately 5 miles). This area of coastline consists of relatively flat upland coastal marine terraces along the southwestern flank of the Santa Cruz Mountains. Opal Cliffs through Capitola (identified as Section III in the Report and shown on Exhibit 5 attached) was described as an irregular 14,000 feet shoreline backed by cliffs ranging in height from 35 to 75 feet. Except for narrow beaches found during the summer in shallow embayments and at the mouth of Soquel Creek and Capitola Beach most of this section was found to be devoid of beach material and the cliffs exposed to wave attack throughout the year. During the winter months, wave action strips the summer beaches almost completely of sand and leaves bedrock exposed. According to the COE Report the average erosion rates for Section III range from 4 to 12 inches per year.

The COE study identifies six reaches of shoreline as marine erosion problem areas in

Section III. The sixth reach, Capitola Beach to New Brighton State Beach, was identified as a high hazard zone where "erosion is very active" and the risk of losing property and structures is high. The Study noted that this 2255 foot long stretch of high, near vertical cliffs is probably the most problematic area of cliff erosion in the entire study area. The applicants' parcels are within this area.

Overall, the COE Report establishes that the subject site is within an area of very active shoreline erosion with erosion rates up to a foot a year. The COE Report does not specifically address individual properties and the relative erosion risk to any particular structure.

(2) Commission Permits, Documentation and Field Observations

The following discussion more specifically addresses bluff erosion for properties and locations within the area identified by the COE Report as Section III, Reach 6, Capitola to New Brighton State Beach. Exhibits 2 and 3, attached, map the locations in Reach 6. Exhibits 5a and 5b map the entire Section III.

APN 036-161-13; 101 Grove Lane: In 1983, the Coastal Commission approved a permit (3-83-66 Rasmussen aka Fazzari) to relocate the residence at 101 Grove Lane from its position 5 feet from the bluff edge to the area most inland on the parcel approximately 65 feet from the bluff edge. A geotechnical investigation by Rogers Johnson and Associates identified overall long term cliff retreat on the property between 1942 and 1983 as about 0.9 feet per year but described it as episodic, unchanged for years, followed by a 5 to 20 foot failure.

APN 036-161-10; 110 Grove Lane: In 1986 the Commission approved a permit (3-86-214 Webb) to fill a deep (10 to 12 feet) seacave at the base of the bluff of the parcel upcoast and immediately adjacent to the Motroni site. The residence was 35 to 50 feet from the bluff edge. The Commission staff recommendation did not analyze the risk to the structure, although the documented erosion rate submitted by the applicant was 1.0 feet per year. It also characterized the erosion as episodic (see below). The Webb seawall is the only shoreline protection structure between Capitola Beach and New Brighton State Beach.

Escalona Gulch: In 1987 a large land mass approximately 150 feet in length on the shoulder of Escalona Gulch upcoast of the Webb site failed under the weight of trees and undercutting. The site is approximately 150 feet from the Motroni parcel.

Depot Hill/Grand Avenue/Crest Apartments: In 1989 the Loma Prieta earthquake had a significant effect on the erosion rate patterns. Along Depot Hill failure of both bedrock and terrace deposits was widespread. Cracks through the soils and terrace deposits parallel to the cliff were noted as far as 20 or 30 feet inland from the bluff edge (Plant and Griggs, 1990). This cracking was extensive along the length of Grand Avenue and under the eastern section of the Crest Apartments (approximately 1500 feet upcoast from the applicant's site). Grand Avenue which formerly ran along the top of the cliff edge, was

closed and only pedestrian access is allowed along the remains of the original roadway. In 1990 the Crest Apartments required demolition of six units due to progressive undercutting of the bluff further accelerated by the 1989 earthquake.

In 1991 the City of Capitola considered the construction of a major seawall project 3,300 linear feet parallel to the shoreline from the Capitola Village area to New Brighton State Beach but abandoned the idea for lack of financial resources and concern for environmental impacts. Currently, the Depot Hill Cliff Owners Association has formed an assessment district to propose a seawall project of 1250 feet in length along Grand Avenue. A preliminary field assessment by Commission Technical Services staff found that the structures in the assessment district did not appear to be in imminent danger. The proposal will be fully analyzed when a coastal development permit application is submitted.

Southern Pacific Railroad Right-of-Way: In 1995 or 1996 two or three blocks of bluff approximately 5 feet in depth and 20 to 25 feet long fell from the bluffs along the Southern Pacific right-of-way downcoast of the Grove Lane enclave (personal communication Fred Braun, Public Works Director, City of Capitola, 1/30/98). The exact site was not located by staff. See Exhibit 2, Area Map and Relevant Sites.

Summary: Evidence from Commission files and staff observation confirm the COE Report that the shoreline in Reach 6 of Section III, the area of the applicants' parcels, is actively eroding and is a high hazard zone. Although typical documented average erosion rates are similar (approximately 1 foot/year), erosion is also highly episodic.

b. Shoreline Retreat at Site

As discussed above, Section III, Reach 6, is an actively eroding shoreline. This conclusion is also supported by the site-specific studies submitted by the applicants. Licensed Land Surveyors, Dunbar and Craig, surveyed (January 1998) the applicants' parcels and mapped structures, existing bluff edge, and the bluff edge locations from 1967 and 1979 for all of the Grove Lane parcels based on digitized data from previous surveys. See Exhibit 3, Grove Lane Survey attached. Using this graphic information Commission staff charted the range of bluff retreat for each parcel between 1967-1998. Information for the subject parcels is **highlighted in the table below.** The Dunbar and Craig survey confirms the range of erosion rate estimates for the area described in Finding 2 above.

APN/Owner	1967-1998 Range of Total Erosion for 32 Year Period (Feet)	1967-1998 Erosion Rates (Inches Per Year)	Closest Point Of Residential Structure To Bluff Edge 1998 (Feet)	Years To Reach Structure At Maximum Average Rate	Comments
036-161-13 Fazzari	5 to 48	1.9 to 18	48	32 yrs	house moved inland in 1983
036-161-06 Coopman	15 to 29	5.6 to 11	65	71 yrs	
036-161-12 106 Grove Lane/Antigua Apt./Bardwell	**15 to 30**	**5.6 to 11.5**	**18**	**18.8 yrs**	
036-161-03 108 Grove Lane/Motroni	**22 to 30**	**8.2 to 11.5**	**22**	**22.9 yrs**	
036-161-10 Webb	14 to 21	5.2 to 7.9	35	60.8 yrs	seacave filled in 1986

In addition to the Dunbar and Craig survey, the consultant, Purcell, Rhoades & Associates, updated the *Site Evaluation of Cliff Erosion for Stan Webb, 110 Grove Lane* with *A Geotechnical Site Update for 106 and 108 Grove Lane*, (Geotechnical Update, 1997). The Webb parcel is upcoast, contiguous to the Motroni parcel. The Coastal Commission approved Webb's application (3-86-214) for the filling of a deep seacave at the base of the bluff. Following is a description of the current conditions along the bluff according to these two evaluations.

The Motroni/Bardwell site is located along a southeast facing bluff and narrow beach. The bluff is approximately 65 feet high and consists of two geologic formations. The upper layer of marine sediments is approximately 25 feet thick and consists of loosely consolidated cobbles and gravel in a sandy matrix. The lower layer of Pliocene sedimentary rocks consist of sandstone to silty sandstone layers, with localized pebble lenses and siltstone inclusions. All portions of the bluff are easily friable. All rocks are easily broken with light effort and a rock hammer; and most rocks obtained from the bluff face can be easily broken by hand.

Extensive seepage occurs across the entire width of the bluff face approximately midslope on the exposed bluff face. Most of the exposed rock below this line is saturated. Undercutting by wave erosion has led to collapse of portions of the bluff, and this is the dominant pattern of bluff retreat in this area. Several "blocks" of sandstone remain attached to the bluff, although vertical cracks parallel to the bluff face have developed behind them.

Wave erosion has undercut the lower portions of the bluff, but deeper caves (such as the one which was filled on the adjacent Webb property) have not developed. Instead, the

middle and upper portions of the bluff spall off, depositing broken rock on the adjacent beach. This pattern is repeated on different scales all along the bluffs in the area.

Typical fractures are bounded by lateral fractures which are arcade in shape and horizontal tops where the material has parted from the slightly more competent rock above it. Fractures may range in size from a few feet, with blocks several inches in thickness, up to several tens of feet with blocks 1-2 feet in thickness. The lower portions of the bluff face include an area of moderate wave erosion which has undercut 4-6 feet into the base of the bluff.

Rates of erosion in the project area are commonly estimated to be on the order of 1/10 to 1 foot per year (from aerial photo 1965-1981). A study prepared by Griggs and Johnson (1979) indicates that the long term coastal recession rate along the open cliffs area averages about 1-foot per year. The pattern of failures, however, is more episodic in nature when the primary cause is undercutting by waves, as in this project site. Typical failures will continue to involve blocks of sandstone ranging from several inches to several feet in width. According to this report, due to the high influence and variability of storm waves in this process, it is not possible to predict the timing or exact location of the next such failure.

The Coastal Commission's Civil Engineer, Lesley Ewing, reviewed the geotechnical data and in a September 30, 1997 letter, requested additional information to make a clear determination that the existing structures are in danger from erosion at the present time. The Motroni parcel at 108 Grove Lane has an existing single family residence which is setback from 22 to 26 feet from the bluff edge; a wooden deck extends from the rear of the structure to the bluff. The Bardwell parcel at 106 Grove Lane is developed with a 15 unit apartment building which is setback from 18 to 32 feet from the bluff edge, a concrete deck extends to the bluff edge.

In response to the Commission staff request, the applicants submitted a Geotechnical Site Evaluation Update- Supplemental letter report, Purcell, Rhoades and Associates, September 30, 1997, (Supplemental Update). The Supplemental Update reports that the decks and drainage improvements extend 1-2 feet beyond the upper face of the bluff due to earlier erosion and failure of bluffs. A recent rock fall (believed to have occurred in the winter storms of early 1997) contains concrete rubble from loss of a portion of the Antigua Apartments' deck. There are three blocks of rock ranging from several inches to 2 feet in thickness separated from the main bluff face by vertical cracks but temporarily supported at their bases. The beach below the bluff narrows to a very small strip of sand, which is submerged during high tides. This affords very little protection from wave action and forces beachgoers to walk next to the base of the bluffs in this areas.

The supplemental report summarized: (1) there is no doubt that there will be additional bluff failures during the coming winter storms and that likely 1-3 of these failures will involve larger blocks of sandstone ranging up to 2 feet or more in thickness; (2) it is very likely that at least some portion of the existing decks and drainage structures including discharge pipes and the concrete culvert between the properties will be damaged or lost over the face

of the bluff; and (3) it is possible that the loss of portions of the decks could also involve damage to the habitable structures. With respect to risk to the structures, the report states: "We have not performed an evaluation of the foundation of these structures, and cannot suggest a probability, either high or low, regarding this likelihood." Overall the report concluded,

> We believe that it is clear that existing decks, drainage pipes and other drainage improvements are in danger from erosion at the present time, and it is possible that the existing habitable structures are in danger at the present time. An additional concern, unique to this portion of beach, is the added hazard to pedestrians on the beach caused by potential bluff failures in an area where the sandy beach is so narrow or non existent.

In addition, the applicant submitted a Slope Stability that determined the minimum factors of safety with respect to sliding for the existing bluff conditions and found that the construction of the erosion control wall was necessary to prevent "imminent substantial failure" which could impact the residential structures (Analysis Soil Engineering Construction, Inc., February 20, 1998).

The analysis was reviewed by the Commission's Civil Engineer who concurred that given this additional data it was clear that the structures were in danger from erosion.

(c) Conclusion

The evidence is clear that the bluff at the applicants' parcels is actively eroding. At the present time the decks and patios and drainage structures which extend to the bluff edge are in immediate danger from erosion. The Capitola Land Use Plan Policy VII-9 specifically precludes the protection of accessory structures, such as decks and drainage facilities, with seawalls. In addition, the Commission has interpreted Section 30235 to require shoreline protection for existing *principal* structures only.

In this case, though, the principal structures are also in danger from erosion. As discussed, the Antigua Apartments (APN 36-161-12) structure is setback variably from 18 to 32 feet. If the maximum *average* rate is applied, the apartment structure would be reached in 18.8 years. The Motroni residence (APN 36-161-03) is setback variably from 22 to 26 feet. If the documented *average* maximum erosion rate of the last 32 years of 11.5 inches per year were applied, the residential structure would be reached in 22.9 years. However, as pointed out by the geologists and geotechnical engineers, erosion in this area is episodic. Surf erosion of the Purisma bedrock at the base of the bluff will remove support of the cliff above which then falls in blocks. The bluff is currently undercut 4 to 6 feet. It is possible that a block of several feet could fall, not only resulting in a loss of deck and drainage facilities but compromising the integrity of the principal structures. The Commission's Civil Engineer has reviewed all the data related to bluff erosion at the specific sites as well as surrounding sites and concurs with the applicants that the residential structures are in

danger from erosion. According to the staff engineer, while the structures may be safe for years to come, it is not unreasonable to expect erosion to reach the structures within 3-5 years and it could be sooner.

In cases such as these if bluff protection is delayed, it could result in an emergency situation. As documented in the Commission's Regional Cumulative Assessment Project for the Monterey Bay, emergency responses can produce less desirable protection solutions such as installation of riprap walls which have significantly greater visual and access impacts by their encroachment onto the beach (see discussion below).

Given the history of major bluff failures in the immediate area, the relative proximity of the structures to the bluff edge, and the Commission staff review and concurrence with the information submitted relating to bluff erosion rates and bluff stability, the Commission finds, as required for approval under Coastal Act section 30235, that the Antigua Apartments and the Motroni residence are "existing structure[s]...in danger from erosion" in the near term.

3. Alternatives to Shoreline Protective Structures

Although Section 30235 allows for the protection of structures in danger from erosion, seawalls are not allowed unless they are also the required solution, that is, there must be no feasible project alternative. In addition, Section 21080.5(d)(2)(i) 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 impact which the activity may have on the environment. Finally, the City of Capitola LCP Policy VII-9 states in part:

> Shoreline structures such as seawalls, revetments, groins, and breakwaters, shall be permitted only to serve coastal dependent uses, to protect existing development (other than accessory structures), or to protect public beaches in danger from erosion, and *shall be permitted only if non structural solutions (such as artificial beach nourishment and relocating structures) have proved to be infeasible*... Such structures shall be designed to eliminate or mitigate adverse impacts on local shoreline sand supply, public access, marine habitats and paleontological resources... (*emphasis added*)

As a general matter since the Coastal Act allows for the protection of existing structures in danger from erosion, alternatives such as abandoning the structure cannot be considered feasible unless the property owner can be compensated. No such compensation is available. However, there are several other alternatives to consider for shoreline protection.

Sand Replenishment: According to the U. S. Army Corps of Engineers Santa Cruz Harbor and Vicinity Shoaling Study, January 1994, the site is located within the Santa Cruz Littoral Cell which extends as far north as San Francisco and terminates downcoast at the

Monterey Submarine Canyon, near the center of Monterey Bay. It is estimated that coastal streams supply about 75% of the total littoral sand input to the cell, bluff erosion contributes about 20%, and the remaining 5% is from gully erosion and sand dune deflation. The sand is moved through the cell by wave-induced longshore transport. The seasonal change in wave energy causes a significant widening of the beaches during the summer and fall followed by the nearly complete stripping of sand from the beaches during winter. The northern end of Monterey Bay is an area of relatively high net littoral transport (between 300,000 and 500,000 cubic yards per year from west to east). This transport is the primary contributor of sand to the Santa Cruz Harbor entrance and the downcoast area.

The COE Report considered fill and/or beach nourishment as a solution to the erosion problem in the study area. This process would replenish a beach with material (usually sand) obtained from another location in order to buffer the shoreline from wave action. However, the Report found that the general absence of significant beach along the majority of the study area under existing conditions would indicate that beach fill alone would not remain in place and that groins would be required to stabilize any fill placed. In addition, for Section III, the Opal Cliffs-Capitola area, the Study found that due to the particular alignment of the shore and the tendency for sand to move rapidly out of the area, a groin system could be expected to result only in short fillets of sand. Fifteen or more comparatively long groins would be required to retain the fill. The Alternatives chosen for consideration in the Section III Opal Cliffs-Capitola Area did not include the multiple groin alternative.

More important, particularly as it relates to the discussion of sand supply mitigation in Finding 4, an effective sand replenishment program also would require the participation of many private property owners and jurisdictions and is not at this time considered a viable option by the U.S. Army Corps of Engineers. Thus, the amount of sand that any single property owner could be reasonably expected to replenish to the Santa Cruz littoral cell is relatively small when compared to the overall volumes of sand that are being transported through the system. Therefore, the Commission finds, that at this time, a sand replenishment program to buffer the cliffs from erosion is not a reasonable nor feasible as an alternative to the construction of a shoreline protective work for the Motroni/Bardwell parcels.

Relocating Structures: Another potential alternative to construction of a shoreline protective work would be to move the structures inland as has been done with other residential structures in this area. In the case of both of the structures, though, this is problematic.

Antigua Apartments: The Antigua Apartments is a 15-unit complex. It is a large three-story stucco structure over thirty feet high and with an approximate 6,120 square foot footprint. The apartment building is a slab-on-grade structure. Carports line the inland side of the building and a separate two story, split level carport structure for 6 cars is situated at the Grove Lane entrance. The area between Grove Lane and the apartment complex structure is fully occupied with either parking structures or the necessary parking aisle space for vehicle maneuvering. The City of Capitola requires 1 covered space and 1 1/2 uncovered

spaces per unit for apartments of more than 4 units (17.51.130). Currently there are 16 covered spaces. Relocating the structure inland would displace required parking. Alternative parking is not available. Adjacent properties are either private residential or part of the Southern Pacific right of way. Park Avenue the nearest public street is a main arterial from Capitola to New Brighton State Beach with bike lanes on either side. Parking is not allowed in these lanes. In addition, the slab on grade foundation makes a lifting operation impractical according to the applicants' engineer, Soil Engineering Construction.

Therefore, because of the sheer size of the building, the alteration of site that would be required, the limited area in which to move the structure, and the fact that on site-parking would be lost were the structure to be relocated, the Commission finds that it is not feasible to move the Antigua Apartment structure.

Motroni Residence: The Motroni parcel (approximately 7500 sq.ft.) at 108 Grove Lane has an existing one-story, single family residence (approximately 1000 sq.ft.) setback from 22 to 26 feet from the bluff edge; a wooden deck extends from the rear of the structure to the bluff edge. The front yard setback from the Grove Lane right-of-way is approximately 60 feet and is undeveloped but used for parking. The parcel would appear to have adequate space for relocation of the house. The applicants have submitted a job estimate sheet prepared by Soil Engineering Construction which estimates the total cost of relocation including installing a new foundation, restoration of all utilities and all associated cosmetic repairs to be $83,212.00. The cost of the proposed seawall, which would span both parcels, is estimated at $54,000.

Additionally, the Commission previously approved the Webb seacave fill/seawall which is upcoast and contiguous to the Motroni site. The Webb seawall is approximately 70 feet in length. The proposed Antigua seawall is 100 feet long and, if approved by the Commission as recommended by staff, would be constructed downcoast and contiguous to the Motroni site. If the Motroni seawall is not constructed, a gap of 50 feet between the Webb seawall and the Antigua seawall would be created. According to the project engineer, a continuous armored face between the Webb Project and the Antigua Apartments will minimize the potential for destabilizing the work done at either site and prevent the potential for end scour into the Motroni parcel.

The bluff setbacks of the residential structures on the two remaining parcels (downcoast of the Antigua Apartments) in the Grove Lane enclave at their closest point to the bluff edge are 48 feet APN 036-161-13 and 65 feet for APN 036-161-06. See Exhibit 3, Grove Lane Survey and the chart on page 16 showing bluff erosion data. These buildings are located as far inland as appears feasible and are not at risk from erosion for several years. Approval of the infill of the seawall for the Motroni parcel would not appear to be likely to prejudice future decisions of the Commission regarding development in this enclave.

Therefore, because of the expense of moving the structure, the Commission finds that it is not feasible to move the Motroni residence. In addition, the continuous wall will provide greater structural integrity consistent with Section 30253 (see below).

To summarize, Section 21080.5(d)(2)(i) of CEQA prohibits a proposed development from being approved if there are feasible alternatives which would substantially lessen significant adverse environmental impacts. Because of the significant environmental impacts on shoreline processes and public access caused by shoreline structures (see below), Section 30235 of the Coastal Act restricts shoreline protective works to those needed to protect coastal dependent development or required to protect existing structures or public beaches in danger from erosion. The Commission has reviewed alternative means of protection and finds that they are not feasible and, therefore, that the proposed seawall is required to protect the residential structures on these sites and is consistent with Section 30235 in this regard.

4. Sand Supply Impacts and Mitigation

Although the proposed seawall construction is consistent with the risk assessment and alternative analysis requirements of Section 30235, this policy also requires the seawall proposal to "eliminate or mitigate" adverse impacts on shoreline sand supply if it is to be approved.

(a) Impacts of Motroni/Bardwell Project

The section 30235 mitigation requirement addresses increasingly well-documented impacts of shoreline structures on natural sand dynamics, sand supply to beaches, and direct and indirect impacts to public access resources. For example, it is now well established that the development of shoreline structures can affect the beach and its users in several ways: (1) by directly encroaching on the beach; (2) by changing the beach profile and reducing the area located seaward of the ordinary highwater mark; (3) by interfering with bluff erosion that supplies sand to nourish the beach; (4) by causing greater erosion on adjacent public beaches; (5) by interrupting longshore and onshore processes; and (6) for riprap designs, by creating future impediments by riprap falling or moving out onto the beach. As recently discussed in the Staff Recommendation for 4-97-071 (Schaeffer, City of Malibu) approved by the Commission in November 1997, these impacts occur for both vertical seawalls and riprap designs.[1]

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[1] Even though the precise impact of a shoreline structure on the beach is a persistent subject of debate within the discipline of coastal engineering, and particularly between coastal engineers and marine geologists, it is generally agreed that a shoreline protective device will affect the configuration of the shoreline and beach profile whether it is a vertical bulkhead or a rock revetment. The main difference between a vertical bulkhead and rock revetment seawall is their physical encroachment onto the beach. Additionally, rock revetments, unlike the proposed seawall, dissipate the wave energy and typically result in less localized beach scour. However, it has been well documented by coastal engineers and coastal geologists that shoreline protective devices or shoreline structures in the form of either a rock revetment or a vertical seawall will adversely impact the shoreline as a result of beach scour, end scour (the beach areas at the end of the seawall), the retention of potential beach material behind the wall, the fixing of the back beach and the interruption of longshore processes. In addition, and **not** insignificantly, seawalls directly encroach on the beach.

The serious need to address these shoreline structure impacts was also well-documented in the Commission's recent evaluation of cumulative impacts in the Monterey Bay area, including the subregion at issue in this permit. The Commission's Regional Cumulative Assessment Project (ReCAP) Findings and Recommendations (1995) documented that large sections of the Monterey Bay shoreline were being armored through emergency and regular permits for individual site protection. The ReCAP findings and other staff work contributed to a growing body of evidence that armoring a bluff, in addition to encroaching onto the beach and preventing its further landward migration, will reduce the amount of sand and gravel entering the littoral cell, and will cause the narrowing of an eroding beach over time and reduction in the area of sand available for recreational use. While seemingly insignificant in the individual case, these projects will have significant cumulative impacts on beach systems over time.

In the Motroni/Bardwell case, there at least five major impacts to sand supply that are of major concern, three of which can be quantified for the purpose of specific mitigation requirements for the applicant's proposal. Each of these is discussed in detail below.

(1) Fixing the Back Beach

Experts generally agree that where a beach is eroding, as is the case with the Motroni/Bardwell site, the erection of a seawall will eventually define the boundary between the sea and the upland. On an eroding shoreline fronted by a beach, a beach will be present as long as some sand is supplied to the shoreline. As erosion proceeds, the entire profile of the beach also retreats. This process stops, however, when the retreating shoreline comes to a seawall. While the shoreline on either side of the seawall continues to retreat, shoreline retreat in front of the seawall stops. Eventually, the shoreline fronting the seawall protrudes into the water, with the winter mean high tide line fixed at the base of the structure. In the case of an eroding shoreline, this represents the loss of a beach as a direct result of the seawall.

In further support of this analysis, Dr. Craig Everts has found that on narrow beaches where the shoreline is not armored, the most important element of sustaining the beach width over a long period of time is the retreat of the back beach and the beach itself (Letter Report, March 14, 1994, to Lesley Ewing, California Coastal Commission, from Dr. Craig Everts, Moffatt and Nichols Engineers). This is particular true where narrow beaches exist, as is the case here. He concludes that:

> Seawalls inhibit erosion that naturally occurs and sustains the beach. The two most important aspects of beach behavior are changes in width and changes in the position of the beach. *On narrow, natural beaches, the retreat of the back beach, and hence the beach itself, is the most important element in sustaining the width of the beach over a long time period.* Narrow beaches, typical of most of the California coast, do not provide enough sacrificial sand during storms to provide protection against scour caused by breaking waves at the back beach

> line. This is the reason the back boundary of our beaches retreats during storms [emphasis added].

Overall, Dr. Everts concludes that "[a] beach with a fixed landward boundary is not maintained on a recessional coast because the beach can no longer retreat.

Finding 2 above presents sub-regional and site-specific data that establishes that the Motroni/Bardwell parcels are located on a recessional or eroding beach. The erosion rates for these parcels range from 5.6 to 11.5 inches/year. Site surveys by the Commission's coastal engineer and coastal planning analysts have confirmed the erosion risks at the project site. The applicant's engineer has submitted documentation of sand impacts that relies on an erosion rate of 11 inches/year (see below). In short, the beach at Motroni/Bardwell would gradually migrate landward if left to its own natural devices.

It is highly likely that the placement of the Motroni/Bardwell proposed structure will halt this landward migration and "fix" the location of the back beach or bluff, at least for the useful life of the wall itself. The fixed position of the back beach will then result in a narrowing of the useable beach to a smaller and smaller corridor between the ocean waves and the shoreline protective device. Eventually, the dry beach will disappear and waves will hit the shoreline protective device during all but the most extreme low tide events. This loss of beach occurs because the natural balance between landward movements of the fore beach and back beach or bluff has been changed by the construction of a more resistant back beach structure, preventing the landward migration of the back beach or bluff.

As discussed in Finding 5, it is important to recognize that the beach lost in this case will be entirely public beach because the mean high tide line is located some distance up the bluff face. In addition, this loss of public access must be mitigated. However, before discussing these concerns, it is important for the purposes of the required impact mitigation under section 30235 to be able to quantify the sand supply impact. In previous decisions, the Commission has used a scientific methodology for this purpose, developed in part out of its experience with shoreline structure impacts in the San Diego Region (see *Report on In-Lieu Fee Beach Sand Mitigation Program*, January 1997; also CDP 6-93-131 (Richards)). Using this methodology, the actual long-term loss of this public beach due to erosion is equal to the long-term erosion multiplied by the width of property which has been fixed by a resistant shoreline protective device:

> *The area of beach lost due to long-term erosion (A_w) is equal to the long-term average annual erosion rate (R) times the number of years that the back beach or bluff will be fixed (L) times the width of the property that will be protected (W). This can be expressed by the following equation:*
>
> $$A_w = R \times L \times W$$

Exhibit 6 illustrates this calculation. Since the actual amount of long-term erosion cannot be predicted precisely, erosion is approximated by the long-term average annual erosion rate times the number of years that the back beach or bluff will be fixed. The width of the

property which has been fixed can be determined from the project design. Using the site-specific information and analysis for this project (see Finding 2 for discussion of site-specific erosion rates); the average erosion rate submitted by the applicant (11 inches/year); and the typical anticipated life of a well-constructed seawall[2], the long term loss of the beach in front of the Motroni/Bardwell site is calculated as follows:

A = 11"/yr x 150 feet x 25 years = 3437.5 square feet

Using the conversion factor of 1.0 to convert square feet to cubic yards, this translates into a direct sand supply impact of 3437.5 cubic yards.[3]

(2) Retention of Potential Beach Material

Beach material comes to the shoreline from inland areas, carried by rivers and streams; from offshore deposits, carried by waves; and from coastal dunes and bluffs, becoming beach material when the bluffs or dunes lose material due to wave attack, landslides, surface erosion, gullying, etc. Coastal dunes are almost entirely beach sand and wind and wave action often provide an on-going mix and exchange of material between beaches and dunes. Many coastal bluffs are marine terraces — ancient beaches which formed when land and sea levels differed from current conditions. Since the marine terraces were once beaches, much of the material in the terraces is beach quality sand or cobble, and a valuable contribution to the littoral system when it is added to the beach. While beaches can become marine terraces over geologic time, the normal exchange of material between beaches and bluffs is for bluff erosion to provide beach material. When the back beach or bluff is protected by a shoreline protective device, the natural exchange of material either between the beach and dune or from the bluff to the beach will be interrupted and, if the shoreline is eroding, there will be a measurable loss of material to the beach. Since sand and larger grain material is the most important component of most beaches, only the sand portion of the bluff or dune material is

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[2] The Commission staff coastal engineer has estimated a useful life of 25 years for the structure being proposed if the structure is properly maintained.

[3] To convert between area of beach and volume of sand to rebuild an area of beach, coastal engineers use a conversion value, v, which is in units of cubic yards per square foot of beach. The value is based on regional characteristics and is often assumed to be between 1 and 1.5, when there is not regional data to help quantify this value better. The value of v is based on the regional beach and nearshore profiles. To build a beach seaward one foot, there must be enough sand to provide a one foot wedge of sand through the entire region of onshore - offshore transport. If the range of reversible sediment movement is from -30 feet msl to +10 feet msl, then a one foot beach addition must be added for the full range from -30 to +10 feet, or 40 feet total. This 40 foot by 1 foot square parallelogram could be built with 1.5 cubic yards of sand (40 cubic feet divided by 27 cubic feet per cubic yard). If the range of reversible sediment transport is less than 40 feet, it will take less than 1.5 cubic yards of sand to rebuild one square foot of beach and if the range of reversible sediment transport is larger than 40 feet it will take more than 1.5 cubic yards of sand to rebuild one square foot of beach. In this case, the Commission has not been able to establish an actual conversion factor for the Capitola vicinity. The depth of closure for Capitola is approximately -20 feet and the upper beach elevation ranges from +7 to +10. This provides a 27 to 30 foot range for reversible sand movement and a value for v of 1.0 to 1.1. However, the assumption that this factor is 1.0, is a conservative one and favors a smaller impact finding than is probably the case here.

quantified as beach material.

A seawall, gunnite facing or revetment also will probably prevent some of the material above it from becoming beach material; however, some upper bluff retreat may continue unless the shoreline protective device extends the entire height of the bluff. Exhibit 7, shows several possible configurations of the bluff face, with a protective structure. The solid line shows the likely future bluff face location with shoreline protection and the dotted line shows the likely future bluff location without shoreline protection. The volume of total material which would have gone into the littoral system over the lifetime of the shoreline protective device would be the volume of material between the solid line and the dotted line, along the width of protected property.

The actual erosion cannot be predicted, so the total erosion of the bluff must be approximated by the average annual long-term erosion of the bluff multiplied by the number of years that the structure will be in place. Finally, since the main concern is with the sand component of this material, the total material lost should be multiplied by the percentage of bluff material which is beach sand, giving the total amount of sand which would have been supplied to the littoral system for beach deposition if the proposed device were not installed. As discussed in the Commission's methodology, the quantification of this impact is expressed in the following equation:

> *Volume of sand denied the beach by the protective device (V_b) is equal to the percentage of sand in the bluff material (S) times the total width of the protected property (W) times the area between the solid and dotted lines in Exhibit 7 directly landward of the device[R x h_s], plus the area between the solid and dotted area above the device [1/2h_u x (R + (R_{cu} - R_{cs}))]. Since the dimensions and retreat rates are usually given in feet and volume of sand is usually given in cubic yards, the total volume of sand must be divided by 27 to provide this volume in cubic yards, rather than cubic feet. This can be expressed by the following equation:*
>
> $$V_b = (S \times W \times L) \times [(R \times h_s) + (1/2h_u \times (R + (R_{cu} - R_{cs})))]/27$$

In this case, the applicant's have submitted documentation that quantifies the amount of sand that will be lost to the system as 300 cubic yards per year, based on an 11 inch annual retreat of the 60 foot high bluff along the 150 foot length of the project (Soil Engineeering Construction, Inc. Letter to Commission, February 25, 1998). This amount is not the result of strict use of the above equation. However, the basic geometric assumptions characterizing the retained sand as a slab rather than a wedge do not result in a reasonable estimate of the site-specific impacts due to the project. The estimate should be refined with a multiplier of the percentage of beach material in the bluff at issue though. In this case, the bluff is approximately 75% Purisima sandstone, which has an estimated beach sand content of 50%, and 25% Terrace deposits, which have an estimated 90% sand content. This nets an overall multiplier (S) of 60%. Refinements to this estimate may also be made pursuant to Condition 7, prior to issuance of the permit, if the applicant so desires. Using the

applicant's estimate, though, qualified with the 60% sand content multiplier, means that **the project will result in the loss of 4,500 cubic yards of sand over an assumed 25 year life of the project, due to retention of bluff material.**

(3) Encroachment on the Beach

Shoreline protective devices such as seawalls, revetments, gunnite facings, groins, etc. all are physical structures which occupy space. When a shoreline protective device is placed on a beach area, the underlying beach area cannot be used as beach. If the underlying beach area is public beach, the public will not be able to use the area the way it had prior to placement of the structure. This area will be altered from the time the protective device is constructed and the extent or area occupied by the device will remain the same over time, until the structure is removed or is moved from its initial location. (The only exception to this would be a structure which can spread or move seaward over time, such as a revetment.) The beach area located beneath a shoreline protective device, referred to as encroachment area, is the area of the structure's footprint. As discussed in the Commission's methodology, this impact may be quantified as follows:

> *The encroachment area (A_e) is equal to the width of the properties which are being protected (W) times the seaward encroachment of the protection (E). This can be expressed by the following equation:*
>
> $$A_e = W \times E$$

Exhibit 8 illustrates this equation. The Motroni/Bardwell project proposes a wall that spans a 150 foot width and that encroaches out onto the beach between eight inches and four feet, depending on what depth of the wall is exposed. Thus, the direct encroachment impact of the project will range from 100 to 600 square feet. For purposes of this one time impact, it is reasonable to use an average encroachment of 350 square feet. Over the long run, of course, this is a conservative impact, given the likelihood that scour will ultimately expose an increasing depth of the wall base. Nonetheless, using the sand conversion factor of 1.0 the **direct loss of beach due to encroachment translates into a one time impact of 350 cubic yards.**

(4) Scour/End Effects

End scour effects involve the changes to the beach profile adjacent to the bulkhead or seawall at either end. One of the more common end effects comes from the reflection of waves off of the seawall in such a way that they add to the wave energy which is impacting the unprotected coastal areas on either end. This causes accelerated erosion on adjacent properties, thereby, artificially increasing erosion hazards.

Scour is the removal of the beach material from the base of a cliff, seawall or revetment due

to wave action. The scouring of beaches caused by seawalls is a frequently-observed occurrence. When waves impact on a hard surface such as a coastal bluff, rock revetment or vertical bulkhead, some of the energy from the wave will be absorbed, but much of it will be reflected back seaward. This reflected wave energy in combination with the incoming wave energy, will disturb the material at the base of the seawall and cause erosion to occur in front and down coast of the hard structure. This phenomenon has been recognized for many years and the literature acknowledges that seawalls, through this scouring action, have an effect on the supply of sand.

For example, according to *Saving the American Beach: A Position Paper by Concerned Coastal Geologists* (March 1981, Skidaway Institute of Oceanography), pg. 4: "Seawalls usually cause accelerated erosion of the beaches fronting them and an increase in the transport rate of sand along them". Similarly, Robert G. Dean in 1987 *in Coastal Sediment Processes: Toward Engineering Solutions,* stated:

> Armoring can cause localized additional storm scour, both in front of and at the ends of the armoring...Under normal wave and tide conditions, armoring can contribute to the downdrift deficit of sediment through decreasing the supply on an eroding coast and interruption of supply if the armoring projects into the active littoral zone.

In addition, there is substantial evidence showing that a seawall, gunnite facing, or revetment will prevent the material directly landward of it from eroding and becoming beach material, particularly for eroding beaches. For example, the National Academy of Sciences found that retention of material behind a revetment may be linked to increased loss of material directly in front of the wall. The net effect is documented in "Responding to Changes in Sea Level, Engineering Implications" (National Academy Press, 1987) which provides:

> A common result of sea wall and bulkhead placement along the open coastline is the loss of the beach fronting the structure. This phenomenon, however, is not well understood. It appears that during a storm the volume of sand eroded at the base of a seawall is nearly equivalent to the volume of upland erosion prevented by the seawall. Thus, the offshore profile has a certain "demand" for sand and this is "satisfied by erosion of the upland on a natural beach or as close as possible to the natural area of erosion on an armored shoreline...

It is likely that the Motroni/Bardwell project will cause both scour and end effects. However, such impacts are difficult to quantify.

(5) Interruption of Onshore and Longshore Processes

If a seawall is built on an eroding beach and the device eventually becomes a headland jutting into the ocean, the seawall can function like a groin and modify or interrupt longshore

transport and cause the upcoast fillet of deposition and downcoast indenture of erosion which is typical of sand impoundment structures. Over the long run, it is possible that the Motroni/Bardwell project will produce such impacts on the coastline. However, it is difficult to quantify these impacts.

Conclusion

The preceding discussion establishes distinct and identifiable impacts due to the applicant's proposed shoreline structure: (1) an immediate loss 350 square feet of beach which will continue for the life of the project; (2) a long-term loss of 3437.5 square feet of beach, resulting from fixing the back of the beach; and (3) retention of 4500 cubic yards of bluff material over the life of the structure. When beach area is converted to a volume of san necessary to build in equivalent area of beach, **a reasonable estimate of the total quantifiable impact of the Motroni/Bardwell project on sand supply is 8287.5 cubic yards of sand over an anticipated 25 year life of the project, or 331.5 cubic yards of sand per year**. This impact will necessarily effect public beach resources. In addition to direct encroachment on public trust lands (see below), the project will cause the loss of sand in the Santa Cruz littoral cell. This sand is a public access and recreational resource that must be protected under both section 30235 and sections 30210-214 (see below).

While this amount of sand lost to the project is small when compared to the overall volumes of sand transport in the cell (at least 300,000 cubic yards/year), the impact is nonetheless significant when considered in relation to all other existing and future shoreline structures in the littoral cell. Coastal Act section 30250 requires that new development not have significant adverse cumulative effects. Again, as documented by the Commission's Regional Cumulative Assessment Project, some 25 acres of beach have already been lost in the Monterey Bay region to shoreline structures; and this is simply the direct encroachment impact. In short, 391 cubic yards of lost beach sand is a significant resource impact in the context of cumulative impact resource management. Finally, as discussed in Finding 5, the direct loss of actual beach at this site is also a significant impact. The next section discusses the mitigation of this impact.

(b) Required Mitigation of Adverse Impacts

The applicant proposes a vertical seawall poured against the cliff face. The proposed wall is 150 lineal feet with a seawall footing 2 feet wide and the wall 8 inches wide. Hence the wall has been designed to minimize direct encroachment on the beach. To protect against end scour effects which involve the changes to the beach profile adjacent to the seawall at either end, the seawall is designed to blend into the adjacent Webb seawall and to taper into the natural bluff face at the downcoast end of the Bardwell site. The applicants' engineers investigated the Webb seawall as a prologue to designing the proposed Motroni/Bardwell seawall and found it to be stable with an intact footing and only very slight sidecutting at the upcoast margin. The wall will still have direct encroachment impacts and end effects as discussed above.

In addition, notwithstanding these design efforts, no mitigation has been provided in the project for the impacts that the proposed seawall will have on sand supply. As discussed at length above, these impacts cannot be eliminated if the wall is to be constructed. Therefore, mitigation must be provided under Coastal Act section 30235. In the past, the Commission has mitigated the direct impacts of shoreline structures by requiring redesign of seawalls, use of vertical walls rather than rip-rap, requiring public access lateral easements and other such measures to meet the requirements of section 30235. The Commission, though, has only recently developed the scientific methodology necessary to reasonably quantify the sand supply impacts of shoreline structures. Such methodology now allows the Commission to better meet the requirements of Coastal Act section 30235.

Although it is not feasible to use sand replenishment as an alternative means to individually protect structures on the top of the bluff, in this case, it is feasible to pursue a sand replenishment strategy that can introduce an equivalent amount of sandy material back into the system as a means of mitigating the loss of material inputs that will be caused by the seawall. Obviously, such an introduction of material, if properly planned can feed into the littoral cell that supplies sand to not only the public beach at the base of the subject bluff but also the popular beaches throughout the area, thereby mitigating the public access and recreation impacts. Prior to any in-kind replenishment, therefore, a program to achieve such an objective should be established (see below). The development of a comprehensive program will provide a means to maximize the benefits of individual mitigation efforts in the area now and in the future. However, absent a full program that evaluates and guides the use of the most appropriate sites and methods for introducing the material so that it will mitigate this project's impacts and maximize benefits to the sandy beaches, the Commission cannot specify a direct in-kind placement of sandy material as mitigation for this particular project.

The in-lieu fee is an alternative mitigation mechanism that is often used when in-kind mitigation of impacts is not presently available. The Commission has successfully used the in-lieu fee mechanism to mitigate sand supply impacts in the San Diego region. To implement this mechanism, the sand supply impacts must be quantified (as above) and then translated into a specific dollar amount. This fee is then put in an interest-bearing account for future allocation to an identifiable sand replenishment effort developed through a program that is specifically designed to address the impacts cause the project at issue. In-lieu fees are particular appropriate in cases such as this, where although there may be as yet unidentified opportunities for beach replenishment in the future within the Santa Cruz littoral cell, in-kind replacement today, by a single applicant, is not an undertaking likely to result in successful resource impact mitigation. Nonetheless, the impacts must be mitigated by law. This is also particularly important to acknowledge given that the Motroni/Bardwell parcels are adjacent to both a state public beach (New Brighton), and public trust lands (see Finding 5) -- both of which are beaches that will be impacted by the project.

Overall, absent any other mitigation proposals for the sand supply impacts of the project, the Commission is obligated to require in-lieu fee mitigation in order to approve the proposed structure under section 30235. Condition 7 of this permit, therefore, requires the

applicants to establish an in-lieu fee account based on the quantifiable impacts of their proposed shoreline structure. The precise dollar amount (as well as other specific geophysical variables) must be determined prior to issuance of the permit, using actual cost estimates for local sand replenishment in the Santa Cruz littoral cell. Initial inquiries by the Commission staff suggest that such costs may vary widely, depending on the particular location of the source, and the total volumes being costed out. One estimate was as low as $1/cubic yard. In San Diego, where the Commission has implemented an in-lieu fee program, the cost is approximately $6/cubic yard. This would translate into a annual in-lieu fee obligation ranging from $331 to $1,989 or a lump sum obligation ranging from $8,275 to $49,725. If such a fee were allocated proportionately to each parcel based on their beach frontage, the ranges are:

Motroni: $109 - $656/year or a one time fee of $2,730 to $16,409
Bardwell: $222 - $1332/year or a one time fee of $5,544 to $33,315

As specified in the condition, the purpose of these in-lieu funds shall be to support a beach replenishment and access enhancement program for the Capitola vicinity of the Santa Cruz littoral cell (Capitola Wharf to New Brighton Beach). This subregion is logically related to the direct, indirect, and cumulative impacts of the project. In particular, as discussed in Finding 65, the sand supply impacts of the project will directly impact public access and recreation between Capitola and New Brighton Beach. This subregion is also a distinct recreational resource segment within the Santa Cruz littoral cell. As discussed in the next finding, this condition also provides for use of the in-lieu fee for public access/recreational projects in the immediate vicinity of the project (for example, New Brighton State Beach), in the event that the fee is not used for sand replenishment during a ten year period following issuance of the permit. This qualification on the in-lieu fee usage is appropriate because of the direct sand supply impacts of the project are, as discussed in the next finding, ultimately direct impacts to public access and recreational resources in this subregion.

In summary, as conditioned to provide an in-lieu fee mechanism for beach replenishment, the project may be found consistent with section 30235 of the Coastal Act.

5. Public Access

The project is located between the first public road and the sea. Sections 30210-30214 of the Coastal Act state that maximum access and recreation opportunities be provided, consistent with, among other things, public safety, the protection of coastal resources, and the need to prevent overcrowding.

Section 30210 of the Coastal Act 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.

Section 30211 of the Coastal Act states:

Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.

Section 30220 of the Coastal Act states in part:

Coastal areas suited for water oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.

The subject parcels are located on top of a sixty-five (65) foot bluff above a narrow band of beach. This narrow, bluff backed beach extends approximately 4000 feet and connects Capitola City Beach at Soquel Creek to New Brighton State Beach downcoast. Whereas the property lines for these parcels were formerly on top of the bluff, the bluff has eroded back and the property lines now fall on the beach below. However, the adjoining beach directly in front of the parcels is part of New Brighton State Beach; the main body of the park lies about a 1000 feet downcoast. See Exhibit 2, Area Map, and Exhibit 3, Grove Lane Survey which show the former, current bluff edge and the State Parks ownership survey. The public has continuously traveled back and forth along this narrow beach between the wide sandy beaches at either end (Capitola Beach and New Brighton Beach). The bluff faces contain rich paleontological resources and interpretive walks along the Capitola bluffs are regularly scheduled by State Parks and by local educational institutes. In short, this is a significant public lateral access route used by local residents and visitors.

In addition, as already mentioned, the Commission's Regional Cumulative Assessment Project, December 1994, found that "shoreline protective measures cover an estimated 25 acres of beach along 12 miles of coastline in the ReCAP region (8.3 miles in Santa Cruz County and 3.7 miles in Monterey County", directly impacting public access. In Santa Cruz County the shoreline protective devices were found to be concentrated from the City of Santa Cruz to New Brighton/Seacliff State Beach, areas of high recreational use. There will be, then a significant cumulative impact on public access generated by the project.

As discussed in detail in finding 4, the Motroni/Bardwell project will also have distinct and quantifiable impacts on public resources. The sand supply lost to this project is a public resource that must be protected under the Access policies of the Coastal Act. The project will lead to the erosion and loss of public beach materials at New Brighton State Beach. Again, the beach that will be lost is currently a significant public lateral access route. Because of these impacts, the project as submitted is inconsistent with Coastal Act section 30211. Thus, mitigation of the sand supply impacts is also required by the public access and recreation policies of the Act. Therefore, as conditioned to provide an in-lieu fee that

will support either direct sand supply replenishment or perhaps public access and recreational benefits to compensate for the loss of sandy beach that is directly supportive of public access, the project may be found consistent with the Coastal Act with respect to its impacts on the public access and recreational resources in the Capitola subregion of the Santa Cruz littoral cell.

Public Trust Issues. In addition to publicly owned recreational beach parks, such as New Brighton State Beach and Capitola City Beach, the public has ownership and use rights in the lands of the State seaward of the ordinary high-water mark (public trust lands) and may have rights landward of the ordinary high water mark through historic public use (public prescriptive rights).

By virtue of its admission into the Union, California became the owner of all tidelands and all lands lying beneath inland navigable waters. These lands are held in the State's sovereign capacity and are subject to the common law public trust. The public trust doctrine restricts uses of sovereign lands to pubic trust purposes, such as navigation, fisheries, commerce, public access, water-oriented recreation, open space and environmental protection. The public trust doctrine also severely limits the ability of the State to alienate these sovereign lands into private ownership and use free of the public trust. Consequently, the Commission must avoid decisions that improperly compromise public ownership and use of sovereign tidelands.

Where development is proposed that may impair public use and ownership of tidelands, the Commission must consider where the development will be located in relation to tidelands. The legal boundary between public tidelands and private uplands is known as the ordinary high water mark. (Civil Code, 830.) In California, where the shoreline has not been affected by fill or artificial accretion, the ordinary high water mark of tidelands is determined by locating the "mean high tide line". The mean high tide line is the intersection of the elevation of mean high tide with the shore profile. Where the shore is composed of a sandy beach whose profile changes as a result of wave action, the location at which the elevation at which the elevation of mean high tide line intersects the shore is subject to change. The result is that the mean high tide line (and therefore the boundary) is an "ambulatory" or moving line that moves seaward through the process known as accretion and landward through the process know as erosion.

Direct Encroachment on Public Tidelands: In 1969 the applicants' southern property boundaries were located on the bluff top. Currently, they fall on the beach below several feet seaward of the toe of the bluff. Dunbar and Craig, License Land Surveyors, prepared a survey (January 1998) stating that the "mean high high water (elevation = 2.4) falls somewhere on the cliff face". Based on this information the State Lands Commission has determined that the seawall will be located on sovereign lands subject to the common law public trust. The State Lands Commission is currently processing a General Lease for use of the site. The coastal permit has been conditioned to required submittal State Lands Lease or evidence that the project may proceed pending completion of lease processing.

Other Impacts on Public Lands. Though the State Lands have agreed to issue a General Lease to the applicants, the structures will continue to the affect the public's ownership and use rights by changing the beach profile and reducing the area located seaward of the ordinary highwater mark, by a progressive loss of sand supply to nourish the beach and by causing greater erosion on adjacent public beaches (see finding 4). This is inconsistent with sections 30210-211 of the Coastal Act. However, as conditioned to provide an in-lieu fee to mitigate for these impacts, the project is consistent with the Coastal Act.

Temporary Impacts on Public Access: The seawall site directly fronts New Brighton State Beach. Equipment working from the beach is proposed to enter at Seacliff State Beach, more than a mile downcoast but the nearest feasible beach access. If staging from the blufftop is not feasible, the equipment staging area is proposed to be located downcoast of the site where the beach widens. The access route and the staging area require use of State Park properties.

The proposal presents difficulties for the applicant and for State Parks. The beach below the bluff is narrow and covered with water many hours of the day. The period of construction could take several days or weeks because of the need to adjust to the tidal cycles. The applicant proposes to work at night as necessary to take advantage of low tides. The heavy recreational season for the State Parks is from Memorial Day weekend through Labor Day weekend or later. State Parks has indicated that construction should be completed by Memorial Day (May 25) weekend. Equipment staging and construction on State Beaches particularly during the heavy use season could have significant impacts on access and pose liability issues.

The coastal development permit has been conditioned to require that the applicants submit to the Executive Director for review and approval written approval and conditions from the State Department of Parks and Recreation for access and staging on State Park property. Therefore, as conditioned, to require submittal to the Executive Director for review and approval (1) written evidence of the State Lands General Lease to allow the construction of the seawall on public trust lands and (2) written evidence from the Department of Parks and Recreation to permit access and staging of the project on State Parks property, the proposed development is consistent with the public access policies of the Coastal Act.

6. Geologic Hazards and Structural Stability

Section 30253 of the Coastal Act states:

> *New development shall:*
> *(1) 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.

The Capitola Land Use Plan Policy VII-11 states in part:

> *The City shall construct future drainage projects and improve existing drainage facilities where feasible so that runoff is directed away from the coastal bluffs or if it cannot be, it should be discharged in a place and manner so as not to contribute to erosion of a bluff or beach.*

The Santa Cruz County coastline has been subject to substantial damage as a result of storm and flood occurrences and geological failures. As discussed in the preceding findings the site of the proposed project is subject to these hazards. The Commission must find that the proposed seawall will be structurally stable and, hence, that it will provide the protection for which it has been designed.

According to Coastal Protection Structures and their Effectiveness, (Fulton-Bennett & Griggs, 1988) concrete walls, in general, have proved to be the most durable type of protection structure within the Central Coast Region from San Francisco to Carmel. Additionally, the COE Report, discussed in Finding 2 above, recommends concrete seawalls for this area.

The two most critical problems observed in the structural stability of concrete wall designs are, first, preventing loss of fill from behind, around and underneath the wall, and second, maintaining the wall's stability and rigidity if such a loss does occur.

Seawall Design: As previously discussed a cave/fill seawall was installed on the Webb property upcoast and adjacent to the Motroni parcel in the late 1980's. Purcell, Rhoades and Associates acted as the consultants for all three projects: Webb, Motroni and Bardwell. According to the Purcell Rhoades Update the seawall on the Webb property was installed in a deeply undercut (up to 12 feet) portion of the bluff and has a design similar to that proposed for the Motroni/Bardwell project. Its upper edge is recessed several inches to one foot, relative to the bluff face, at the level of what was the upper margin of a previous bluff failure. Most of the body of the seawall provides a surface approximately continuous with the bluff face.

Purcell evaluated the condition of the existing wall as part of the geotechnical analysis for the Motroni/Bardwell proposal. The consultant found that the footing of the Webb seawall appears intact, and only very slight sidecutting was observed at its southwest (upcoast) margin. Its northeast margin (at the Motroni property line) is returned into the bluff face and appears stable. Several pieces of rusted rebar protrude from the northeast edge. There are a very few small cracks and dislodgements from the gunite coating of this seawall, but its overall structure and appearance are very sound according to the consultant.

From this report and staff field observation the Webb wall requires some maintenance but is sound and is not apparently creating accelerated erosion at its ends. The implication of the

consultant's conclusions is that a similar structure similarly located can be expected to perform as well.

The proposed one hundred and fifty foot wall will be founded on bedrock. As discussed previously the reinforced concrete (shotcrete) erosion control seawall will be anchored into the bluff with two horizontal rows of 20 feet deep rock anchors. A third upper row of anchors located above the top of the wall will stabilize the cliff face itself. The ends of the wall will be nearly continuous to the existing bluff to mitigate end scour. The concrete wall will be structurally strengthened by reinforcing steel. There is no indication that the bars will be coated to prevent exposure to seawater. The use of epoxy coated rebar and 2 to 3 inches of concrete cover over steel is one recommendation to prevent deterioration from marine exposure. The permit has been conditioned to require that construction specifications include protection of rebar from marine exposure. This also will prevent the unsightly rust stains that occur.

Hydrostatic pressure from ground seepage behind the wall can destabilize the structure. Purcell, Rhoades found that the seepage is very extensive throughout the bluff face within the area of the proposed wall. The plans indicate that 12-inch wide geocomposite drainage material will be placed vertically at intervals of 5 feet and that seepage discharge would occur through 1/2 inch diameter PVC pipe weep holes. The weep holes would be joined with similar geocomposite mat. The consultant recommends that the exact placement of the drainage mats and weep holes should be determined in the field, with protective covers to prevent blocking the pipe discharge. In addition surface runoff is to be directed to discharge pipes which extend down the bluff face to prevent erosion. The upper bluff will have jute netting tied into the bluff and plantings of appropriate native vegetation.

Overall, to assure structure stability consistent with Section 30253 of the Coastal Act, the permit has been conditioned to require that the final plans be submitted to the Executive Director for review and approval prior to transmittal of the permit. The plans shall include bluff top drainage/erosion control plans. Only native plant species shall be incorporated into the erosion control plans. The final plans shall incorporate the recommendations of the Purcell, Rhoades and Associates, Geotechnical Site Evaluation Update for 106 and 108 Grove Lane, Capitola, CA, July 24, 1997. Any recommendations made by the Monterey Bay National Marine Sanctuary, Regional Water Quality Control Board and City of Capitola, and conditions of this coastal development permit shall supersede recommendations of the Purcell, Rhoades and Associates Update.

Monitoring and Maintenance: In addition, the effective life of a seawall will be determined by the severity and frequency of storms and the types of maintenance and repair provided. Though the seawall has been designed for longevity and stability, on an eroding shoreline any protective structure built to withstand direct wave attack is subject to deterioration. To ensure compliance with all of the recommendations and standards of the engineering reports and drawings, the project geotechnical engineer, geologist and civil engineer will conduct site inspections during construction. To prevent failure after construction, monitoring must be undertaken on a regular basis to provide for early detection of problems.

Therefore, to assure the continued stability of the seawall and to minimize the risk to bluff top residential structures consistent with Section 30253, the permit has been conditioned to require inspection of construction, and post construction monitoring and maintenance after major storms and annually. The inspection should be done by a qualified civil engineer. The engineer should report his findings to the property owner with a copy to the Coastal Commission. The report should be commensurate with the need, i.e., a single paragraph would be adequate if there was no evidence of damage or a full analysis of damage and recommended action might be needed.

Assumption of Risk: Finally, the Coastal Act recognizes that new development, such as the proposed seawall may involve some risk and that the constructed wall itself is subject to wave attack and erosion and as such involves risk. The Coastal Act policies require the Commission to establish the appropriate degree of risk acceptable for the proposed development and to determine who should assume the risk. When development in areas of identified hazards is proposed, the Commission considers the hazard associated with the project site and the potential to the public, as well as the individual's right to use his property.

Therefore, the Commission finds that due to the possibility of wave attack and erosion, the applicant shall assume these risks as a condition of approval. Since this risk of harm cannot be completely eliminated, the Commission is requiring the applicant to waive any claim of liability on the part of the Commission for damage to life or property which may occur as a result of the permitted development. The applicant's assumption of risk, when executed and recorded on the property deed, will show that the applicant is aware of and appreciated the nature of the hazards which existing which may adversely affect the stability or safety of the proposed development.

As conditioned, to require submittal to the Executive Director for review and approval (1) final plans for the seawall, (2) monitoring and maintenance provisions, and (3) a waiver of liability on the part of the Commission, the proposed development will be constructed and maintained to minimize risks to life and property consistent with Section 30253 of the Coastal Act.

7. Water Quality

Coastal Act Section 30230 states:

> *Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

Section 30231 of the Coastal Act states:

> *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

In 1992 the waters to the mean high water line lying adjacent to the Central California coastline were designated the Monterey Bay National Marine Sanctuary (MBNMS). The area was designated by the Secretary of Commerce as a marine environment of special national significance to ensure comprehensive management and protection. Discharges into Sanctuary waters require review by the MBNMS. In addition, the Regional Water Quality Control Board is reviewing the proposal.

The seawall footing will be excavated and poured during periods of low tides. The sandstone material, approximately 120 cu.yds., that is excavated for the seawall footing will be initially used as a coffer dam and then allowed to wash to sea. This is a naturally occurring material that may increase turbidity temporarily but is not expected to have any significant impacts on the marine environment. According to the applicant the shotcrete material used for the wall is relatively stiff and dry and does not require dewatering.

The applicant has submitted the project plans to the Monterey Bay National Marine Sanctuary for review and approval and has applied to the Regional Water Quality Control Board for a Waste Discharge Permit.

The permit has been conditioned to require review and approval of the project by the Monterey Bay National Marine Sanctuary and the Regional Water Quality Control Board to assure consistency with water quality standards. In addition, the permit has been conditioned to provide for construction monitoring which provides that no concrete or construction debris shall enter ocean waters. All construction materials and debris must be removed from the beach at the conclusion of the construction operation.

Therefore, as conditioned, the proposed development will not significantly impact the water quality and biological productivity of the coastal waters and is consistent with Sections 30230-1 of the Coastal Act.

8. <u>Archaeological and Paleontological Resources</u>

Section 30244 of the Coastal Act provides:

Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.

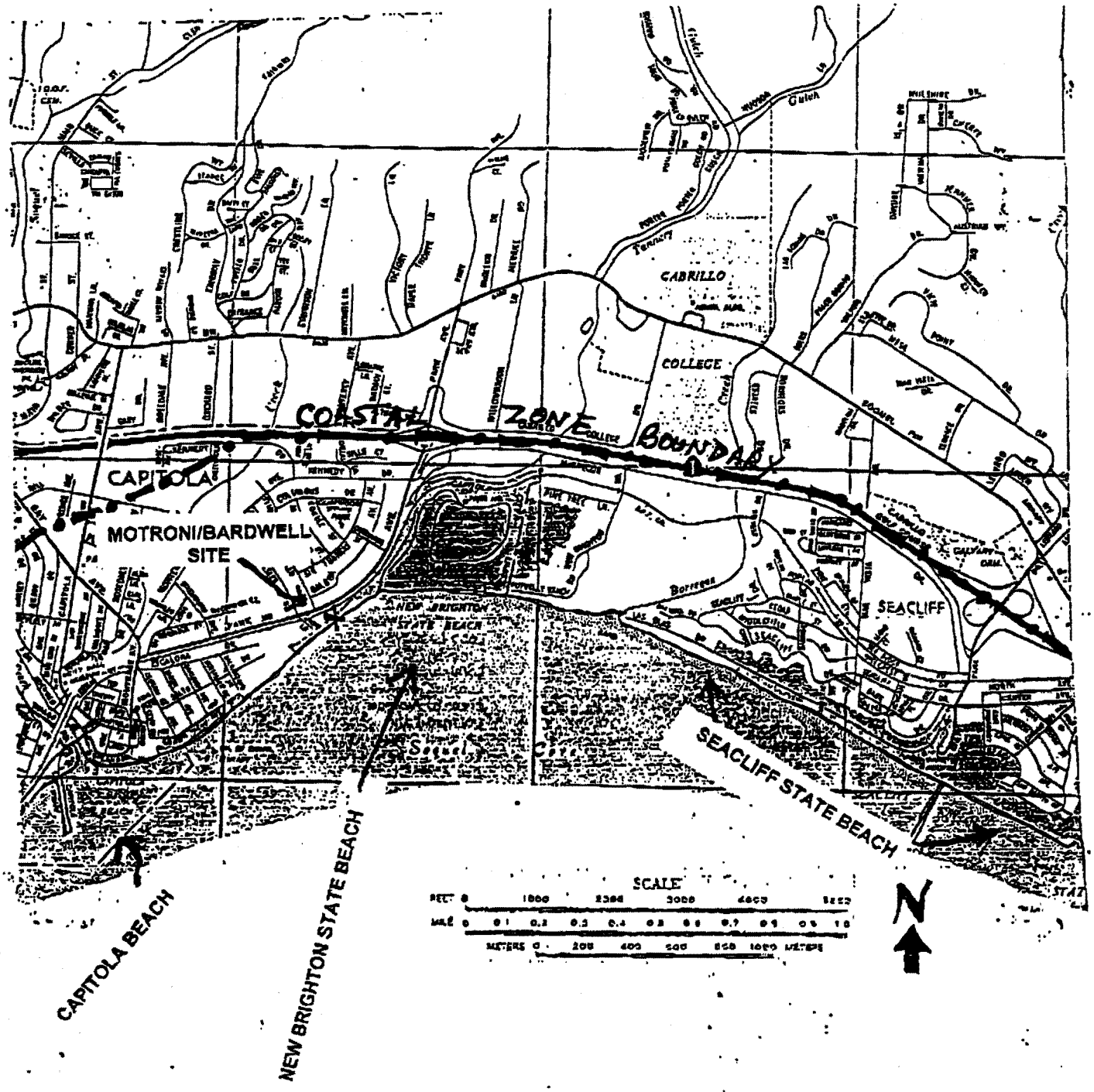
Capitola's Coastal Zone contains an important fossil record. Most of these paleontological resources are found in the Purisima Formation, a geological unit of sandstone and siltsone approximately 3 to 6 million years old. The bluff faces contain rich paleontological resources and interpretive walks along the bluffs are regularly scheduled by State Parks and by local educational institutes. There is a high potential for paleontological resources along all the bluffs in Capitola. The Capitola Land Use Plan Archaeological/Paleontological Sensitivity Map I-1 shows the site within an area of potential archaeological resources. According to the LUP a significant number of fossils have actually been found in the bluffs below Grand Avenue. LCP Implementation, Section 17.11 Archaeological/Paleontological Resources District of the Capitola Zoning Ordinance, requires that in mapped sensitivity areas, an archaeological/paleontological survey report shall be required for any development.

The project involves excavating and filling of the coastal bluff which has the potential to both disturb and cover paleontological resources. No survey for paleontological resources has been done. The permit has been conditioned to require an archaeological survey report and reasonable mitigation, if required, consistent with provisions of the Capitola City Local Coastal Program and with the Coastal Act. Therefore, as conditioned, the proposed development is consistent with Section 30244 of the Coastal Act.

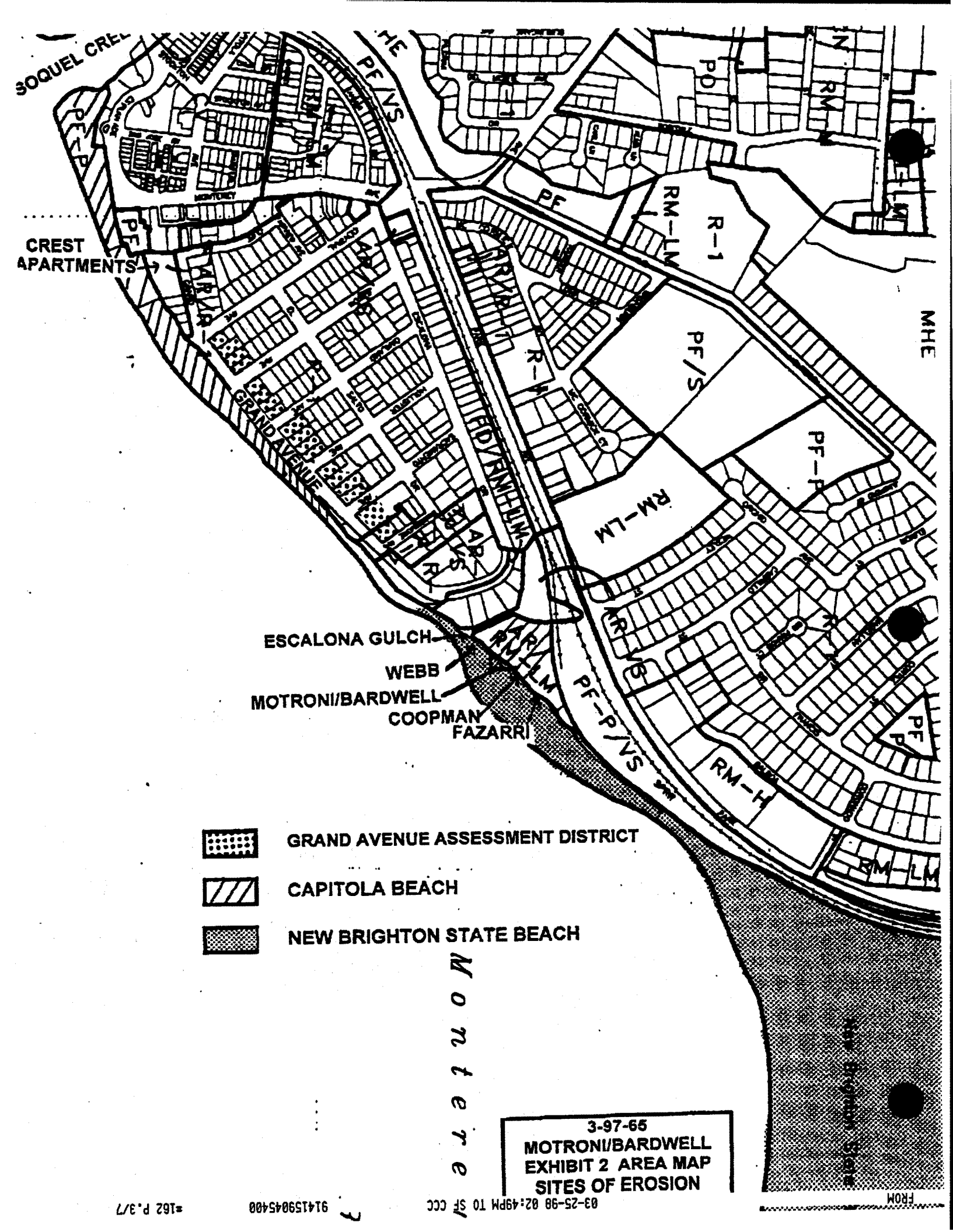
9. Local Coastal Program/CEQA

The City of Capitola Local Coastal Program was certified in April 1990 and City assumed coastal development permit authority in the coastal zone with the exception of City lands within the Commission's original jurisdiction, i.e., tidelands, submerged lands, and public trust lands. The City approved a Conditional Use Permit and a Coastal Permit and adopted a Negative Declaration for the Motroni/Bardwell seawall project on November 6, 1997. The coastal permit was to apply to any portion of the wall within the City's permit jurisdiction. The City conditioned the permit to require the applicant to obtain a coastal development permit from the Coastal Commission to assure Commission review of any portion of the wall within the Commission's original jurisdiction. Shoreline protective works are integrated structures that often cross these paper boundaries as in this case. The Commission and City work together to assure that Coastal Act and LCP policies are met.

Specific relevant Capitola LCP policies have been discussed in the preceding findings. The proposed seawall, as conditioned, will be consistent with the City's Local Coastal Program and the California Coastal Act. There are no feasible alternatives or feasible mitigation measures available, other than those imposed, that would substantially lessen any significant adverse impact and, as conditioned, the proposed project will not have significant adverse effect on the environment, within the meaning of the California Environmental Quality Act.



3-97-65
MOTRONI/BARDWELL
EXHIBIT 1
LOCATION MAP



VERTICAL DATUM

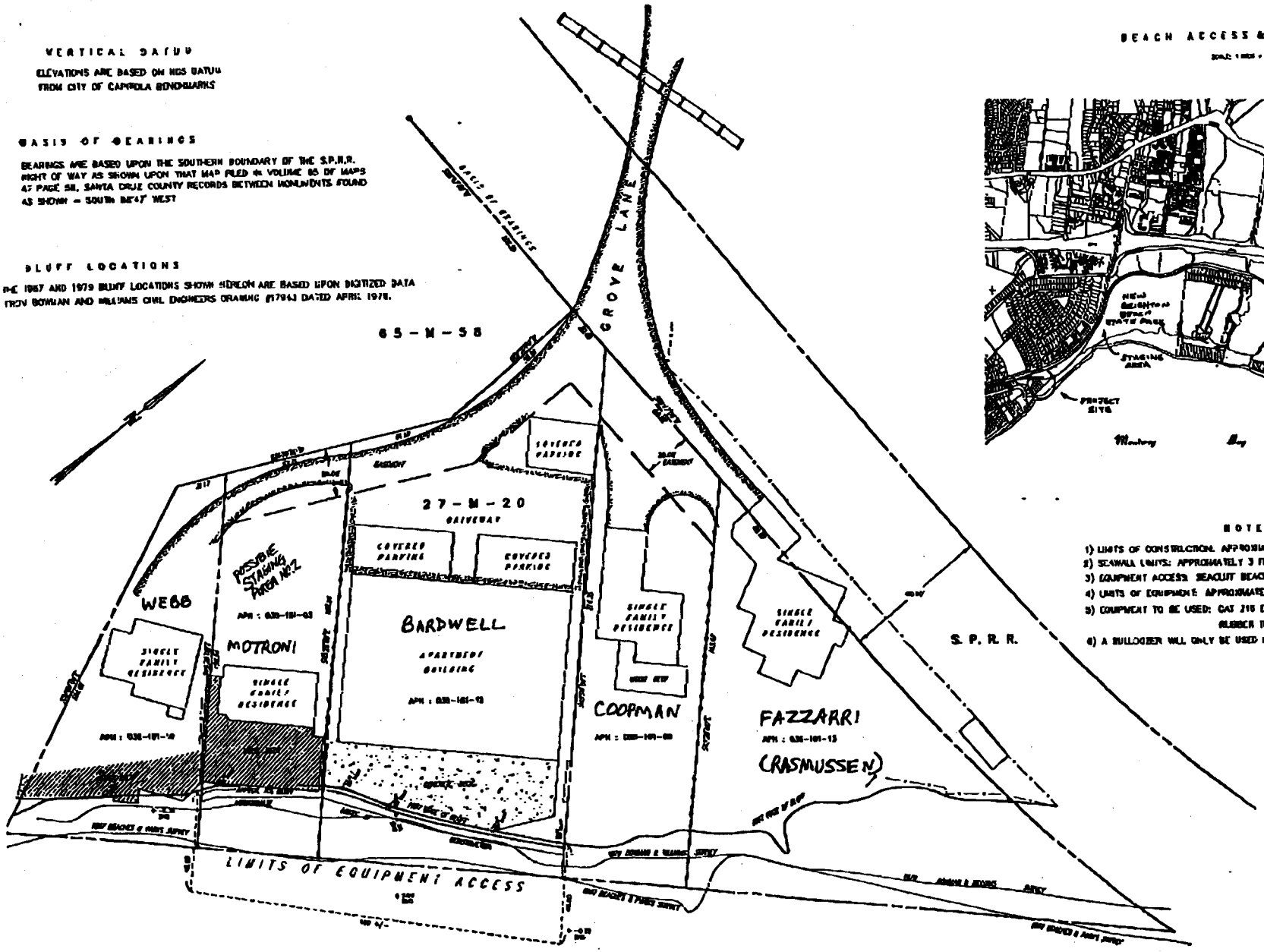
ELEVATIONS ARE BASED ON NGS DATUM FROM CITY OF CAPITOLA BENCHMARKS

BASIS OF BEARINGS

BEARINGS ARE BASED UPON THE SOUTHERN BOUNDARY OF THE S.P.R.R. RIGHT OF WAY AS SHOWN UPON THAT MAP FILED IN VOLUME 85 OF MAPS AT PAGE 58, SANTA CRUZ COUNTY RECORDS BETWEEN MONUMENTS FOUND AS SHOWN — SOUTH 84°47' WEST

BLUFF LOCATIONS

THE 1987 AND 1979 BLUFF LOCATIONS SHOWN HEREON ARE BASED UPON DIGITIZED DATA FROM BOWMAN AND WILLIAMS CIVIL ENGINEERS DRAWING #17943 DATED APRIL 1978.



BEACH ACCESS & VICINITY MAP

NOTES

1) LIMITS OF CONSTRUCTION: APPROXIMATELY 4 FEET WIDE FROM BASE OF SLOPE
2) SEAWALL LIMITS: APPROXIMATELY 3 FEET WIDE AT BASE OF SLOPE
3) EQUIPMENT ACCESS: SEACLIFF BEACH STATE PARK
4) LIMITS OF EQUIPMENT: APPROXIMATELY 40 FEET
5) EQUIPMENT TO BE USED: CAT 215 EXCAVATOR - 90 TON CRANE RUBBER TIRE ALL TERRAIN TR
6) A BULLDOZER WILL ONLY BE USED IF NECESSARY TO BI

3-97-65
MOTRONI/BARDWELL
EXHIBIT 3
GROVE LANE SURVEY/
BLUFF LOCATION MAP

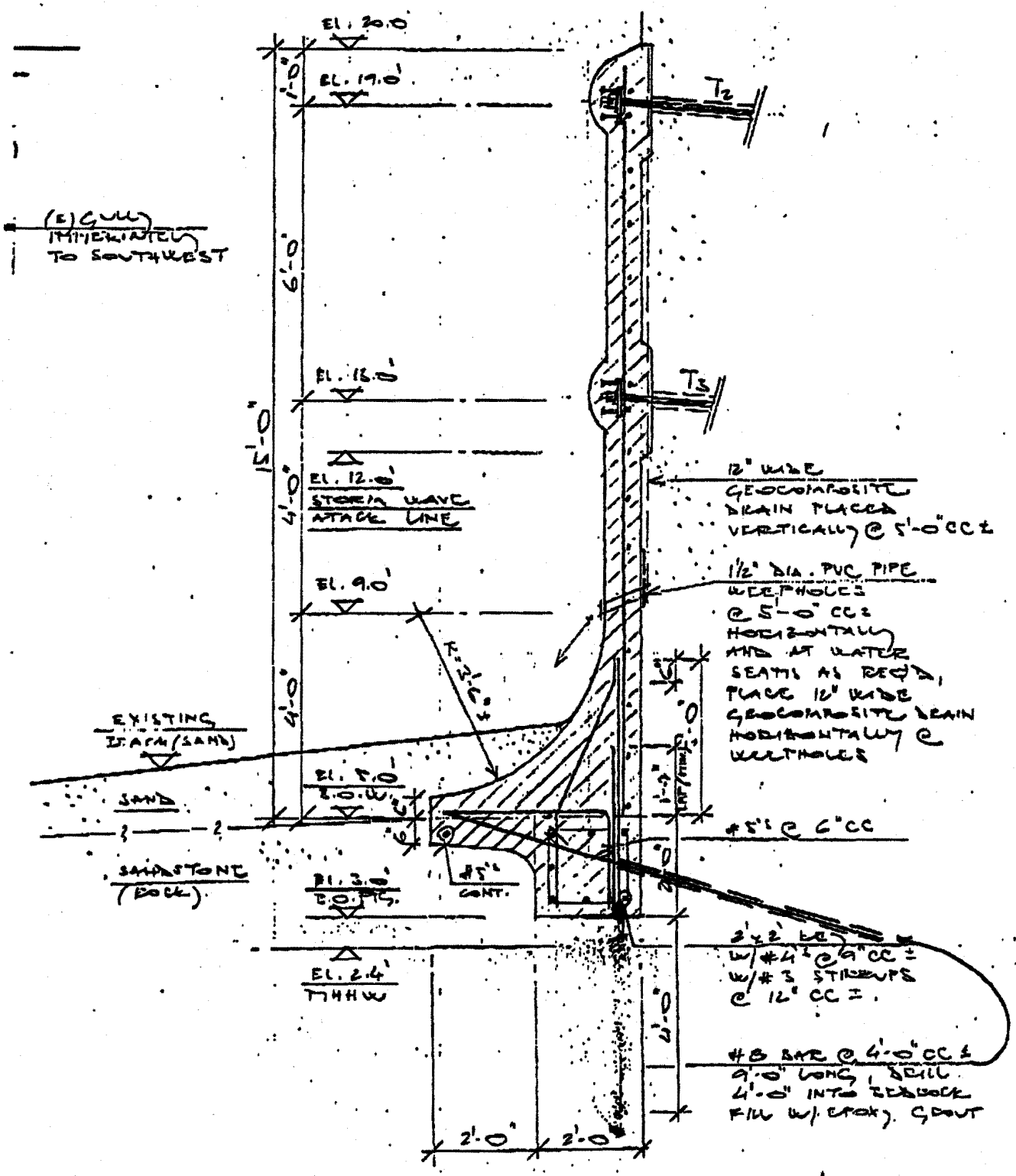
GRAPHIC SCALE

DUNBAR and CRAIG
REGISTERED LAND SURVEYORS

TOPOGRAPHIC COASTAL GROVE

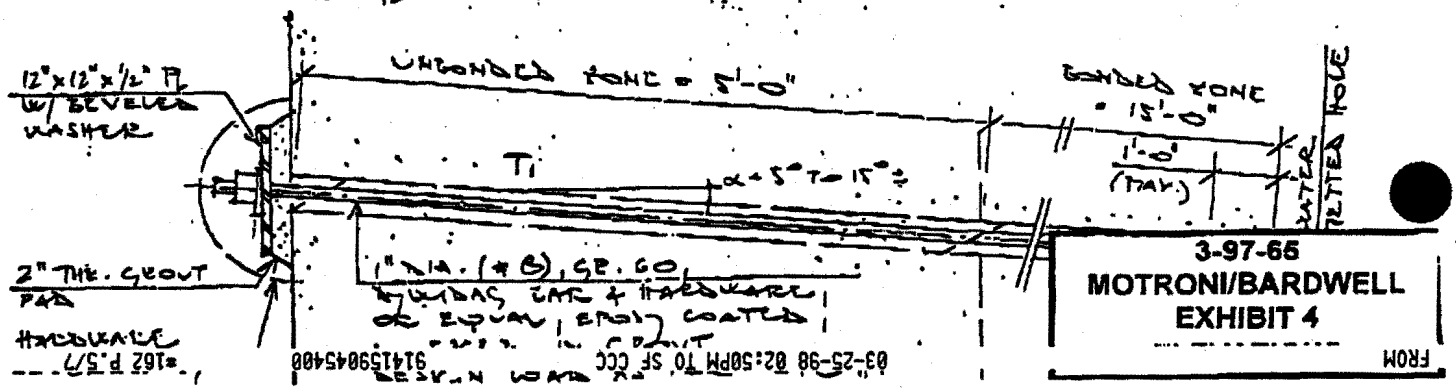
CITY OF

APN : 036-181-34



DETAIL - SHOTCRETE FACING (2)

SCALE ½" = 1'-0"



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3-97-65
MOTRONI/BARDWELL
EXHIBIT 4

SHORE ENVIRONMENT

- SANDY BEACH
- BEACH BACKED BY MARSH
- CLIFF PROTECTED BY BEACH
- UNPROTECTED CLIFF
- RIPRAP
- SEAWALL
- GUNNITE
- EROSION RATE IN INCHES PER YEAR

STATUS OF EXISTING SHORE PROTECTION

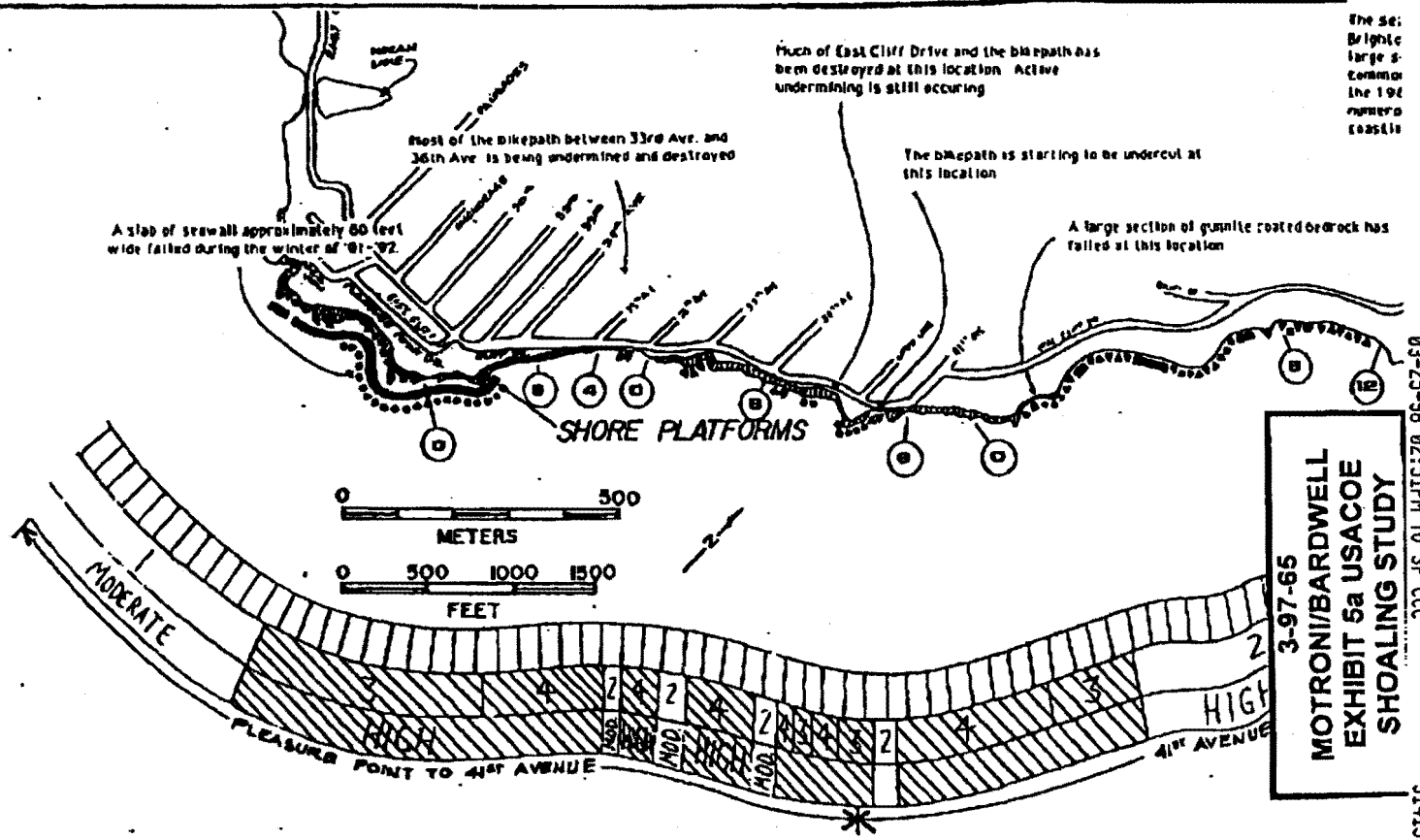
1. ADEQUATE - Existing seawall/riprap/gunnite is stable. Cliff is stable and erosion is minor.
2. SEMI-ADEQUATE - Existing seawall/riprap/gunnite is stable. Cliff is unstable and actively eroding, mainly through terrestrial processes.
3. INADEQUATE - Existing seawall/riprap/gunnite is unstable and failing. Cliff is unstable and actively eroding through both marine and terrestrial processes.
4. UNPROTECTED - No engineered protection structure exists. Cliff erosion is very active at locations lacking a protective beach.

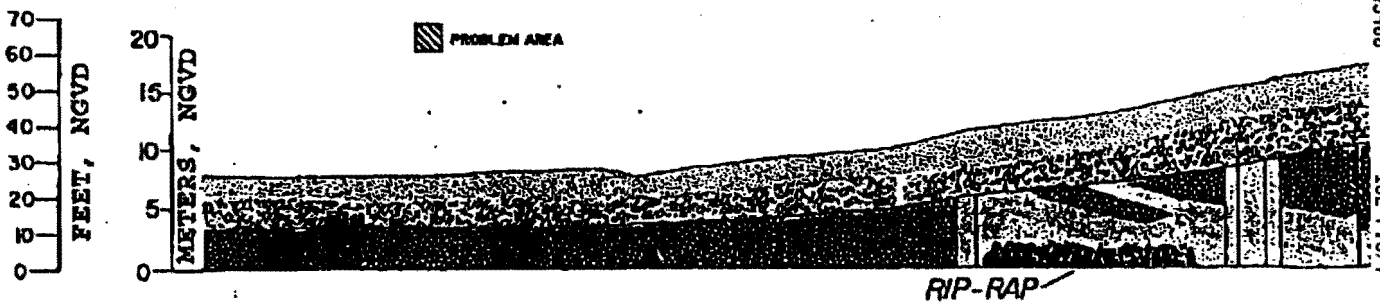
HAZARD ZONES

LOW - Erosion is minor, and risk of losing property, structures, etc. is low.

MODERATE - Erosion is active, and risk of losing property, structures, etc is moderate

HIGH - Erosion is very active, and risk of losing property, structures, etc is high





3-97-65
MOTRONI/BARDWELL
EXHIBIT 5a USACOE
SHOALING STUDY

SANTA CRUZ COUNTY CALIFORNIA

GENERAL INVESTIGATIONS
SANTA CRUZ
HARBOR AND VICINITY
SHOALING STUDY

STATUS OF EXISTING SHORELINE

IN SHEET (SECTION III) SHEET NO.
U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
DRAWN: FILE NO.
TRACED:
CHECKED:
TO ACCOMPANY REPORT
DATED 12 JANUARY 1994

BEACH BACKED BY MARSH

UNPROTECTED BY BEACH

UNPROTECTED CLIFF

SEAWALL

GUNNITE

EROSION RATE IN INCHES PER YEAR

seawall/riprap/gunnite is stable. Cliff is stable and erosion is

2. SEMI-ADEQUATE - Existing seawall/riprap/gunnite is stable. Cliff is unstable and actively eroding, mainly through terrestrial processes

3. INADEQUATE - Existing seawall/riprap/gunnite is unstable and failing. Cliff is unstable and actively eroding through both marine and terrestrial processes

4. UNPROTECTED - No engineered protection structure exists. Cliff erosion is very active at locations lacking a protective beach

HAZARD ZONES

LOW - Erosion is not active, and risk of losing property, structures, etc is low.

MODERATE - Erosion is active, and risk of losing property, structures, etc is moderate

HIGH - Erosion is very active, and risk of losing property, structures, etc is high

FROM

Drive and the bikepath has this location. Active

l: occurring

The seacliff between 41st Ave and New Brighton Beach is extremely unstable, and large scale slumps and rockfalls are a common occurrence. Seismic shaking during the 1989 Loma Prieta Earthquake resulted in numerous failures throughout this section of coastline

The bikepath is starting to be undercut at this location

A large section of gunnite coated bedrock has failed at this location

A large section of Cliff Drive, including the bikepath has been destroyed, and is currently being undermined.

During the winter of 1983 major inundation of oceanfront restaurants by wave smash and high tides caused major damage

CAPITOLA

Undercutting and cliff failure & cracking during the 1989 Loma Prieta Earthquake led to the demolition of 6 apartment units and closure of Grand Ave., east of Central Ave.

GROIN

SEAWALL

MOTRONI/BARDWELL
APPROX. LOCATION OF SITE

3-97-65
MOTRONI/BARDWELL
EXHIBIT 6b USACOE

ADDIS GUNTER
09-25-98 02:51PM TO SF CCC

HIGH

41ST AVENUE TO CAPITOLA BEACH

MODERATE

CAPITOLA BEACH

HIGH

CAPITOLA BEACH TO NEW BRIGHTON STATE BEACH

9141590545400

P.7/7

SANTA CRUZ COUNTY CALIFORNIA

GENERAL INVESTIGATIONS
SANTA CRUZ
HARBOR AND VICINITY
SHOALING STUDY

STATUS OF EXISTING SHORELINE
(SECTION II(I))

NO SHEET SHEET NO.

U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E

DRAWN: FILE NO.

TRACED: TO ACCOMPANY REPORT

CHECKED: DATED 12 JANUARY 1994

PLATE 8

Figure 4-3 Long-term Loss of Beach Area with a Fixed Back Beach.

EXHIBIT NO. 6
APPLICATION NO.
3-97-55
Motroni/Bardwell

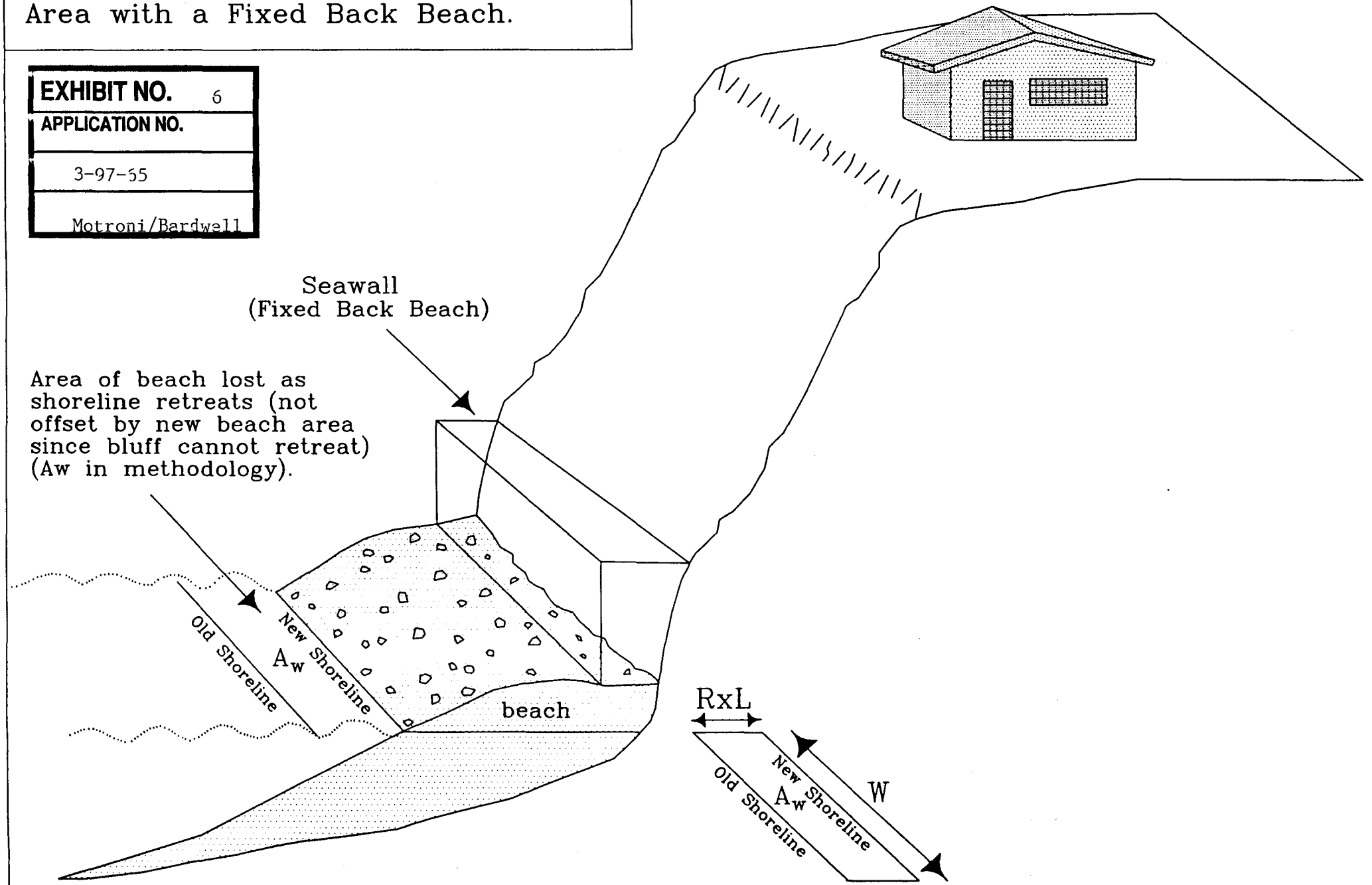


Figure 4–4 Material Added to Littoral System from Natural Bluff Erosion.

EXHIBIT NO. 7
APPLICATION NO.
3-97-65
Motroni/Bardwell

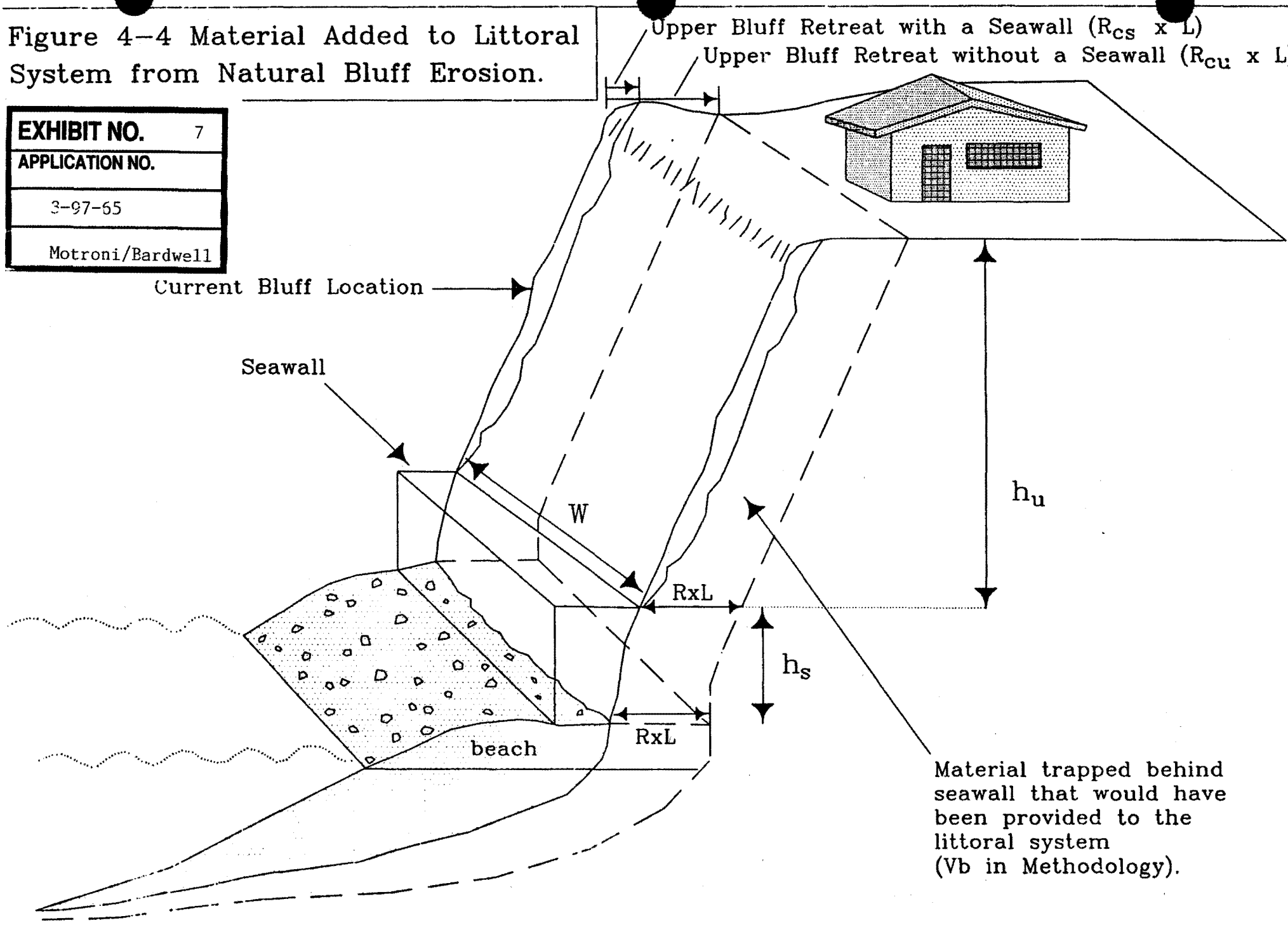


Figure 4-2 Encroachment Area-Beach Area Lost Due to Placement of a Structure on the Beach.

EXHIBIT NO. 8
APPLICATION NO.
3-97-65
Motroni/Bardwell