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STAFF REPORT
PERMIT AMENDMENT

Application number ..... **3-83-217-A4, City of Carmel Bluff Repair and Protection**

Applicant ..... City of Carmel-by-the-Sea

Project location ..... Scenic Road between 9th and 12th Avenues in the City of Carmel-by-the-Sea, Monterey County (APNs: 010-313-01 & 010-294-01).

Project description ..... Amend permit to place landscaped revetment along approximately 240 linear feet of beach bluffs in front of Scenic Road between 11th and 12th Avenues and to install 2-foot high guardrails at various locations along Scenic Road between 9th and 12th Avenues. Previously permitted activities involved the development of a blufftop recreational trail, stairways to the beach, shoreline protective work, and guardrails along the Carmel City Beach.

Local approvals rec'd ..... City Council 10/7/97 & 9/9/97; Planning Commission 8/20/97; CEQA: Negative Declaration

File documents ..... City of Carmel LCP Land Use Plan; Permit files for P-980, P-79-320, 3-83-217-A1, 3-83-217-A2, 3-95-045-G, and 3-83-217-A3; Carmel Beach Management Plan (as amended); Phase 1 Erosion Protection, Carmel Beach (by Rogers Johnson & Associates, September 1983); Carmel Beach Restoration Phase 2 (December 1985 & May 1986); Coastal Conservancy Project Report 85-502 (Carmel Beach Restoration Project) (March 1987).

Staff recommendation .... **Approval with conditions**

Staff Summary: Staff recommends approval with conditions. As conditioned, the proposed amendment will be consistent with the provisions of the Carmel Beach Management Plan and will protect Scenic Road, the City's sewer line, and the Commission-approved recreational pathway system from future erosion and storm events. The rip-rap revetment will be camouflaged by pushing sand up over its base and covering the top portion with a vegetated landscape 'cap'. With the City's proven track record for innovative landscaping of revetments, over time, this structure should blend into the natural back beach bluff, similar to previous efforts permitted by the Commission over the past 23 years on the publicly owned Carmel City Beach. As such, the shoreline protective work will preserve scenic and recreational values of the world famous Carmel Beach consistent with the public access and resource policies of Chapter 3 of the Coastal Act.

STAFF REPORT CONTENTS

1. STAFF RECOMMENDATION ON COASTAL DEVELOPMENT PERMIT

The staff recommends that the Commission, after public hearing, adopt the following resolution:

Approval with Conditions. The Commission hereby grants a permit for the proposed development, as modified by the conditions below, on the grounds that the modified development will be in conformance with Chapter 3 of the California Coastal Act of 1976 (Coastal Act), will not prejudice the ability of the City of Carmel to implement 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 recreation policies of Chapter 3 of the Coastal Act, and will not have any significant adverse impact on the environment within the meaning of the California Environmental Quality Act (CEQA).

2. CONDITIONS OF APPROVAL

A. Standard Conditions (see Appendix A)

B. Special Conditions

1. **Final Plans.** PRIOR TO THE ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the permittee shall submit to the Executive Director for review and approval revised plans which clearly identify the drainage features to be incorporated into the revetment in conformance with the Geotechnical Investigation by Rogers E. Johnson & Associates, dated February 20, 1997.

2. **Construction Plans.** PRIOR TO COMMENCEMENT OF CONSTRUCTION, the permittee shall submit to the Executive Director for review and approval construction plans which clearly indicate when construction activities will begin and end (both daily schedules and overall duration of the project) and include maps showing the location of staging areas and access corridors to the construction site and staging areas. Staging areas and construction access corridors shall be located in a manner that has the least impact on public beach access. Any disturbed areas shall be restored immediately following completion of the development.

3. **Archaeological Resources.** PRIOR TO COMMENCEMENT OF ANY EXCAVATION IN OR ON THE BLUFF, the permittee shall submit to the Executive Director for review and approval either:
   a. evidence that there are no potential impacts to archaeological resources associated with the construction of the revetment (e.g., previous archaeological surveys for the area); or
   b. a plan providing for archaeological monitoring by a qualified professional archeologist, as well as evaluation and mitigation in the event that any archaeological resources are discovered during excavation.

4. **Revegetation Evidence.** WITHIN SIX (6) MONTHS OF COMPLETION OF THE REVETMENT, the permittee shall submit to the Executive Director for review and approval evidence that the revetment was revegetated by backfilling sand over its base and covering the top portion with soil and landscaping consistent with previous revetments approved by the Commission to the north of the subject site (see Exhibit C-4).

5. **Monitoring and Maintenance Plans.** WITHIN THREE (3) MONTHS OF COMPLETION OF THE REVETMENT, the permittee shall submit to the Executive Director for review and approval a monitoring and maintenance plan in conformance with the monitoring and maintenance recommendations contained in the Geotechnical Investigation by Rogers E. Johnson & Associates, dated February 20, 1997. The applicant shall comply with all terms and conditions of the monitoring and maintenance plan. Maintenance of the permitted shoreline protective device shall be the responsibility of the permittee. If after inspection, it is apparent repair or maintenance is necessary, the permittee should contact the Commission office to determine whether permits are necessary.

6. **Other Approvals.** PRIOR TO COMMENCEMENT OF CONSTRUCTION, the permittee shall submit to the Executive Director documentation from the State Lands Commission, the U.S. Army Corps of Engineers, and the Monterey Bay National Marine Sanctuary showing that the project has been approved by those agencies or that no approval is necessary. Any mitigation measures or other changes to the project required by these other agencies shall reported to the Executive Director and shall become part of the project. Modifications that the Executive Director determines to be significant shall require an amendment to this permit or a separate coastal development permit.

7. **Assumption of Risk.** PRIOR TO THE ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the permittee shall submit to the Executive Director for review and approval an authorized signed document in which the applicant understands that the site may be subject to extraordinary hazard from bluff retreat and erosion and assumes the liability from such hazards, and the permittee unconditionally waives any claim of liability on the part of the Commission or its successors in interest for damage from such hazards and agrees to indemnify and hold harmless the Commission, its offices, agents, and employees against any and all claims, demands, damages, costs, expenses or liability arising out of the Commission's approval of the project.

3. RECOMMENDED FINDINGS AND DECLARATIONS

A. Project Description

The proposed amendment is to install a rip-rap revetment along approximately 240 linear feet of beach bluffs below Scenic Road between 11th and 12th Avenues, and to install 2-foot high guardrails at various locations along Scenic Road between 9th and 12th Avenues in the City of Carmel-by-the-Sea (See Exhibit B). The rip-rap is intended to protect Scenic Road, utilities buried under Scenic Road, and the heavily used beach bluff pathway running along the top of the relatively steep, approximately 25 foot high bluff.

The revetment would extend from the top of the bluff (approximately 34 feet above mean sea level) to the bottom of a 3 foot keyway buried in the bedrock below the beach sand -- a structural vertical height of 37 feet. With the existing beach sand approximately 8 feet above the top of the mean sea level bedrock, approximately 26 vertical feet of revetment would be visible from the beach. The width at the base of the revetment would vary from approximately 5 feet to approximately 28 feet (see Exhibit C). Sand will be pushed up over the base of the revetment and the top will be covered with soil and landscaping to achieve a more natural appearance (see Exhibit C-4).

The proposed rip-rap is intended to stabilize and protect a coastal bluff area which failed during the winter storms of 1996-97. The bluff failure was primarily due to saturation of the marine terrace deposits by both direct rainfall and subsurface drainage along the contact between the sandstone bedrock and the overlying marine layer. The proposed guardrails are intended to direct pedestrians using the recreational trail away from the bluff edge where their footsteps can lead to additional erosion of the bluffs.

Project History

This proposed amendment is consistent with past shoreline work approved by the Commission along the Carmel Beach over the years and ties directly into these previous efforts.

In 1974, the Commission approved the original Carmel Beach Management Plan which described the judicious use of shoreline protection structures and landscaping to stabilize slopes along Scenic Road in order to protect both Scenic Road and the character of the Carmel Beach itself (P-980, approved 11/4/74). This original plan acknowledged the need to protect the bluffs through a combination of retaining walls, landscaping, and sand contouring that would best approximate a natural look in harmony with natural beach and bluff appearance. The stated main goal of the plan was "to preserve the beauty of this unique and scenic area" by maintaining the bluff as a greenbelt between the white sand beach and Scenic Road.

The 1974 permit authorized beach bluff seawalls at four different locations, including seawalls directly up and down coast of the current amendment request, as well as multiple stairways to the beach. This 1974 shoreline work was augmented in 1979 by additional rip-rap revetments authorized through the Beach Management Plan at the coves present at 12th and 13th Avenues directly south of the current application (P-79-320, approved by the Commission 6/25/79).

The severe winter storms of 1982-83 caused extensive damage to not only the beach itself, but to the existing revetments, seawalls, bluff slopes, stairways, and utilities. These winter storms removed much of the beach leaving the bluffs, shoreline protective work, and stairways unprotected from wave attack. In addition, major damage was caused by storm water runoff and groundwater drainage which weakened the natural bluff structure along the Carmel Beach bluffs.

In 1983, the Commission approved Phase 1 of the Carmel Beach Restoration Plan (3-83-217-A1, 11/15/83) as an amendment to the original Beach Management Plan. Phase 1 consisted of the installation of emergency restoration measures in the form of major areas of rip-rap revetment (approximately 10,000 tons of rip-rap), reconstruction of lost stairways, repair of failed bluffs, and interim sand replenishment. An important part of these Phase 1 repairs was the construction of the City's shoreline storm drainage system designed to relieve pressure on the bluffs due to water saturation and to redirect storm drainage away from stairs and bluff slopes.

In 1987, the Commission approved another segment of seawall at the terminus of 12th Avenue (immaterial amendment approved 4/6/87) and further amended the Beach Management Plan through Phase 2 of the Carmel Beach Restoration Plan (3-83-217-A2, approved 6/9/87). Phase 2 was the culmination of 3 years of planning efforts and resulted in redirecting Scenic Road to one-way to make way for access improvements, the development of the blufftop scenic walkway, rebuilding of 5 stairways, creation of a sand ramp for handicapped access, revegetation of bluff slopes, construction of visitor amenities (i.e., benches, trash receptacles, drinking fountains, etc.), and guardrails to direct pedestrians away from fragile bluff slopes to developed accessways.

The comprehensive work begun in 1983 and completed in 1988 through Phases 1 & 2 of the Carmel Beach Restoration Plan has defined the bluffs along Carmel Beach as a meandering mixture of shoreline protection (both rip-rap revetments and seawalls), extensive vegetation, stairway access, and a continuous scenic recreational trail with intermittent guardrails along the top. In general, the hardened "points" of the bluffs have typically been protected with seawalls while the softer terrace deposits in the "bays" have been treated with rip-rap. The City of Carmel has been quite successful in camouflaging the rip-rap and seawalls with vegetation. In particular, by covering the bottom rip-rap revetments with sand, and the top with soil and vegetation cover, the effect achieved is very natural and aesthetically pleasing. Because of these extraordinary efforts, it can be difficult to pinpoint where there is, and is not, rip-rap protection on the bluff slopes (see Exhibit C-4).

Relationship of this amendment to previous work

The shoreline planning methodology evidenced by the project history at Carmel Beach is the context within which the current amendment proposal is before the Commission. The current request is nearly identical to the work approved by the Commission more recently in 1995 when approximately 100 feet of bluff failed due to subsurface drainage and wave action associated with 1993 and 1995 winter storms. In that instance, the Commission approved an immaterial amendment (3-83-217-A3, approved 8/11/95) to restore the failed bluff with rip-rap and vegetation. The current proposal is directly north of this revetment approved two years ago and would tie into this previous work.

The project is necessary, according to the consulting engineering geologist, Rogers Johnson and Associates, because of (1) erosion and failure of the marine terrace deposits which make up the upper portion of the bluff, and (2) the long term retreat of the sandstone bluff due to surf erosion. Although only the upper marine terrace deposits failed during last winter, the sandstone bedrock bluff could potentially be eroded by surf erosion leading to a corresponding failure in the overlying terrace deposits. With Scenic Road, the City's sewer line, and the shoreline recreational trail at risk, the City believes that the shoreline protective work is required to protect these existing structures from upcoming winter storms. Given that typical winter storms this year may be intensified by the El Niño weather phenomenon, similar to the 1982-83 winter storms that severely damaged the Carmel Beach, the City believes that this protective work is that much more pressing.

B. Issue Discussion

1. Allowing Shoreline Structures

Section 30235 of the Coastal Act addresses the use of shoreline protective devices:

> ***30235:*** *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.*

Under this section of the Coastal Act, the Commission shall approve a shoreline structure if it finds that (1) there is an existing structure in danger from erosion, (2) shoreline altering construction is required to protect the existing threatened structure, and (3) the required protection is designed to eliminate or mitigate the adverse impacts on shoreline sand supply.

Existing structure at risk

The proposed revetment would protect both Scenic Road and the City's sewer line beneath Scenic Road. Under the Coastal Act definition of development (Section 30106), the road and sewer line are considered existing structures. In addition, the Commission-approved beach bluff pathway system and a portion of the retaining wall supporting the pathway, are also present at the top of the bluff. According to the consulting engineering geologist, Rogers Johnson and Associates, the project is necessary because of (1) erosion and failure of the marine terrace deposits which make up the upper portion of the bluff, and (2) the long term retreat of the sandstone bluff due to surf erosion. Although only the upper marine terrace deposits failed during last winter, the sandstone bedrock bluff could potentially be eroded by surf erosion leading to a corresponding failure in the overlying terrace deposits. The consulting engineering geologist has indicated that, based upon the *long term* erosion rate at this location, the overlying structures at this location may be undercut by surf erosion within 5 to 10 years.

With upcoming winter storms, and the State bracing for the possible compounding effect of the El Niño weather phenomenon, the City is concerned that an episodic storm event may lead to bluff failure at this location. Several such episodic events have been documented at Carmel Beach over the years with retreat of up to 40 feet documented due to the 1982-83 winter storms directly to the south of the subject site. Given that there is virtually no bluff setback at this location, such a storm event that led to additional bluff failure could have a catastrophic impact on Scenic Road, the sewer line, and the recreational trail.

The City's conclusion was corroborated by Commission staff field observations on October 2, 1997. Reconnaissance of the site showed that the bluff appeared fairly sheer and unstable at the failure point with the beach roped off for public safety purposes below. The flotsam and jetsam present on the sand this day indicated that high tides had reached the bluff directly north of the failure point in the very recent past (see Exhibit B-4). Overall, there appears to be significant near term risk to Scenic Road and the sewer line located directly inland of the bluff's edge. In addition, the Commission-approved recreational trail along the edge of the bluff is also at risk.

This project, therefore, meets the first test of Section 30235 of the Coastal Act.

Feasible Protection Alternatives to a Shoreline Structure

The second test of Section 30235 of the Coastal Act that must be met is that the proposal to alter the shoreline with the placement of rock slope protection must be *required* to protect the existing structure. In other words, there must be no feasible alternative to the use of a shoreline structure to protect Scenic Road and the City's sewer line.

No project alternative

One alternative to this project is the 'no project' alternative where the existing bluff that remains is the protective option. As just discussed, however, the risk to Scenic Road and the sewer line, as well as to the recreational path system, is sufficiently great to rule out this option. The City has estimated that repair costs (i.e., road, utilities, and path) would be around $600,000, with another $500,000 impact due to loss of use of these public facilities should a storm event occur at this location. Under this scenario, raw sewage would flow into the Carmel Bay. There is too much uncertainty about whether the winter rainy season, possibly magnified by the effects of El Niño, would produce erosion that would completely undermine the roadway. In addition, since approximately 2,000 square feet of beach are currently unavailable due to safety concerns, having been roped off by the City, the no project alternative currently results in the loss of useable recreational beach area. This alternative, therefore, is not feasible.

Moving threatened structures

A second alternative to a shoreline structure is to move the existing structures away from the dangerous bluff. However, with inland residential structures abutting the roadway on the east side of Scenic Road, there is little right of way space to accommodate an inland shift in the road. Furthermore, there would be an enormous cost associated with shifting the sewer line inland or moving it to another location. Even if the existing structures could be marginally shifted inland, the uncertain risk associated with a potential storm event at this location, as discussed above, would still threaten these structures. This alternative, therefore, is not feasible.

Bluff restoration

A third alternative to a shoreline structure is to restore the failed bluff section, employ new drainage features, and revegetate the slope to its previous configuration. Similar to the no project alternative, however, bluff restoration may not be sufficient to protect Scenic Road and the sewer line should winter storms and El Niño combine to produce erosion at this location that would completely undermine the roadway. In addition, the City has already installed a new storm drain system (following the 1982-83 storms) designed specifically to relieve pressure on the bluffs due to water saturation and to redirect storm drainage away from bluff slopes (3-83-217-A1, approved by the Commission 11/15/83). This alternative, therefore, is not feasible.

Overall, there are not any "soft" fixes that could be pursued to ensure protection of the existing structures at this location. The project, therefore, meets the second test of Section 30235 of the Coastal Act.

Sand Supply Impacts

The third test of Section 30235 that must be met in order to require Commission approval is that shoreline structures must be designed to eliminate or mitigate adverse impacts to local shoreline sand supply. Sand supply at Carmel Beach is atypical in that the sand supply system is essentially self-contained within the Carmel Bay. This west facing beach is bounded by granitic headlands that effectively prevent the migration of beach sand up and down the coast. For most sandy beaches, sand is supplied from the littoral drift of materials from upcoast and downcoast sources miles away. In

contrast, most of the sand on Carmel Beach is probably derived locally from erosion of sandstone and granitic bedrock [As described in Phase 1 Erosion Protection, Carmel Beach (by Rogers Johnson & Associates, September 1983)]. The Carmel River, south of the subject site, also contributes materials into the sand supply system. Thus, the potential impact to sand supply from revetment is threefold: (1) loss of sandy beach and/or sand generating materials (i.e., sandstone) under the footprint of the structure, (2) long term loss of beach when the back beach location is fixed on an eroding shoreline, and (3) loss of material that would have been supplied to the beach if the bluffs were allowed to erode naturally.

Structural footprint

All of the shoreline armoring options that the City has considered (i.e., seawall, seawall with partial revetment, and rip-rap revetment), would not be placed directly on sandy beach but rather would be keyed into the underlying sandstone at the subject site (see Exhibit C-2). While there are access and recreational issues associated with the loss of useable beach space, because the sand would be scraped away and the structures placed onto sandstone (and the sand pushed back over the revetment), the *sand supply* impact in this case concerns the potential loss of sandstone area (see beach encroachment section that follows for a discussion of access and recreational issues). As discussed above, according to the consulting engineering geologist, Rogers Johnson & Associates, sandstone is one probable source of sand for the Carmel Beach shoreline supply. As a result, each of the structural fixes pursued by the City would eliminate a small section of sandstone that would otherwise contribute to the local sand supply during winter beach conditions.

Fixing the back beach location

As a general rule, shoreline protective devices lead to a decreased local sand supply due to the cessation of natural bluff erosion. Shoreline armoring fixes the back beach location by hardening the bluff face with some form of structure (e.g., seawall). As the beach profile erodes, and the ocean's edge migrates inland, the beach will effectively narrow thus reducing public recreational access opportunities. In practice, however, every sand system is different. In the case of the Carmel Beach, fixing the back beach location, as has been done at multiple locations within the framework of the Carmel Beach Management Plan, as amended through the project history, has had a negligible effect on the overall width of the beach. The applicant has indicated that the beach has actually *increased* in width since the 1982-83 storms, after which the Commission approved multiple revetments along the bluffs.

Halting natural bluff erosion

By armoring the natural bluff face, shoreline protective devices typically remove a source of sand generating materials from the sand supply system. As discussed above, the consulting engineering geologist, Rogers Johnson & Associates, has indicated that most of the sand on Carmel Beach is probably derived locally from erosion of sandstone and granitic bedrock. As a result, by armoring this 240 foot length of bluff, the underlying sandstone comprising the bottom half of the bluff at this location can no longer contribute to the local shoreline sand supply (see Exhibit C-2).

Because the project will cover sandstone, eliminating a source of local sand supply, this adverse impact to the local shoreline sand supply is *not* eliminated as described in Section 30235. Furthermore, while the design of the structure (i.e., a revetment) will help to minimize adverse sand supply impacts due to the project (by absorbing wave energy rather than directing it downward or toward the ends of the structure where it can cause further sand erosion), these design elements do

not *mitigate* for the adverse impact identified above. As a result, the project, does *not* meet the third test of Section 30235 of the Coastal Act.

Because the project does not meet the sand supply impact test of Section 30235 of the Coastal Act, the Commission is not *required* to approve the protective structure. Nonetheless, by mitigating for these impacts, the proposed project can be found in conformance with Section 30235. Typical mitigations required by the Commission for direct sand supply impacts are in-lieu fees and beach nourishment. In the case of Carmel Beach, there is no established in-lieu fee program and beach nourishment would appear to be unnecessary given that the beach area has not been substantially reduced over time by the cumulative impact of many shoreline structures permitted through the project history.

While the mechanism may not be fully understood, it appears that the cumulative sand supply impact from many shoreline structures on Carmel Beach has been negligible over the project's history. Even with substantial winter storm events, such as 1982-83 storms which removed the majority of the sand from the Carmel Beach, this self contained sand supply system has proven itself capable of maintaining a very large sandy beach area with a typical width of 100 yards (approximately 21.5 acres of beach). Thus, while the proposed project will result in an incremental sand supply impact, the overall impact on the local shoreline sand supply in this case would be negligible. Given this, and because the sand supply impact in this case is essentially an issue of lost coastal access and recreational opportunity, this mitigation is deferred to the discussion on beach encroachment that follows. Therefore, subject to appropriate mitigation contained in the following finding on beach encroachment, the project can be found consistent with Section 30235 of the Coastal Act.

2. Public Access and Recreation

Beach Encroachment

The Carmel City Beach is owned and maintained by the City of Carmel and accounts for approximately 21.5 acres of white sand beach. The beach is used year round and represents a major recreational and economic resource to the community. It is estimated that the beach attracts over 1,000 persons per day, with larger crowds on holidays and during special events. Sections 30210 and 30211 of the Coastal Act protects the public right of access to the sandy beach at Carmel Beach:

> ***30210:*** *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.*
>
> ***30211:*** *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.*

The proposed rip-rap revetment will extend from 5 to 28 feet from the toe of the existing bluff and it will remove approximately 3,500 square feet of sandy beach that had been available to the public for general recreational activities (see Exhibit C-1). Given that approximately 2,000 square feet of sandy beach is currently unavailable due to safety concerns, having been roped off by the City, the project would result in an additional 1,500 square feet of recreational beach loss.

Mindful of the loss of recreational beach area, the City examined two additional of design alternatives that would result in less recreational beach loss: a seawall (2,000 square feet loss of beach) and a seawall with a partial revetment (3,000 square feet loss of beach). In the end, the City chose to chose to pursue a rip-rap revetment for a number of reasons (see also Exhibit D):

Aesthetics
A primary goal of the Carmel Beach Management Plan with regards to shoreline protective work, as amended through the project history presented above, is to maintain the natural beauty of back beach bluffs. Carmel Beach is one of the more famous beaches in the world and the City has clearly taken its stewardship role seriously in maintaining its aesthetic attributes. Given the recreational and economic importance of the beach to the City of Carmel, the ultimate design chosen has to combine aesthetic considerations with sound engineering design. While the City has been successful with landscaping of both seawalls and revetments, seawalls are more difficult to landscape and the City has a proven track record for innovative landscaping of revetments. The City's methodology for revetments has been to push sand up over the bottom of the revetment and cover the top with soil and landscaping. The effect of this sand and vegetation "cap" is that the revetment looks like a vegetated bluff face (see Exhibit C-4).

Cost
The City estimated the cost of construction and yearly maintenance for 3 different shoreline armoring options:

	Construction cost	*Annual maintenance cost*
Seawall	$570,000	$10,000
Seawall with partial revetment	$418,000	$10,000
Rip-rap revetment	$215,000	$5,000

These estimates show that the rip-rap revetment is more cost effective in terms of both initial and long-term maintenance costs. In addition, while storm damaged seawalls can be expensive to repair, the City has indicated that their revetments capped with sand and vegetation can be inexpensively repaired following storm damage.

Wave energy
Given wave energy dynamics whereby rip-rap tends to dissipate wave energy while seawalls tend to refocus this energy, the City has been concerned about this refocused storm energy weakening both structural footings and the bluff. The City has indicated that they have been forced to artificially re-grout footings at the base of their vertical seawalls, however, their revetment structures have not experienced these structural integrity problems.

Sand retention
The introduction of a shoreline protective device into the natural landscape will result in localized (i.e., at the project's footprint) sand retention and erosion characteristics. These structures can lead to a loss of sandy beach directly in front of the structure due to accelerated erosion. Rip-rap revetments tend to induce less erosion than seawall structures since more of the energy of the waves is absorbed by or between the rocks rather than being directed

downward or toward the ends of the structure. In addition, the City contends that the rip-rap revetment will retain more sand than would the seawall options.

Structural consistency

Through the Carmel Beach Management Plan, as amended through the project history presented above, the City has pursued seawalls at the harder portions of the bluff that form headlands or 'points' out onto the beach, and has pursued rip-rap revetments at the softer portions of the bluff that form 'bays' between the harder points. This proposed amendment work would tie into one such revetment permitted by the Commission in 1995 that is directly south of the subject site. In this way the design ties into the existing structural protection and provides a consistent back beach appearance.

The proposed revetment would remove approximately 3,500 square feet of sandy beach from recreational use, according to project plans (see Exhibit C-1); 1,500 square feet more beach loss than a vertical wall and 500 square feet more than a seawall with partial revetment (according to City estimates). However, on balance, given the cost, aesthetic, wave energy, sand retention, and consistency considerations, a rip-rap revetment is the best choice for this specific site. The City has designed the revetment at a 1.5:1 slope to minimize any encroachment and will recontour the sand at its base to cover the rip-rap and maintain as much useable beach space as possible. Furthermore, the 3,500 square feet of sandy beach that would be lost to recreational use represents less than one-half of one percent (.37%) of the overall available sandy beach at Carmel Beach; with the success that the City has had with sand recontouring, the loss of useable sandy beach may be less.

Nonetheless, the loss of recreational sandy beach must be mitigated to be found consistent with Coastal Act Sections 30210, 30211, and 30235. As mitigation for sandy beach coverage, the Commission has, among other things, typically required a lateral access dedication to ensure public access along the coast. However, since the Carmel Beach is publicly owned, an access dedication is unnecessary. In addition, as described earlier, this project is but a small piece of the comprehensive management plan for Carmel Beach. Public access is a major part of the plan and the City has provided substantial lateral (i.e., recreational blufftop pathway system) and vertical (i.e., 9 stairways to the beach) access in the immediate vicinity. The plan also includes amenities such as benches, trash receptacles, wash-off areas and drinking fountains. Moreover, as included with this project, all of the shoreline structures are artfully revegetated and designed to ensure that Carmel Beach beach goers are not confronted with a very unnatural back beach environment but rather an approximation of a natural landform (see Exhibit C-4).

In short, the City has gone to great lengths to maximize and maintain public access to and along Carmel Beach. Part of these efforts have included the careful design and use of shoreline structures. In this case the revetment will protect Scenic Road, an important recreational vehicular accessway, as well as the blufftop recreational trail, another important component of public access along Carmel Beach. While a very small bit of sandy beach is impacted by the project, a valuable lateral access benefit is protected. Overall, when considered within the larger context of the Carmel Beach Management Plan, the access impacts of this project are in effect pre-mitigated. Therefore, on balance, this portion of the project is consistent with Coastal Act Sections 30210, 30211, and 30235.

Temporary Encroachment

Construction of the revetment will require the use of mechanized equipment on the beach that could pose a danger and a disruption of existing public access to and along the Carmel Beach. To date, the City has indicated that the work should take about a month, but there has been no construction plan submitted. In order to ensure that public access disruption is kept to a minimum and public safety is

not compromised, to ensure consistency with Coastal Act Sections 30210 and 30211, this permit is conditioned for a construction staging plan (see Special Condition 2).

3. Ensuring Structural Stability

Section 30253 of the Coastal Act addresses the need to ensure long-term structural integrity of the site, minimize future risk, and avoid additional, more substantial protective measures in the future:

> *30253: 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.*

While the whole purpose of the project is to ensure stability at this bluff location, there is the possibility that the revetment could fail in the future resulting in rocks strewn on the beach and/or bluff failure. According to the consulting engineering geologist, Rogers Johnson and Associates, the revetment should be monitored at least once a year, in June or July, to check its condition and to recommend maintenance to be done prior to the following winter. To mitigate against the potential impact of structural failure, and to avoid more substantial protective measures in the future, consistent with Section 30253 and the geologic report for this project, this approval requires the applicant to monitor and maintain the revetment (see Special Condition 5). This requirement is consistent with the provisions of the Carmel Beach Management Plan (as amended by Phase 2 of the Carmel Beach Restoration Plan in 1897) for periodic assessment and repair of rip-rap structures.

In addition, the consulting engineering geologist, as mirrored in the City's negative declaration adopted for this project, also recommends that the drain pipe currently issuing onto the face of the bluff be incorporated into the revetment structure, but the project plans do not incorporate this recommendation. Given that part of the cause of the bluff failure was due to surface and subsurface drainage problems at the site, this omission is particularly critical for this project. In order to reduce the possibility of failure of the approved revetment and avoid the need for substantial additions or future alteration of the bluff in the future, consistent with Section 30253 and the geologic report for this project, this approval requires the applicant to submit final plans which show the incorporation of drainage features into the final structural design (see Special Condition 1).

The second portion of the project, that of installing guardrails at several locations between 9th and 12th Avenues is intended to help ensure long term bluff stability not only at the revetment site but at two segments of the bluff to the north of the revetment (see Exhibit B-3). These guardrails are intended to keep pedestrians from trampling on the steep bluff slopes and causing additional erosion that may lead to more protective devices in the future. Section 30214 specifically discusses the need to protect these fragile bluff resources:

> ***30214(a):*** *The public access policies of this article shall be implemented in a manner that takes into account the need to regulate the time, place, and manner of public access depending on the facts and circumstances in each case including, but not limited to, the following:*
> *(1) Topographic and geologic site characteristics.*

(3) The appropriateness of limiting public access to the right to pass and repass depending on such factors as the fragility of the natural resources in the area and the proximity of the access area to adjacent residential uses.

The certified LUP and the Carmel Beach Management Plan, as amended through Phase 2 Beach Restoration Plan in 1987, specifically describes the use these guardrails as necessary to reinforce bluff protection measures and to deter pedestrians from walking on fragile bluffs. These guardrails have been designed to be short, wooden, ranch style fences that have a negligible impact on the views from Scenic Road and the recreational pathway system. These additional measures to promote bluff stability are consistent with Section 30253 for minimizing future risk, and also consistent with Section 30214 for defining the parameters of public access across these blufftops. With nine stairways to the beach and a well defined lateral blufftop trail, these guardrails will not limit public access to the shoreline and along the coast.

4. Visual Resources

Sections 30251 and 30240 of the Coastal Act address the need to protect the scenic and visual qualities of the coast and to prevent impacts to park and recreational areas:

30251: *The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.*

30240(b): *Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.*

A potential impact from the project on the recreational beach area is the introduction of a decidedly unnatural structure in an area of tremendous scenic value. As previously discussed, a primary goal of the Carmel Beach Management Plan with regards to shoreline protective work, as amended through 23 years of permitting history, is to maintain the natural beauty of back beach bluffs. While rip-rap revetments are generally unsightly piles of rock, the City of Carmel has been extremely successful with landscaping of revetments along the beach. The City's methodology for revetments has been to push sand up over the bottom of the revetment and cover the top with soil and landscaping. The effect of this sand and vegetation "cap" is that the revetment looks like a vegetated bluff face (See Exhibit C-4).

The City has indicated that it will camouflage this revetment as it has done others consistent with the Beach Management Plan (i.e., sand recontouring and landscape cap). In order to ensure that this revegetation is completed in a timely manner, so as to minimize the visual impacts of the revetment on the Carmel Beach environment in the interim, this approval is conditioned for completion of the camouflaging process within 6 months of completion of the revetment (see Special Condition 4). The City has explicitly expressed its willingness to accept this type of condition. With the City's proven

track record for the innovative landscaping of revetments, over time, this structure should blend into the natural back beach bluff similar to previous efforts. Furthermore, the Carmel Beach Management Plan as amended by Phase 2 of the Carmel Beach Restoration Plan (approved by the Commission 6/9/87), provides for replacement planting and sand recontouring of the bluffs when storm action strips away these design features. As such, and as conditioned, scenic and visual qualities of the Carmel Beach will be maintained over the long term and the project is consistent with Sections 30251 and 30240 of the Coastal Act

5. Archaeological Resources

The City has identified that the site location is in an area of archaeological significance. Section 30244 states:

> ***30244:*** *Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.*

Given that archaeological resources may be present at the proposed revetment site, this approval requires evidence that either (1) no archaeological resources will be impacted due to revetment construction, or (2) a plan describing reasonable monitoring and mitigation measures, to be undertaken by a qualified professional archeologist, in the event that archaeological resources are discovered at the site (see Special Condition 3). The City has explicitly expressed its willingness to accept this type of condition. As conditioned, this portion of the project is consistent with Section 30244 of the Coastal Act.

6. Other Agency Approval

The proposed project may require the approval of other resource agencies in order to proceed. Project plans show that the revetment will be keyed into bedrock that varies from 0' to 3' above mean sea level (i.e., the inland extent of State Lands). Given that the keyway is to be 3 feet deep, some portion of the work may be below mean sea level and may involve State Lands, requiring a State Lands Commission determination, and the Monterey Bay National Marine Sanctuary. In addition, the U.S. Army Corps of Engineers may require a separate permit. Accordingly, this approval requires submittal of documentation from these other agencies that the project has been approved or that no approval is necessary (see Special Condition 6).

7. Assumption of Risk

Oceanfront development is susceptible to bluff retreat and erosion damage due to storm waves and storm surge conditions. Past occurrences have resulted in public costs (through low interest loans and grants) in the millions of dollars. Section 30001.5 of the Coastal Act states, in part, that the economic needs of the people of the state are a basic consideration:

> ***30001.5:*** *The Legislature further finds and declares that the basic goals of the state for the coastal zone are to:*
>
> *(a) Protect, maintain, and where feasible, enhance and restore the overall quality of the coastal zone environment and its natural and artificial resources.*

(b) Assure orderly, balanced utilization and conservation of coastal zone resources taking into account the social and economic needs of the people of the state.

The experience of the Commission in evaluating the consistency of proposed developments with the policies of the Coastal Act regarding development in areas subject to problems associated with geologic instability, flood, wave, or erosion hazard, has been that development has continued to occur despite periodic episodes of heavy storm damage, landslides, or other such occurrences. As a means of allowing continued development in areas subject to these hazards while avoiding placing the economic burden on the people of the state for damages, the Commission has regularly required that the applicants agree to waive any claims of liability on the part of the Commission for allowing the development to proceed. Accordingly, this approval is conditioned for a waiver of liability (see Special Condition 7)

This waiver of liability is intended to apply to both the construction approved by this permit and the existing development being protected. While the Commission has found the project consistent with the Coastal Act, it makes no claim as to the engineering reliability of the design other than that it appears to be a reasonable approach based on previous experience with shoreline protective work approved on Carmel Beach consistent with the Carmel Beach Management Plan as amended by the project history. As conditioned, the project is consistent with Section 30001.5 of the Coastal Act.

8. City of Carmel Local Coastal Program

Section 30604 of the Coastal Act states in part that a coastal development permit shall be granted if the Commission finds that the development will not prejudice the local government's ability to prepare a Local Coastal Program (LCP) in conformity with the resource protection policies of the Coastal Act. The entire City of Carmel falls within the coastal zone. The Land Use Plan (LUP) for the City of Carmel has been certified by the Commission (4/1/81), however, the City has not yet completed the implementation phase of their LCP.

The LUP designates the bluff and beach seaward of Scenic Drive as Open Space (P-1). This proposed project as modified and conditioned is consistent with the certified LUP and will not prejudice the City's ability to complete its LCP in accordance with Coastal Act requirements.

9. California Environmental Quality Act (CEQA)

Section 13096 of the California Code of Regulations requires that a specific finding be made in conjunction with coastal development permit applications showing the application to be consistent with any applicable requirements of CEQA. 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.

The City issued a negative declaration for the revetment on August 4, 1997 which was adopted by the City's Planning Commission on August 20, 1997 and by the City Council on September 9, 1997. Commission staff commented on the negative declaration on August 27, 1997 (within the appropriate comment period) and identified concerns about the project including maintaining public access to sandy beach, including appropriate erosion control and drainage features, protection of scenic resources, protection of archaeological resources, and the need for an evaluation of shoreline protection alternatives to rip-rap. These issues, and others that have become apparent since the

negative declaration, have been discussed in this report and appropriate mitigations have been developed. The Coastal Commission's review and analysis of land use proposals has been certified by the Secretary of Resources as being the functional equivalent of environmental review under CEQA. Accordingly, this permit is conditioned to reinforce certain mitigation measures already proposed, to provide clarity where detail was lacking, to establish deadlines for completion of mitigation measures, and to mitigate potential impacts (e.g., archaeological resources) not already addressed by the City. Therefore, the Commission finds that only as modified and conditioned by this permit will the proposed project not have any significant adverse impacts on the environment within the meaning of CEQA.

Exhibit A. 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 on which the Commission voted on the application. 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 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.

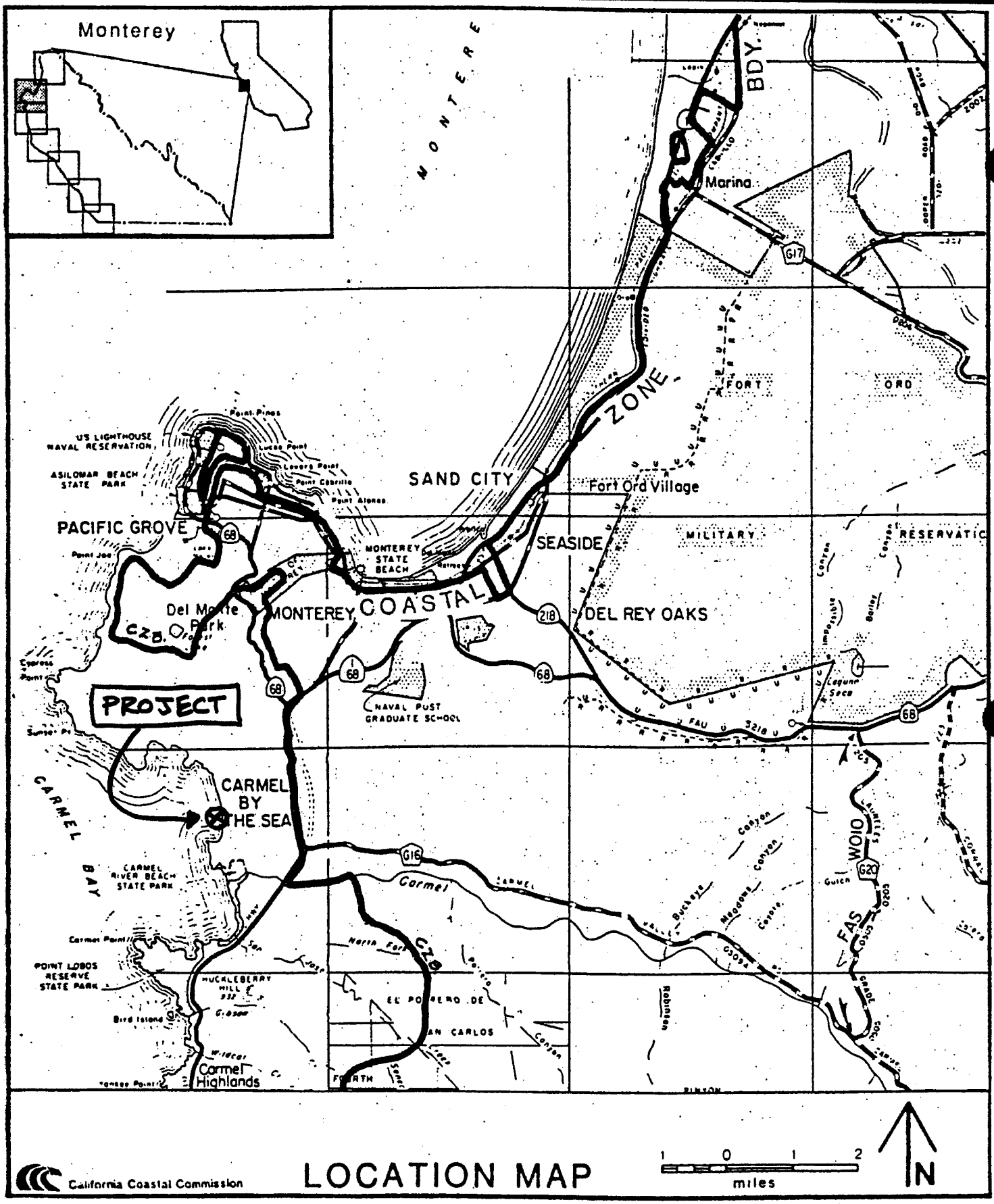
4. **Interpretation.** Any questions of intent or interpretation of any condition will be resolved by the Executive Director or the Commission.

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.

EXHIBIT NO. A
APPLICATION NO. 3-83-217-A4
STANDARD CONDITIONS



California Coastal Commission

LOCATION MAP

EXHIBIT NO. B-
APPLICATION NO. 3-83-217-A4
REGIONAL LOCATION

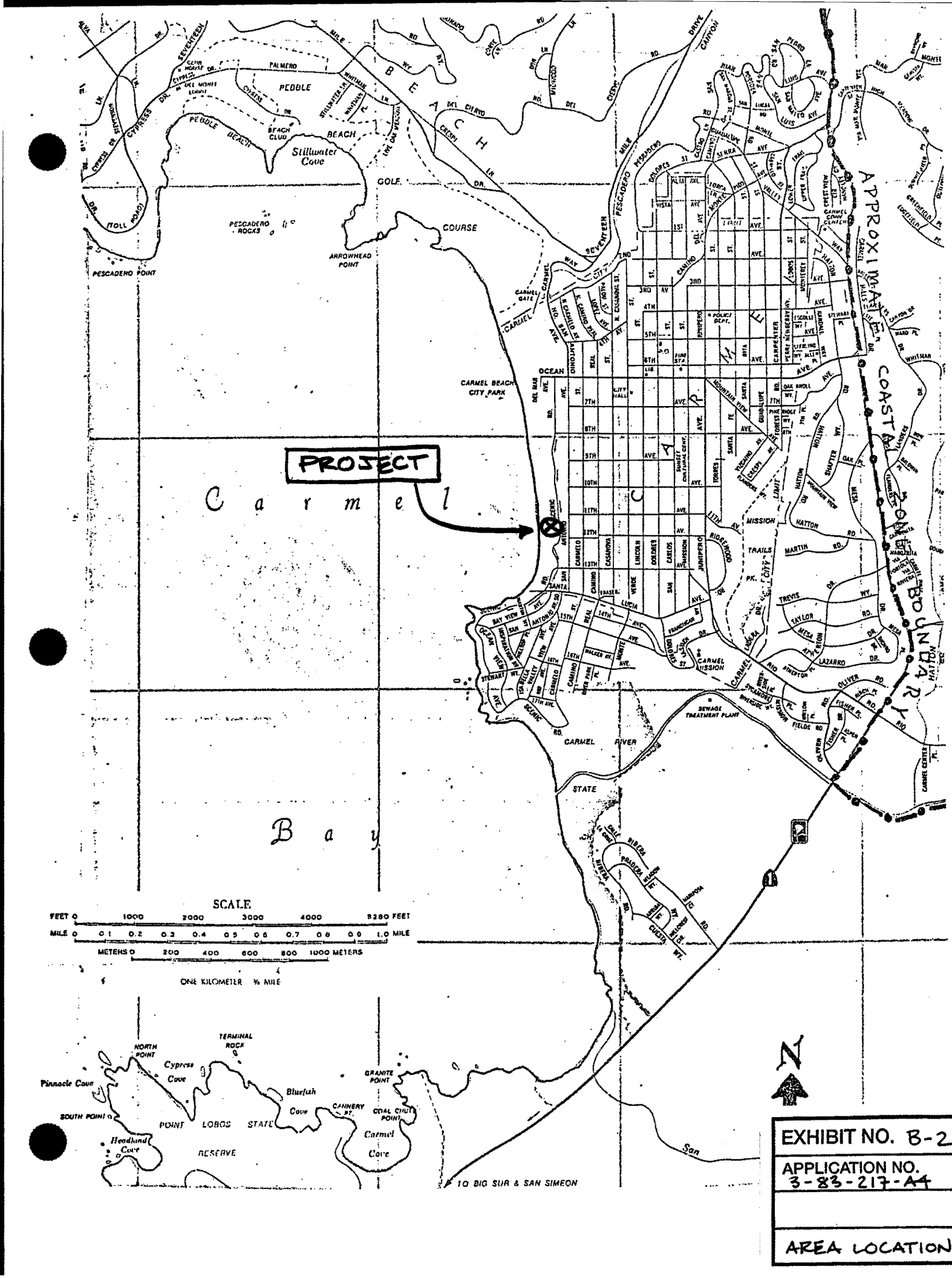


EXHIBIT NO. B-2
APPLICATION NO. 3-83-217-A4
AREA LOCATION

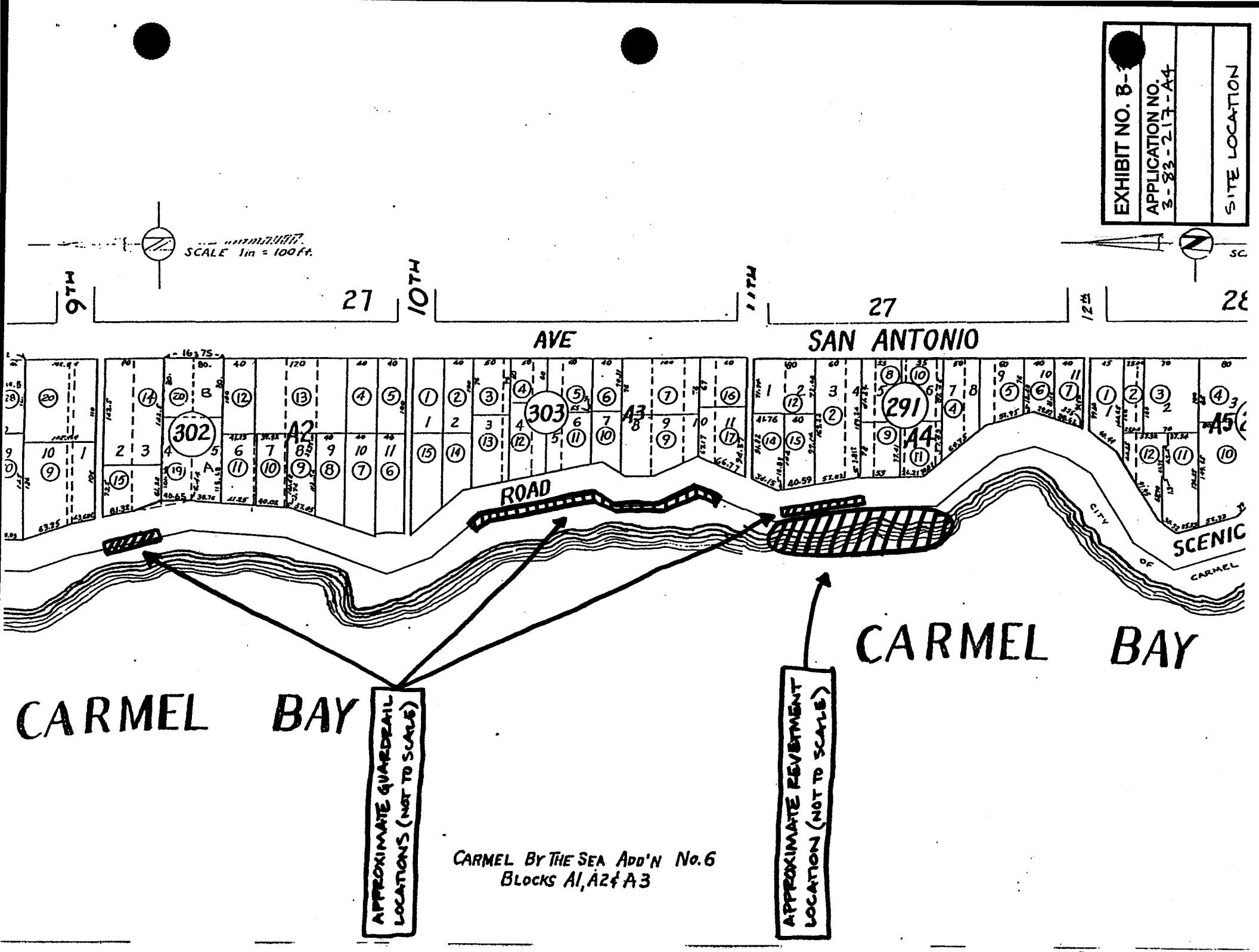
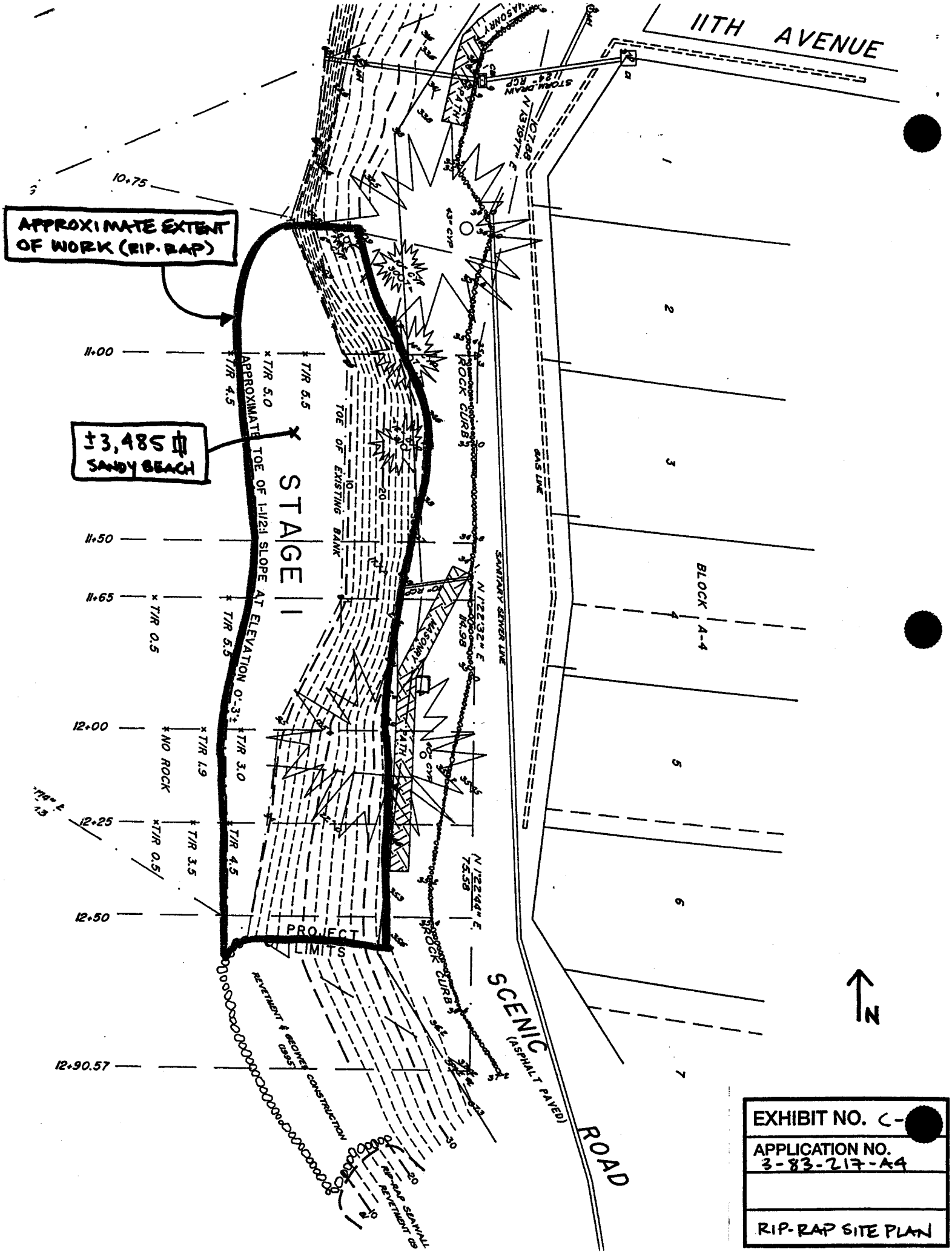
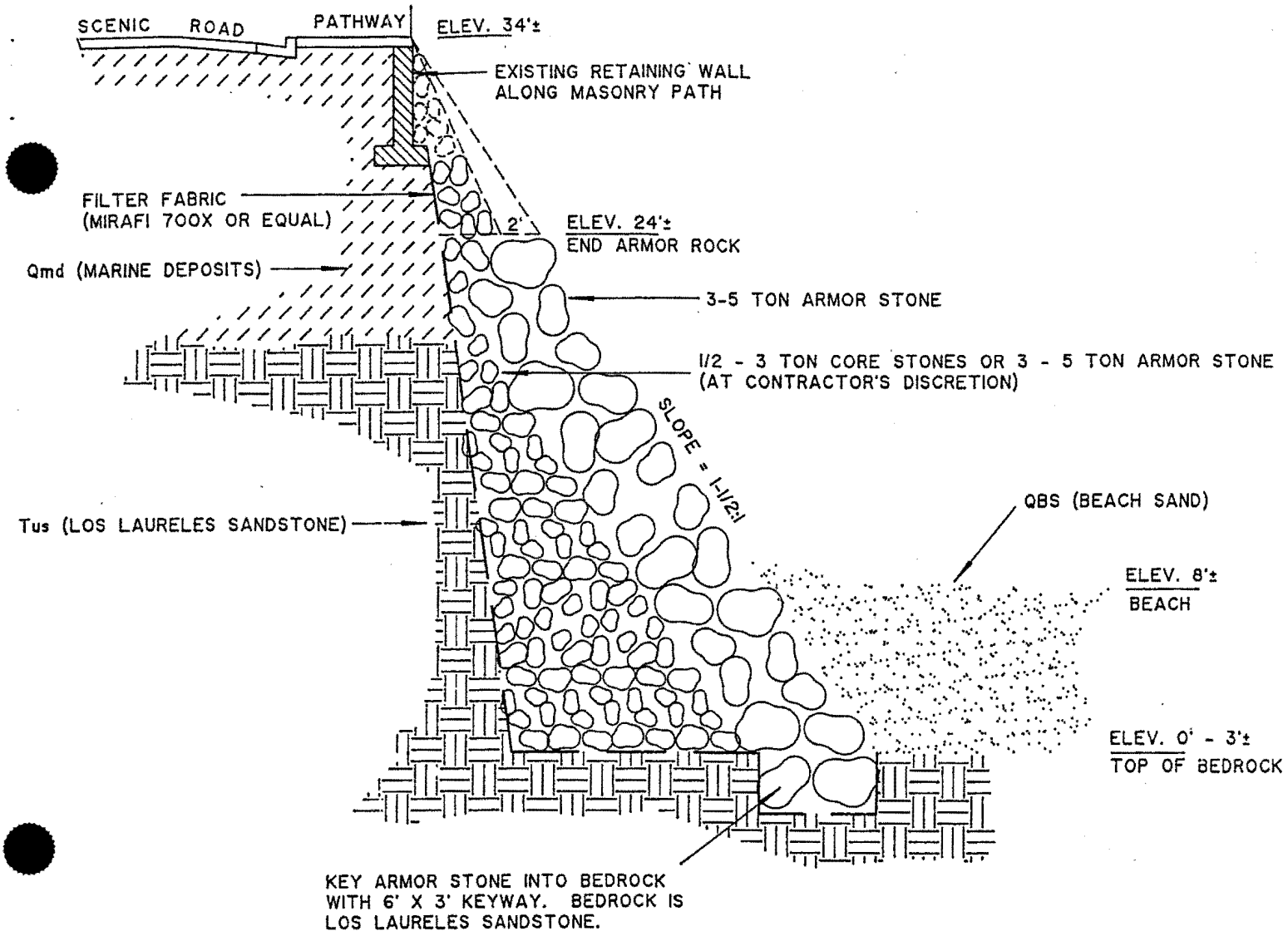


EXHIBIT NO. B-1
APPLICATION NO. 3-83-217-A4
SITE LOCATION
SCALE 1in = 100ft.
9TH
27
10TH
11TH
27
12TH
AVE
SAN ANTONIO
ROAD
CITY OF CARMEL
SCENIC
CARMEL BAY
CARMEL BAY
APPROXIMATE GUARDRAIL LOCATIONS (NOT TO SCALE)
APPROXIMATE REVETMENT LOCATION (NOT TO SCALE)
CARMEL BY THE SEA ADD'N No. 6
BLOCKS A1, A2 & A3

EXHIBIT NO. B-4
APPLICATION NO. 3-83-217-A4
SITE PHOTOS


11TH AVENUE
APPROXIMATE EXTENT OF WORK (RIP-RAP)
±3,485 SF SANDY BEACH
STAGE I
PROJECT LIMITS
SCENIC (ASPHALT PAVED) ROAD
BLOCK A-4
SANITARY SEWER LINE
GAS LINE
ROCK CURB
MASONRY
TOE OF EXISTING BANK
APPROXIMATE TOE OF 1-1/2:1 SLOPE AT ELEVATION 0'-3"±
REVETMENT & BROWSE CUTS
CONSTRUCTION
RIP-RAP SEAWALL REVETMENT
11+00
11+50
11+65
12+00
12+25
12+50
12+90.57
10+75
T/R 4.5
T/R 5.0
T/R 5.5
T/R 0.5
T/R 1.9
T/R 3.0
T/R 3.5
T/R 4.5
NO ROCK
N 1°22'32" E 14.98
N 1°22'44" E 75.58
N
EXHIBIT NO. C-
APPLICATION NO. 3-83-217-A4
RIP-RAP SITE PLAN



TYPICAL SECTION

NO SCALE

NOTES:

1) ROCK REVETMENT TO BE CONSTRUCTED AT 1.5 HORIZONTAL TO 1 VERTICAL SLOPE.

2) KEY TO BE EXCAVATED THREE FEET DEEP BY 6' WIDE INTO SANDSTONE BEDROCK AT ELEVATION 0' TO 3'. (BEDROCK IS LOS LAURELES SANDSTONE MEMBER OF MONTEREY FORMATION, PER ROGERS JOHNSON, GEOLOGIST.

3) ALL TREES TO BE FULLY PROTECTED.

LEGEND:

CYP = CYPRESS TREE
T/R = TOP OF BEDROCK

NEILL ENGINEERS CORP. CARMEL, CALIFORNIA

BEACH BLUFF RESTORATION

(STAGE 1)

SCENIC ROAD BETWEEN ELEVENTH AND TWELFTH AVENUES

CITY OF CARMEL-BY-THE-SEA, CALIFORNIA

EXHIBIT NO. C-2
APPLICATION NO. 3-83-217-A4
RIP-RAP CROSS
SECTION (TYP.)

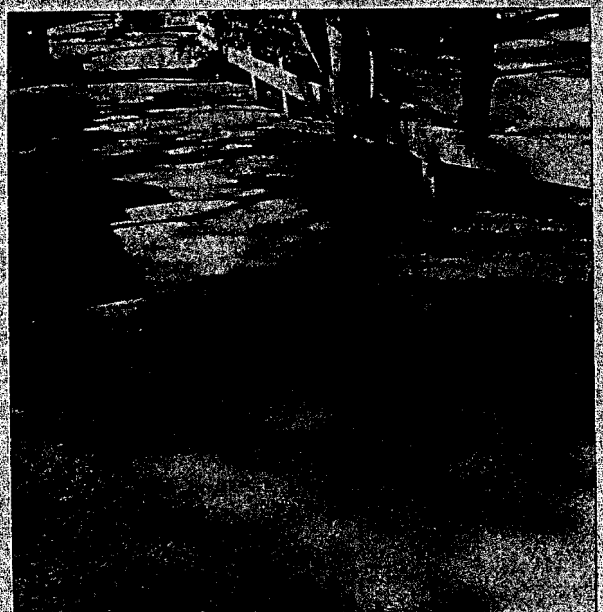


EXHIBIT NO. C-3

APPLICATION NO. 3-83-217-A4

(GUARDRAILS (TYP.)

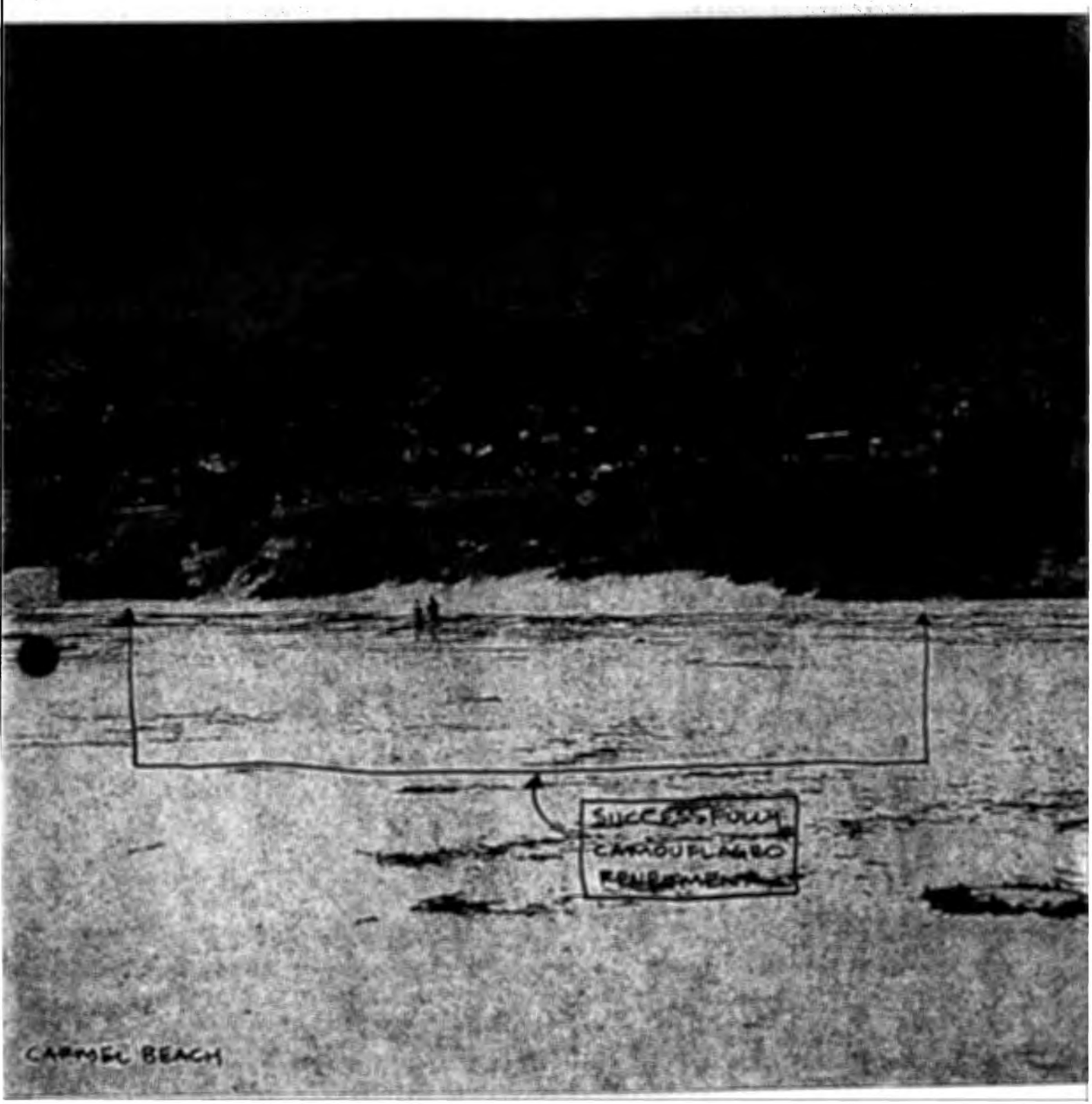


EXHIBIT NO. C-4
APPLICATION NO. 3-83-217-A4
CARMEL BEACH
REVETMENT (TYP.)

MEMORANDUM

To: Greg D'Ambrosio, Assistant City Administrator

From: James M. Cullem, Director of Public Works

Date: 3 October 1997

SUBJECT: BACKUP INFORMATION - BEACH BLUFF RESTORATION - SCENIC ROAD AND 12TH AVENUE

In response to the Coastal Commission's letter of 30 September 1997, and Lee Otter's questions on 2 October 1997, the following Public Works Director and City Engineer comments are as follows:

A. Alternative Evaluations

Alternatives		Pros/Cons	Initial Costs	Annual Maint. Costs.
1.	No Project	-No loss of beach. -High probability of future loss of path, road, utilities with repair costs of $600,000, plus economic impact due to loss of use of $500,000 (est). -High risk of sewer main break on Scenic Road with raw sewage flows onto beach and into the Bay. -2,000 SF of beach now unusable due to unsafe overhead conditions on the bluff.	$1,100,000	N/A
2.	Shotcrete & Seawall	-2,000 loss of beach. -Rigid construction on mudstone and sandstone foundations with high probability of future cracking. -Moderate wave energy dissipation. -Poor sand retention capability. -Not aesthetically consistent with Carmel Beach, but can be partially covered with sand or landscaping over time.	$570,000	$10,000

EXHIBIT NO. D-
APPLICATION NO. 3-83-217-A4
ALTERNATIVES ANALYSIS

Alternatives		Pros/Cons	Initial Costs	Annual Maint. Costs.
3.	Seawall with partial revetment	-3,000 SF loss of of beach. -Rigid construction on mudstone foundation with high probability of future cracking. -Poor wave energy dissipation. -Moderate probability of cracking and foundation damage withing 10 years. -Fair sand retention capability. -Aesthetically consistent. -Can only be partially covered with sand and difficult to landscape.	$418,000	$10,000
4.	Rip-rap Revetment	-4,000 SF loss of beach -Most flexible design that can shift without failure. -Good wave energy dissipation. -Excellent sand retention capability. -Initially the best aesthetic solution -Easy to cover with sand or landscaping over time.	$215,000	$5,000

B. Recommendations

The Public Works Director and City Engineer only considered options 2, 3, and 4 to be technically acceptable, and option 3 and 4 economically feasible. We considered option 4 the alternative of choice because it is a flexible design capable of shifting without damage and is the design recommended by Rogers Johnson for wave energy dissipation. We believe its initial disadvantage of aesthetic appearance can be masked with sand and landscaping as has been the City experience at other beach locations. Also, the loss of 4,000 SF of beach, out of a total of 21.5 acres (900,000 SF) is less than half of 1%.

C. Timelines

The bluff at Scenic Road between 11th and 12th Avenues experienced an initial failure along an 80-foot section in January 1997. Shortly thereafter, Rogers Johnson and Associates was requested to provide a mitigation proposal for the slide. That report, which was completed on 20 February 1997, considered 3 alternatives and recommended a rip-rap revetment (page 4 of the REJA report).

With a view toward considering additional alternatives, Haro and Kasunich and Associates was asked to investigate the problem. On 23 April 1997, they submitted a proposal which recommended a combination of textured concrete (shotcrete) and vertical concrete seawall (page 1 of the Haro and Kasunich report).

EXHIBIT NO. D-2
APPLICATION NO. 3-83-217-A4
ALTERNATIVES ANALYSIS

In May 1997, City Staff evaluated the alternatives and developed funding options. In June, the City Council approved the use of $175,000 in year-end funds for repairs based on initial damage estimates of 80 feet of bluff.

In June 1997, the City Engineer initiated a site survey to locate base rock and confirm the actual extent of required repairs (190'). His analysis revealed the damage to be more extensive requiring repairs to at least 190 feet of embankment with 240 feet recommended. Attached is a copy of the final design directive (23 July 1997) to the City Engineer including the required work and schedule.

The work is currently on schedule and bids were opened on 2 October 1997. All that is needed to proceed with the initial stage of this project is Coastal Commission approval (or waiver) and City Council award of bid. Both of these are needed no-later-than 15 October 1997 if we hope to be able to complete work before winter.

JMC/mmp

Jim\seawall.udt

EXHIBIT NO. D-

APPLICATION NO. 3-83-217-A4

ALTERNATIVES ANALYSIS

CITY HALL
BOX CC
CARMEL-BY-THE-SEA, CALIFORNIA 93921

12 September 1997

Mr. Lee Otter
Director, Central Coast Division
California Coastal Commission
725 Front Street, #300
Santa Cruz CA 95060

Dear Mr. ~~Otter:~~ Lee

Carmel-by-the-Sea is submitting an application for a Coastal Development Permit to install a guardrail on Scenic Road between 9th and 13th Avenues and to construct 240 linear feet of rip-rap revetment on Carmel Beach below Scenic Road between 11th and 12th Avenues. The project is intended to shore up, stabilize and protect against further collapse of unconsolidated saturated soils perched above consolidated bluff sandstone and mudstone strata. The structure is also intended to defuse wave energy and shield the bluff face against the erosive impacts of wave run-up.

The bluff face at this site has eroded back some 12 feet since 1982. Less than 8 feet of bluff remains protecting Scenic Road, Beach Walkway, patios, and underground utilities including storm drains and sewer systems, thus the need for additional guardrails.

City staff and Commissions evaluated various design alternatives, including rip-rap and vertical reinforced concrete seawalls, both of which have been used extensively along the Carmel shoreline. We analyzed many factors that would influence design selection with loss of beach, aesthetics, bluff erosion protection, wave energy disipation, and overall cost as primary considerations. With that in mind, our selection of a rip-rap revetment rather than a vertical wall was the preferred choice.

The factors leading to our decision make it more clear why a rip-rap revetment design option was preferred:

* Bluff Erosion

  The bluff at this site has been slumping from subsurface water liquefying the unconsolidated soil at the interface with the underlying harder strata. The bluff face is also rapidly being eroded from wave impacts. Both design options could slow these erosion processes; however, the harder strata of the lower bluff on which a footing for a vertical wall would lie is highly erodible mudstone. The footings of existing walls at other locations along the beach are being undermined where this type of mudstone or sandstone condition underlies and supports vertical walls.

* Wave Energy

  A major goal of our original studies in 1983/84 was to select a design that would dissipate wave energy, not intensify or refocus it. The dynamics of waves impacting vertical walls

EXHIBIT NO. D-4
APPLICATION NO. 3-83-217-A4
ALTERNATIVES ANALYSIS

tend to do both, thus producing slope-cutting eddies at ends of walls and undermining footings, weakening both the structure and embankment. Rip-rap, on the other hand, tends to dissipate wave energy, dispersing the wave on impact instead of refocusing it to another site beyond the protection of the structure. Our rip-rap structures have not experienced the structural integrity problems of vertical walls. Thus, the City Engineer (Neill Engineers) concurs with a rip-rap repair which can remain flexible and which can absorb displacements without damage.

* Loss of Beach

We recognize that rip-rap requires more space to construct and may use more beach area than a vertical wall. However, once it is constructed, we intend to backfill displaced beach sand to bury the structure's base. It is very likely that loss of beach will be negligible. We also intend to overtop the revetment with soil to support landscaping to screen as much of the structure as possible. A similar successful approach was used with revetments built in 1984. (Refer to pictures of landscaped revetments.) The sand, soil, and landscape cap can be replaced inexpensively if wave run-up should erode them. I should note that the bluff has been eroded approximately 12 feet since 1982. Thus the actual amount of "lost beach" based on 1982 would be less than 15 feet.

* Rock Rip-rap

Design aesthetics are always a concern. We believe the color of the rip-rap (gray/gray-tan) is a middle ground between artificial golden granite-rock-faced vertical walls and capped revetments with landscaping. Even if the rip-rap remains exposed, over time it tends to become transparent to the eye, blending with the surrounding mix of materials and vegetation. Arguably, neither design is "natural" nor blends well with the surrounding terrain unless disguised by landscaping. Other, more natural designs would be cost-prohibitive to the City.

We must move forward on this project prior to the onset of winter storms in order to prevent further erosion and make certain that other beach facilities are not damaged or destroyed due to lack of action. Pathways, patio, road, storm and sewer systems could all be compromised if we do not act expeditiously. We would appreciate your review of our application and look forward to a positive response.

Please contact me if you have any further questions. I would be very interested in discussing this directly with your staff if additional information is required.

Very truly yours,

Greg

Gregory D'Ambrosio
Assistant City Administrator

GD:sam
data/sarah/greg/planning/seawall

EXHIBIT NO. D-
APPLICATION NO.
3-83-217-A4
ALTERNATIVES ANALYSIS