FINAL - PLAN OF DEVELOPMENT
BLUFF EROSION & ENHANCEMENT PROJECT

Prepared for:

City of Long Beach

Prepared By:

Tetra Tech, Inc.

Steven A. Ormenyi & Associates

November 2000

Revision 5.1

ACKNOWLEDGEMENTS

This document is the result of the participation and/or expression of opinions of a number of community representative individual members and/or groups, local government, and consultants. The following list represents a sample of those explicitly involved, and does not preclude those not mentioned herein whose opinions were also considered.

CITY OF LONG BEACH, DEPARTMENT OF PARKS, RECREATION AND MARINE

Phil Hester, Director
Dennis Eschen, Manager
Tom Shipey, Superintendent
Dave Ashman, Superintendent
Jeff Edwards, Superintendent

CITY OF LONG BEACH, DEPARTMENT OF PUBLIC WORKS

Barbara Muñoz, PE, Division Engineer
Don Grussing, PE, Senior Civil Engineer
José Remón, PE, Civil Engineer

COMMUNITY GROUP PARTICIPANTS

Historical Society of Long Beach
Long Beach Museum of Art
Alamitos Beach Association
Bluff Park Association
Model Plane Glider Group
Bluff Park Front Runners
Bluff Park Users
Bixby Park Users
Ferral Cats Protectors
Surfrider Foundation

PROJECT TEAM

Tetra Tech, Inc. – General Consultant

Fernando Pagés, P.E., Project Manager, Civil/Coastal Engineer
John Wells, P.E., Structural Engineer
William Mather, P.E., Civil/Site Engineer
Allen Jayne, P.E., Senior Structural Engineer
Jim Andersen, P.E., Mechanical Engineer
Peter Miles, ASLA, Landscape Architect
Craig Hattori, CAD/Graphics Coordinator
Sarah McFadden, Biologist
Luanne Lum, Biologist/Botanist
Belén DeFuentes, Technical Staff
Robert Yates, Technical Staff

Steven A. Ormenyi & Associates, Inc. – Environmental Landscaping Consultant

Steven A. Ormenyi, ASLA, Principal
Dina Klemm, Technical Editor
Ben Rosenbloom, Principal Planner

Geotechnical Professionals, Inc.

Byron Konstantinidis, P.E., Geotechnical Engineer

TABLE OF CONTENTS

INTRODUCTION 1

BACKGROUND 1

- HISTORY 1
- REGION AND COMMUNITY 5
- ACCESS 7

PROJECT BOUNDARIES 8

PROJECT GOALS 9

- FUNDING 9
- REGULATION REQUIREMENTS 10
- COMMUNITY INVOLVEMENT 10
- SUPPORT FACILITIES 11
- BLUFF EROSION PRIORITIES 11

SETTING 12

FLORA & FAUNA 12

GEOTECHNICAL 14

BLUFF EROSION 15

- FIRST PRIORITY PROJECTS 15
  - 1st Place 17
  - 5th Place 19
  - 7th Place 21
  - 12th Place 23
- SECOND PRIORITY PROJECTS 27
  - 4th Place 29
  - 8th Place 31
  - Junipero Avenue Slope (Landscape Demonstration Project) 33
  - Molino Avenue Bluff and Slope (Landscape Demonstration Project) 35
  - 36th Place Bluff and Slope (Landscape Demonstration Project) 37
- THIRD PRIORITY PROJECTS 39
  - 6th Place 41
  - 9th Place 43
  - 10th Place 45
  - 11th Place 47
  - 13th Place 49
  - 14th Place 51
  - 15th Place 53
  - Bixby Park Bluff Top 55
  - Bluff Park Railing 57
  - Bluff Park Drainage and Root Trimming 59

Bluff Park Erosion from Museum of Art to east of Lindero Avenue 61
Bluff Park Erosion along gabion-stabilized area west of Temple Avenue 63
Bluff Park Erosion east of Temple Avenue.....67
Bluff Park Erosion east and west of Redondo Avenue.....71

FOURTH PRIORITY PROJECTS 73
2nd Place 75
3rd Place.....77

PUBLIC SHORELINE ACCESS 79

BEACH ENTRANCES 81
WALKING PATH 83
STAIRWAY CONNECTIONS.....85
BIKE AND PEDESTRIAN OASES.....87
OCEAN BOULEVARD CROSSINGS 89
CHERRY AVENUE TUNNEL 91
BIXBY PARK AMPHITHEATER.....93
LONG BEACH MUSEUM OF ART.....95
BLUFF PARK WALKWAY 97
HISTORIC "RAMPS TO THE BEACH" SYSTEM.....99

COMMUNITY USE IMPROVEMENT.....101

STORM DRAIN IMPROVMENTS 103
MODEL GLIDER PLANE FLYING AREA.....105
SAILING CENTER AT ALAMITOS AVENUE 107
ALFREDO'S (ALAMITOS AVENUE PARKING LOT).....109
CHERRY AVENUE BEACH AREA 111
BLUFF PARK OVERLOOKS.....113
MOLINO AVENUE PLAYGROUND 115
MOLINO AVENUE BEACH RESTROOM AREA 117
REMOVE TELEPHONE LINES.....119
IMPROVE SIGNAGE 121

APPENDIX A - Native Plant Species and Wildlife List

INTRODUCTION

Following two rounds of community meetings, the Long Beach Department of Parks, Recreation and Marine has reviewed the community input for inclusion within this document. The purpose here is to summarize the overall Bluff Erosion and Enhancement Project objectives with respect to bluff erosion issues, public shoreline access, and community improvement. This plan will be used to document the planning and development process. The plan is to be reviewed and approved in concept. Projects consistent with the Local Coastal Plan will then be implemented. Projects not consistent with the Local Coastal Plan will be deferred for consideration in the "Beach Master Plan," recommended in the "Long Beach 2010: A Strategic Plan."

The primary objective of the overall project is to restore the stability of the bluff areas that exhibit excessive erosion and slumping failures. Secondary objectives include improving the appearance of the bluff areas. Integral to the overall bluff restoration program is the need to assess the geotechnical stability of the existing slope conditions, to evaluated the feasibility of a range of conceptual designs aimed at improving the stability to acceptable levels, and to add landscaping where appropriate.

BACKGROUND

History

The spectacular bluffs and shoreline that today hold glamorous high-rise buildings and elegant estates were discovered early on for their potential by William Willmore, the developer of Willmore City, in 1882. Although the seaside city would be slow to take root, William Willmore left a legacy with the filing of the completed city map, which plotted the town's development for the future. This was the area of Downtown Long Beach. Ocean Park Avenue, currently Ocean Boulevard, was designed and constructed at this time. The scenic avenue followed the contours of the bluff, and its design allowed for 75 feet between the Avenue and the bluff for a shady promenade. Only two hotels were planned for this area, leaving an unobstructed view for the homes on the north side of Ocean Park Avenue.

In 1886 John Bixby, a rancher and developer, subdivided part of Rancho Los Alamitos along Ocean Park Avenue from Alamitos Avenue to Redondo Avenue, called the Alamitos Beach Townsite, including most of this study area. Lots sold for around $550, and sales began to intensify. It was at this time that the citizens of the failing Willmore City renamed it to Long Beach; the city was incorporated in 1888.

Tourism and beach visitation flourished near the closing of the 19th century. Tourists and citizens flocked to the beach to sunbathe and play in the surf break, and campers were allowed to set up tents along the shoreline for a small fee. Scores of families would park their horses and carriages on the bluff tops and picnic down on the beach below even though such practices routinely led to flea infestations **[Figure 1]**. Beach dress was fairly conservative during this time, illustrated by a meticulous city ordinance dictating

suit dimensions and style for women. However, this law was practically unenforceable and was quickly abandoned. Fortunately, more productive efforts were focused on the beach scene, demonstrated by the addition of substantial lifeguard stations every 200 yards, each equipped with a lookout tower and a dory (rowboat) locker **[Figure 2]**. The present day historic lifeguard station at the Bixby Plaza beach parking lot was constructed in 1926 as one of three other regular stations.

Figure 2. Lifeguard station east of 7th Place in the 1940s.

The Virginia Hotel, built in 1906, was the first resort development in Long Beach and helped set the tone for future endeavors. Many fantastic attractions were added to the shoreline over the years after the turn of the century. Places like Pikes Pier with roller

coasters and food vendors drew thousands of visitors to the coast **[Figure 3]**. The construction of Pine Avenue Pier in 1904, the two Belmont Piers in 1908 and 1915, aided by the magnificent hotels and resorts that were being erected, all helped beckon the surrounding public to the sunny shores of Long Beach.

Figure 3. Looking west towards Pike's Pier (1925).

Bluff Park No. 1 was born when The Long Beach Water Company deeded the bluff between Golden Avenue and Alamitos Avenue (now Victory Park and Santa Cruz Park) to the City of Long Beach. Shortly after, Alamitos Land Company deeded Alamitos Park to the City, which became Bixby Park. Finally, in 1919 the Alamitos Land Company gave the City the bluff between 20th Place and Redondo Avenue, named Bluff Park No. 2. These latter two additions to Long Beach open space would form what is today Bluff Park and Bixby Park and conserve the bluff from the development that now flanks it from both sides. Construction on Bluff Park occurred in 1924, and with the installation of comfort stations in the '30s, lighting in 1966, and various other improvements and renovations, it became a real recreational asset for the City and community.

Long Beach boomed after the discovery of oil in Signal Hill in 1921. Throughout the 1920s, beautiful structures were built near the bluff area and shoreline of Long Beach. Notable apartment buildings that were constructed include the Cooper Arms at 455 Ocean Boulevard, Villa Riviera at 800 Ocean Boulevard, the Aubatan, and the Terry Apartments. Other additions to the beachfront were the Pacific Coast Club in 1923 at 850 E. Ocean Boulevard where oil executives would exercise and relax, the Breakers Hotel in 1923 topped by the Sky Room Tower, the Willmore Hotel in 1925, and many elegant residential estates. Many houses were built during this time, lining the new streets and becoming landmarks, several of which are considered historic structures today.

The popularity of the beach remained strong through the 1930s despite the stock market crash of 1929, the Great Depression, and the destructive 1933 earthquake. The construction of Rainbow Pier around the new civic auditorium and beach park contributed to this, and major residential building like the Saint Regis in 1939 continued to be built.

The nature of the beach and bluff changed significantly in the 1920s and 1930s. The beaches were always transient as waves and currents washed them away or replaced them from the mountains during floods. But, at this time, the paving of the Los Angeles Basin and the flood control measures to protect urban property began to starve the beaches of new sand. Seawalls had to be built in 1927 to protect private property, and during the 1930s waves crashed into the toe of the bluff **[Figure 4]**.

Figure 4. Looking east from Bluff Park during 1939.

Although the general character of the bluff has remained constant throughout the years, the original recreational attraction of long, uninterrupted sets of big waves was diminished with the construction of the breakwater beginning in 1899 in San Pedro and coming to an end with the Long Beach section in 1949. The beach was recreated in the late 1940s and 1950s with millions of cubic yards of sand fill placed on the beach to keep pace with the erosion, the depletion of replacement sediment from the channelization of the Los Angeles River, and the subsidence of the shoreline from oil drilling. People did not stop coming to the beach, however, the uses just changed. People started to take advantage of a calm place to picnic, sunbathe, and wade in the lapping water's edge. Beach access was greatly improved with the construction of the Coronado and Molino Avenue ramps in the 1940s and the Bixby Plaza beach parking lot at the base of Junipero Avenue in 1964 **[Figure 5]**. A bike path was constructed along the sandy beach in 1987, allowing bicyclists and evening strollers to venture from Belmont Pier to the recently constructed Downtown Marina. The bluff itself went through a battery of self-improvements in the 1980s and '90s as slope stabilization was enlisted and stairways

were built, gaining convenient access to the beach along Ocean Boulevard for the public. Beach nourishment activities, with the importation of dredge material from local areas, have been under way since the 1920s

Today's beachgoers use the beautiful waterfront in much the same manner as their predecessors did. However, the many attractive additions to the area now allow the public to experience the shoreline in a way that was not available in the past. The redevelopment of downtown Long Beach in the 1980s, with the development of Shoreline Village, the Downtown Marina, the World Trade Center, the Long Beach Convention Center, and Rainbow Harbor, has made the City's waterfront an exciting place to be. Hotels like the Hyatt Regency, Ramada Renaissance, Westin, Holiday Inn, Hilton and others, offer tourists and visitors world-class accommodations with a view to match. The Long Beach shores have served the public well, a continuing source of recreation, relaxation, and refuge for all to enjoy. It is for this reason that this Plan of Development focuses on the protection, maintenance, and enhancement of the bluffs and beaches of Long Beach.

Figure 5. Bixby Plaza beach parking lot at Junipero Avenue looking east in the 1980s

Region and Community

The City of Long Beach is in the southeastern corner of Los Angeles County, with Orange County to its east. The population in the City of Long Beach started at 564 people in 1890 and grew to 142,032 by 1930, making it the fastest growing city in the country. The current population is growing toward half a million people.

Demographic data for the three ZIP codes surrounding the bluff area of Long Beach **[Figure 6]** demonstrate much about the users of the beach and help planners design more suitable public facilities. Interpreting the 1999 data in **Table 1** from Claritas

Demographics, there is a sharp contrast found between the different zip code demographic areas with regard to income, age, and race. One such contrast is that the population bordering the bluff to the east of Cherry Avenue, delineated by zip code 90803, has a median income fully 50% higher than that of its neighbors in the area west of Cherry Avenue and extending to the Los Angeles River in zip code 90802. The population directly north of zip code 90803 also has a median income 40% higher than the population between Cherry Avenue and the Los Angeles River.

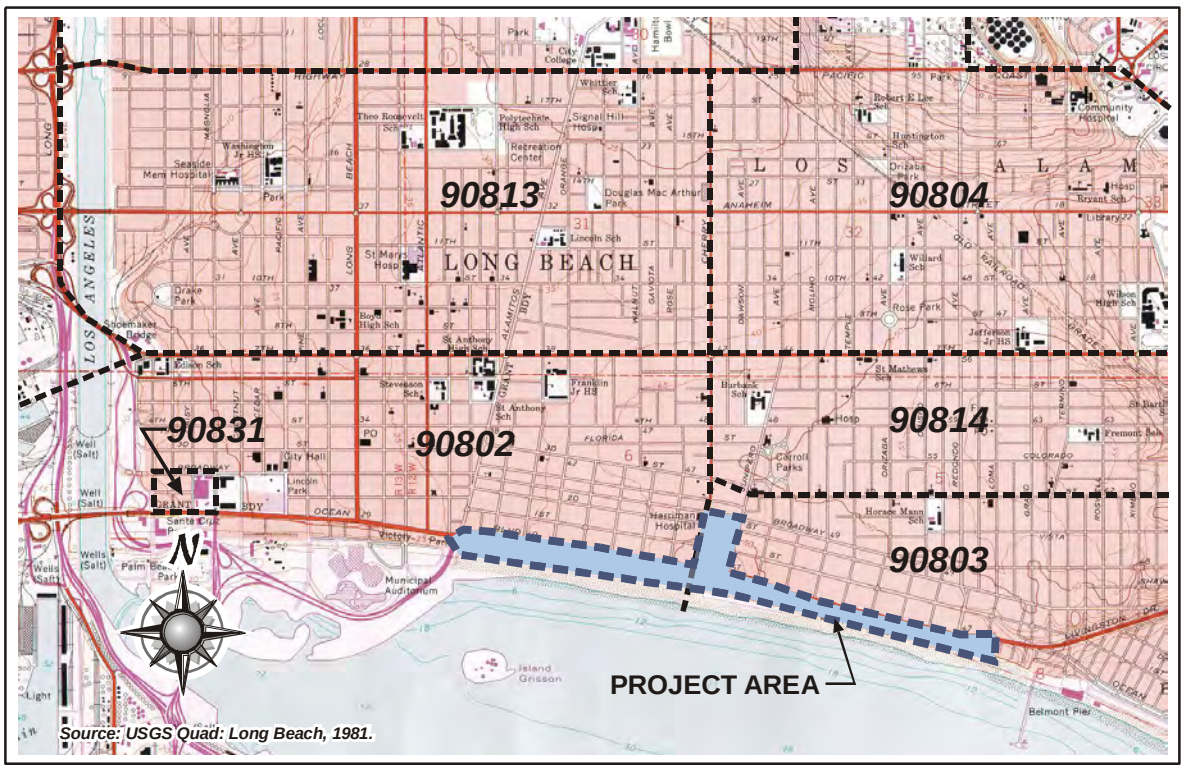


Figure 6. Zip code boundaries near project area in Long Beach.

Table 1. Demographic data for the study area.

	ZIP CODE		
	90802	90803	90814
POPULATION:	35,640	32,808	17,937
MEDIAN HH INCOME:	$25,042	$50,623	$43,769
MEDIAN AGE:	35.30	43.20	38.80
RACE:			
White	37.0 %	83.5 %	71.0 %
Hispanic White	40.0 %	9.0 %	16.0 %
Black	13.0 %	2.0 %	6.5 %
Asian	8.0 %	5.0 %	6.0 %
American Indian	0.5 %	0.5 %	0.5 %
Other	1.0 %	0.3 %	0.5 %

SOURCE: Claritas Demographics 1999

A comparison with regard to the median age of the population in the study area reveals that the population to the east of Cherry Avenue is the oldest by almost 5 years with the populations to the north in zip 90814, and west of Cherry Avenue in 90802 only being a few years apart.

Finally, in analyzing the race of each zip code area, it is found that in t area west of Cherry Avenue, Whites equal Hispanics and the two races together form the majority there with Blacks and Asians making up the minority. In the area to the east of Cherry Avenue, in zip code 90803, and also directly north in zip code 90814, the majority of the population is overwhelmingly White, with Hispanics not exceeding one-fifth of the population.

Access

The major arterial thoroughfare is from the 405 Freeway, which runs east to west through the center of the City of Long Beach. The 710 Freeway is the major north-south arterial thoroughfare, which runs through the western portion of the City of Long Beach. The 605 Freeway borders the City on the east and the 91 Freeway borders part of the City on the north. The major arterial routes are shown in **Figure 7**. The other portions of the city are accessed through the larger streets.

Access to the bluffs from the west is through Ocean Boulevard that runs east-west along the shoreline, with access to the bluffs from the east through 2nd Street. The major north-south street accesses are Alamitos Avenue, Cherry Avenue, and Redondo Avenue, as shown in **Figure 8**.

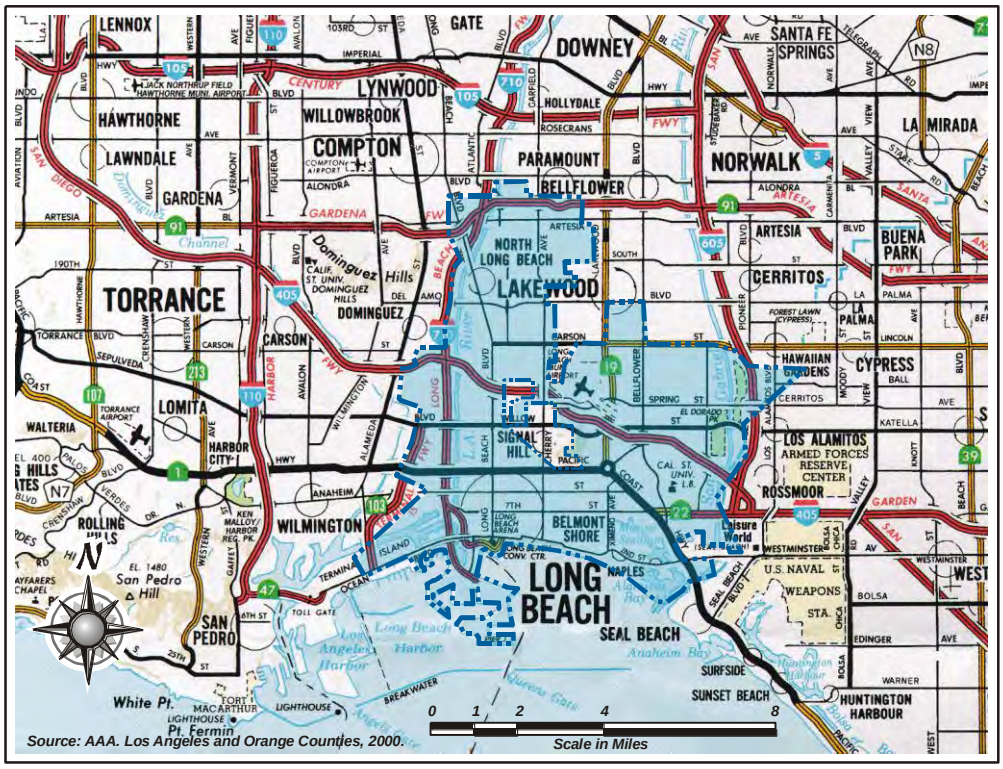


Figure 7. Major arterial routes to Long Beach.

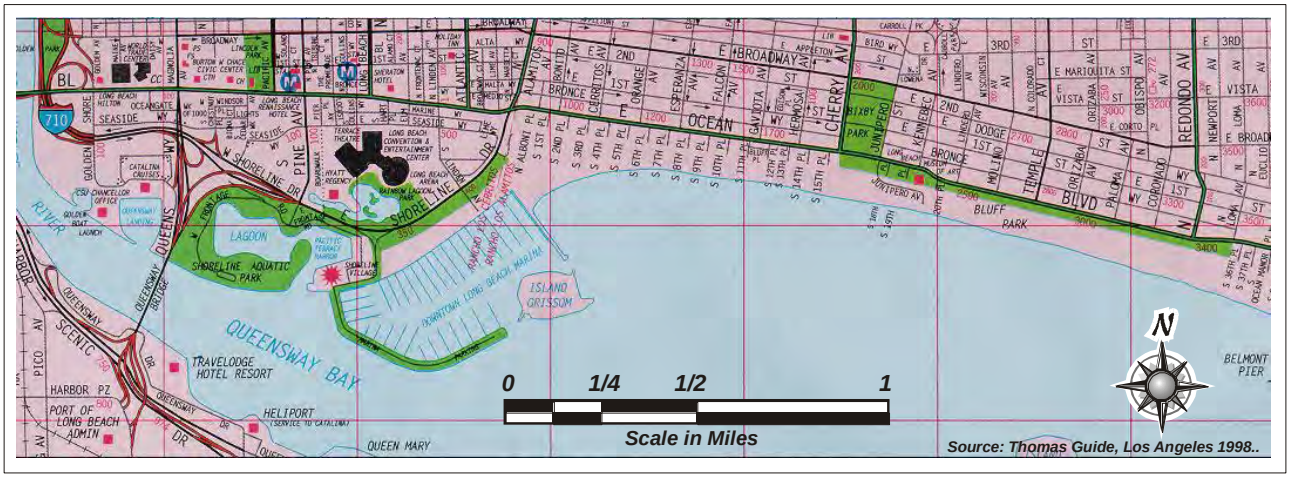


Figure 8. Street access to the beach area.

PROJECT BOUNDARIES

The "Plan of Development – Bluff Erosion and Enhancement Project" focuses on the areas adjacent to and including the bluff and beach areas from Alamitos Avenue to 36th Place. The Project is bordered by the downtown Long Beach Marina to the west and the Belmont Pier to the east. The area is delineated in **Figure 9**.

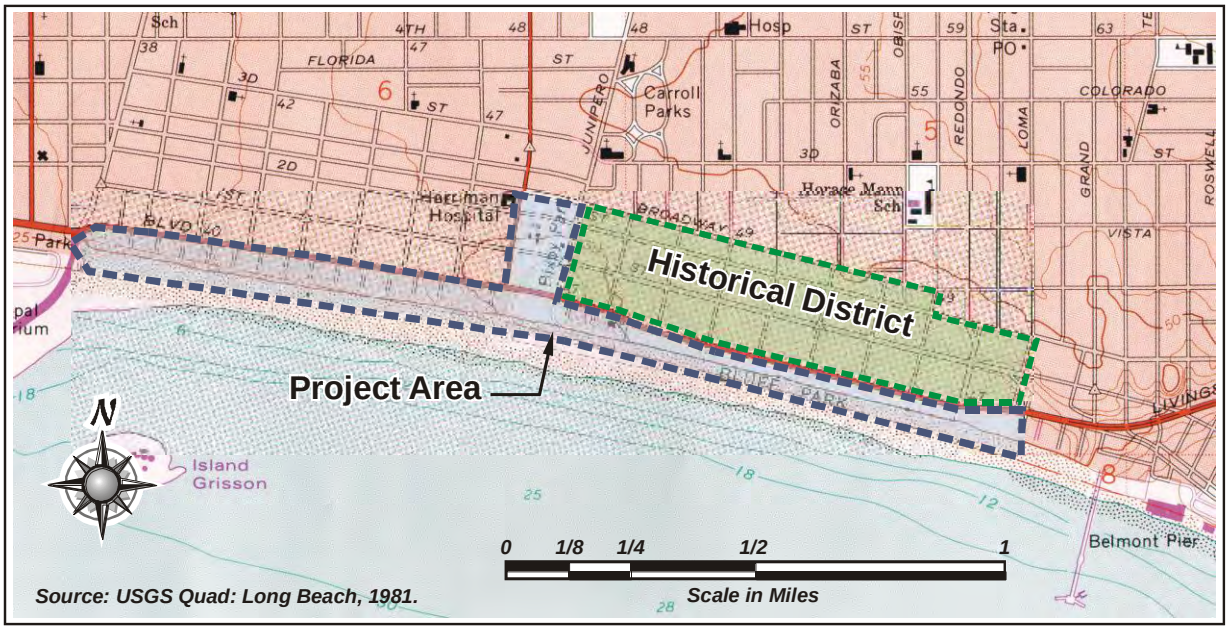


Figure 9. Bluff Erosion and Enhancement Study – Project area.

PROJECT GOALS

The immediate concern is to protect public and private property from the existing erosive conditions and create an environment that protects both human health and safety. The project goals are separated into the following three areas:

- Bluff Erosion
- Public Shoreline Access
- Community Use Improvements

Bluff Erosion pinpoints areas of slope failure or potential failure along the bluff that affects both property and safety. **Public Shoreline Access** covers projects needing improvement of existing and potential access points from the bluff to the beach. **Community Use Improvements** focuses on ways in which the aesthetic appeal and recreational opportunities for the community can be enhanced. Each project proposed may address the appropriate following issues:

- Protect public safety
- Protect private and public property through slope stabilization
- Provide/maintain/improve access
- Improve aesthetics
- Provide educational/recreational value

While the condition of the bluff would be improved, other adjacent enhancement projects can coincide to increase the overall aesthetics and recreational values of the bluff areas. The following goals were developed in conjunction with the community in the public meetings:

- Mitigate hazards to public health, safety, and property from erosive slope failures
- Improve aesthetic appearance of the bluff and adjacent parks
- Integrate erosion control and slope stability with public use and specialized events
- Establish native vegetation habitats
- Improve beach access
- Maintain recreational activities (i.e., RC gliders) along the bluff
- Develop environmentally sound and feasible alternatives
- Attain long-term low maintenance
- Enhance storm drains and discharge quality

Funding

The funding for each proposed project will be through the following sources:

- City of Long Beach
- Private entities
- California Coastal Conservancy

- California Department of Parks and Recreation
- California Department of Transportation
- United States Department of Interior
- Other State Agencies

Regulatory Requirements

The primary regulating document relating to bluff erosion is the City's Local Coastal Plan (LCP). The LCP only addresses bluff erosion specifically in the geographic area of Bluff Park, where it provides the following policy, Part II-23, Recommendation #6: "Bluff stabilization measures should be designed to cause minimum encroachment to existing sand area." This is further explained on Part III-B-11, which states, "Bluff erosion and slumping which may be hazardous should be stabilized by plantings and diversion of run-off waters away from the face of the bluff. As long as this feature is left in its natural state, however, no maintenance program can guarantee a complete elimination of hazardous conditions."

The regulatory requirements vary in accordance with the purpose and extent of each project. The regulatory and/or reviewing agencies anticipated to be involved are:

- City of Long Beach – Department of Parks, Recreation & Marine
- City of Long Beach – Department of Public Works
- California Coastal Commission
- State Historic Preservation Office
- California Department of Fish and Game
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Services
- Regional Water Quality Control Board
- Long Beach Transit Co.

Community Involvement

The following entities have been included in the consultation for some of these projects that affect their interests:

- Bluff Park Association
- Alamitos Beach Association
- Model Plane Glider Group
- Bluff Park Front Runners
- Long Beach Museum of Art
- Bluff Park Users
- Bixby Park Users
- Feral Cat Protectors
- Molino Avenue Beach Area
- Beach Consessionaires

Support Facilities

With each project there may be new support facilities necessary or an existing facility may be impacted. Some such support facilities that may be impacted include:

- Stairways
- Restrooms
- Parking
- Shaded areas
- Concessions
- Pathways

Bluff Erosion Priorities

The main purpose of this Plan of Development is to identify and implement corrective measures for those areas where erosion is visibly evident or which show potential for erosion. The erosion occurring along the bluff is classified into four categories, from grossly unstable to stable. The categories in judging the current condition of the areas are defined as follows:

1st Priority: High priority, evidence of slope instability (calculated factor of safety near 1, static*); repairs needed.
2nd Priority: Medium priority, visible evidence of slope instability (calculated factor of safety less than 1.5, static) or exposed slopes subject to superficial erosion not affecting short-term stability; preventative maintenance needed.
3rd Priority: Moderate priority, no visible evidence of slope instability (calculated factor of safety less than 1.5, static) and not exposed to superficial erosion; improvement desirable.
4th Priority: Grossly stable.

* Static stability scale: 1 or less = grossly unstable; between 1 and 1.5 = potentially unstable; greater than 1.5 = stable. This scale does not include seismic considerations.

The Bluff Erosion study areas are classified by the following:

1st Priority: 1st Place, 5th Place, 7th Place, 12th Place
2nd Priority: 4th Place, 8th Place, Junipero Avenue, Molino Avenue, 36th Place
3rd Priority: 6th Place, 9th Place, 10th Place, 11th Place, 13th Place, 14th Place, 15th Place
4th Priority: 2nd Place and 3rd Place

Other Bluff Erosion Issues: Bixby Park Bluff Top; Bluff Park Railing; Bluff Park Drainage & Root Trimming; Bluff Park Erosion East of Lindero Avenue,

West of Temple Avenue, East of Temple Avenue, East & West of Redondo Avenue

In dealing with the erosion issues at these areas, the City will coordinate with the private property owners adjacent to the project areas to ensure that the solutions accomplish the primary project goals.

SETTING

The project site encompasses approximately two miles of bluffs within the public right-of-way, between 1st Place on the west end and 36th Place at the east end. Bixby Park is located in the center of the project. West of Cherry Avenue the public portion of the bluffs is typically limited to the south ends of streets and separated by private property. East of Cherry Avenue the entire bluff area, with the exception of two properties, is within the public ownership. The bluff conditions vary significantly from location to location and are described in detail in the project portion of the document.

FLORA AND FAUNA

The Long Beach Bluff Erosion and Enhancement Project area has historically had little to no vegetation. Urbanization considerably changed the character and use of the bluff. Prior to the stabilization and expansion of the beach, the bluffs experienced periodic direct impact from ocean waves. This resulted in active erosion of the bluffs and limited opportunities for plants to establish.

The area west of Bixby Park is within a residential zone that is landscaped with various exotic plants, including iceplant (*Carpobrotus edulis*) and Bougainvillea. The bluff area east of Bixby Park is currently covered with exotic grasses, iceplant, and acacia. As a result of surface water runoff and pedestrian traffic, some vegetation has been destroyed, causing localized erosion in the form of ruts and gullies.

In Southern California, the plant community that naturally occupies coastal bluffs is Southern Coastal Bluff Scrub. Plants in this community are typically soft-stemmed shrubs and herbs that are drought-tolerant, shallow-rooted and summer-dormant. These characteristics are well-suited to soils that dry out during the summer and fall; winter and spring is the growing season with moisture available in the upper horizons. Exotic plants that are not as well-suited to these soils and climate typically accelerate erosion processes. For landscaping, use of regionally native plants is known to reduce erosion and reduces long-term irrigation with minimal maintenance. It also provides a habitat for a wide variety of wildlife species and insects that would naturally use the resources for feeding and breeding. The beach presently has no vegetation. The plant community that naturally occupies sandy beach areas is Coastal Strand, which provides a transition zone between the bluff and the beach.

Community workshops for the Long Beach Bluff Erosion and Enhancement Project area were conducted on March 18 and 25, 2000, for public input on ways to improve the bluff. A plant database (Fialko 2000) was provided during this workshop and reviewed. Selected native plants from the database were incorporated into a native plant species list for the project area. This list is intended for use as a guide for the City of Long Beach Bluff Erosion and Enhancement Project area. This document does not meet all California Coastal Commission (CCC) requirements for a Habitat Restoration Plan and should not be submitted as such. Tree of Life Nursery in San Juan Capistrano is recommended for plant seed collection (if necessary), plant propagation and seed mix supply. They have experience with native plants especially in Southern California. The community within the residential area west of Bixby Park have chosen landscaping with ornamental plants for aesthetic purposes. This list contains native plant species recommended for the area east of Bixby Park and specifies the following four zones (as shown in **Figure10**):

Zone 1 Southern Coastal Bluff Scrub, upper three feet
Zone 2 Southern Coastal Bluff Scrub, along the entire slope
Zone 3 Coastal Strand

Zones 1, 2, and 3 may also be considered for the stair easements west of 14th Place.

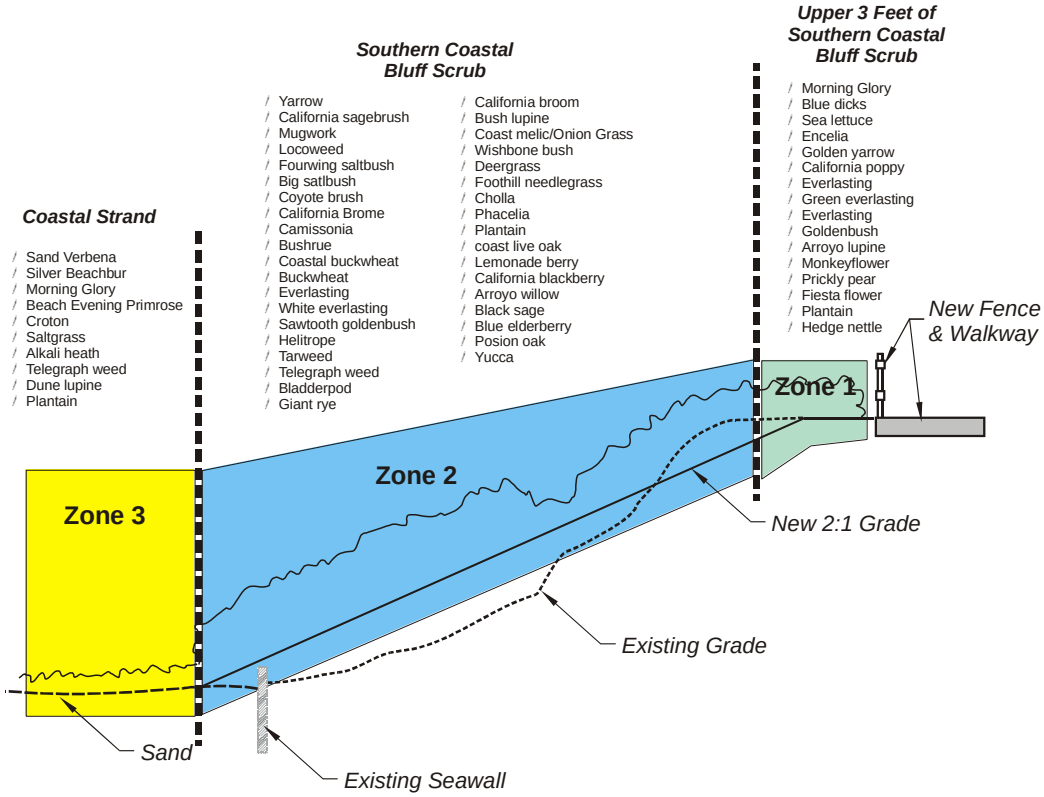


Figure 10. Vegetation Zones at Bixby Park

If feasible, the City of Newport Beach Tidelands Oilfield (approximately three miles southeast of the Long Beach Bluff study area) could be used as a seed collection site for the bluff area to obtain a regional plant seed source. This Newport Beach site on Highway 1 just west of Superior Avenue is a fairly small, pristine site. A plant survey of the oilfield site should be conducted during the appropriate periods (spring and summer) to identify all species present that may be added to Zone 1 and 2 lists.

Please see Appendix A for detailed lists of native plant species and wildlife for these zones.

GEOTECHNICAL

The geotechnical investigation indicates that while the soil conditions exhibit only subtle variations across the project site, the bluff conditions are highly variable. The primary factors affecting the condition of the bluffs are the steepness of the slopes, drainage conditions, and slope vegetation. Each of these factors is discussed in the project descriptions. For more detailed information please consult the *Geotechnical Investigation Proposed Belmont Shore Bluff Restoration (Tetra Tech, Inc. & Geotechnical Professionals, Inc., May 2000).*

Bluff Erosion
First Priority Projects

1st Place
5th Place
7th Place
12th Place

Project: **1st Place**

Location: **Bluff at end of 1st Place**

Purpose:	Protect public safety, private and public property through slope stabilization.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	$250,000 to $325,000	Funding:	City of Long Beach and private entities
Regulatory Requirement:	Local coastal development permit	Environmental Issues:	Revegetation of the slope below proposed retaining wall

Existing Issues:

- **Bluff Failure**
- **Public Property Endangerment**

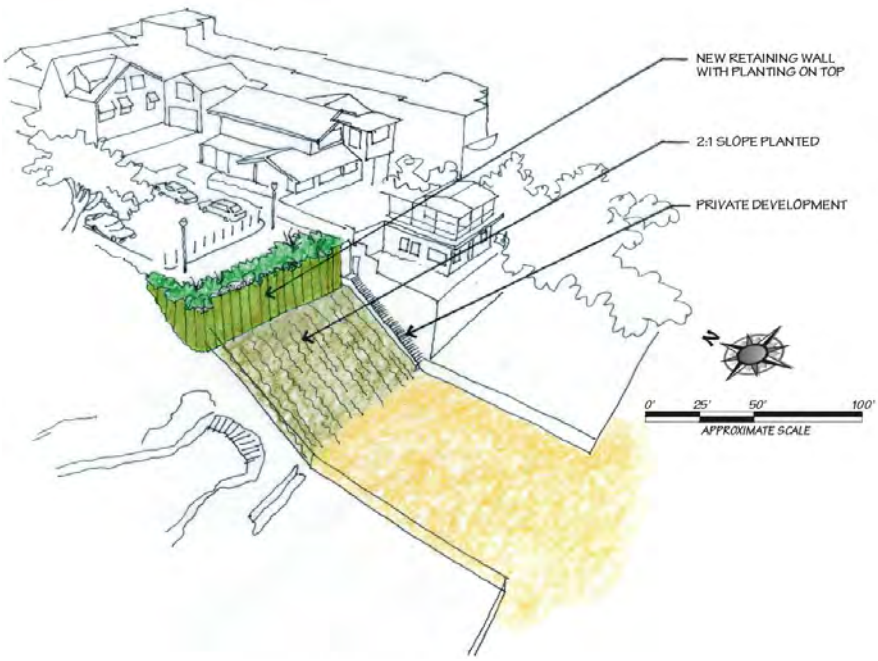
Current condition of 1st Place

Existing Issues: The City property of the bluff area at the end of 1st Place constitutes approximately 55 feet of the bluff and is bordered by private property on each side. The private property boundaries are delineated by chainlink fences and stairway. Vegetative cover consists mostly of wild grasses and includes two palm trees. The overall bluff height is approximately 25 feet, with a variable slope inclination ranging from vertical to 2:1.

The bluff area falls within the 1st Priority category. The calculated factor of safety is near 1.0 on static conditions. The slope is potentially unstable. Severe erosion is undermining the sidewalk at the end of the street.

Proposed Improvements:

- **Reinforced Slope Covered with Vegetation**
- **Coordination with Private Properties**



Conceptual drawing of 1st Place.

Proposed Improvements: A reinforced slope will be engineered to stabilize the bluff while maintaining a vegetated bluff appearance. The repair of this bluff will be coordinated with the new condominium development on the east side of 1st Place. This new development will generate fill to be used for the engineered slope. The top ten feet of reinforced slope will be almost vertical with the remaining slope being 2:1 to match the existing grade on the property to the west of 1st Place. In addition, coordination with the owner of this landmark Greene & Greene designed home will be necessary for constructing the reinforced slope and consequent grading. The existing palm tree and utilities will be relocated as a result of this work.

Project: **5th Place**

Location: **Bluff at end of 5th Place**

Purpose:	Protect public safety, private and public property through slope stabilization and water drainage control.	Support Facilities:	Stairways and beach pathways will be impacted.
Budgetary Cost:	$100,000 to $150,000	Funding:	City of Long Beach and private entities
Regulatory Requirements:	Local coastal development permit	Environmental Issues:	Revegetation of the slope

Existing Issues:

- **Slope Stability**
- **Drainage**
- **Privacy**

Current condition of 5th Place

Existing Issues: The City property at the end of 5th Place constitutes approximately 55 feet of the bluff and is bordered by private property on each side. Iceplant covers most of the slope and the overall bluff height is about 30 feet. The bluff at this location has been partially improved. The slope has been flattened to approximately 2:1 within the western half of the slope, while the upper part of the eastern half of the slope has an inclination of 1½:1 on a southerly direction. The slope covered by the oleander bushes (to the east of the stairs) is steeper than 1:1 on an easterly direction; however, the construction drawings for the stairs did not indicate that this slope is reinforced. Although the slope is currently reinforced by vegetation, the degree of stability cannot be adequately calculated. The oleander bushes were planted by the property owners to provide privacy for the lower tenants and are considered a deterrent for transients. Current drainage patterns are adversely effecting the condominium to the west. Furthermore, a

Jacuzzi or spa drainage pipe from the building to the west has caused some localized erosion on the slope, not visually evident.

Proposed Improvements: Although the property owners to the east side do not perceive a slope stability problem, it is evident that the existing slope is too steep in the easterly direction. Therefore, a retaining structure or geotechnically reinforced slope is required. If the Oleander bushes are to remain, a drilled pile-caisson wall could be installed following the footprint of the bushes. Additional small retaining walls along the eastern property line would be required to divert run-off from the private property. Spot regrading and re-landscaping will be necessary.

- **Install Retaining Structure**
- **Re-grade and Revegetate**

Project: **7th Place**

Location: **Bluff at end of 7th Place**

Purpose:	Protect public safety, private and public property through slope stabilization.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	$135,000	Funding:	City of Long Beach and private entities
Regulatory Requirements:	Local coastal development permit	Environmental Issues:	Revegetation of the slope below proposed retaining wall

Existing Issues:

- **Bluff Failure**
- **Appearance**
- **Drainage From Private Property**

Current condition of 7th Place

Existing Issues: The City property at the end of 7th Place constitutes approximately 55 feet of the bluff and is bordered by private property on each side. The area is well vegetated, with large bushes bordering on the west side. Currently, vegetative cover over the majority of the slope consists of iceplant. Heavy growth of Bougainvillea covers the western third of the slope. Existing slope drainage appears to be to towards the adjacent properties as well as to the south. The bluff has a gradually variable slope, ranging from about 1¼:1 near the top to about 2:1 over the lower half.

The bluff area falls within the 1st Priority category. The calculated factor of safety is near 1.0 on static conditions on the east side, which represents a potentially unstable slope. This is confirmed by a small failure which has occurred on the top of the slope on the east side which has undermining the sidewalk.

A concrete retaining wall with a sloping top retains most of the western edge of the slope. However, localized drainage which is causing erosion is evident along the wall. Based on information provided by a local resident, it is understood that the slope was re-graded to its existing condition and re-planted after a shallow landslide. Shallow, terraced modular block walls have been placed by the residents along the lower eastern parts of the slope.

Proposed Improvements: Due to the existing properties and special constraints, a retaining structure or geotechnically reinforced slope is required along the north end of the bluff. The remaining slope can be re-graded to a 2:1 slope and revegetated with appropriate coastal plants to discourage pedestrian traffic into vegetated areas. Drainage patterns will be redirected away from private properties. However, roof drainage from the eastern property must be diverted to the bottom of the slope to prevent further erosion. These property owners have requested that the bottom story windows remain free of visual obstructions.

- **Install Retaining Structure**
- **Regrade and Revegetate**

Project: **12th Place**

Location: **Bluff at end of 12th Place**

Purpose:	Protect public safety, private and public property through slope stabilization.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	$500,000 to $625,000	Funding:	City of Long Beach and private entities
Regulatory Requirements:	Local coastal development permit	Environmental Issues:	Revegetation of the slope below proposed retaining wall

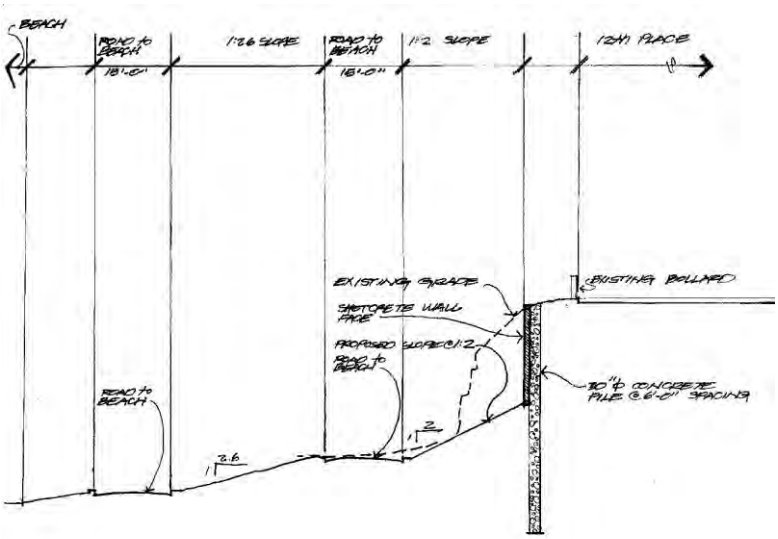
Existing Issues:

- **Bluff Failure**
- **Public Property Endangerment**
- **Private Retaining Wall**
- **Appearance**
- **Access**
- **Utilities**

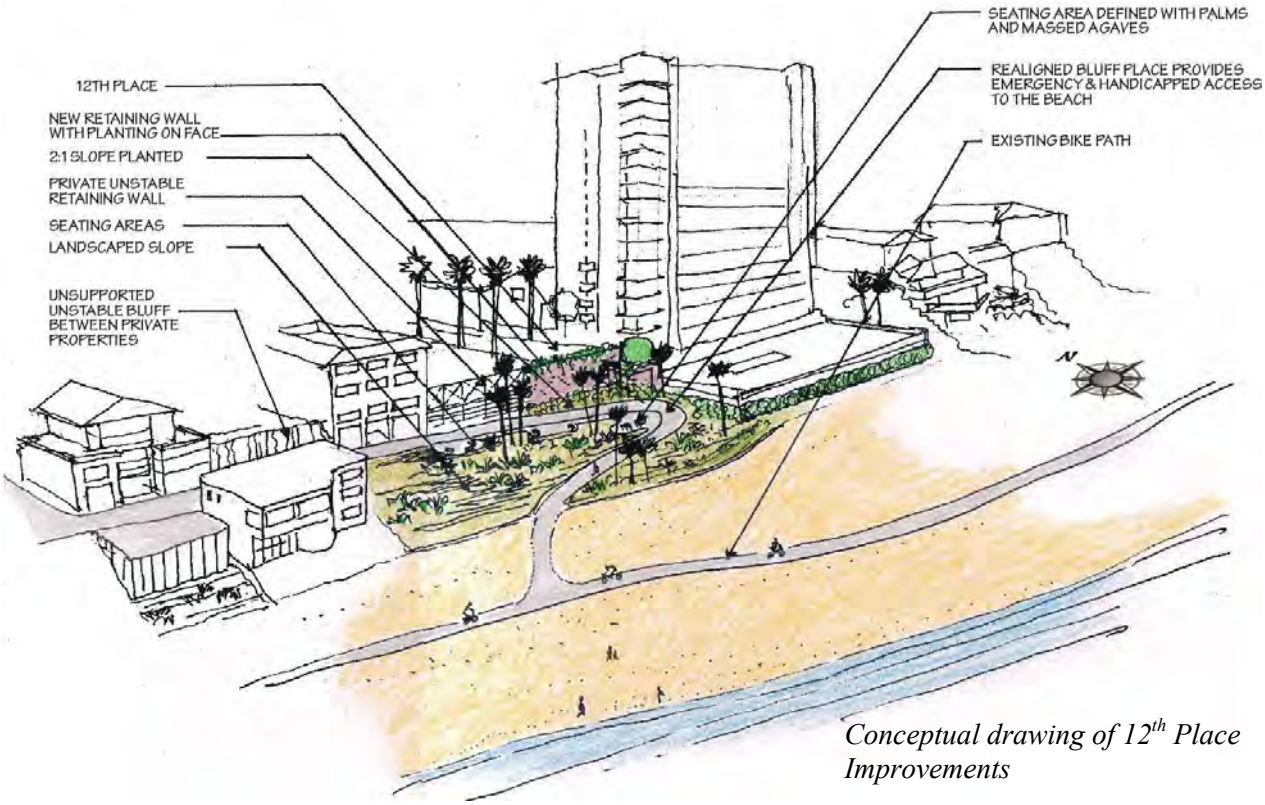
Current condition of 12th Place

Existing Issues: The City property at the end of 12th Place constitutes approximately 55 feet of the bluff and is bordered by private property on each side. The overall slope height is about 30 feet. The slope is retained by two timber walls covered by vegetation that have an overall (top to bottom) inclination of 1:1. The bluff is very steep, showing evidence of surficial failures/slumps, and it has been shored by a variety of means. A masonry retaining wall is visible along the toe of the slope. The wall appears to wrap around the eastern edge of the public right-of-way (Bluff Place) and supports grade differentials of 5 to 8 feet. Bluff Place is located along the toe of bluff and provides emergency vehicle access to the beach. There is a private retaining wall to the west that is showing evidence of failure which should be assessed as soon as possible. The two walls do not contain the entire bluff leaving the center section (area between private and public property) exposed and consequently failing.

The bluff area falls within the 1st Priority category. The calculated factor of safety within the unsupported section is near 1.0 on static conditions, which represents a potentially unstable slope.



Cross section of proposed modifications



Conceptual drawing of 12th Place Improvements

Proposed Improvements: Due to the apparent undermining of the existing retaining walls and the adjacent private retaining wall failure, an engineered retaining structure is called for. The proposed retaining structure must be coordinated with the private property owners on the east and west. Due to the proximity of the adjacent structures, public improvements and the spatial limitations at the toe of the bluff, a near vertical retaining structure may be required. The structure will be designed to incorporate a vegetative cover to respond to the community interests. These bluff improvements will result in the realignment/regrading of existing Bluff Place, which will provide emergency vehicle and handicap access to the beach. The sloped area will be re-landscaped with palm trees, low-profile seashore plants and look-out seating areas. Utilities will be relocated and additional lighting will be provided for security.

- **Replace Retaining Structure**
- **Coordinate with Private Property Owners**
- **Relandscaping and Lighting**
- **Utility Relocation**
- **Handicap Access**
- **Seating Areas**

Bluff Erosion
Second Priority Projects

4th Place
8th Place
Junipero Avenue Bluff Slope
Molino Avenue Bluff Slope
36th Place Bluff Slope

Project: **4th Place**

Location: **Bluff at end of 4th Place**

Purpose:	Protect public safety, private and public property through slope stabilization.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	$40,000 to $75,000	Funding:	City of Long Beach and private entities
Regulatory Requirements:	City of Long Beach	Environmental Issues:	Revegetation of the slope

Existing Issues:

- **Drainage**
- **Surficial Failure**
- **Bluff Instability**
- **Adjacent Private Property Slope Failures**

Current condition at 4th Place

Existing Issues: The City property at the end of 4th Place constitutes approximately 55 feet of the bluff and is bordered by private property on each side. The overall bluff height is about 28 feet. The private property boundaries are delineated by a retaining wall on the east side and a chainlink fence on the west side. The bluff has a variable slope ranging from 1:1 in the upper/western part of the slope, to 1¾:1 along the eastern edge (against the existing building). The slope within the private property to the west is steeper and exhibits slumping failures in the upper part of the slope. The east side of the bluff area is well vegetated, mostly with iceplant and large bushes.

The bluff area falls within the 2nd Priority category. The calculated factor of safety is near 1.5 on static conditions, which represents a less than fully stable slope. The bluff within public property is visually stable. However, the instability of the bluff on private property may

contribute to future erosion on the public property.

Proposed Improvements: The emphasis will be on coordinating with the private property owners on the west side to improve the stability of the bluff that resides on their property. Drainage improvements are an issue, where it will be necessary to coordinate with the private property owners to create a drainage system that prevents further erosion. The slope should be filled to reduce the steepness. Continual monitoring of drainage and irrigation is necessary to prevent further erosion.

- **Improve Drainage**
- **Regrade**
- **Coordinate with Private Property Owners**

Project: **8th Place**

Location: **Bluff at end of 8th Place**

Purpose:	Protect public safety, private and public property through slope stabilization.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	$40,000 to $75,000	Funding:	City of Long Beach and private entities
Regulatory Requirements:	City of Long Beach	Environmental Issues:	Revegetation of the slope below proposed retaining wall

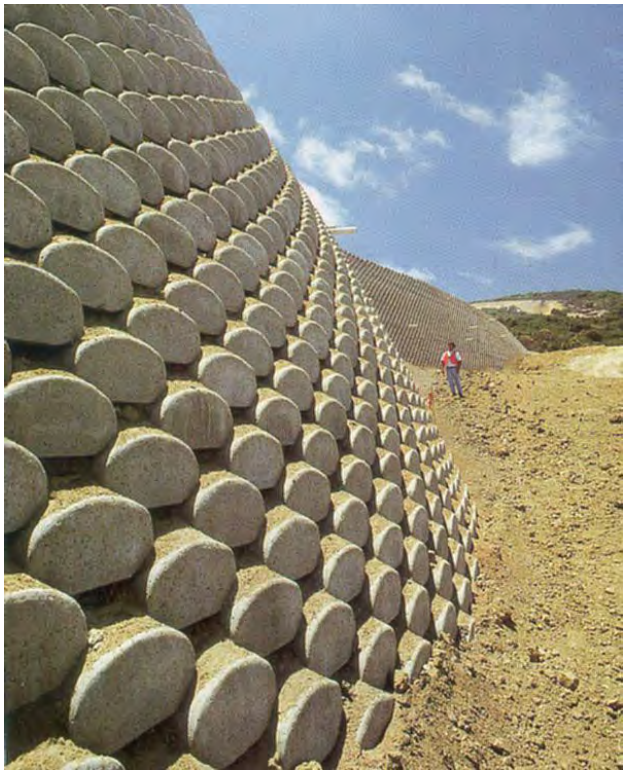
Existing Issues:

- **Bluff Instability**
- **Adjacent Private Property Slope Failures**

Current condition of 8th Place

Existing Issues: The City property at the end of 8th Place constitutes approximately 55 feet of the bluff and is bordered by private property on each side. The bluff has an overall height of 32 feet. There is stairway access from the street to the beach below. The area is well vegetated with shrubs and iceplant to the west of the stairway. Plans for the ongoing development on the east side should be closely reviewed to ensure that their design criteria is consistent with the City's community input. The average slope (top to bottom) across the stairs is about 1¾:1. The slope to the west has been terraced with timber cribbing and has an overall inclination of 1½:1.

The bluff area falls within the 2nd Priority category. The bluff within public property is visually stable. However, the private improvements west of the stairway do not appear to be engineered. The calculated factor of safety is near 1.5 on static conditions, which represents a less than fully stable slope.



Example of modular wall.

Proposed Improvements: Replace railroad tie walls with engineered/permitted modular block walls on west side of stairs. Regrade the slope and replant with appropriate coastal plants. Repair the existing irrigation to prevent runoff-caused erosion and improve drainage. Coordinate with private property owners for new development improvements on the east side to ensure a consistent degree of quality when slope stabilization is enlisted.

- **Replace Railroad Tie Wall with Modular Block Wall**
- **Regrade and Revegetate Coordinate with Private Property Owners**

Project: **Junipero Avenue Bluff Slope**

(Landscape Demonstration Project)

Location: **Bluff along Junipero Avenue ramp**

Purpose:	Demonstrate forms of native coastal plant species found on natural bluffs in Southern California as erosion control measures.	Support Facilities:	Side walk and beach access temporarily impacted.
Budgetary Cost:	$100,000 to $125,000	Funding:	City of Long Beach and private entities
Regulatory Requirements:	City of Long Beach	Environmental Issues:	Revegetation of the slope.

Existing Issues:

- **Slope Erosion**
- **Public Access**
- **Undermined Sidewalk**

Current condition of the Junipero Ramp slope

Existing Issues: The slope on the south and southwesterly side of the Junipero Avenue ramp embankment has an average inclination of 2:1 and overall height ranging up to 35 feet (at the west end). Vegetation on the slope surface is sparse, consisting of light growth of wild grasses and a few palm trees. There is sidewalk access to the beach below, parallel to the Junipero ramp.

Although the slope appears to be grossly stable and well compacted, extensive erosion gullies (up to 2 feet deep) have formed over the slope surface. These gullies coincide with former irrigation head locations, which may have failed, thereby causing severe localized erosion. The guardrail at the top of the slope is loose because the supporting timber posts have rotted. This section of bluff is categorized within the 2nd Priority category.

Mud washing onto the bike path has caused maintenance problems and is a hazard to bicyclists.

Proposed Improvement: A demonstration project has been initiated at this location. The purpose is to demonstrate how Southern Coastal Bluff Scrub and other species which naturally occur in similar areas can be used to revegetate and provide erosion control measures in a deteriorated area. The project consists of the following: regrading the slope, filling in the ruts, and revegetating by hydromulching, hydroseeding and planting appropriate coastal plants; and redesigning the irrigation system with flow control valves to prevent uncontrolled discharge. Once completed, the storm drain system in Ocean Boulevard will be visually monitored to ensure that storm drain overflow does not impact the slope repairs in the event of high rainfall.

- **Regrade and Revegetate**
- **Redesign Irrigation**

Project: **Molino Avenue Bluff Slopes**

(Landscape Demonstration Project)

Location: **Bluff at both sides of Molino stairs on top of the gabions**

Purpose:	Demonstrate forms of native coastal species found on natural bluffs in Southern California found as erosion control measures.	Support Facilities:	Sidewalk and beach access temporarily impacted.
Budgetary Cost:	$100,000 to $125,000	Funding:	City of Long Beach and private entities
Regulatory Requirements:	City of Long Beach	Environmental Issues:	Revegetation of the slope above the gabion

Existing Issues:

- **Slope Erosion**
- **Public Access**

Current condition of Molino Avenue bluff.

Existing Issues: The bluff area at both sides of the Molino Avenue stairs on top of the gabions falls within the 2nd Priority category. The slopes on top of the gabions are scarred from what appears to be irrigation pipe failures and/or runoff from Bluff Park. The existing acacia shrubs have been removed upon community request.

.

Proposed Improvements: A demonstration project is being implemented at this location. The purpose is to demonstrate how Southern Coastal Bluff Scrub and other species which naturally occur in similar areas can be used to revegetate and provide erosion control measures in a deteriorated area. The work generally consists of the following: repairing erosion ruts, installing irrigation with flow control valves, and removing exotic weeds through successive weed growing and weed abatement procedures on both sides of the

stairs. The site is divided into four quadrants. Each quadrant is a slightly different demonstration. One quadrant has minimal soil loosening with drilled holes and minimal amending. In the second quadrant drilled holes are amended and planted. The third quadrant is benched and the amendments are installed hydraulically. In the fourth quadrant the entire soil surface is scarified, amended, and finally hydroseeded.

- **Educational Value**
- **Sidewalk Stabilization**
- **Improved Bluff Appearance**

Project: **36th Place Bluff Slope**

(Landscape Demonstration Project)

Location: **Bluff west of 36th Place stairs on top of the gabions**

Purpose:	Demonstrate forms of native coastal species found on natural bluffs in Southern California.	Support Facilities:	Sidewalk and beach access temporarily impacted.
Budgetary Cost:	$50,000 to $60,000	Funding:	City of Long Beach and private entities
Regulatory Requirements:	City of Long Beach	Environmental Issues:	Revegetation of the slope above the gabion

Existing Issues:

- **Soil High in Salts and Metals**

Current condition of 36th Place.

Existing Issues: The bluff area just west of the 36th Place stairs is presently vegetated with iceplant (*Carpobrotus edulis*). The existing soil contains higher levels of salts and metals than the typical bluff soils.

Proposed Improvements: The area west of 36th Place was chosen as a revegetation demonstration area due to the higher levels of salts and metals in the soil. The iceplant will be removed from the slopes between the top of the gabions and the walkway of Bluff Park. In order to minimize disturbing the slope, 2' diameter holes will be drilled 30" deep at 6'-0" on center. The drilled soil will be disposed and new imported amended soil will be used to refill the holes. One half of the area will be drenched with PAM, a polymer that keeps the soil particles from cementing together. The second section will not be drenched. The planting will be similar on

- **Improved Bluff Appearance**
- **Revegetate**
- **Educational Value**
- **Beneficial Uses of Unsuitable Soils**

both sides but, unlike the other demonstration projects, this one will feature more grasses and cactus and less woody shrubs that tend not to grow well in soils higher in the metals. The intent of this experiment is to demonstrate that even unsuitable soils can be successfully revegetated. Through monitoring of the planting, it will be possible to test various soil amending procedures on future projects. The plantings will be from container grown plants which are compatible with drip irrigation. Construction plans are complete and being reviewed by the City.

Bluff Erosion
Third Priority Projects

6th Place
9th Place
10th Place
11th Place
13th Place
14th Place
15th Place
Bixby Park Bluff Top
Bixby Park Railing
Bluff Park Drainage – Root Trimming
Bluff Park Erosion

Project: **6th Place**

Location: **Bluff at end of 6th Place**

Purpose:	Protect public safety, private and public property through slope stabilization.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	$20,000 to $60,000	Funding:	City of Long Beach and private entities
Regulatory Requirements:	As required by the City of Long Beach	Environmental Issues:	Revegetation of the slope

Existing Issues:

- **Drainage from Private Property**
- **Bluff Improvements**

Current condition of 6th Place

Existing Issues: The City property at the end of 6th Place constitutes approximately 55 feet of the bluff and is bordered by private property on each side. The overall slope height is about 32 feet.

The private property boundaries are delineated by structures that form retaining walls on each side. The area is well vegetated, with a couple of Eucalyptus trees in the middle of the bluff. Grasses and shrubs cover the east half of the slope. The slope has a variable inclination, ranging from flatter than 2:1 in the middle to nearly 1:1 in the upper/western parts of the slope. A retaining wall with a sloping top retains the west side of the slope.

The bluff area falls within the 3rd Priority category. The bluff within public property is visually stable. However, the instability of the bluff on private property may contribute to future instability to the public property. The calculated factor of safety is near 1.5 on static conditions.

Proposed Improvement: Minor regrading and revegetation with appropriate coastal plants is needed to mitigate the surficial erosion. Improve drainage and irrigation to prevent runoff-caused erosion. Coordinate with private property owners to erect potential retaining walls at property lines.

- **Coordinate with Private Property Owners**
- **Regrade and Revegetate**

Project: **9th Place**

Location: **Bluff at end of 9th Place**

Purpose:	Protect public safety, private and public property through slope stabilization.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	$20,000 to $60,000	Funding:	City of Long Beach and private entities
Regulatory Requirements:	As required by the City of Long Beach	Environmental Issues:	Revegetation of the slope

Existing Issues:

- **Storm Drain Failure**
- **Bluff Improvements**

Current condition of 9th Place

Existing Issues: The City property at the end of 9th Place constitutes approximately 55 feet of the bluff and is bordered by private property on each side. The overall slope height is about 32 feet. Vegetative cover on the east includes Capeweed, evergreen, and shrubs, with two palms towards the top of the bluff to the east of the stairway. The eastern slope at the end of 9th Place has been regraded to a 2:1 slope. A development has commenced on the west side of the stairs and should be reviewed to ensure that their design is consistent with the results of this study. This is a good example of public/private cooperation in developing the bluff in conjunction with new development.

The bluff area falls within the 3rd Priority category. The calculated factor of safety is near 1.5 on static conditions. The bluff on the east side of the stairs is visually stable.

Proposed Improvements: Coordinate with the developer on the west side to complete improvements and to complement the east side that is already complete. Revegetate with deep-rooting plants to mitigate the surficial erosion. Improve drainage and irrigation to prevent runoff-caused erosion. Mitigate dry season flow through the storm drain.

- **Regrade and Revegetate**
- **Improve Drainage**
- **Coordinate with Private Property Owner**

Project: **10th Place**

Location: **Bluff at end of 10th Place**

Purpose:	Protect public safety, private and public property through slope stabilization. Maintain public access.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	$20,000 to $60,000	Funding:	City of Long Beach and private entities
Regulatory Requirements:	As required by the City of Long Beach	Environmental Issues:	Revegetation of the slope.

Existing Issues:

- **Bluff Improvements**
- **Bluff Instability on Private Property**

Current condition of 10th Place

Existing Issues: The City property at the end of 10th Place constitutes approximately 55 feet of the bluff and is bordered by private property on each side. Stairs have been constructed along the middle of the slope. The slope at the south end of 10th Place has been graded to an inclination of 2:1 along the middle of the slope. The area west of the stairs is graded with slopes steeper than 2:1 in a westerly direction abutting a retaining wall which is part of the new development. To the east of the stairs, the slope transitions to a steeper inclination matching the slope of the adjacent private property line, about 1¼:1 slope. Vegetation consists of flowers and palm trees on the west side, and wild grasses and shrubs on the east side.

The bluff area falls within the 3rd Priority category. The bluff within public property is visually stable. However, the steepness of the bluff on the east side of the private property may contribute to future

instability to the public property. The calculated factor of safety on the southerly direction is near 1.5 on static conditions.

Proposed Improvements: The private development on both sides has created slopes that appear to be steeper than 2:1. Coordination with the property owners on both sides is necessary to ensure continuity with the objectives of this project.

- **Coordination with Private Property Development**

Project: **11th Place**

Location: **Bluff at end of 11th Place**

Purpose:	Protect public safety, private and public property through slope stabilization. Maintain public access.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	$20,000 to $60,000	Funding:	City of Long Beach and private entities
Regulatory Requirements:	As required by the City of Long Beach	Environmental Issues:	Revegetation of the slope.

- **Existing Issues:**
- **Bluff Improvements**
- **Unconventional Retaining Wall**

Current condition of 11th Place

Existing Issues: The City property at the end of 11th Place constitutes approximately 55 feet of the bluff and is bordered by private property on each side. The slope has an overall height of about 32 feet. There is stairway access from the street to the beach below. To both sides of the stairway is vegetation, mostly iceplant, with a Eucalyptus tree to the west of the stairway. Variable slope conditions prevail at the south end of 11th Place. The middle of the slope has been flattened to an inclination of 2:1. The two lateral sides have steeper slopes. On the west side, due to physical constraints imposed by the adjacent private property, the overall slope inclination is about 1½:1 with localized steeper sections. Similarly, the slope on the east side also has an average inclination of 1½:1, although there are no physical constraints for a flatter slope. An unconventional concrete retaining structure supporting up to about 15 to 20 feet of earth above the slope surface is located on the east side of the 11th Place slope. The filled area supports auto

parking stalls. The stability of this structure is questionable.

The bluff area falls within the 3rd Priority category. The bluff within public property is visually stable. However, the instability of the bluff on private property to the west side may contribute to future instability to the public property. The calculated factor of safety is near 1.5 on static conditions. Slope creep was noted in localized over-steepened areas, such as the upper parts west of the stairs. Additionally, the contouring of the slope results in drainage being directed to the two sides of the slope.

Proposed Improvements: Stabilize slope creep by repairing localized areas by excavating and recompacting and the planting of deep-rooting shrubs. Coordinate with private property owners on the west side to raise retaining walls to prevent erosion into private property. Place additional fill on slope to the east side toward non-permitted wall of the parking area to achieve a 2:1 stable slope. Repair irrigation and revegetate with deep-rooting plants to control erosion.

- **Stabilize Slope**
- **Repair Irrigation and Revegetate**

Project: **13th Place**

Location: **Bluff at end of 13th Place**

Purpose:	Protect public safety, private and public property through slope stabilization.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	$20,000 to $60,000	Funding:	City of Long Beach and private entities
Regulatory Requirements:	As required by the City of Long Beach	Environmental Issues:	Revegetation of the slope.

Existing Issues:

- **Bluff Improvements**

Current condition of 13th Place

Existing Issues: The City property at the end of 13th Place constitutes approximately 55 feet of the bluff, bordered by private property on each side. The overall slope height is about 30 feet.

The bluff boundaries are delineated by retaining walls on both sides. Vegetation consists of iceplant covering most of the slope, large Bougainvillea shrubs in the eastern half of the slope, and two palm trees. The western half of the slope at 13th Place is uniformly sloped to about 1½:1. The eastern half of the slope is steeper, due to physical constraints imposed by the adjacent property. The bluff area falls within the 3rd Priority category. The bluff within public property is visually stable, although the slope surface is uneven. However, the potential instability of the bluff on private property to the east side may contribute to future instability to the public property. The calculated factor of safety is near 1.5 on static conditions.

.

Proposed Improvements: On the west side, coordinate with private property owners to redirect drainage away from the slope. On the east side coordinate with private property owners to secure the steep slope under existing Bougainvillea. Revegetate sparse areas with deep-rooting drought-tolerant plants.

- **Coordinate with Private Property Owners**
- **Revegetate**

Project: **14th Place**

Location: **Bluff at end of 14th Place**

Purpose:	Protect public safety, private and public property through slope stabilization. Maintain public access.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	$20,000 to $60,000	Funding:	City of Long Beach and private entities
Regulatory Requirements:	As required by the City of Long Beach	Environmental Issues:	Revegetation of the slope.

Existing Issues:

- **Bluff Improvements**

Current condition of 14th Place

Existing Issues: The City property at the end of 14th Place constitutes approximately 55 feet of the bluff and is bordered by private property on each side. The overall bluff height is about 30 feet. Along the stairs, the slope has an average inclination of about 2½:1. However, at the two edges, the slope is steeper, up to about 1½:1 on the west side. The slope surface is sparsely vegetated with iceplant and weeds.

The bluff area falls within the 3rd Priority category. The bluff within public property is visually stable. However, the potential instability of the bluff on private property to the east side may contribute to future instability to the public property. The calculated factor of safety is near 1.5 on static conditions.

Proposed Improvements: Minor regrading and revegetation with appropriate coastal plants to mitigate the surficial erosion is needed. Improve drainage and irrigation to prevent runoff-caused erosion. Eliminate dry season storm drain flows.

- **Regrade and Revegetate**

Project: **15th Place**

Location: **Bluff at end of 15th Place**

Purpose:	Protect public safety, private and public property through slope stabilization. Maintain public access.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	$20,000 to $60,000	Funding:	City of Long Beach and private entities
Regulatory Requirements:	As required by the City of Long Beach	Environmental Issues:	Revegetation of the slope.

Existing Issues:

- **Bluff Improvements**

Current condition of 15th Place

Existing Issues: The City property at the end of 15th Place constitutes approximately 55 feet of the bluff and is bordered by private property on each side, delineated by retaining wall on the west side and a chainlink fence on the east side. The bluff has heavy vegetation, mostly of iceplant, with two palms to the top of the west side boundary. The slope at the south end of 15th Place has an overall height of about 35 feet. The upper 20 feet of the slope has an average inclination of 1½:1. There is a timber retaining structure in the middle of the slope. The slope becomes progressively flatter below the retaining structure, gradually transitioning to the relatively flat beach beyond the toe.

The bluff area at the end of 15th Place falls within the 3rd Priority category. The bluff within public property is visually stable. However, the potential instability of the bluff on private property to

the west side may contribute to future instability to the public property. The calculated factor of safety is near 1.5 on static conditions

Proposed Improvements: Minor regrading and revegetation with appropriate coastal plants to mitigate the surficial erosion. Improve drainage and irrigation to prevent runoff-caused erosion.

- **Regrade and Revegetate**

Project: **Bixby Park Bluff Top**

Location: **Bixby Park along the top of the bluff**

Purpose:	Protect public safety, mitigate pedestrian activity; provide sitting areas and ocean viewing.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	$100,000 to $250,000	Funding:	City of Long Beach
Regulatory Requirements:	Local coastal development permit. LCP page III-8-9, Area B Policy Plan	Environmental Issues:	Revegetation of the slope.

Existing Issues:

- **Lack of Proper Pedestrian Beach Access**
- **Bluff Erosion**

Current condition of bluff, showing the erosion from pedestrian traffic. Cherry Ave. Tunnel (closed) is to the left.

Existing Issues: Bixby Park bluff top is located south of Ocean Boulevard, between Cherry and Junipero Avenues. Traditionally, pedestrian access to the beach has been through either the Cherry Avenue Tunnel and/or the face of the bluff, which bounds the Park to the south. The original bluff was cut back and regraded to the current slope of 2½:1 during the 1970s as a result of an accident. Since then the bluff face has been vegetated with light growth of exotic annual grasses and some iceplant.

The Bixby Park bluff top falls within the 3rd Priority category. The closing of the Cherry Avenue Tunnel, due to public safety reasons, has resulted in an increased use of the bluff slope which has caused additional pedestrian despoliation. The paths made by the pedestrian traffic greatly accelerate the erosion of the bluff slope.

Runoff of mud on the bicycle path is a maintenance problem and hazard to bicyclists.

Proposed Improvements: Developing of the bluff top with an edge walk, railing, ocean viewing and sitting areas, and perhaps telescopes similar to those located throughout Bluff Park would complement the access requirements and improve the use of the upper bluff. Revegetate the bluff areas with native coastal species to prevent further erosion and provide an aesthetic transition between the upper grassy park and the lower beach area. Provide planned pedestrian access to the beach through either diagonal pathways and/or through the Amphitheater concepts.

- **Bluff Top Viewing and Sitting Areas**
- **Revegetate for Aesthetic Quality**
- **Pedestrian Beach Access**.

Project: **Bluff Park Railing**

Location: **Bluff Park along Ocean Boulevard**

Purpose:	Protect public safety by replacing existing railing.	Support Facilities:	Concrete walkway, bluff face repair
Budgetary Cost:	To Be Determined	Funding:	City of Long Beach
Regulatory Requirements:	Local coastal development approval.	Environmental Issues:	No environmental issues will be impacted

Existing Issues:

- **Deteriorating Railing**
- **Public Safety**

Current condition of Bluff Park railing.

Existing Issues: The existing railing at Bluff Park has become a visual icon for the City of Long Beach. The railing's Art-Deco style simplicity and openness provides a clear visual access to the beach and San Pedro Bay. The majority of the railing has been maintained over its useful life by painting. However, the moisture of the seaside environment has severely corroded sections of it, which have required periodic replacement. A section of railing toward the east end of the Park does not match, indicating the more recent development of the east end of the park

Proposed Improvements: In an effort to conserve the historical appearance of the railing, it is proposed to install a geometrically identical railing. Horizontal wires could be installed within the railing to satisfy safety requirements stipulated by building codes. The railing replacement project should be combined with the Bluff Park Drainage and Trimming Project and the bluff and walkway reconstruction projects.

- **Replace Railing**
- **Reconstruct Walkway**

New aluminum railing adjacent to historical railing.

Example of compliance with clearance requirements

Project: **Bluff Park Drainage, Root Trimming**

Location: **Bluff Park along top of the bluff**

Purpose:	Improve drainage to avoid erosion, trim tree roots to avoid walkway damage	Support Facilities:	Concrete walkway, railing and bluff face repair
Budgetary Cost:	$100,000 to $130,000	Funding:	City of Long Beach
Regulatory Requirements:	Local coastal development permit. LCP page II-23, Strand Segment 2, Recommendation 6.	Environmental Issues:	No environmental issues will be impacted

Existing Issues:

- **Subsurface Drainage**
- **Undermined Walkway**
- **Bluff Erosion**

Current condition of bluff walkway that requires root trimming.

Existing Condition: The Bluff Park drainage and root trimming issues fall within the 3rd Priority category. Multiple locations along Bluff Park drain in a southerly direction, toward the concrete walkway and bluff. Several depressions or "sink holes" have been identified and coincide with areas where severe erosion on the bluff and undermining of the walkway have been observed. Irrigation lines and sprinkler heads have failed, aggravating erosion and scouring.

Proposed Improvements: In order to mitigate erosion due to drainage, install a subsurface drainage feature (i.e., French drain) directly north and adjacent to the walkway, fill the low areas and restore the lawn as required. Trim the roots of the trees which are currently undermining the walkway and install root barriers to prevent any future scouring and damage to the walkway.

- **Improve Drainage**
- **Trim Tree Roots and Install Root Barriers**

Project: **Bluff Park Erosion**

Location: **Bluff Park from Museum of Art to East of Lindero Avenue along top of bluff**

Purpose:	Protect public safety, private and public property through slope stabilization. Aesthetic improvement.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	$750 to $2,000 per lineal foot of bluff	Funding:	City of Long Beach
Regulatory Requirements:	Local coastal development permit. LCP page II-23, Strand Segment 2, Recommendation 6.	Environmental Issues:	No environmental issues will be impacted

Existing Issues:
- **Variable Sloping**
- **Sparse Vegetation**

Current condition of Junipero Avenue and the Long Beach Museum of Art.

Existing Issues: This segment of bluff spans approximately 500 feet from the east edge of the Long Beach Museum of Art to the west end of the gabion-stabilized slope, east of Lindero Avenue, and falls within the 3rd Priority category. This section of bluff, which has an overall height of about 40 feet, is essentially unimproved, with variable slope inclination, slumped areas, and sparse vegetation. A buried seawall is located at the toe of slope. The average slope inclination is on the order of 1½:1, with near-vertical portions near the top and middle of the slope and generally much flatter portions near the bottom of the slope. The variable slope conditions can be attributed to subtle variations in soil layering, with the steeper portions corresponding to cohesive soil layers and flatter portions to sandy layers. The steep areas have a very uneven profile, exhibiting deep erosion and slumping.

Current condition of bluff from Long Beach Museum of Art to Lindero Avenue.

Current condition of bluff from Long Beach Museum of Art to Lindero Avenue.

- **Slope Repair**
- **Revegetation**

Proposed Improvements: Three methods of repairing the slope were developed. To retain the bluff's top edge, the slope can be stabilized with imported fill to reduce its current steepness. This would result in a flatter slope and would extend the toe of the slope seaward. Another alternative is to cut into the existing bluff to achieve a flatter slope, but would result in reducing the existing Bluff Park area (the community expressed concern with reducing the Park area). In order to minimize extending onto the beach and reducing the upper park area, a steep slope would be required. This could be achieved by reconstructing the slope in layers with geotechnical reinforcement. The slope face on a reinforced slope can be very steep, and variable slopes can be engineered to emulate more natural contours.

The bluff repairs could be conducted in segments to minimize construction impacts on daily bluff and beach uses. These bluff repairs should also be coordinated with the railing, walkway and drainage repairs whenever possible to reduce overall construction costs.

These bluff repair projects could require a LCP amendment if the bluff toe is extended

Eroded Bluff and undermined abandoned section of sidewalk west of Lindero Ave.

Project: **Bluff Park Erosion**

Location: **Bluff Park along gabion-stabilized area West of Temple Ave. along top of bluff**

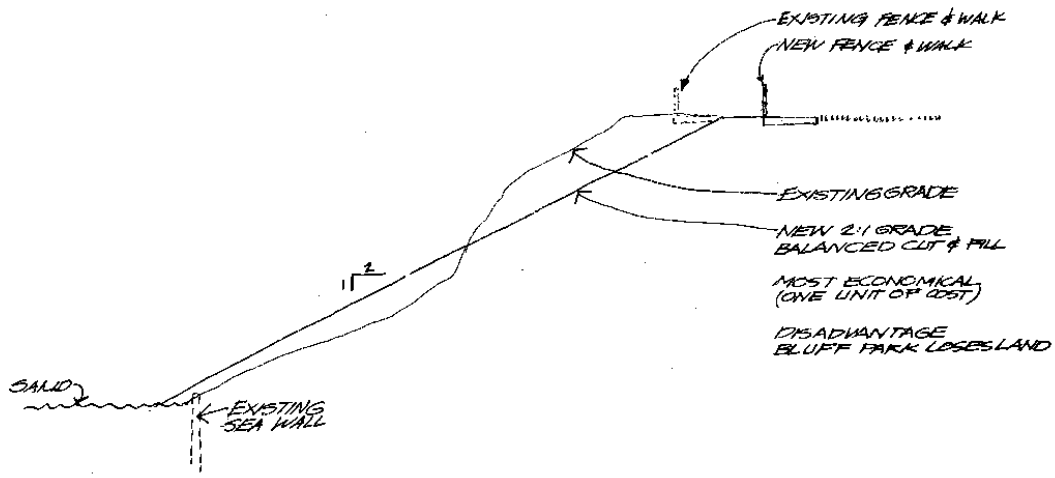
Purpose:	Protect public safety, private and public property through slope stabilization. Aesthetic improvement.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	$750 to $2,000 per lineal foot of Bluff	Funding:	City of Long Beach
Regulatory Requirements:	Local coastal development permit. LCP page II-23, Strand Segment 2, Recommendation 6.	Environmental Issues:	No environmental issues will be impacted

Existing Issues:

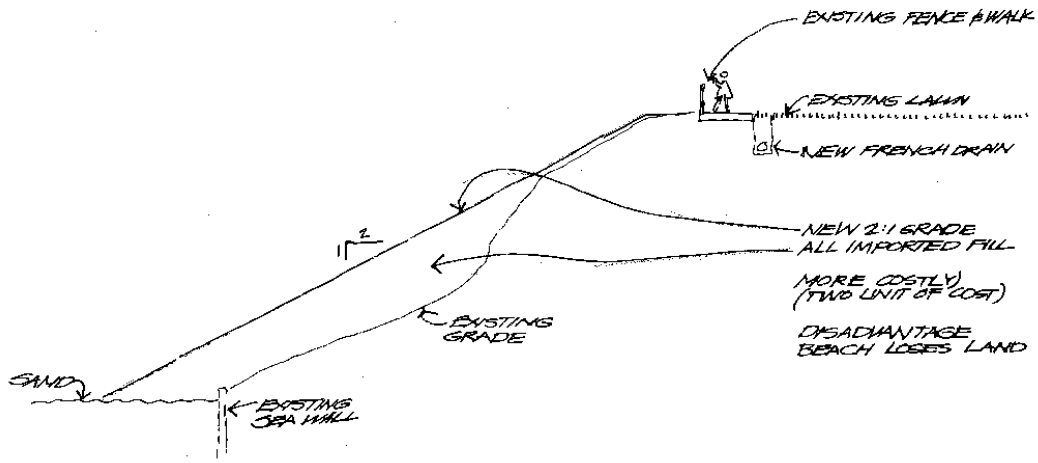
- **Ongoing Demonstration Projects**
- **Localized erosion near walkway**

Current condition of bluff from Lindero Ave. to Molino Ave. The gabion is located towards the bottom of the bluff, east of the stairs

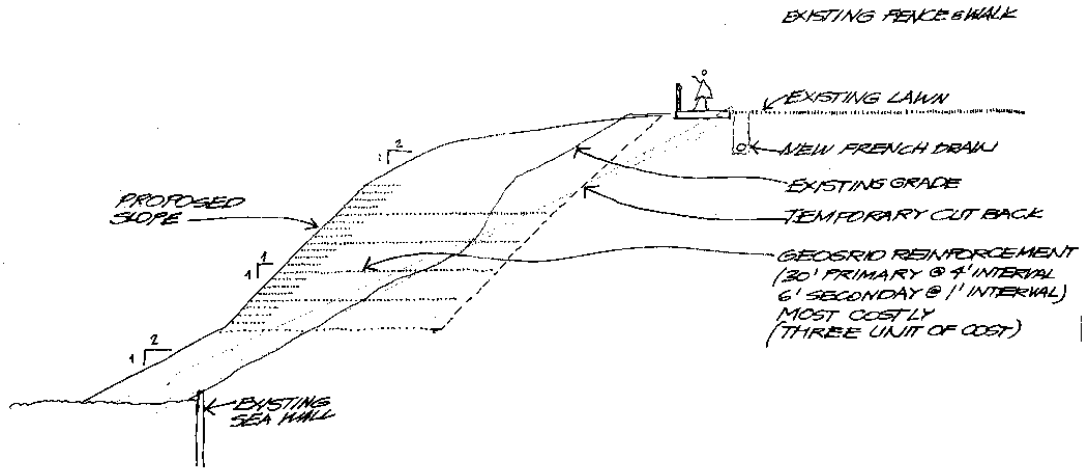
Existing Issues: This 900-foot long segment of bluff extending up to Temple Avenue, which falls within the 2nd Priority category, has been stabilized using gabions (blocks of rocks retained by wire mesh). The gabions are located in the middle section of the slope and have a near vertical exposed face. The smooth-graded slopes above and below the gabions have average inclinations of about 2:1. A buried wall is located at the toe of slope. The slope has an overall height in the range of 36 to 38 feet and an overall average inclination of 1:1. Near the middle of this bluff segment, the slope has been flattened to 2:1 and stairs have been constructed. Vegetation above the gabions consists of shrubs. Vegetation in the slope segment below the gabions is sparse. No evidence of slope instability was noted in this segment of bluff.



Unimproved Areas concept – Cut-Fill Balance (least costly)



Unimproved Areas Concept – Imported Material, Unreinforced Slope (more costly)

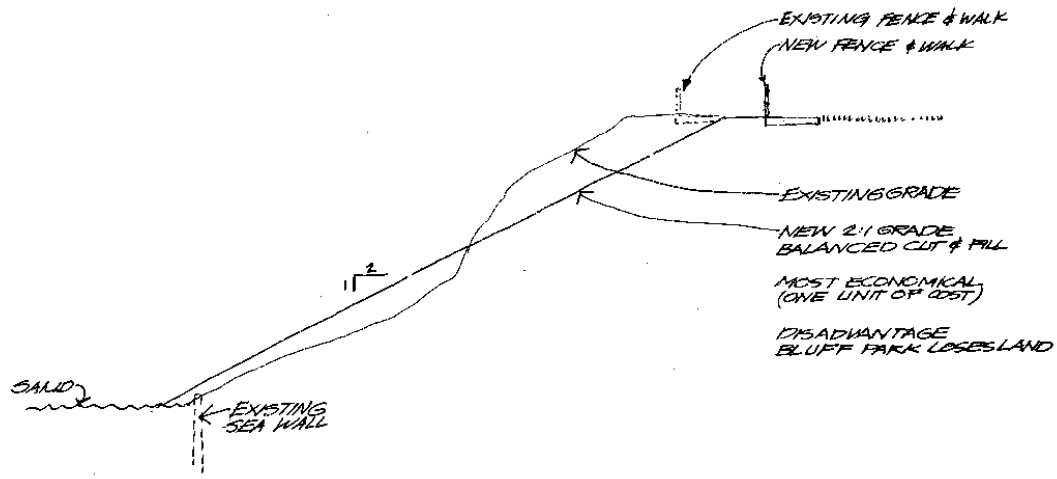


Unimproved Areas Concept – Imported Material, Geogrid Slope (most costly)

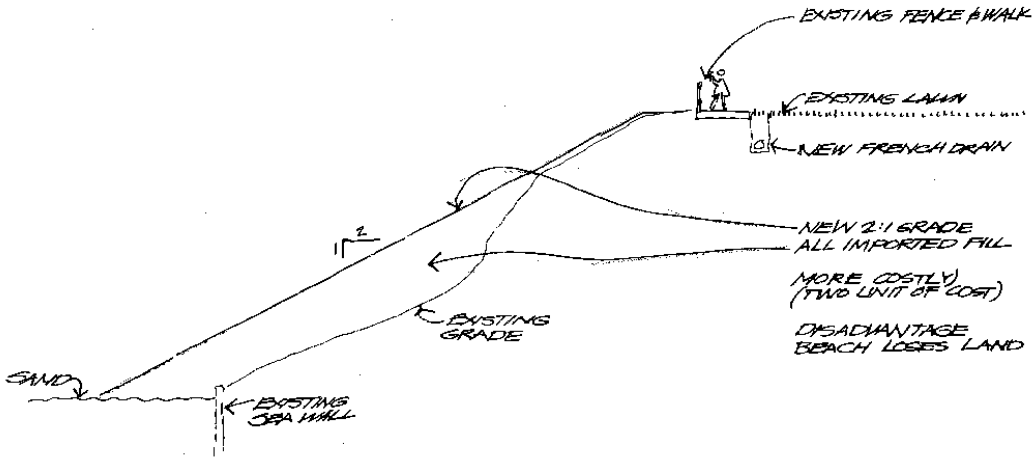
Current condition of bluff from at Temple Ave.

Proposed Improvements: Based upon the results and public feedback of the three Landscape Demonstration Projects currently underway, this area could be revegetated and an integrated irrigation system installed to prevent uncontrolled runoff.

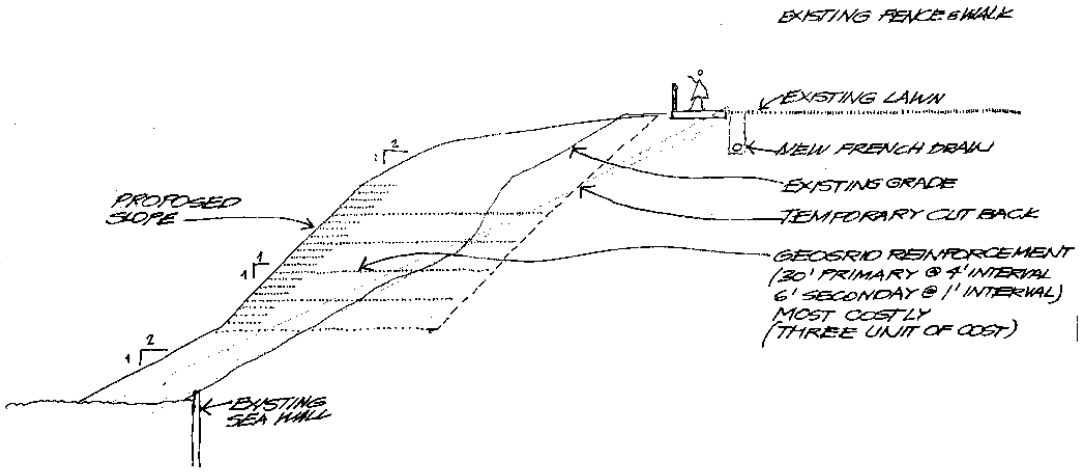
Bluff looking west from stairway at Orizaba Ave.



Unimproved Areas concept – Cut-Fill Balance (least costly)



Unimproved Areas Concept – Imported Material, Unreinforced Slope (more costly)

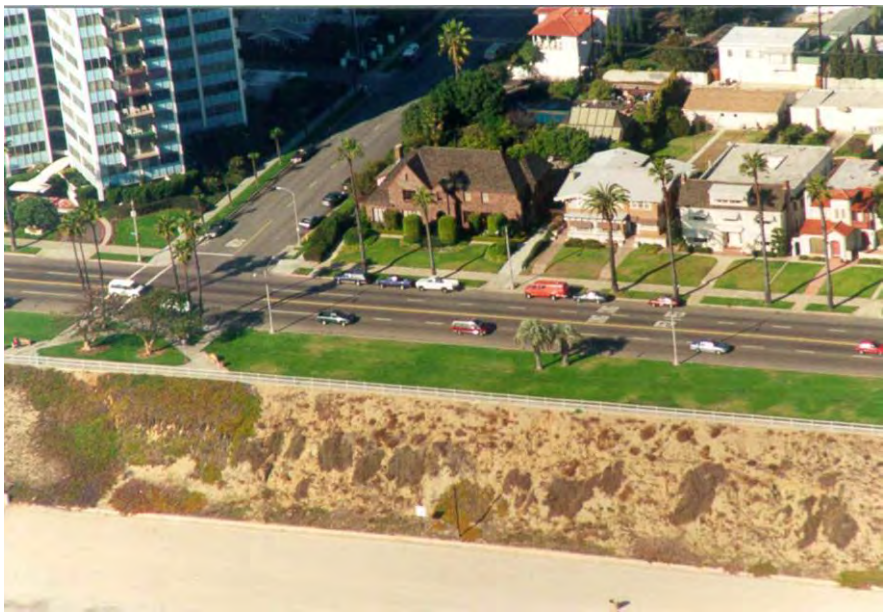


Unimproved Areas Concept – Imported Material, Geogrid Slope (most costly)

Project: **Bluff Park Erosion**

Location: **Bluff Park East of Temple Ave. along top of bluff**

Purpose:	Protect public safety, private and public property through slope stabilization. Aesthetic improvement.	Support Facilities:	Bluff Park, walkway, railing, and drainage projects.
Budgetary Cost:	$750 to $2,000 per lineal foot of Bluff	Funding:	City of Long Beach
Regulatory Requirements:	Local coastal development permit. LCP page II-23, Strand Segment 2, Recommendation 6.	Environmental Issues:	No environmental issues will be impacted



Existing Issues:

- **Variable Slopes**
- **Sparse Vegetation**

Current condition of bluff from Orizaba Ave. to Paloma Ave.

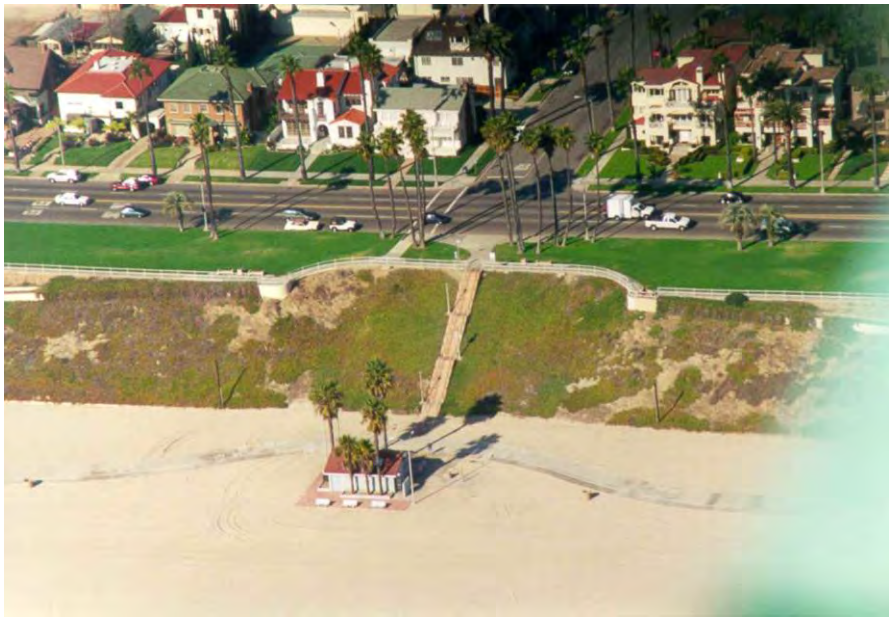
Existing Issues: This ½-mile segment of bluff east of Temple Avenue falls within the 2nd Priority category. It is mostly unimproved with a few localized exceptions. In general, the condition of the bluff is very similar to the segment east of the Museum of Art, with uneven slope surface, sparse vegetation, erosion gullies and slumped areas, and generally steeper slope inclinations in the mid-portions of the slope. The average height of slope is about 37 feet.

Bluff looking east from stairway at Orizaba Ave.

Proposed Improvements: Three methods of repairing the slope were developed. To retain the bluff's top edge, the slope can be stabilized with imported fill to reduce its current steepness. This would result in a flatter slope and would extend the toe of the slope seaward. Another alternative is to cut into the existing bluff to achieve a flatter slope, but would result in reducing the existing Bluff Park area (the community expressed concern with reducing the Park area). In order to minimize extending onto the beach and reducing the upper park area, a steep slope would be required. This could be achieved by reconstructing the slope in layers with geotechnical reinforcement. The slope face on a reinforced slope can be very steep, and variable slopes can be engineered to emulate more natural contours.

Current condition of bluff at Paloma Ave. showing the western end of historic ramp

The bluff repairs could be conducted in segments to minimize construction impacts on daily bluff and beach uses. These bluff repairs should also be coordinated with the railing, walkway and drainage repairs whenever possible to reduce overall construction costs. These bluff repair projects could require a LCP amendment if the bluff toe is extended



Current condition of bluff at Coronado Ave.

Project: **Bluff Park Erosion**

Location: **Bluff Park east and west of Redondo Avenue along top of bluff**

Purpose:	Protect public safety, private and public property through slope stabilization. Aesthetic improvement.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	$750 to $2,000 per lineal foot of Bluff	Funding:	City of Long Beach
Regulatory Requirements:	Local coastal development permit. LCP page II-23, Strand Segment 2, Recommendation 6.	Environmental Issues:	No environmental issues will be impacted

Current condition of bluff from Coronado Ave to Redondo Ave.

Existing Condition: Two relatively short sections of gabions are located between 36th Place and Redondo Avenue. These sections are approximately 160 feet and 200 feet long respectively, and fall within the 2nd Priority category. The gabion areas are vegetated with shrubs and iceplant and appear to be stable.

Proposed Condition: Remove existing acacias and revegetate slope based upon the proven techniques of the Landscape Demonstration Projects. Improve unprotected segment with variable slopes as described in the Model Glider Plane Flying Area.

Current condition of bluff from Redondo Ave. to 36th St.

Bluff Erosion
Fourth Priority Projects

2nd Place
3rd Place

Project: **2nd Place**

Location: **Bluff at end of 2nd Place**

Purpose:	Protect public safety, private and public property through slope stabilization.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	$10,000 to $50,000	Funding:	City of Long Beach and private entities
Regulatory Requirements:	As required by the City of Long Beach	Environmental Issues:	Revegetation of the slope.

Existing Issues:

- **Vegetative Cover and Irrigation Maintenance**

Current condition of 2nd Place

Existing Issues: The City property at the end of 2nd Place constitutes approximately 55 feet of the bluff and is bordered by private property on each side. Total slope height is about 26 feet. The private property boundaries are delineated by an iron rod fence to the east, and no visible boundary to the west. The 2nd Place slope appears to have been graded to a relatively uniform slope with an average inclination close to 2:1. Stairs have been constructed in the middle of the slope. Vegetation consists mostly of iceplant.

The bluff area at the end of 2nd Place falls within the 4th Priority category. The calculated factor of safety is greater than 1.5 on static conditions, which represents a grossly stable slope. However, current landscaping and irrigation practices may contribute to future erosion of the bluff slope.

Proposed Improvement: Minor regrading and revegetation with deep-rooted coastal plants to mitigate the surficial erosion is needed. Improve drainage and irrigation with flow control valves to prevent runoff-caused erosion.

- **Regrade and Revegetate**

Project: **3rd Place**

Location: **Bluff at end of 3rd Place**

Purpose:	Protect public safety, private and public property through slope stabilization.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	$10,000 to $50,000	Funding:	City of Long Beach and private entities
Regulatory Requirements:	As required by the City of Long Beach	Environmental Issues:	Revegetation of the slope.

Existing Issues:

- **Surficial Erosion**
- **Vegetative Cover and Irrigation Maintenance**

Current condition of 3rd Place

Existing Issues: The City property at the end of 3rd Place constitutes approximately 55 feet of the bluff and is bordered by private property on each side. The private property boundaries are delineated by building walls on both sides. The slope conditions are very similar to those at 2nd Place, with the exception that the overall slope height is about 30 feet. There is stairway access to the beach below. The bluff has deteriorated vegetation.

The bluff area falls within the 4th Priority category. The calculated factor of safety is greater than 1.5 on static conditions, which represents a grossly stable slope. However, current landscaping and irrigation may contribute to future erosion.

Proposed Improvements: Regrade, remove broken shrubs, and revegetate in coordination with private property owners with deep-rooting, spiky plants to mitigate the surficial erosion. Improve drainage and irrigation with flow control valves to prevent runoff-caused erosion. Improve maintenance of existing irrigation to repair broken heads and blow-outs on regular basis.

- **Regrade and Revegetate**

Public Shoreline Access

Beach Entrances
Walking Path
Stairway Connections
Bike & Pedestrian Oases
Ocean Boulevard Crossings
Cherry Ave. Tunnel
Bixby Park Amphitheater
Long Beach Museum of Art
Bluff Park Walkway
Historic "Ramps-to-the-Beach"

Public Shoreline Access

The coastline is an important recreational resource and it is essential that safe and simple public access is provided.

The state of California owns the tide and submerged lands seaward of what is called the "mean high tide line" which is determined by using the average of normal high tides over approximately 19 years. The State Lands Commission has administered the state's tidelands since 1938. Although it is difficult to ascertain the exact boundary between private and public lands, it is understood that the public has a right to walk on the wet beach. Article 10 of the California Constitution guarantees the public's right to access to the state's navigable waters. Proposition 20 (1972), the California Coastal Act (1976), and the State Coastal Conservancy Act (1976) include policies regarding the California coast with the intent of maximizing public coastal access. In 1979 additional legislation was enacted directing the California Coastal Commission and State Coastal Conservancy to establish a comprehensive program to protect and maximize public access to the shoreline and related recreational opportunities and resources.

As a result of this legislation the State Coastal Conservancy has enhanced access in Long Beach by funding projects including the bicycle path along the beach and improvements to the Bluff Park Stairs, which provide vertical access to the beach and Belmont Pier rennovations.

Currently the City has ample public access locations throughout its coastline. However these areas can be further enhanced by providing a safe pedestrian thoroughfare to these access points and by improving the associated signage and lighting. In addition a number of amenities can be added to City's shoreline.

Project: **Beach Entrances**

Location: **Shoreline Drive, Alamitos Avenue, and Ocean Boulevard intersection; Marina Green parking lot, eastern end; Junipero Avenue; Granada Avenue; and Bayshore Avenue**

Purpose:	Protect public safety and improve signage.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	To be determined.	Funding:	City of Long Beach.
Regulatory Requirements	Local coastal development permit	Environmental Issues:	Aesthetics

Current signage to the Alamitos Ave. beach access

Existing Issues: Inadequate signage and lighting at several public coastal access points along Ocean Blvd. Also, the difficulty in finding parking contributes to traffic congestion and parking problems in the adjoining residential areas.

Proposed Improvements: Improve the signage and lighting at these locations and provide major entrance features at parking lots to facilitate recognition.

Increase sign visibility similar to Shoreline Village signage.

Project: **Walking Path**

Location: **Along the base of the bluff area**

Purpose:	Protect public safety, increase pedestrian comfort, and improve aesthetics.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	To be determined.	Funding:	City of Long Beach.
Regulatory Requirements:	Coastal Commission Development permit. LCP page II-20, General Strand Policy 6.	Environmental Issues:	Water quality, aesthetics, and beach maintenance

Existing Issues:

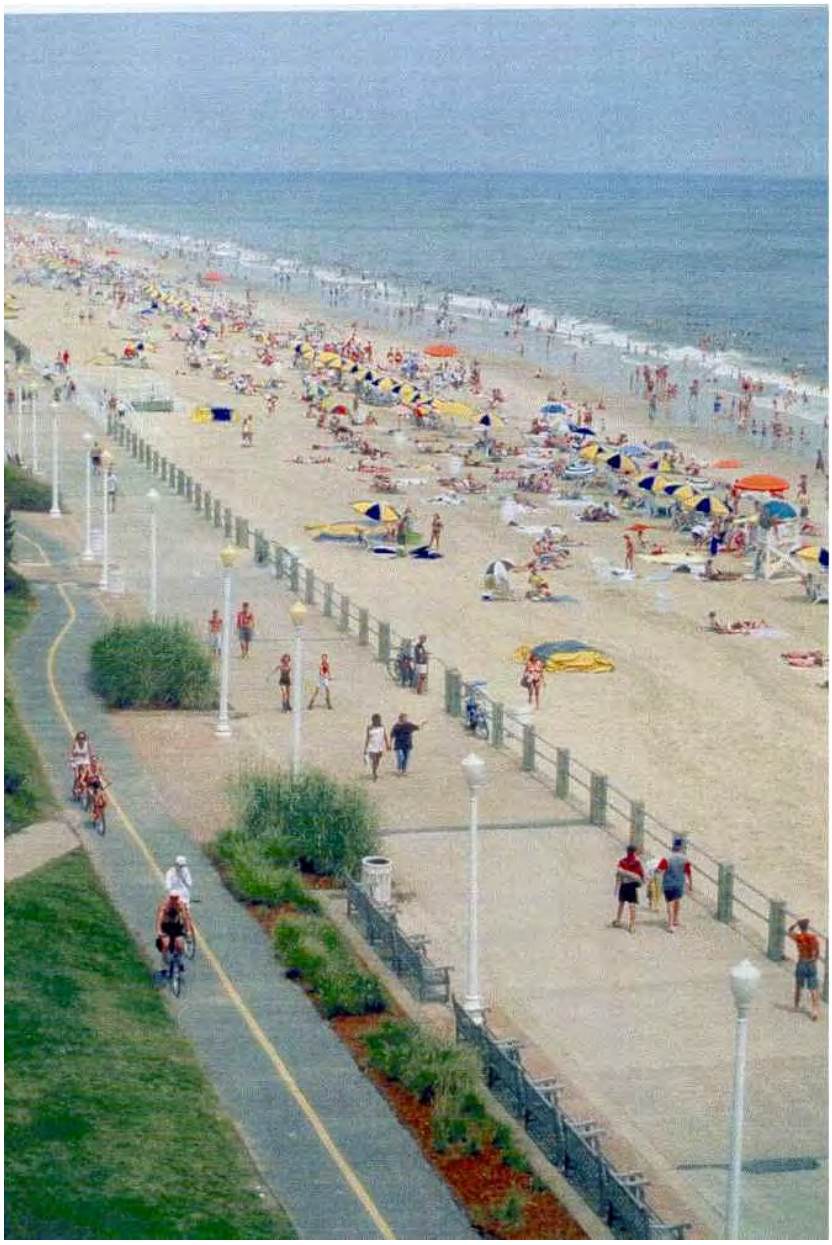
- **Pedestrian Safety**

Bike path near Junipero Ave.

Existing Issues: The bike path consists of two bike lanes and a pedestrian lane. Due to great popularity and unanticipated resurgence in skating, the beach bike path sometimes becomes overcrowded, with different speeds of traffic creating challenging conditions for the user. The existing bike parh is also without lighting, contributing to safety problems and anti-social behavior.

Proposed Improvement: Build a pedestrian trail adjacent to the bike path to accommodate only the pedestrians in order to reduce congestion and eliminate varied speeds on the same path. Investigate the use of a non-concrete surface, possibly Road Oyl or other alternatives, to discourage wheeled vehicle use and create a more natural appearance. Also, add lighting to the bike path.

- **Build Pedestrian Path**
- **Improve Aesthetics**
- **Add lighting**



Example of separated bike and walking path.

Project: **Stairway Connections**

Location: **Access avenues from the bluff stairways to the bike path**

Purpose:	Protect public access and improve aesthetics.	Support Facilities:	Bike path and beach facilities will be impacted.
Budgetary Cost:	To be determined.	Funding:	City of Long Beach.
Regulatory Requirements:	Coastal Commission Development permit. LCP page II-20, General Strand Policy 5 & 6.	Environmental Issues:	Aesthetics and beach maintenance

Existing Issues:

- **Bike Access**

Stairway access at 2nd Place with no connection to bike path.

Existing Issues: There are no connecting paths from some stairway accesses to the bike path on the beach. This makes it difficult for non-motorized wheeled vehicles to travel from the stairways to the bike path, and requires joggers and walkers to walk across the sand before reaching the firm footing on the bike path.

.

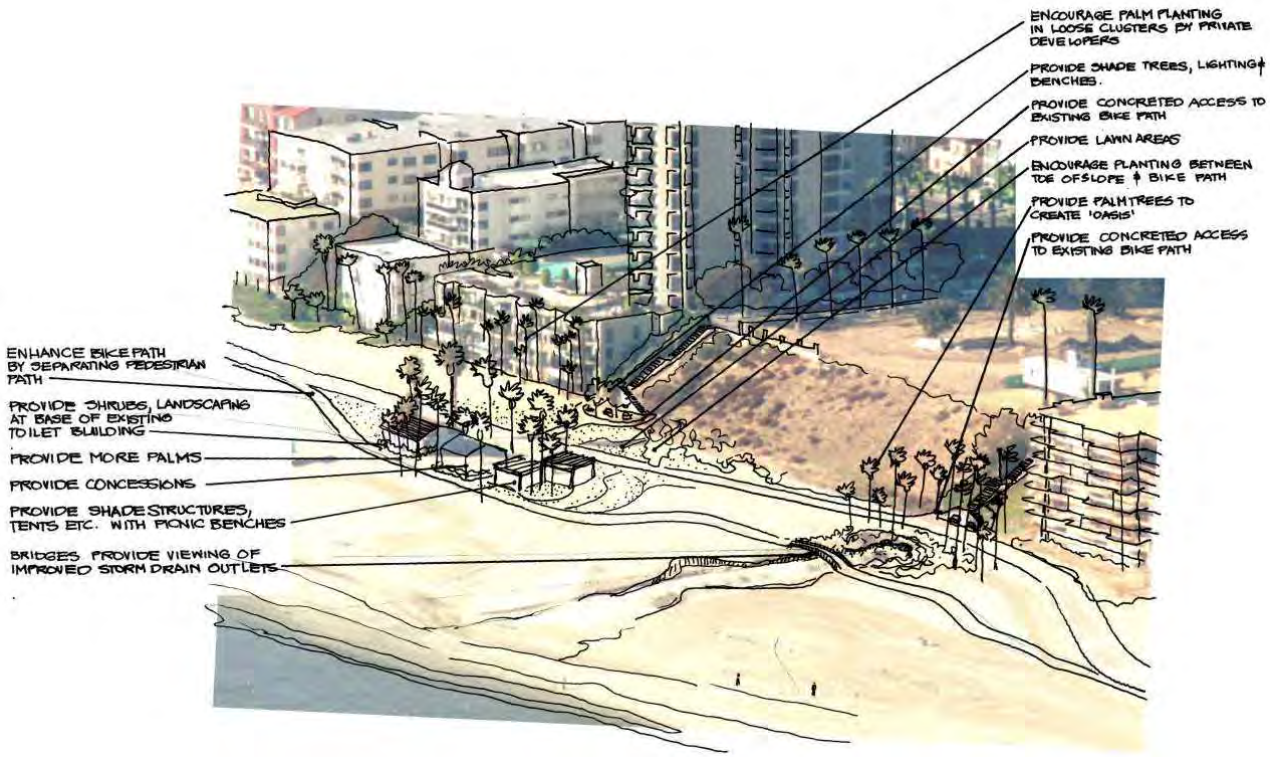
Proposed Improvement: Create a firm walkway from the bluff stairways to the bike path with environmentally friendly construction materials. This will improve access of non-motorized wheeled vehicles and pedestrians to the bike path.

- **Build Walkways from Stairs to Bike Path**

Project: **Bike and Pedestrian Oases**

Location: **Along the bike path at each stairway, path, and ramp intersection**

Purpose:	Enhance beach experience and improve aesthetics.	Support Facilities:	Bike path and beach facilities will be impacted.
Budgetary Cost:	To be determined.	Funding:	City of Long Beach.
Regulatory Requirements:	Coastal Commission Development permit. LCP page II-20, General Strand Policy 5 & 6.	Environmental Issues:	Aesthetics and beach maintenance



Conceptual drawing of an oasis.

Existing Issues: There are no bike and pedestrian rest areas at this time along the beach.

Proposed Improvements: Create rest stops along the paths with shade, drinking fountains, seating, trash receptacles, bicycle racks, emergency phone, and vending opportunities. The "oases" should allow for non-conflicting flow of traffic between the pedestrians and wheel traffic. Shade should be created using either trees or a gazebo of early 20th century design. Trees should be a mix of native trees with palms used for accent. A decomposed granite with binder

- **Create Rest Stops**
- **Build Pedestrian Path**

surface should be considered for the pad area. Use of a beach theme sculpture and some native dune (Coastal Strand) landscaping should be considered to add atmosphere. Also, add lighting for security.

Project: **Ocean Boulevard Crossings**

Location: **Pedestrian Crossing areas along Ocean Boulevard**

Purpose:	Protect public safety and increase pedestrian conveniences.	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	To be determined.	Funding:	City of Long Beach
Regulatory Requirements:	Local coastal development permit. LCP page III-B-8, Shoreline Access.	Environmental Issues:	No issues are impacted.

Existing Issues:

- **Pedestrian Safety**

Ocean Blvd. and Junipero Ave. intersection.

Existing Issues: High speed traffic on Ocean Blvd is a deterrent to safe access to the bluff and beach.

Proposed Improvements: Install pedestrian crossing knuckles to ease access across Ocean Boulevard at Alamitos, Cherry, Junipero, Kennebec, and Redondo Avenues and at 20th Place. Pedestrian knuckles are an extension of the sidewalk out into the street with the width of the parking lane. They are intended to slow traffic. Include entrance monuments with "Welcome to the Alamitos Beach Neighborhood" at Alamitos and Cherry Avenues, "Welcome to the Bluff Park Neighborhood" at Junipero and Redondo Avenues, and "Welcome to the Long Beach Museum of Art" at Kennebec Avenue. Include "early 20th century" style street lights at each knuckle.

Project: **Cherry Avenue Tunnel**

Location: **Along the bike path at each stairway, path, and ramp intersection**

Purpose:	Protect public safety and improve aesthetics.	Support Facilities:	Bike path and beach facilities will be impacted.
Budgetary Cost:	To be determined.	Funding:	City of Long Beach and private funding
Regulatory Requirements:	Local coastal development permit.	Environmental Issues:	Aesthetics and beach maintenance

Existing Issue:

- **Public Safety**
- **Aesthetics**

Cherry Avenue tunnel on the bluff side.

Existing Issues: The tunnel from Bixby Park north of Ocean Boulevard near Cherry Avenue to the beach is currently closed to pedestrian traffic. Chainlink enclosures currently prevent access to the stairs down to the tunnel. These are unattractive and allow dirt and trash to collect in the stairwells. The tunnel's structural soundness has also been questioned.

Cherry Avenue tunnel on the Ocean Blvd.

Proposed Improvements: Seal the tunnel and fill the old stairway entrances on Ocean Boulevard. Even if structurally sound, the tunnel be conducive to undesirable loitering. Retain existing mural.

Project: **Bixby Park Amphitheater**

Location: **Along the bluff slope below Bixby Park**

Purpose:	Shoreline access and community use improvement.	Support Facilities:	Traffic, parking, bike paths, and Bixby Park facilities.
Budgetary Cost:	To be determined.	Funding:	City of Long Beach and private funding
Regulatory Requirements:	Coastal Commission development permit.	Environmental Issues:	Bluff stability and vegetation.

Existing Issues:

- **Beach Access**
- **Facility Improvements**

Current condition of Bixby Park.

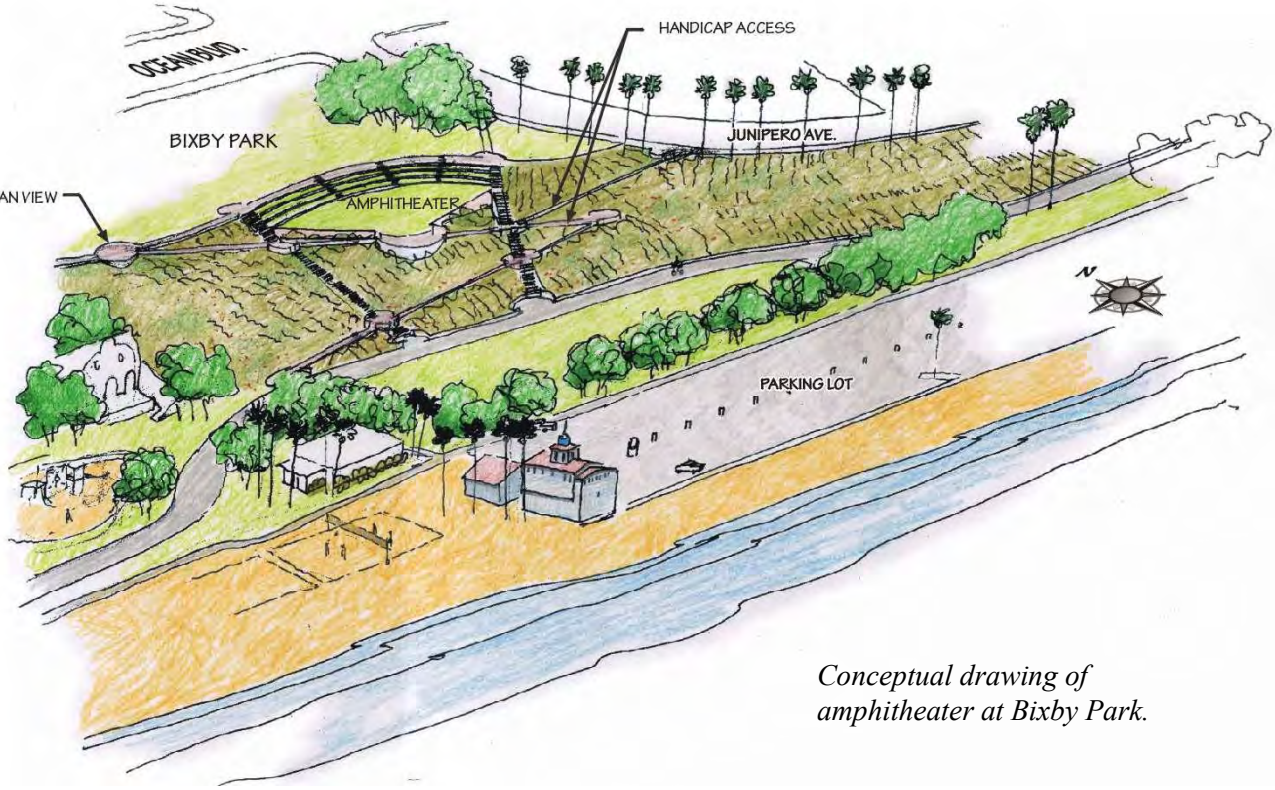
Current condition of Bixby Park.

Existing Issues: The bluff area below Bixby Park is showing signs of erosion. There is currently no access down the bluff slope below Bixby Park. The low flat area between the toe of the slope and the parking lot is underutilized.

Proposed Improvement: Integrate amphitheater type seating into a ramp down the slope to provide a meaningful connection between Bixby Park and the beach. By improving the existing restrooms and developing the area as an "oasis" with shaded picnic areas and a children's playground, it will extend its use towards the beach. Develop underutilized area between the toe of the slope and parking lot to field sports. Provide more trees for shade and picnic areas.

.

- **Integrate an Amphitheater**
- **Develop Picnic Area and Playground**



Conceptual drawing of amphitheater at Bixby Park.

Project: **Long Beach Museum of Art**

Location: **At the intersection of Kennebec Avenue and Ocean Boulevard**

Purpose:	Shoreline access and community use improvement.	Support Facilities:	Traffic, parking, and stairway access.
Budgetary Cost:	To be determined.	Funding:	City of Long Beach and private funding
Regulatory Requirements:	Coastal Commission Development permit. LCP page II-23, Strand Statement 2, Recommendation 3.	Environmental Issues:	Bluff stability and vegetation.

Existing Issues:

- **Bluff Erosion**
- **Public Safety**
- **Access**

Current condition of bluff at the Long Beach Museum of Art.

Existing Issues: The bluff below the Museum of Art shows signs of surficial erosion. There is stairway access on the east side of the Museum from the Junipero Avenue parking lot to the museum above. To the east of the Junipero Avenue ramp is beach. The bluff slope below the Museum will be revegetated under the current remodeling.

Proposed Improvement: The stairway access from the Museum to the beach provides a significant connection between this cultural institution and the recreational beach. The undeveloped flat area between the existing parking lot and the bluff could be developed as additional parking for the Museum as well as for beach patrons. Develop the slope with a ramp that will provide handicapped access from the Museum to the beach. Loan sculptures from the Museum could be displayed next to the stair access, the ramp, as well as next to the east side of the Museum at Bluff Park.

- **Additional Parking**
- **Handicap Access to Beach**
- **Terrace Walkway Sculpture Garden**
- **Display Sculptures**
- **Educational Values**

Alternate access improvements to encourage museum patrons to utilize the beach parking should be investigated. These could include elevator, escalator or funicular railway.

Conceptual plan of development at the Long Beach Art Museum.

Project: **Bluff Park Walkway**

Location: **Bluff Park along the top of the bluff**

Purpose:	Shoreline access and community use improvement.	Support Facilities:	Railing, bluff repair, and drainage projects
Budgetary Cost:	To be determined.	Funding:	City of Long Beach
Regulatory Requirements:	Local coastal development permit . LCP page III-B-9, Recreation and Visitor Service Facilities, the Parks.	Environmental Issues:	No issues will be impacted.

Existing Issues:

- **Conflicting Uses**
- **Public Safety**

Current condition of walkway at Bluff Park.

Existing Issues: The current walkway in Bluff Park is approximately 8 feet wide. During periods of high use, the walkway becomes crowded with people enjoying very different activities that often conflict with one another.

Proposed Improvements: Widening the current walkway will affect the scale of the bluff edge. Instead, consider providing a separate jogging path in the lawn as well as a separate area for the gliders in order to reduce congestion. As an alternative, an additional pedestrian path could be installed on the beach. This would preserve the scale of Bluff Park.

- **Reduce Congestion**
- **Create Separate Jogging Path**

Project: **Historic "Ramps to the Beach" System**

Location: **Below the Bluff Park between Paloma Avenue and Coronado Avenue**

Purpose:	Shoreline access and community use improvement.	Support Facilities:	Bikepath and restrooms.
Budgetary Cost:	To be determined.	Funding:	City of Long Beach, California Coastal Conservancy
Regulatory Requirements:	Local coastal development permit. LCP page II-26, Strand Segment 2, Recommendation 1.	Environmental Issues:	Bluff stability and revegetation.

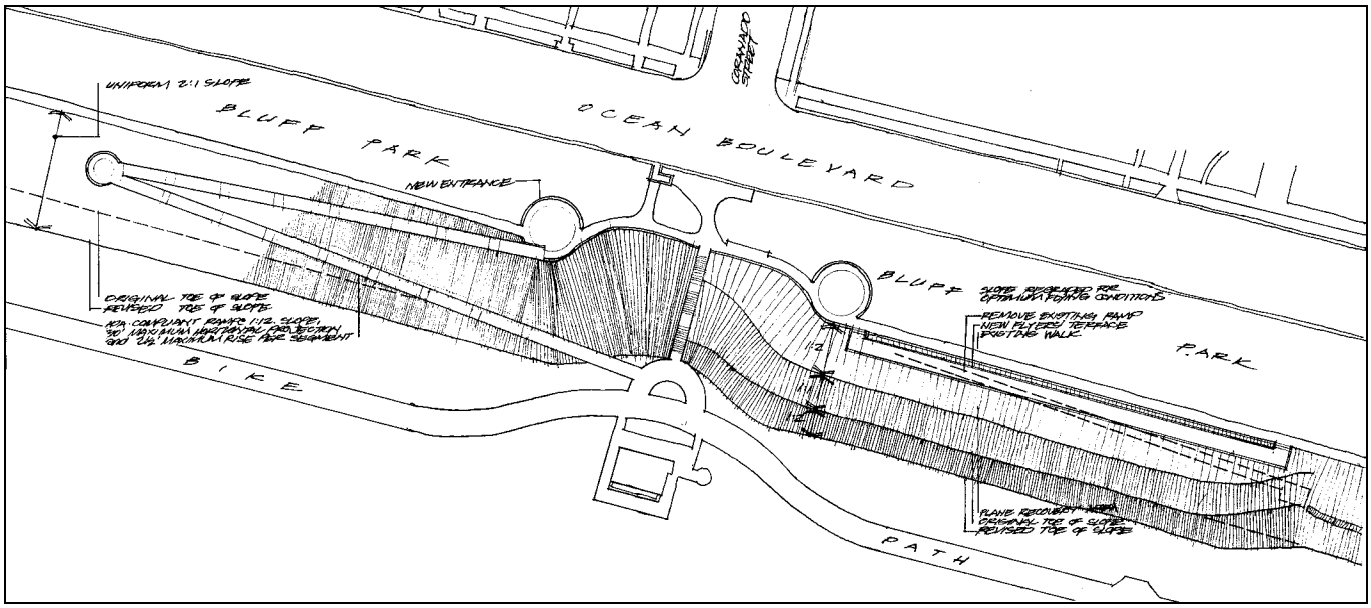
Current condition of the historic "ramps to beach" at Coronado Ave.

- **Security**
- **Unusable Ramp**

Existing Issues: The existing ramp below the Bluff Park has deteriorated to the point where it is unusable. Currently the only available wheelchair or bicycle access is at Junipero Avenue and 36th Place.

Proposed Improvements: Rehabilitate the historic "ramps to the beach." Only the westerly ramp will be the one reinstalled and not the easterly ramp since it will interfere with the glider area. The ramps will be ADA accessible. The use of Road Oyl or cobble surface to prevent its use as a skateboard ramp is recommended. Use early 20th-century design overhead trellis/arbor to announce its location.

- **Bike Access**
- **Wheelchair Access**



Conceptual drawing of restored ramp area.

Community Use Improvement

Storm Drain Improvements
Model Glider Plane Flying Area
Sailing Center at Alamitos Avenue
Alfredo's
Cherry Avenue Beach Area
Bluff Park Overlooks
Lindero Avenue Playground
Cherry Avenue Beach Restroom Area
Relocate Telephone Lines
Improve Signage

Community Use Improvements

The public workshops were designed to gather information on the needs and desires of the local community. The goal here is to provide improved outlets for recreational opportunities as well as to enhance the aesthetic quality of the bluff environment. A number of these improvement projects will benefit primarily the surrounding community.

Project: **Storm Drain Improvements**

Location: **9th Place, 14th Place, Molino Avenue, Coronado Avenue, Redondo Avenue**

Purpose:	Protect public safety and improve aesthetics	Support Facilities:	No support facilities will be impacted.
Budgetary Cost:	To be determined.	Funding:	Long Beach Water Department, Los Angeles County Public Works, Los Angeles County Sanitation District, State of California Agencies, and the City of Long Beach
Regulatory Requirements:	Local coastal development permit, Sanitation District connection permit.	Environmental Issues:	Water quality, aesthetics, and beach maintenance.

Existing Issues:

- **Aesthetics**
- **Health Risk**

Storm drain runoff at Molino Ave..

Existing Issues: The storm drains run onto the beach. The non-peak outfall pools on the sand due to insufficient flow to reach the ocean. These pools have a tendency to stagnate and are visually unattractive and can pose a health risk to the beach user. A project to improve filtration of the discharges is funded and in preliminary design phases. Investigations to divert non-storm flows to the sanitary sewer system are underway with the Los Angeles County Sanitation District and Los Angeles County Public Works.

Proposed Improvement: Divert the non-peak storm flows for all storm drains to the sewer system in a similar fashion to the pump at Bayshore Avenue. Extend the storm drain closer to the ocean to reduce scarring on the beach.

- **Divert Non-Peak Flows to Sewer System**
- **Extend Storm Drain**

Project: **Model Glider Plane Flying Area**

Location: **Bluff Park at Coronado Avenue**

Purpose:	Community use improvement	Support Facilities:	Bluff Park facilities
Budgetary Cost:	To be determined.	Funding:	City of Long Beach
Regulatory Requirements:	LCP amendment.	Environmental Issues:	Bluff stability and revegetation

Existing Issues:

- **Conflicting Uses**
- **Deteriorating Ramp**
- **Bluff Erosion**

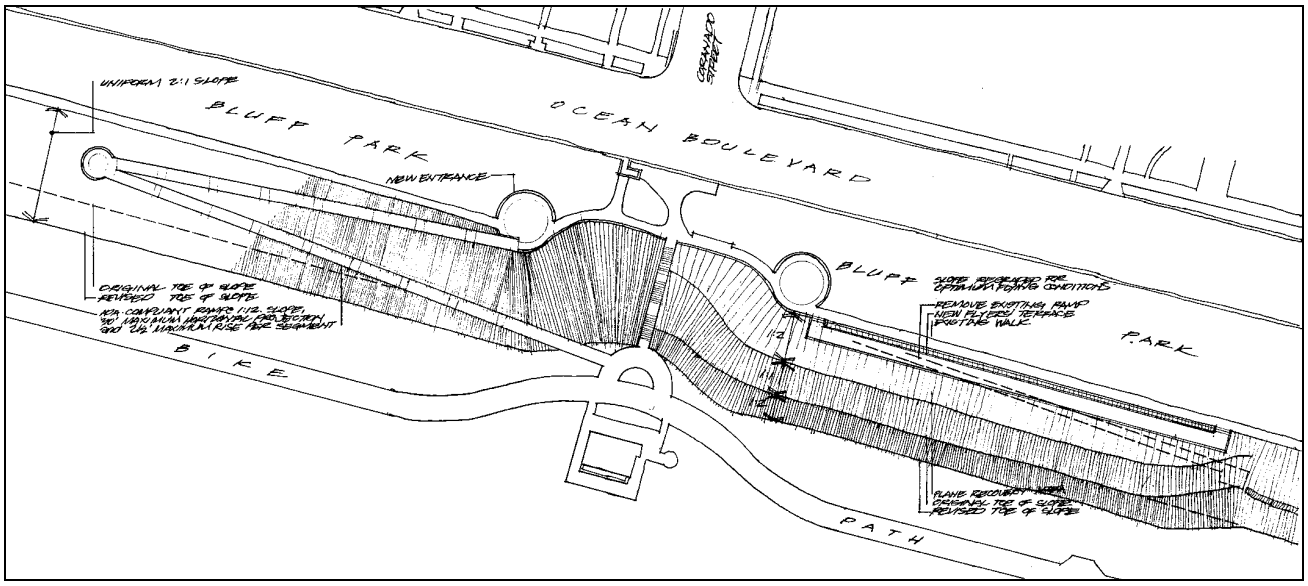
Current area used to fly gliders above the eastern portion of "historical ramp" at Coronado Ave.

Existing Issues: The historic ramps below the Bluff Park at Coronado Avenue are in a state of deterioration and unusable. This area has been used by the remote control glider pilots as a flying site. The area is ideal for glider flying due to consistent wind and the steepness of the slope of the bluff. There is less Pedestrian traffic in this area compared to other areas in Bluff Park, which mitigates possible safety issues.

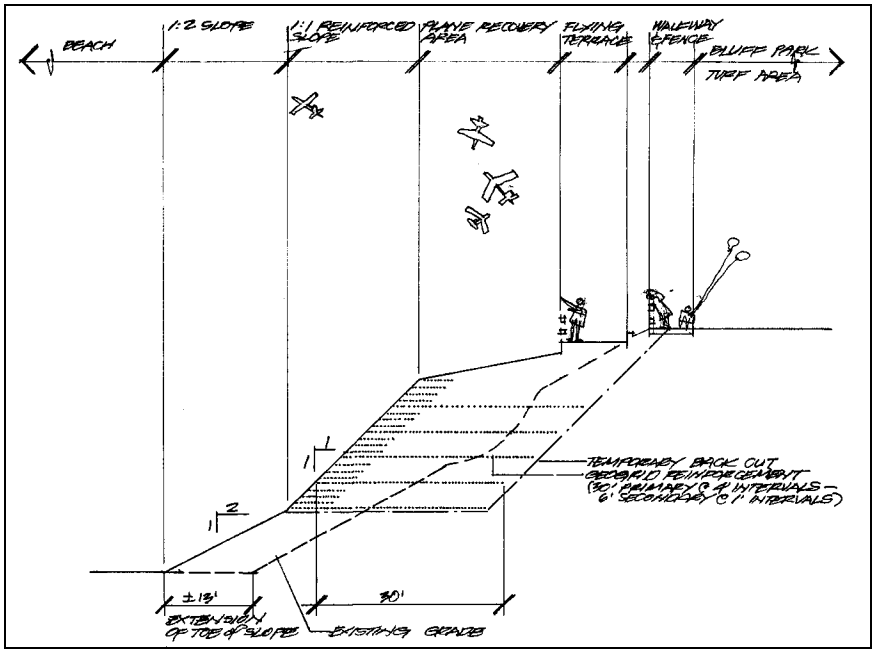
The erosion has created cavities in the bluff which are being used as shelters. The ramp is currently too narrow and not ADA compliant.

Proposed Improvement: Remove and regrade the eastern historic ramp while preserving the alignment and reconstructing the western ramp for pedestrian access. Regrade the bluff to improve the slope for glider flying. Provide additional landing area for planes so as not to be in conflict with other users of Bluff Park.

- **Construct New Ramp on the East Side of Stairs**
- **Regrade Bluff**
- **Increase Landing Area**



Conceptual drawing of restored ramp area with glider area to the right.

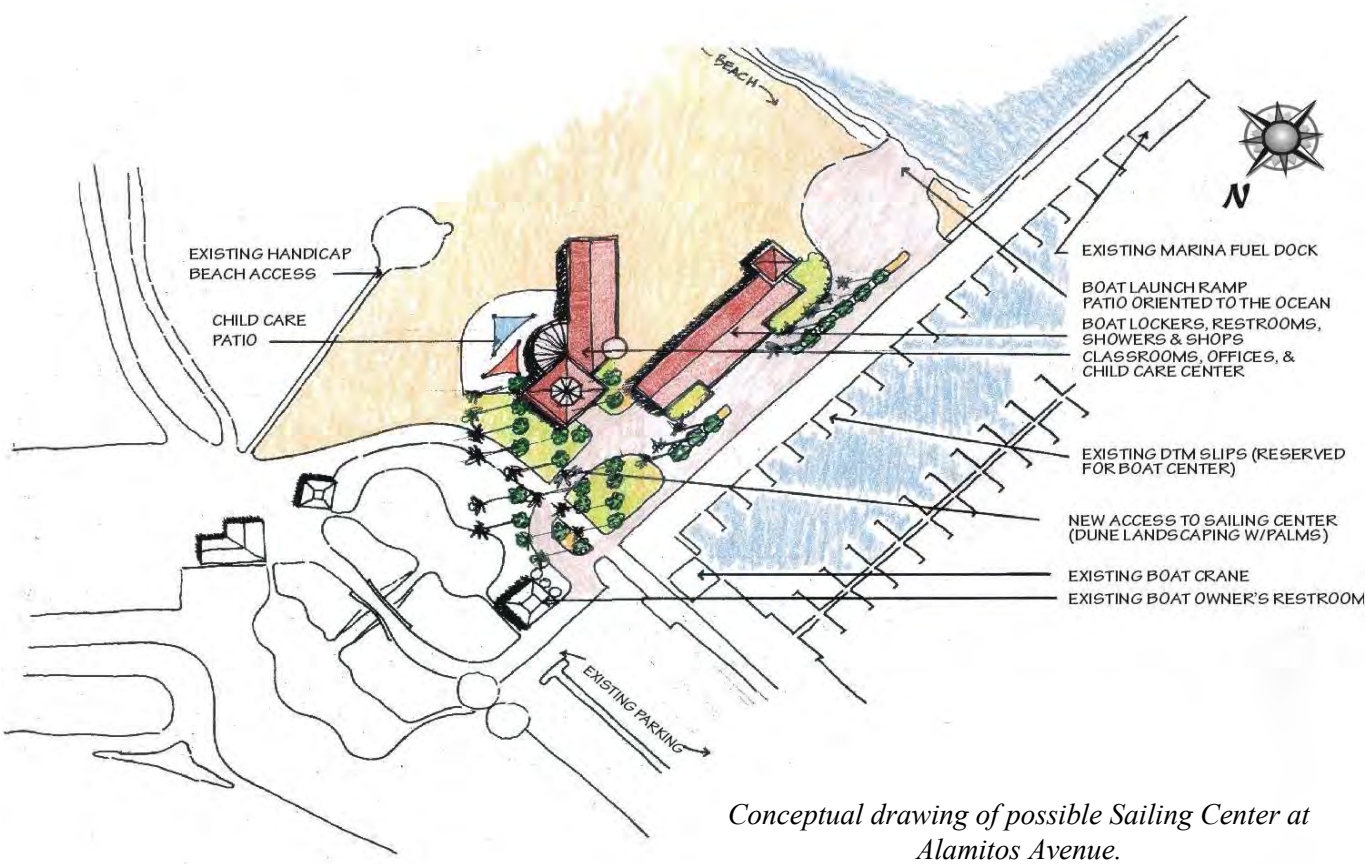


Cross section of conceptual drawing of glider area.

Project: **Sailing Center at Alamitos Avenue**

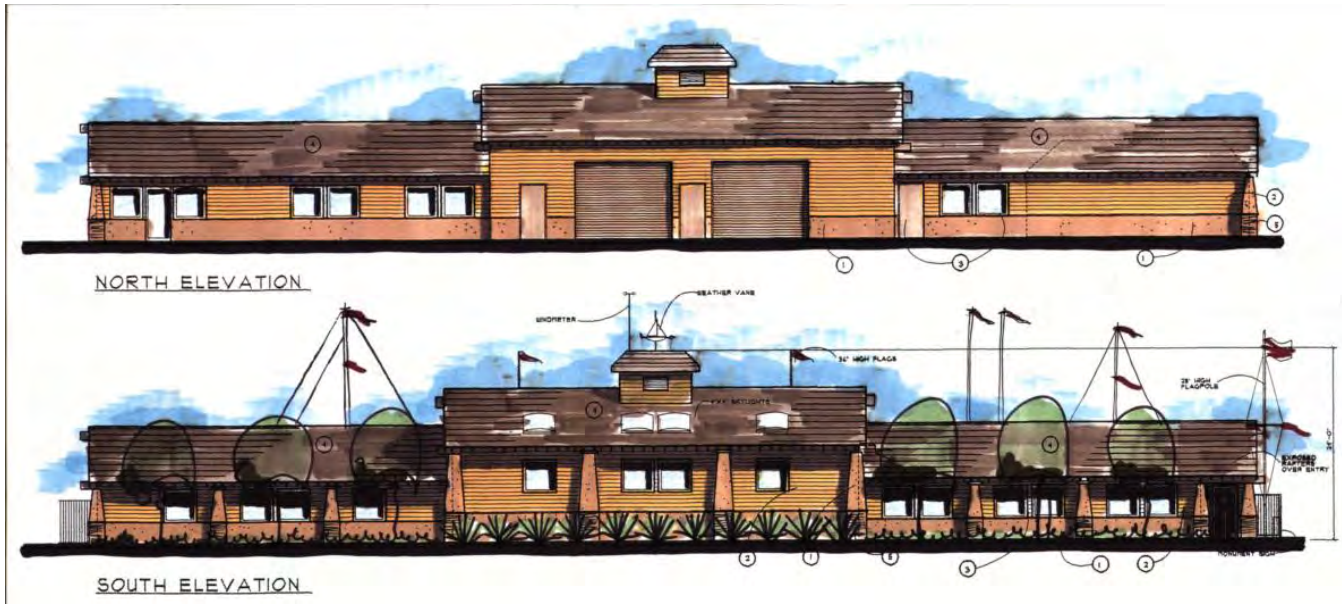
Location: **On the beach near the Alamitos Avenue parking lot**

Purpose:	Community use improvement	Support Facilities:	Street, parking and restroom facilities.
Budgetary Cost:	To be determined.	Funding:	State Department of Boating and Waterways, City of Long Beach
Regulatory Requirements:	LCP amendment.	Environmental Issues:	Water quality



Conceptual drawing of possible Sailing Center at Alamitos Avenue.

Existing Issues: There are currently no facilities at the west end of the beach near the Alamitos Avenue parking lot, which borders the east side of the Downtown Marina. The beach is wide at this area, ideal for recreational uses that require a larger space.



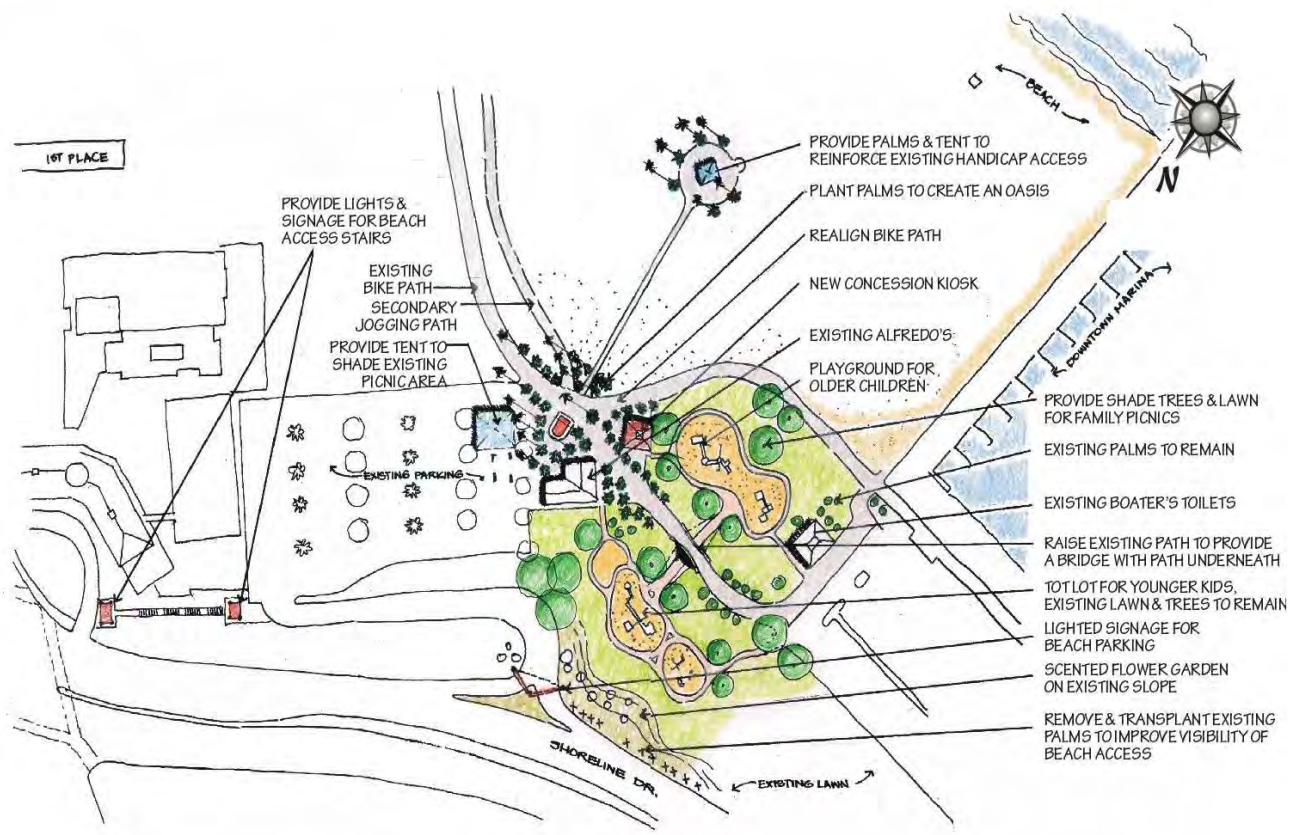
Conceptual drawing for the United States Sailing Center, which reflects the type of facility that might be built..

Proposed Improvements: Build a "learn-to-sail" facility (similar to Leeway) and supporting parking lot area. This facility would include day camp, child-care, and small boat rental. This would provide sailing and beach camp access to the west side of the city and support tourism with day-care and beach oriented activities. The beach is very wide in this area, buffering the residential area while providing visual interests on the beach activities.

Project: **Alfredo's (Alamitos Avenue Parking Lot)**

Location: **Alamitos Avenue Parking Lot**

Purpose:	Community use improvement	Support Facilities:	Street, parking and restroom facilities.
Budgetary Cost:	To be determined.	Funding:	City of Long Beach
Regulatory Requirements:	Coastal Commission Development permit. LCP page II-20, General Strand Policy 8.	Environmental Issues:	Water quality



Conceptual drawing of development at Alfredo's.

- **No Recreational Facilities**

Existing Issues: There are currently no recreational facilities at the west end of the beach near the Alamitos Avenue parking lot, which borders the east side of the Downtown Marina. The beach is wide at this area, ideal for recreational uses that require a larger space. The extreme width of the beach here currently discourages use.

Proposed Improvements: Add playground equipment inland of bicycle path at Alfredo's (beach concessionaire) and other accessory use improvements such as lockers, information kiosks, and maps.

- **Increase Beach Use**
- **Children's Playground**
- **Beach Concessions**

Project: **Cherry Avenue Beach Area**

Location: **Beach area below Cherry Avenue**

Purpose:	Community use improvement	Support Facilities:	Street, parking and restroom facilities.
Budgetary Cost:	To be determined.	Funding:	City of Long Beach
Regulatory Requirements:	Coastal Commission Development permit. LCP page II-23, General Strand Policy 2 & 7; Page II-23, Strand Segment 2, Recommendation 3.	Environmental Issues:	Water quality

Existing Issues:

- **Underutilized Beach Resources**

Existing Cherry Avenue beach area.

Existing Issues: The beach adjacent to Bixby Park is wide at this area, ideal for recreational uses that require space.

Proposed Improvements: Improve the beach area below Cherry Avenue. Install turf, a preschool-age children's playground, and picnic facilities on the beach north of the bicycle path. Add a playground for school-age children and a sports field west of the Lifeguard Station Headquarters. This building has historical architectural values and should be protected from erosion and wave action. A submerged or perched beach could be constructed seaward of the building to re-establish its original beach.

- **Recreational Improvements**
- **Playground**

Project: **Bluff Park Overlooks**

Location: **Bluff Park**

Purpose:	Community use improvement	Support Facilities:	Bluff Park facilities
Budgetary Cost:	To be determined.	Funding:	City of Long Beach
Regulatory Requirements:	Local coastal development permit. LCP page III-B-9, Area B, Policy Plan Summary, Recreation and Visitor Service Facilities.	Environmental Issues:	No environmental issues will be impacted.

- **Install Additional Amenities**

Existing Bluff Park overlook ammenities.

Existing Issues: The Bluff Park runs from the Long Beach Museum of Art to 36th Place. The existing walkway at the edge of the Park overlooking the ocean is underutilized.

Proposed Improvements: Install more overlook bench combinations with trash receptacles at Molino Avenue, Temple Avenue, Orizaba Avenue, Paloma Avenue, Coronado Avenue, and 36th Place where exiting walkways cross the Park. Install drinking fountains at both ends and middle of the Park. Replace telephones with emergency call boxes.

- **Install Additional Amenities**

Project: **Lindero Avenue Playground**

Location: **Bluff Park**

Purpose:	Community use improvement	Support Facilities:	Bikepath, stairways, parking and restroom facilities.
Budgetary Cost:	To be determined.	Funding:	City of Long Beach
Regulatory Requirements:	Coastal Commission Development permit. LCP page II-24, General Strand Policy 8.	Environmental Issues:	No environmental issues will be impacted.

Existing Molino Beach Area to the right.

Existing Issues: The beach at the Molino Avenue stairway lacks recreational facilities for children.

Proposed Improvements: Between the Molino Avenue stairs and the stairs at the Museum of Art, provide children's playground equipment and play area, and picnic areas with shade at the east end of the parking lot near the Molino stairs. Parking will be at the existing Junipero parking lot. There are nearby restrooms in place.

- **Children's Playground**
- **Improve Aesthetics**

Conceptual plan of development at Long Beach Art Museum.

Project: **Cherry Avenue Beach Restroom Area**

Location: **Beach below Cherry Avenue**

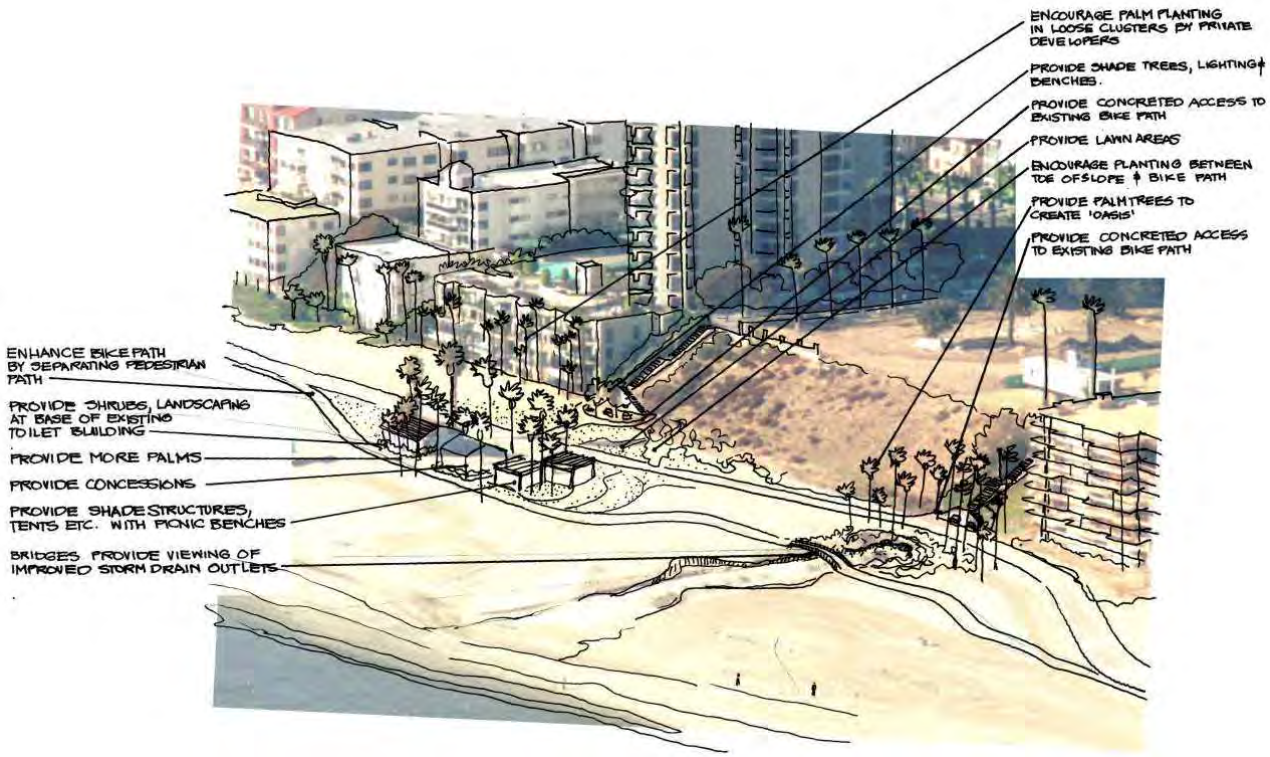
Purpose:	Community use improvement	Support Facilities:	Bikepath, stairways, and parking facilities.
Budgetary Cost:	To be determined.	Funding:	City of Long Beach and private sources.
Regulatory Requirements:	Coastal Commission Development permit. LCP page II-24, General Strand Policy 8.	Environmental Issues:	Water quality

Existing restroom facilities at Cherry Ave, which will be similar to Molino Ave. improvements.

Existing Issues: The beach below the Molino Avenue stairway is marred to the east by the drainage channel to the ocean

Proposed Improvements: In conjunction with the proposed Molino Avenue Playground, install "oasis" amenities at the existing restroom, including concession stand plus cabanas, palapas, and lockers based upon concessionaire ideas. Provide additional landscaping, palms, and native dune plants.

- **Install Facilities**
- **Concessions**



Conceptual drawing of oasis facility.

Project: **Relocate Telephone Lines**

Location: **Bluff Park**

Purpose:	Community use improvement	Support Facilities:	No facilities will be impacted.
Budgetary Cost:	To be determined.	Funding:	City of Long Beach
Regulatory Requirements:	Local coastal development permit.	Environmental Issues:	No environmental issues will be impacted.

Existing telephone poles below Bluff Park along the toe of the bluff.

Existing Issues: The lifeguard towers have telephone lines running to them, which are visually unaesthetic.

Proposed Improvements: Remove telephone posts and provide either underground communication lines or wireless systems between Lifeguard facilities. Keep some poles for kestrel roosts until trees provide same function.

- **Improve Aesthetics**

Project: **Improve Signage**

Location: **Throughout Bluff Enhancement and Erosion Project Area**

Purpose:	Community use improvement	Support Facilities:	No facilities will be impacted.
Budgetary Cost:	To be determined.	Funding:	City of Long Beach
Regulatory Requirements:	Local coastal development permit. LCP page II-21, Strand Segment 1, Recommendation 2.	Environmental Issues:	No environmental issues will be impacted.

Lack of signage at Junipero Ave. beach ramp.

Existing Issues: The signage is inadequate throughout the study area. Existing signage is not aesthetic and hard to read

Proposed Improvements: Improve the signage by making the signs larger and user-friendly for easier access to the beach environment.

Example of signage used on Shoreline Drive.

Appendix A

City of Long Beach Bluff Erosion and Enhancement Study
Native Plant Species and Wildlife List
September 2000

EXISTING CONDITIONS AND RATIONALE

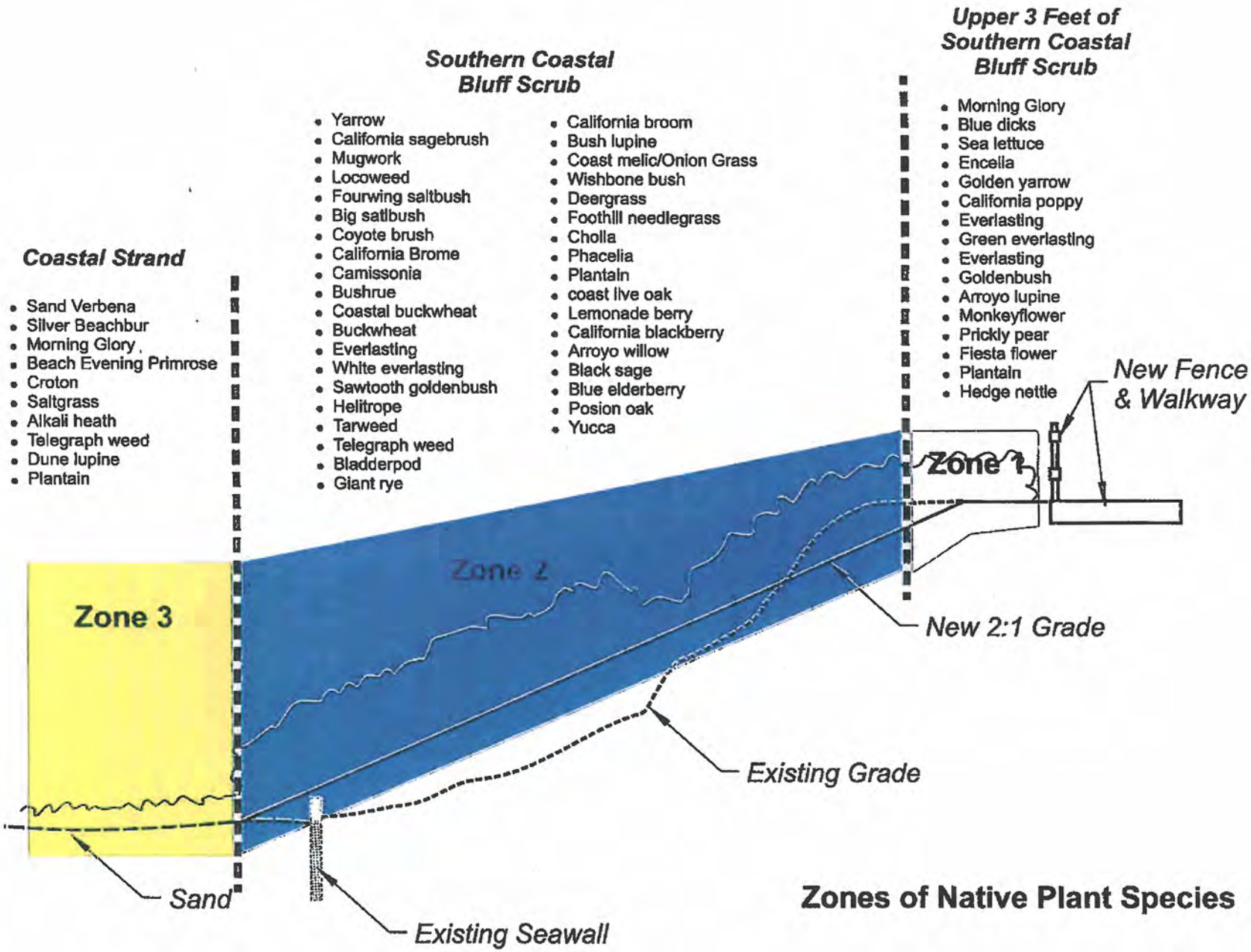
The Long Beach Bluff Erosion and Enhancement Study area has historically had little to no vegetation. Urbanization has considerably changed the character and use of the bluff. The area west of Bixby Park is within a residential zone that is landscaped with various exotic plants including iceplant (*Carpobrotus edulis*) and bouganvilla spp. The bluff area east of Bixby Park is currently covered with exotic grasses and iceplant with acacia spp. Several sections of the bluff in both areas have had slope failure where erosion has occurred. In southern California, the plant community that naturally occupies coastal bluffs is southern coastal bluff scrub. Plants in this community are typically soft-stemmed shrubs and herbs that are drought-tolerant, shallow-rooted and summer-dormant. These characteristics are well suited to soils that dry out during the summer and fall; winter and spring is the growing season with moisture available in the upper horizons. Exotic plants that are not as well suited to these soils and climate typically enhance erosion processes. For landscaping, use of regionally native plants is known to reduce erosion and reduces long-term irrigation with minimal maintenance. It also provides habitat for a wide variety of wildlife species and insects that would naturally use the resources for feeding and breeding. The beach presently has no vegetation. The plant community that naturally occupies sandy beach areas is coastal strand which provides a transition zone between the bluff and the beach.

A public participation workshop for the Long Beach Bluff Erosion and Enhancement Study area was conducted on March 18 and 25, 2000 for public input to improve the bluff. A plant database was provided during this workshop (Fialko 2000) and reviewed. Selected native plants from the database were incorporated into a native plant species list for the study area. This list is intended for use as a guide for the City of Long Beach Bluff Erosion and Enhancement Study area. The City of Long Beach will undergo a permit review process and coordinate with regulatory agencies prior to planting activities. This document does not meet all California Coastal Commission (CCC) requirements for a Habitat Restoration Plan and should not be submitted as such. Tree of Life Nursery in San Juan Capistrano is recommended for plant seed collection (if necessary), plant propagation and seed mix supply. They have experience with native plants especially in southern California. The bluff within the residential area west of Bixby park will be landscaped with ornamental plants for aesthetic purposes. This list contains native plant species recommended for the area east of Bixby Park and specifies the following four zones.

1. Southern Coastal Bluff Scrub upper 3 feet.
2. Southern Coastal Bluff Scrub along the entire slope.
3. Coastal Strand.
4. Drainage at outfall areas.

Zones 1, 2, and 3 may also be considered for the stair easements west of 14th Place.

If feasible, the City of Newport Beach Tidelands Oilfield (approximately 3 miles southeast of the Long Beach Bluff study area) could be used as a seed collection site for the bluff area to obtain a regional plant seed source. This Newport Beach site on Highway 1 just west of Superior Avenue is a fairly small, pristine site. A plant survey of the oilfield site should be conducted during the appropriate periods (spring and summer) to identify all species present that may be added to Zone 1 and 2 lists.



Zones of Native Plant Species

NATIVE PLANT SPECIES AND WILDLIFE LIST

ZONE 1: Recommended Species for upper 3 feet of Southern Coastal Bluff Scrub

Criteria considered for these species include minimal interruption of the visual horizon. The selected plants grow up to 3 feet tall.

Table 1
ZONE 1: Recommended Species for upper 3 feet of Southern Coastal Bluff Scrub

Scientific Name	Common Name	Habit	Other notes
Calystegia macrostegia	Morning glory	perennial vine	
Dichelostemma capitatum	Blue dicks	perennial herb	
Dudleya lanceolata	Sea lettuce	perennial	low fuel capacity
Encelia californica	Encelia	shrub	found in Newport Beach bluff remnant site
Eriogonum fasciculatum var. *fasciculatum*			low fuel capacity; found in Newport Beach bluff remnant site
Eriophyllum confertiflorum var. *confertiflorum*	Golden yarrow	subshrub	
Eschscholzia californica	California poppy	annual herb	
Gnaphalum bicolor	Everlasting	perennial herb	
Gnaphalum californicum	Green everlasting	annual/biennial herb	
Gnaphalum lutea-album	Everlasting	annual herb	
Isocoma menziesii var. *sediodes*	Goldenbush	subshrub	
Lupinus succulentus	Arroyo lupine	annual herb	found in heavy clay soil
Mimulus aurantiacus	Monkeyflower	subshrub	
Opuntia littoralis	Prickly pear	cactus	found on site; low fuel capacity; thorny; found in Newport Beach bluff remnant site
Pholistoma auritum var. *auritum*	Fiesta flower	annual herb	
Plantago ovata	Plantain	annual	
Stachys bullata	Hedge Nettle	herb	

ZONE 2: Recommended Species for Southern Coastal Bluff Scrub along the entire slope

Criteria considered for these species include high diversity and slope stabilization properties. The taller plants should be planted approximately 6 feet below the top of the bluff so that the beach view from the houses will not be obstructed. If safety issues need to be considered, the larger species may be distributed to accommodate this need away from the bluff top and beach level. All plants in Zone 1 may also be included in Zone 2. The selected plants vary in height and some grow up to 6 feet tall with the exception coast live oak and arroyo willow that grow taller.

Terracing is suggested for some erosion problem areas. The terraces will be low in height so shrubs and trees may obstruct the view of the terrace. This will reduce visual impacts. The possibility of an outfall to collect water and divert it away to a lower part of the slope may also be installed.

Table 2-1
ZONE 2: Recommended Species for Southern Coastal Bluff Scrub along the entire slope

Scientific Name	Common Name	Habit	Other notes
Achillea millefolium	Yarrow	perennial	
Artemisia californica	California sagebrush	shrub	
Artemisia douglasiana	Mugwort	perennial	
Astragalus trichopodus var. *lonchus*	Locoweed	perennial	This is the host plant to the federally endangered Palos Verdes blue butterfly
Atriplex canescens ssp.	Fourwing saltbush	shrub	found in Newport Beach bluff remnant site
Atriplex lentiformis	Big saltbush	shrub	found in Newport Beach bluff remnant site
Baccharis pilularis	Coyote brush	evergreen shrub	
Bromus carinatus	California Brome	grass	
Camisonia micrantha	Camissonia	annual herb	
Cneoridium dumosum	Bushrue	shrub	<1.5 meters tall
Eriogonum cinereum	Coastal buckwheat	shrub	0.6 to 1.5 meters tall
Eriogonum parvifolium	Buckwheat	shrub	low fuel capacity
Gnaphailum bicolor	Everlasting	perennial	
Gnaphailum canescens ssp.*beneolens*	Everlasting	biennial herb	
Gnaphalium canescens ssp.*microcephalum*	White everlasting	annual herb	
Hazardia squarrosa	Sawtooth goldenbush	evergreen shrub	few individuals found on site.
Heliotropium curassavicum	Heliotrope	perennial	found in moist to dry saline soils.
Hemizonia fasciculata	Tarweed	annual herb	
Heterotheca grandiflora	Telegraph weed	annual herb	found throughout site.
Isomeris arborea	Bladderpod	shrub	found in Newport Beach bluff remnant site
Leymus condensatus	Giant rye	tall grass	Very good for soil stabilization, should be planted in erosion problem areas and duuring the first planting season.
Lotus scoparius var. *scoparius*	Callifornia broom	perennial shrub	May grow to 2 meters. In shade and beach will form mats.
Lupinus arboreus	Bush lupine	shrub	
Melica imperfecta	Coast melic/onion grass	grass	
Mirabilis californica	Wishbone bush	shrub	trailing to ascending, older plants are grayish
Muhlenbergia rigens	Deergrass	grass	sandy to gravelly places in canyons and stream bottoms
Nasella lepida	Foothill needlegrass	grass	
Opuntia prolifera	Cholla	cactus	low fuel capacity; thorny; found

Scientific Name	Common Name	Habit	Other notes
			in Newport Beach bluff remnant site
Phacelia ramosissima var. *austrolitoralis*	Phacelia	Perennial	
Plantago ovata	Plantain	Annual	
Quercus agrifolia	Coast live oak	tree	sparse distribution possibly near outfall areas
Rhus integrifolia	Lemonade berry	evergreen shrub	
Rubus ursinus	California blackberry	perennial vine	
Salix lasiolepis	Arroyo willow	tree	possibly planted near outfalls
Salvia mellifera	Black sage	shrub	
Sambucus mexicana	Blue elderberry	shrub	distribute sparsely, grows up to 8 meters
Toxicodendron diversilobum	Poison oak	perennial vine	
Yucca whipplei	Our lord's candle	subshrub	low fuel capacity; thorny

Wildlife species that may potentially occur in the restored southern coastal bluff scrub are listed in Table 2-2. This is a comprehensive list and limitations of an urban setting will limit the number of species that would naturally inhabit the bluff.

Table 2-2
ZONE 2: Wildlife species expected to occur in Southern Coastal Bluff Scrub

Scientific Name	Common Name	Regulatory Status
Insects		
Glaucopsyche lygdamus palosverdesensis	Palos Verdes blue butterfly	FE
Amphibians		
Ensatina eschscholtzi	Ensatina	
Hyla regilla	Pacific treefrog	
Reptiles		
Sceloporus occidentalis	Western fence lizard	
Uta stansburiana	Side-blotched lizard	
Phrynosoma coronatum frontale	California coast horned lizard	FCS, CSC
Eumeces skiltonianus	Western skink	
Cnemidophorus tigris	Western whiptail	
Gerrhonotus multicarinatus	Southern alligator lizard	
Anniella pulchra pulchra	Silvery legless lizard	FSC, CSC
Diadophis punctatus	Ringneck snake	
Coluber constrictor	Racer	
Masticophis flagellum	Coachwhip	
Masticophis lateralis	California whipsnake	
Pituophis melanoleucus	Gopher snake	
Lampropeltis getulus	Common kingsnake	
Thamnophis elegans	Western terrestrial garter snake	
Tantilla planiceps	Two-black headed snake	
Hypsiglena torquata	Night snake	

Scientific Name	Common Name	Regulatory Status
Crotalus viridis	Western rattlesnake	
Birds		
Callipepla californica	California quail	
Elanus caeruleus	Black-shouldered kite	
Circus cyaneus	Northern harrier	CSC
Accipiter striatus	Sharp-shinned hawk	CSC
Accipiter cooperii	Cooper's hawk	CSC
Buteo jamaicensis	Red-tailed hawk	
Buteo lineatus	Red-shouldered hawk	
Buteo regalis	Ferruginous hawk	FSC, CSC
Buteo lagopus	Rough-legged hawk	
Aquiala chrysaetos	Golden eagle	
Cathartes aura	Turkey vulture	
Falco sparverius	American kestrel	
Falco columbarius	Merlin	CSC
Falco peregrinus anatum	Peregrine falcon	
Falco mexicanus	Prairie falcon	CSC
Tyto alba	Barn owl	
Otus kennicotti	Western screech owl	
Bubo virginianus	Great horned owl	
Athene cunicularia	Burrowing owl	FSC, CSC
Asio otus	Long-eared owl	CSC
Asio flammeus	Short-eared owl	CSC
Phaelaenoptilus nuttallii	Common poorwill	
Aeronautes saxatalis	White-throated swift	
Zenaida macroura	Morning dove	
Columbia livia	Rock dove	
Calypte anna	Anna's hummingbird	
Calypte costa	Costa's hummingbird	
Stellula calliope	Calliope hummingbird	
Selasphorus sasin	Allens' hummingbird	
Colaptes auratus	Northern flicker	
Sayornis saya	Say's phoebe	
Tyrannus vociferans	Cassin's kingbird	
Tyrannus verticalis	Western kingbird	
Eremophila alpestris actia	California horned lark	CSC
Tachycineta thalassina	Violet-green swallow	
Stelgidopteryx serripennis	Northern rough-winged swallow	
Hirundo pyrrhonota	Cliff swallow	
Hirundo rustica	Barn swallow	
Corvus brachyrhynchos	American crow	
Aphelocoma coerulescens	Scrub jay	
Psaltriparus minimus	Bushtit	
Troglodytes aedon	House wren	
Thryomanes bewickii	Bewick's wren	
Chamaea fasciata	Wrentit	
Regulus satrapa	Golden-crowned kinglet	
Regulus calendula	Ruby-crowned kinglet	

Scientific Name	Common Name	Regulatory Status
Polioptila caerulea	Blue-gray gnatcher	
Mimus polyglottos	Northern mockingbird	
Oreoscoptes montanus	Sage thrasher	
Toxostoma redivivum	California thrasher	
Catharus ustulatus	Swainson's thrush	
Catharus guttatus	Hermit thrush	
Bombycilla cedrorum	Cedar waxwing	
Lanius ludovicianus	Loggerhead shrike	
Sturnus vulgaris	European starling	FSC, CSC
Vermivora celata	Orange-crowned warbler	
Dendroica petechia	Yellow warbler	CSC
Wilsonia pusilla	Wilson's warbler	
Euphagus cyanocephalus	Brewer's blackbird	
Sturnella neglecta	Western meadowlark	
Molothrus ater	Brown-headed cowbird	
Zonotrichia leucophrys	White-crowned sparrow	
Zonotrichia atricapilla	Golden-crowned sparrow	
Chondestes grammacus	Lark sparrow	
Amphispiza belli belli	Bell's sage sparrow	FSC, CSC
Aimophila ruficeps canescens	Southern California rufous-crowned sparrow	FSC, CSC
Spizella passerina	Black-chinned sparrow	
Pooecetes graminues	Vesper sparrow	
Passerella iliaca	Fox sparrow	
Melospiza melodia	Song sparrow	
Melospiza lincolnii	Lincoln's sparrow	
Pipilo erythropthalmus	Rufous-sided towhee	
Pipilo crissalis	California towhee	
Junco hyemalis	Dark-eyed junco	
Carpodacus mexicanus	House finch	
Carduelis tristis	American goldfinch	
Carduelis psaltria	Lesser goldfinch	
Carpodacus purpureus	Purple finch	
Pheuctucus melanocephalus	Black-headed grosbeak	
Mammals		
Didelphis virginiana	Virginia opossum	
Sorex trowbridgii	Trowbridge shrew	
Sorex ornatus	Ornate shrew	
Scapanus latimanus	Broad-footed mole	
Myotis yumanensis	Yuma myotis	
Myotis volans	Long-legged myotis	
Lasionycteris ñoctiv agans	Silver-haired bat	
Pipistrellus hesperus	Western pipistrelle	
Eptesicus fuscus	Big brown bat	
Lasiurus borealis	Red bat	
Lasiurus cinereus	Hoary bat	
Plecotus townsendii townsendii	Townsend's western big-eared bat	FSC, CSC
Antrozous pallidus	Pallid bat	CSC

Scientific Name	Common Name	Regulatory Status
Tadarida brasiliensis	Brazilian free-tailed bat	
Eumops perotis californicus	California mastiff bat	FSC, CSC
Lepus californicus	Black-tailed jackrabbit	
Sylvilagus audubonii	Desert cottontail	
Sylvilagus bachmanii	Brush rabbit	
Spermophilus beecheyi	California ground squirrel	
Thomomys bottae	Valley pocket gopher	
Perognathus californicus	California pocket mouse	
Dipodomys heermanni	Heermann's kangaroo rat	
Dipodomys agilis	Pacific kangaroo rat	
Reithrodontomys megalotis	Western harvest mouse	
Peromyscus californicus	California mouse	
Peromyscus maniculatus	Deer mouse	
Peromyscus boylii	Brush mouse	
Onychomys torridus	Southern grasshopper mouse	
Neotoma lepida intermedia	San Diego desert woodrat	FSC, CSC
Neotoma fuscipes	Dusky-footed woodrat	
Microtus californicus	California vole	
Procyon lotor	Raccoon	
Mustela frenata	Long-tailed weasel	
Spilogale gracilis	Western spotted skunk	
Mephitis mephitis	Striped skunk	

Notes: FE – Federally Endangered; FSC – Federal Species of Concern; CSC – Special Species of Concern by California State Department of Fish and Game.

Coastal bluff scrub provides habitat for bobcat, mule deer and coyote in other areas, but is not included because of the urban setting.

ZONE 3: Recommended Species for Coastal Strand

It is recommended that if possible, some sand from the beach may be relocated to the area in front of the bluff wall to continue the topography with a gradual slope to the beach level. There are a few areas where wind-blown sand has been placed in front of the wall in this fashion. The coastal strand will provide a transition zone between the bluff and the beach which occurs in many California beach systems. For the area west of 14th Place, sand transfer may be required as necessary.

Table 3-1
ZONE 3: Recommended Species for Coastal Strand

Scientific Name	Common Name	Habit	Other notes
Abronia maritima	Sand verbena	perennial	
Abronia umbellata ssp. *umbellata*	Sand verbena	annual	
Ambrosia chamissonis	Silver beachbur	perennial	
Calystegia soldonella	Morning glory	perennial	
Camissonia cheiranthefolia ssp. *suffruticosa*	Beach evening primrose	subshrub	
Croton californicus	Croton	subshrub	
Distichlis spicata	Saltgrass	grass	found on bluff site
Frankenia salina	Alkali heath	subshrub	
Heterotheca grandiflora	Telegraph weed	annual, biennial herb	
Lupinus Chamissonis	Dune lupine	shrub	
Plantago ovata	Plantain	annual herb	

Wildlife species expected to occur in the restored coastal strand are listed in Table 3-2.

Table 3-2
ZONE 2: Wildlife species expected to occur in Coastal Strand

Scientific Name	Common Name	Regulatory Status
Amphibians		
Bufo microscaphus	Southwestern toad	
Reptiles		
Anniella pulchra pulchra	Silvery legless lizard	FSC, CSC
Birds		
Pelecanus occidentalis	Brown pelican	FS, SE
Larus occidentalis	Western gull	
Larus heermanni	Heermann's gull	
Larus delawarensis	Ring-billed gull	
Larus hyperboreus	Glaucus gull	
Sterna maxima	Royal tern	
Sterna caspia	Caspian tern	
Sterna antillarum	Least stern	FE, SE
Rynchops niger	Black skimmer	CSC
Ardea herodias	Great blue heron	
Pluvialis squatarola	Black-bellied plover	
Pluvialis dominica	American golden-plover	
Charadrius semipalmatus	Semipalmated plover	
Charadrius alexandrinus	Snowy plover	FT, CSC
Charadrius vociferous	Killdeer	

Scientific Name	Common Name	Regulatory Status
Charadrius montanus	Mountain plover	FC, CSC
Calidris alba	Sanderling	
Sayornis nigricans	Black phoebe	
Anthus rubescens	American pipit	
Hirundo pyrrhonota	Cliff swallow	
Hirundo rustica	Barn swallow	
Corvus brachyrhynchos	American crow	
Lanius ludovicianus	Loggerhead shrike	FSC, CSC
Dendroicia coronata	Yellow-rumped warbler	
Mammals		
Didelphis virginiana	Virginia opossum	
Procyon lotor	Raccoon	
Spilogale gracilis	Western spotted skunk	

Notes: FSC – Federal Species of Concern; FE – Federal Endangered; SE- State Endangered by California State Department of Fish and Game; CSC – California State listed Special Species of Concern

Coastal strand has been visited by bobcat and coyote in other areas, but is not included because of the urban setting.

ZONE 4: Drainage at outfall areas

This zone would be a man-made created area. If any wetland marsh were developed, some coordination with the Army Corps may be required. If feasible, it is recommended that the water exiting the outfall enter an oil/water separator before it discharges to the beach. This will help to remove some of the petroleum hydrocarbons and heavy metals from street runoff. During the rainy season, the separator will require regular maintenance. There is a fair amount of preliminary analysis that needs to be conducted to determine what may be installed in this area. Investigations such as soil analysis, tidal regime and hydrology will be necessary.

- **Brackish Marsh Option**

  Design of this marsh and its outlet to the ocean should imitate coastal systems where ephemeral creeks discharge to the ocean. Depending on rain and discharge flow rates from the outfall, the area in front of the outfall should be large enough to support discharge and tidal fluxes. Tidal influences need to be considered to determine planting zones. A bridge walkway may be provided and informational signage included to reduce public intrusion into the marsh. The sand may need to be removed for a portion of the beach in front of the outfall and a silty clay soil may need to be put in place.

Table 4
ZONE 4: Recommended Species for Brackish Marsh Option

Scientific Name	Common Name	Habit	Other notes
Cuscuta salina	Salt-tolerant dodder		
Distichlis spicata	Saltgrass	grass	found on bluff site
Frankenia grandifolia	Frankenia		
Jaumea carnosa	Fleshy jaumea		
Juncus acutus var. *sphaerocarpus*	Spiny rush		

Scientific Name	Common Name	Habit	Other notes
Limonium californicum	Sea-lavender		
Mononthocloe littoralis	Shore grass	grass	
Salicornia virginica	Pickleweed		
Sueda californica	Sea-blite		
Triglochin ssp.	Arrow grass	grass	

- **Rocky drainage option**

  There are areas in southern California that have drainages that enter the ocean. Within the larger drainages, riparian habitat occur up to the sandy beach. Rocks from runoff are usually scattered along the sandy beach. Since a riparian habitat may not be feasible due to the tidal, salt water influence, a rocky drainage may be created in front of the outfall. The edges of the created rocky drainage may be planted with coastal strand plants (see Table 3) along the upper portion of the beach.

- **Any other options?**

Wildlife species for drainage TBD; shorebirds listed for coastal strand would likely occur plus others.

REFERENCES

California Department of Fish and Game (CDFG)
2000 *Query Results of the RareFind 2 Data Base for the Sanpedro, Long Beach, Seal Beach, Newport Beach, and Laguna Beach USGS 7.5' Quadrangles*. Report of the Natural Diversity Data Base. Natural Heritage Division. California Department of Fish and Game. Information dated January 2000.

California Department of Fish and Game (CDFG)
1990a *California's Wildlife, Volume II: Birds*. Edited by David C. Zeiner, William F. Laudenslayer, Jr., Kenneth E. Mayer, and Marshall White.

Fialko, John
2000 Personal communication. Provided "Database of California Native Plants That Are Most Likely Indigenous to Long Beach." Long Beach, California.

Hickman, J.C.
1996 The Jepson Manual Higher Plants of California. University of California Press, Berkeley and Los Angeles, CA.

Holland, R.F.
1986 Preliminary Descriptions of the Terrestrial Natural Communities of California. The Resources Agency, Department of Fish and Game, Sacramento, CA.

Sawyer, J.O., Keeler-Wolf, T.
1995 *A Manual of California Vegetation*. California Native Plant Society, Sacramento, CA.

Schoenherr, A.A.
1992 *A Natural History of California*. California Natural History Guides: 56. University of California Press, Berkeley.

Scott, James A.
1986 *The Butterflies of North America: A Natural History and Field Guide.* Stanford University Press, Stanford.

Whitaker, J.O. Jr.
1997 *National Audubon Society Field Guide to North American Mammals.* Alfred A. Knopf, Inc. New York.