

---

**DRAFT**  
**EXPEDITED RECONNAISSANCE STUDY**  
**Section 905 (b) (WRDA 86) Analysis**  
**City of Huntington Beach, Bluff Top Park, California**  
**May 1999**

---

**1. STUDY AUTHORITY:** This study is being conducted in accordance with a resolution adopted by the House Committee on Public Works and Transportation, dated 13 May 93, which reads as follows:

“ Resolved by the Committee on Public Works and Transportation of the United States House of Representatives, that, in accordance with Section 110 of the River and Harbor Act of 1962, the Secretary of the Army, acting through the Chief of Engineers, is directed to investigate the feasibility of providing shore improvements in and adjacent to the City of Huntington Beach, Orange County, California, in the interest of storm damage reduction, beach erosion control, and other related purposes.”

**2. STUDY PURPOSE:** The purpose of this reconnaissance study is to determine if there is a Federal interest in providing storm damage reduction measures to the Huntington Cliffs. The study has the main objectives of evaluating the existing conditions of the study area, studying the nature and extent of the cliff erosion and identifying solutions to the problem. Evaluation of existing conditions is based upon historical and current erosion rates and the observed progressive deterioration of the existing revetment. The reconnaissance phase also includes developing a Project Study Plan (PSP) for the cost-shared feasibility phase of the study and executing a Feasibility Cost-Sharing Agreement (FCSA) that is supported by both the Federal and non-Federal interests. The primary area of concern to be addressed in this study, in response to the study resolution and coordination with the local sponsor, is to investigate the feasibility of providing shore protection improvements along the cliffs in the City of Huntington Beach, California to reduce the rates of shoreline and bluff top erosion.

**3. LOCATION OF PROJECT/ CONGRESSIONAL DISTRICT:** The Huntington Beach Bluff Top Park is located in the City of Huntington Beach, Orange County, California, about 15 miles north of Dana Point and 10 miles southeast of Los Angeles-Long Beach Harbors (Fig. 1). The study area is defined as an 8,000-foot stretch of coast extending from the southern boundary of Bolsa Chica State Beach to 17<sup>th</sup> Street, and inland to Pacific Coast Highway. The study is located within the 45<sup>th</sup> Congressional District (R-Dana Rohrabacher) of California .

**4. DISCUSSION OF PRIOR STUDIES, REPORTS AND WATER PROJECTS:**

(1) A report entitled “ Huntington Cliffs Reconnaissance Report, Huntington Beach, Orange County, California ”, dated March 1995, was prepared by the U.S. Army Corps of Engineers, Los Angeles District. The report findings showed that there were three economically justified plans to reduce storm damages to the Huntington Cliffs. However, the benefits accrued were primarily due to loss of existing recreation and damages to park facilities, which is a low Federal priority.

(2) The U.S. Army Corps of Engineers has performed other studies which are not directly related to the Huntington Cliffs area, but are relevant to the coastal erosion problem in the vicinity of the study area. These studies are summarized below:

a. In the “Beach Erosion Control Report on Cooperative Study of Orange County, California, Appendix V, Phase 2” (USACOE-LAD, 1962), the District Engineer found that shoreline erosion had occurred between Anaheim Bay and the Newport Pier, and that protective measures would be required to prevent further damage . With respect to the Huntington Cliffs area, it was noted that “part of the sea cliff is protected from wave action by a concrete seawall and at one place, near the upper city limits, the eroded shore has nearly destroyed the Pacific Electric Railroad and heavy stone revetment has been placed along the right-of-way to prevent additional wave damage.” The report recommended the construction of an offshore breakwater near the head of the Newport Submarine Canyon to prevent sediment losses down the canyon, and the placement of 3 million cubic yards (“cy”) of beach fill in the vicinity of Surfside-Sunset Beach.

b. Hales (1980), in “Littoral Processes Study, Vicinity of Santa Ana River Mouth

from Anaheim Bay to Newport Bay, California”, utilized wave statistics from hindcast analyses to estimate the potential longshore transport of littoral material. A net southerly transport of 276,000 cy/yr was computed for the Surfside-Sunset Beach region, a net southerly transport of 112,000 cy/yr for the Huntington Beach region (which includes the Huntington Cliffs area), and a net southerly transport of 127,000 cy/yr for the region between the Newport Submarine Canyon and Newport Bay. It was concluded that the Huntington Beach region would continue to receive nourishment as long as the feeder beach at Surfside-Sunset Beach was maintained.

c. The “Shoreline Movement Investigation Report: Portuguese Bend to Mexican Border (1853-1982)” (USACOE-LAD, 1987) includes shoreline change maps prepared by the National Ocean Service. The average rate of shoreline change in the Huntington Cliffs area is indicated to be  $-0.6$  to  $-1.0$  ft/yr between 1874 and 1959, and  $-0.9$  to  $1.1$  ft/yr between 1959 and 1982.

d. “Bolsa Bay, California, Proposed Ocean Entrance System Study; Report 2, Comprehensive Shoreline Response Computer Simulation, Bolsa Bay, California”, prepared by Gravens (1990), describes an application of the numerical shoreline change model GENESIS to assess the potential impacts that might result from the creation of a jettied ocean entrance for Bolsa Bay. From an analysis of ten historical data sets pertaining to the position of the Mean Higher High Water shoreline, it was concluded that the shoreline between Anaheim Bay and the Huntington Beach Municipal Pier remained relatively stable between 1878 and 1983, and experienced shoreline advances between 1934 and 1983. The advances were attributed to the periodic beach nourishment operations conducted at Surfside-Sunset Beach since the 1940’s.

e. The “Existing State of Orange County Coast” report (USACOE-LAD, 1993) provides a summary of knowledge regarding nearshore oceanography and coastal processes in the Seal Beach Littoral Cell, the Huntington Beach Littoral Cell, and the Laguna Beach Group of Littoral Sub-Cells. It was prepared under the auspices of the Coast of California Storm and Tidal Waves Study (CCSTWS), South Coast Region. The report includes a preliminary budget of sediment for the Huntington Beach Littoral Cell, along with discussions of longshore transport rates, shoreline change rates, and subsidence in the vicinity of the Huntington Cliffs.

(3) Studies by Others: Ground subsidence in the vicinity of the Study Area resulting from petroleum extraction has been addressed in a number of prior studies. Among the most noteworthy is that of Habel (1978), who estimated a volume of 7.2 million cubic yards for the depression that developed off Huntington Beach between 1934 and 1964. His findings indicated a subsidence of approximately 3 feet in the Huntington Cliffs area during that period, representing a rate of 0.10 ft/yr.

## **5. PLAN FORMULATION:**

### **a. Identified problems**

#### **(1) Existing Conditions:**

The Huntington Cliffs area lies within the City of Huntington Beach, in Orange County, California. As implied by its name, the distinguishing characteristics of the region is the presence of steeply-sloping sea cliffs that rise from 30 to 40 feet above the Pacific Ocean. A narrow strip of park land known as Bluff Top Park, occupies the cliff top between the cliff edge and Pacific Coast Highway. Pacific Coast Highway, which is the primary access route to the Orange County coastal area, lies approximately 50-100 feet inland of the cliff edge at some locations. Because the cliffs consist of poorly consolidated alluvium and marine terrace deposits, they are subject to erosion from both marine and subaerial influences. The result has been a gradual but continuing loss of cliff top park land, which has destroyed park facilities. Portions of the park including walkways, bicycle paths, night lights, and the lifeguard house have been closed to public access because of safety risks. The erosion is also threatening parking lots and eventually may impact Pacific Coast Highway.

The facilities impacted to date consist of security lights (several of which have been lost since they were installed in 1982), a safety rail (which is on the verge of being lost in several areas), and a pedestrian walkway (a 15-ft long stretch of walkway which has been slightly undermined). If the cliff top continues to retreat, additional security lights will be lost, along with large segments of the safety railing, and pedestrian walkway. The approximate value of the Bluff Top Park facilities to be damaged is approximately \$500,000. The projected annual use of the pedestrian walkway and bicycle path is approximately 750,000. An estimated annual recreational value of \$240,000 would

apply to the loss of the walkway. The annual beach attendance in the study area is estimated to be 750,000 to 1 million people.

In 1995, the U.S Army Corps of Engineers completed a reconnaissance report that documented the existing conditions within the Huntington Cliffs area. It also identified the nature and extent of the cliff erosion problem and formulated and evaluated solutions to the problem. To facilitate a detailed analysis of the problem, three sub-reaches were identified (North, Central, and South) on the basis of distinguishing cliff and beach characteristics. These reaches are shown in Figure 1.

**(2) Expected Future Conditions:**

Based upon historical and current erosion rates and assumed progressive deterioration of the existing revetment, the cliff top retreat distance in the Central Reach under the “ future without project “ condition could reach 1.00 ft/ year. Local variations of plus or minus 0.5 ft/ year are likely to occur. In addition, it is speculated that any catastrophic failure of the slope could lead to accelerated erosion rates and damages to Pacific Coast Highway at a number of locations within the project reach.

**(3) Problems and opportunities:**

The essence of the cliff problem at Huntington Cliffs is a gradual loss of cliff top park land in the Central Reach, accompanied by loss of park facilities and a threat to Pacific Coast Highway. Wave impact and potential slope failure constitute the primary causes of cliff retreat in the Central Reach. Storm waves are almost entirely responsible for the losses at the cliff base, and can cause cliff top retreat when they are sufficiently large to undermine the cliff face. Potential damages include possible interruption to Pacific Coast Highway traffic, loss of recreational opportunities and erosion of existing public structures (parking, utility lines, etc.)

The feasibility study would investigate the feasibility of providing needed protection improvements to the Huntington Cliffs area.

**b. Alternative plans:** The array of alternative plans to be examined in the feasibility study includes the following:

Alt	Description	Expected Benefits		Estimated Cost (\$1,000,000)	Annual O&M (\$1000)
		Storm Damage	Recreation		
1	Replacement of non-engineered revetment and grading of the upper slope (replace revetment at the foot of the bluffs along the 4,600-ft length of the Central Reach)	YES	YES	9.0	50
2	Fill embayments and provide toe protection (revetment) at the foot of the bluffs along approx. 1,100 ft length of the Central Reach	YES	YES	3.0	15
3	Construct protective beach in Central Reach (100 ft wide x 4600 ft long) *	YES	YES	3.0	200
4	Construct protective beach in Central Reach (200 ft wide x 4600 ft long) *	YES	YES	6.0	400
5	Use a number of segmented detached breakwaters for the Central Reach	YES	YES	15.0	50

\* Requires periodic nourishment.

The 1995 reconnaissance study identified the relocation of existing facilities as the National Economic Development (NED) plan. However, the relocation plan is no longer considered viable because of limited relocation area and continued risk of damage from erosion .

**c. Evaluation of Alternatives:** At this level of study, it is apparent that the alternatives would result in storm damage protection benefits and some recreation benefits. Construction of coastal structures along the base of the cliff would provide protection against wave impact and wave run up and afford future protection to Pacific Coast Highway. Construction of protective beaches would reduce or eliminate the wave energy that reaches the cliff base. Beach nourishment would involve widening the beach to such an extent that wave energy is dissipated before it reaches the cliff base. The Project Study Plan for the feasibility phase will be based on the development and analysis of these five alternatives.

**6. FEDERAL INTEREST:** The study area is experiencing toe erosion and its cliff slopes are vulnerable to failure at many locations. This represents a real threat to the existing activities and

possibly to Pacific Coast Highway. Under existing shore protection guidelines, Congress has authorized Federal participation in shore protection projects to prevent or reduce damages caused by wind and tidal generated waves along the Nation's coasts and shores. In general, the purposes of Federal shore protection projects are associated with reducing storm damages to existing public and private development and/or improving recreation. The storm damage problems at Huntington Cliffs have caused and contributed to economic losses to both recreational and other public facilities. It is expected that these losses will be magnified in the future due to potential damages to Pacific Coast Highway. Therefore, it is recommended that the existing conditions at Huntington Cliffs warrant Federal interest and the study should proceed to the Feasibility Phase.

**7. PRELIMINARY FINANCIAL ANALYSIS:** A local sponsor would be required to cost-share 50/50 the feasibility phase of the study and 65/35 for construction, with 65/35 for periodic nourishment of the protective beach, or 100 percent for maintenance of the revetment. Based on a cost of about \$1,000,000 for the feasibility study and \$3,000,000 for revetment at critical reaches, the non-Federal costs would be \$500,000 for the feasibility study and about \$1,000,000 for revetment. It is likely that the State will contribute 50 percent of the construction cost. Knowing this requirement, the City of Huntington Beach has indicated their willingness to be the Local Sponsor. The City of Huntington Beach has submitted a "Letter of Intent" indicating their interest in entering into a cost-sharing agreement with the U.S. Army Corps of Engineers for this feasibility study, subject to completion of negotiations on the Project Study Plan (PSP) and the Feasibility Cost-Sharing Agreement (FCSA), and assembly of the non-Federal participation.

**8. RECOMMENDATIONS:** The recommendation resulting from the reconnaissance level investigations is that the Los Angeles District proceed with a cost-shared Feasibility Study of storm damage reduction measures.

**9. POTENTIAL ISSUES AFFECTING INITIATION OF FEASIBILITY PHASE:** Cost-sharing of the study and project implementation is the primary issue related to proceeding forward.

**10. PROJECT AREA MAP:** A project map is attached (Fig. 1).

