DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2288
MOBILE, ALABAMA 36628

REPLY TO
ATTENTION OF:

24 August 1973

MINIMUM
PLAN OF SURVEY

BEACH EROSION CONTROL AND HURRICANE PROTECTION
FOR
MOBILE COUNTY, ALABAMA (INCLUDING DAUPHIN ISLAND)

1. Authority. - This study is authorized by a resolution adopted 27 October 1970 by the Senate Public Works Committee, in accordance with Section 110 of the River and Harbor Act of 1962, and at the request of Senator John Sparkman of Alabama. The resolution requests a survey of the shores of Mobile County and such acjacent shores as necessary, including Dauphin Island, in the interest of beach erosion control, hurricane protection, and related purposes.

2. Prior reports. - There have been no prior survey reports specifically for beach erosion control for Mobile County. Studies on the general subject of hurricane problems and inventory of beach erosion problems in Alabama are contained in the following reports:

a. Report on Hurricane Survey of Alabama Coast (House Doc. No. 108, 90th Cong., 1st sess.) transmitted to Congress 14 April 1967.

b. "National Shoreline Study - Regional Inventory Report, South Atlantic - Gulf Region, Puerto Rico and the Virgin Islands" published by SAD, August 1971.

3. Description. - Mobile County (Pop. 312,700) is one of the two coastal counties in Alabama. It has a total salt-water shoreline of about 134 miles on several bodies of water; mainly, Mobile Bay, Mississippi Sound, and the Gulf of Mexico. Mobile, population 190,000, largest city in the county, is centered on the west bank of Mobile River near its mouth at the head of Mobile Bay and extends southward for about 9 miles along the bayshore to the mouth of Dog River. Extensive development outside the city limits extends even further south along the shoreline so that most of the western bayshore is in residential development. Mobile Bay is an arm of tne Gulf of Mexico, separated from the Gulf by Dauphin Island on the west and on the east by a peninsular terminating at Mobile Point, in Baldwin County. Mobile Bay is about 30 miles long and varies in width from 8 miles at the northern end to 20 miles in its lower portion. Natural depths average 8 to 10 feet and range from shallow mud flats at the head of

the bay to depths of about 25 feet near the entrance. The entire western shore of Mobile Bay, from Cedar Point to McDuffie Island near the mouth of Mobile River, has short sections of poor beach alternating with short reaches of marsh. There are no dunes but along much of the reach bluffs about 10 feet high or more back the shoreline. The entire southern mainland shore of the county, along Mississippi Sound, is salt marsh and swamp interlaced by several tidal streams or bayous.

Dauphin Island lies about 4 miles south of the mainland. It is the easternmost of the chain of offshore islands that form the southern boundary of Mississippi Sound. The island is about 15 miles long and one mile wide at its widest point. The western 11 miles is a barren sand spit about ¼ mile wide, which is occasionally covered by storm tides. The eastern four miles, where most of the island's population is concentrated, is wooded, with elevations ranging from 5 to 10 feet above mean sea level. Sand dunes on the Gulf side rise nearly to 50 feet. The Gulf shoreline of the island has a broad, well developed beach composed of the white, so-called "sugar sand", mostly pure quartz, characteristic of the beaches along the east central Gulf coast. The Mississippi Sound side is generally marsh. Dauphin Island is well known as a resort and summer home area.

4. Statement of problems and improvements desired. - Mobile Bay provides ample fetch for wind waves to develop from almost any direction. Although usually small, waves can become quite large during storms and recent hurricanes have caused extensive shoreline recession and bluff erosion. Such erosion is reported along most of the western shoreline of Mobile Bay from the southern boundary of the former Brookley AFB reservation south to Cedar Point. This erosion has been a source of concern and expense to residents along this reach for many years.

On Dauphin Island, all the 15 miles of Gulf beach is eroding to some extent but the easternmost 4 miles is experiencing serious erosion, with losses of over 100 feet reportedly occurring in recent years. This reach includes about ½ mile of Federal property, now used by a marine sciences consortium, about ¼ mile of bird sanctuary, slightly over a mile of golf course and private beach and about a mile of public beach.

The northern shore of Dauphin Island on Mississippi Sound is also reportedly experiencing erosion. Being protected by the island, the mainland shoreline on Mississippi Sound is almost all tidal marsh, with no erosion reported. An exception is a bulkheaded reach at Bayou La Batre, which is reportedly still under active attack.

The eastern tip of Petit Bois Island, which is the next barrier beach to the west of the chain of islands separating Mississippi Sound from the Gulf, is slightly west of the Mississippi-Alabama state border.

The gap between Dauphin and Petit Bois Islands (Petit Bois Pass) is now about five miles wide. Early coast charts indicated a gap of about 8,000 feet, and that a substantial part of the island was in Mobile County, Alabama. Successive charts indicated progressive widening of the gap, Petit Bois Island receding westward beyond the state line. As a result of the wider opening, salt water intrusion has increased and consequently Mississippi Sound in the general area has become progressively more saline. The increase in salinity has effected an increase in numbers of oyster predators, with the consequent result that productive oyster reefs which once flourished in the Grand Bay area are now virtually non-existent, adversely affecting the area economy.

Another adverse effect of the widening gap between the two islands is on navigation. The Gulf Intracoastal Waterway passes through Mississippi Sound a short distance north of the pass. Some 19 million tons of freight are now transported by barge annually over this reach. Representatives of the barge lines navigating the waterway indicate that, during adverse seas, tows are often delayed in crossing the exposed reach while awaiting in the shelter of either Dauphin or Petit Bois Islands for the seas to subside.

Any improvements considered will be closely coordinated with Federal, State, and local health, water quality, pollution, conservation and environmental agencies. The extent of this coordination will be determined when a feasible plan and alternatives have been developed.

Shoreline residents and interests are vitally concerned with the loss of their property and the eventual danger to their homes or installations and urgently desire that the shoreline erosion be arrested and that those areas where losses have impaired use of the beaches and have endangered or destroyed structures, navigation, and marine resources be restored to a safe and usable condition.

5. Physical factors pertinent to the problem.

a. Littoral forces. - Records of the United States Weather Bureau, the United States Navy, the United States National Ocean Survey, the United States Coast and Geodetic Survey and the Corps of Engineers will be used to develop wind, wave, tide, and current data for the study. Some data on bay salinity, currents, etc., as well as supplementary surveys, have recently been taken as verification data for the Mobile Bay hydraulic model and some of that information should prove useful.

b. Storms. - The Alabama coast is subject to hurricanes and tropical storms. Since 1900, seventeen disturbances of this nature have passed inland or close enough to Mobile County to cause damage and loss of life, an average of one every 4 to 5 years. The estimated

100-year frequency tide ranges from 10.6 feet m.s.l. for the bay area, 11.5 feet m.s.l. for Dauphin Island, and 13 feet for the Bayou La Batre-Grand Bay reach.

c. Geomorphology. - The Mobile County area is at the mouth of an extensive river system that drains some 45,000 square miles in portions of Alabama, Mississippi, and Georgia. The county lies in the East Gulf Coastal Plain, part of the Southern Pine Hills Physiographic division. Mobile Bay has been described as a classic estuary. It is the drowned mouth of a river valley, possibly a graben. Within a geologic time frame, the bay is a transient geologic feature and will ultimately be filled by marsh, tidal flats, and deltaic deposits.

d. Prior corrective actions. - Property owners and the county have constructed bulkheads and revetments at a number of locations. No coordinated plan has ever been developed and most of the structures are ineffective and in a state of disrepair. Information will be assembled and analyzed on all such prior corrective works by local interests in their efforts to combat erosion to the extent that budgetary contraints permit.

6. Probable solutions. - The study will include alternative plans of improvements and related costs. The study will consider artificial restoration using beach fill material; protective structures such as groins, revetments, and breakwaters; combinations of beach fill and protective structures; and non-structural alternatives. Reconnaissance trips will be made in the study area to define the problem areas and emphasis will be placed on solutions for the most acute problem areas. Economic analysis will determine costs, benefits, and environmental impact of the various plans considered, and the extent of Federal interest in any recommended plan. Population projections and beach use studies will be made to determine future requirements for recreational beach areas. Economic data will also be developed on land values, property damages, damages to marine resources, losses to navigation, costs of existing protective structures, and present recreational use of the beaches in the study area.

7. Work program. - Work items considered necessary in accomplishing the study are given in detail below. Office work has already begun. Field work will be started in the near future, subject to funding limitations. A bar graph showing the work schedule is shown on inclosure 2.

a. Preliminary planning and public contacts. - An initial public meeting for the study was held in Mobile, Alabama, 31 July 1973. Two additional public meetings are tentatively planned: a second one to discuss the various alternative plans and environmental considerations

should favorable findings be indicated during the course of the study, and a third one to present the study findings and tentative plan selected and to obtain local interests' views thereof.

b. Surveying and mapping. - Shoreline change maps for the period of record will be requested from the Coastal Engineering Research Center. After study of the shoreline change maps and a field reconnaissance of the areas which these maps show as experiencing severe erosion, plane-table surveys of the present mean high water line will be made at selected locations and that line added to the shoreline change maps. Some bathemetry can be obtained from the data assembled for the Mobile Bay model.

c. Materials and foundations investigations. - Budgetary limitations preclude field investigation. An office investigation will be made to determine what available records, if any, can be utilized in this study. Where information is lacking and there is no indication to the contrary, reasonable conditions will be assumed.

d. Designs and cost estimates. - A plan to provide adequate protective and recreational beaches for Dauphin Island will be developed. A plan for restoring, if feasible, and protecting the eroding portions of the Mobile Bay shoreline will be developed. Narrowing the Petit Bois Pass opening, by beach fill methods, will also be investigated. Cost estimates for proposed plans and alternatives will be prepared.

e. Economic studies. - Population projections and beach use studies will be made to determine future requirements for recreational beach areas. The value of property lost to erosion and of structures endangered will be estimated and average annual damages determined. The economic analyses will compare costs and benefits of the various plans considered. The economic justification of selected plan or plans of improvements, and allocation of project costs between the Federal Government and local interests will be made.

f. Real estate studies. - A gross appraisal of riparian land values and developed property will be included in the study. Investigations to determine costs of acquisition of necessary lands, easements, and rights-of-way of any proposed project will be made. Where erosion is critical, property values will be determined in sufficient detail to permit a firm evaluation of average annual damages.

g. Wind and wave studies. - Information available on winds, waves, tides, circulation patterns, and salinities in the area will be assembled from available data and analyzed. There are six automatic tide recording gages now in operation in the bay and one in the Gulf opposite Dauphin Island. Mobile is a primary gaging station for NOAA.

Action will also be taken to establish a Littoral Environment Observation station on Dauphin Island to determine littoral forces in the Gulf along the beach.

h. Current studies. - Available data on currents in the area will be assembled and analyzed.

i. Geomorphology. - Available data on geomorphology of the region will be supplemented, as necessary, by further literature research and consultation with State or other geologists.

j. Storms. - History of hurricanes and storms affecting the area will be obtained and their effect insofar as beach erosion will be obtained from Corps' reports, other Federal agencies, State agencies, and local residents.

k. Environmental studies. - Investigations of environmental and ecological aspects of the area will be made and environmental impact statements on any improvements found justified will be prepared in accordance with the provisions of the National Environmental Policy Act of 1969 and applicable guidelines.

l. Preparation of report. - A complete and comprehensive report suitable for submission to Congress will be prepared. Authority will be requested for interim reports on specific reaches composing a complete physiographic unit if preliminary studies so warrant.

8. Coordination. - Cooperation and coordination will be maintained with local interests in the problem area, and with appropriate State and Federal agencies during the course of the study. They will be asked to comment on the selected plan when it is formulated. The environmental impact statement will also be coordinated with State and Federal agencies, local conservation groups, and interested individuals.

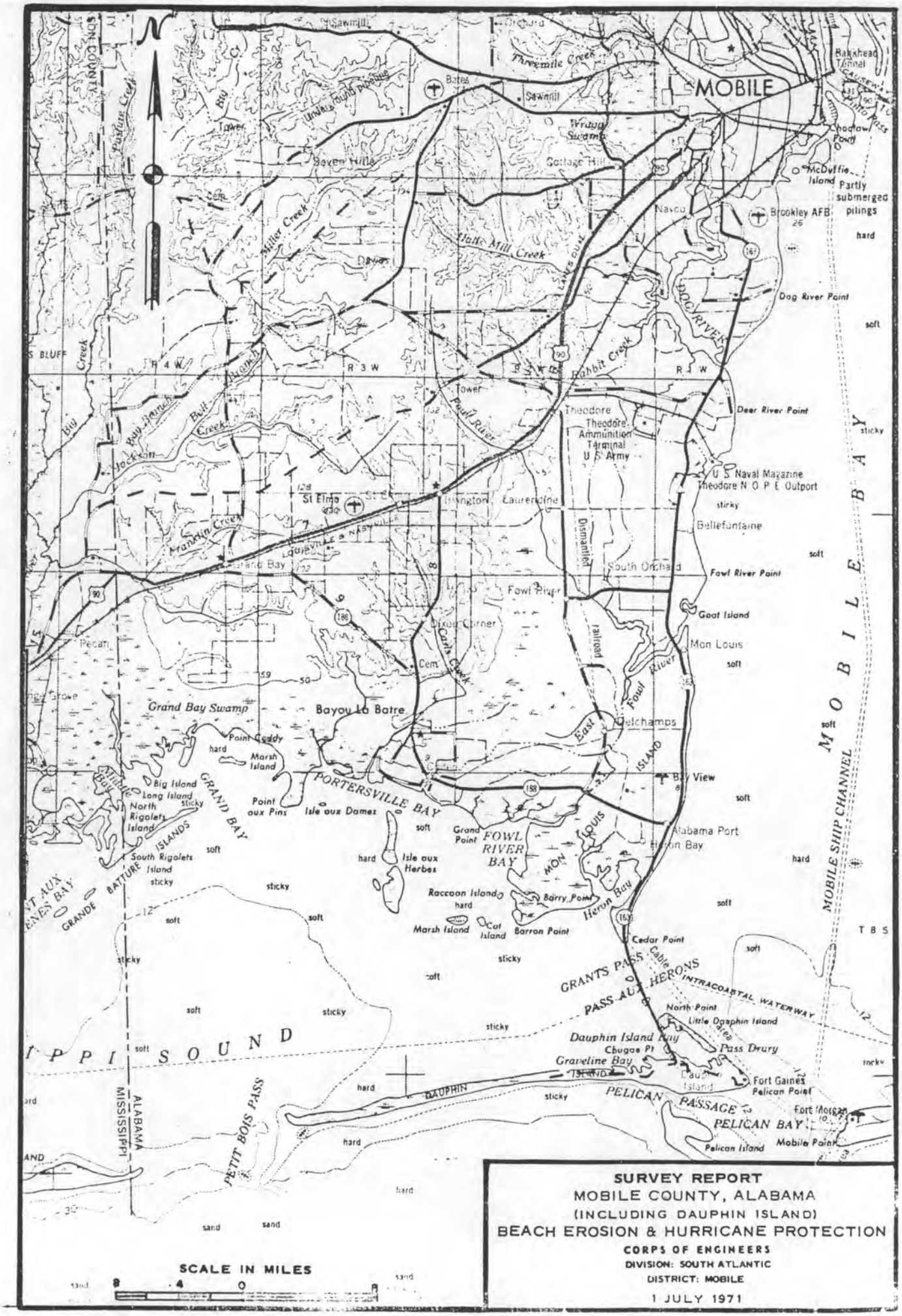
9. Statement of applicable constraints and controls. - Controls necessary to avoid continuance of studies beyond practicable limits and to insure flexibility in terminating separable unfavorable parts of the study stem through the initial field and office studies. Those areas where it is apparent that lack of development would preclude economic justification of project improvements would be eliminated from further consideration. A comparison of the benefits and costs resulting from a preliminary analysis of economic data obtained by reconnaissance field trips will determine if a more detailed study is warranted for those areas which are sufficiently developed and have a definite need for protection to upland development and an increased beach area for recreational purposes.

10. Study cost estimate. - Estimates of costs and time include allowances for contingencies. The estimated costs for major segments of the study are shown on the attached PB-6 (inclosure 3). Funds needed to complete the study are as follows:

Allotted FY 1973	$ 5,000
Budgeted for FY 1974	10,000 [1]
Balance to complete	135,000
Total	150,000

[1] Total capability, FY 1974 = $50,000

3 Incl
1. Map of study area
2. Bar graph
3. PB-6



SURVEY REPORT

MOBILE COUNTY, ALABAMA

(INCLUDING DAUPHIN ISLAND)

BEACH EROSION & HURRICANE PROTECTION

CORPS OF ENGINEERS

DIVISION: SOUTH ATLANTIC

DISTRICT: MOBILE

1 JULY 1971